abstract book

EvK2CNR

Consiglio Nazionale delle Ricerche

Milano
Comune di Milano
Mobilità, Trasporti, Ambiente

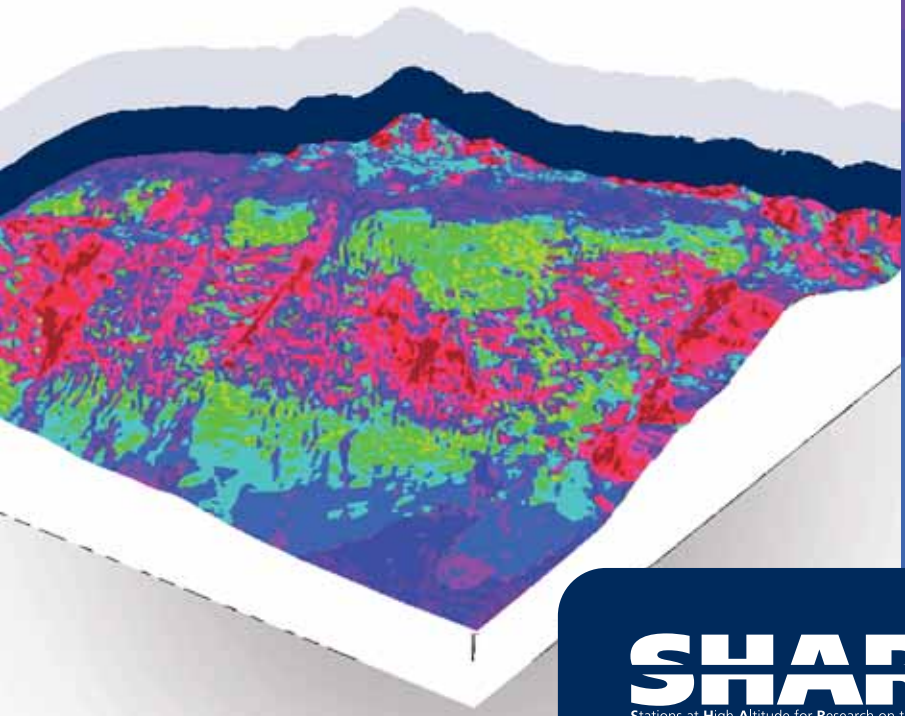
EXPO

International Conference

"Mountains: energy, water and food for life. The SHARE project: understanding the impacts of climate change"

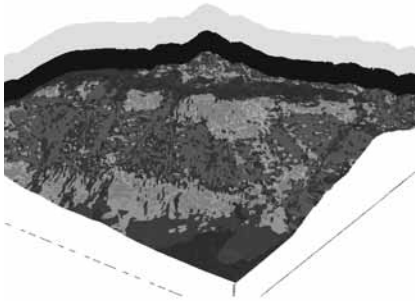
Milan 27-28 May, 2009

Venue: Circolo della Stampa - Palazzo Serbelloni - Corso Venezia, 16

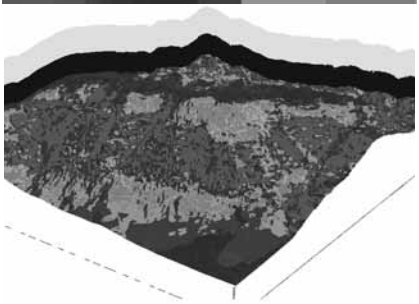


SHARE

Stations at High Altitude for Research on the Environment



**"Mountains: energy, water and food for life.
The SHARE project:
understanding the impacts of climate change"**



CONTEXT and BACKGROUND

Over the past six years, since the declaration of 2002-International Year of Mountains by the United Nations and the Johannesburg World Summit on Sustainable Development, thanks to greater global environmental awareness and significant developments made in high altitude scientific research, the recognition of mountain environments as some of the world's most important ecosystems has increased dramatically. Already at the Rio de Janeiro Earth Summit in 1992, Chapter 13 of Agenda 21 confirmed the need for sustainable development in mountain regions, given mountains' crucial role as sources of water, energy, biodiversity, minerals, forest products and agricultural products. 10% of the world's population depends directly on mountains, especially for freshwater, while millions more benefit indirectly from such mountain resources.

In 2007, the Intergovernmental Panel on Climate Change (IPCC) confirmed that climate change is not only happening, but that global warming is affecting many physical and biological processes, which in turn affect the availability of water resources, food security and human health. Mountain ecosystems were identified in a recent report of the General Assembly of the United Nations as key indicators of such effects of climate change, especially in terms of vulnerable resources like biodiversity and water.

Over the past century, the size of glaciers in the Alps and the Caucasus mountains has been reduced by half. In Africa, only 8% of the largest glacier in the mountains of Kenya still remains. If this trend continues, by the end of the 21st century, many mountain glaciers will have completely disappeared, and along with them, vital sources of freshwater. The Himalayan glaciers, like those of the Alps, the Andes, etc., act as water towers for entire populations. These frozen reservoirs not only provide water for drinking and cooking, but also for irrigation and livestock, industry and hydro-electric power to millions, if not billions, of people. Furthermore, winter and summer mountain tourism, a primary source of livelihoods in many mountain regions, also depends on the state of the environment, with its increasingly unpredictable climate trends and widely changing seasonal variations.

Mountains constitute an extraordinary platform for monitoring climate change and its effects. They can be considered representative of vast spatial areas, areas often only theoretically uncontaminated. Furthermore, mountains themselves influence local and global climates, although

their role in this sense is not entirely understood. Only through high altitude research and environmental monitoring might we increase our knowledge and help guide future policy choices to ensure the conservation and sustainable development of mountain ecosystems, key to our wellbeing on the planet.

Governments, local administrators, international organizations and the scientific community all need reliable information on the health of mountain environments so as to develop strategies that might reverse the trend of global warming, or at least mitigate its worst effects. Scientific researchers have a responsibility to the public to raise awareness on the implications of climate change in mountain areas. Their role in helping define policies for integrated mitigation and adaptation actions cannot be underestimated.

In Lombardy, highlands constitute over 40% of the region, while in Italy they make up the three quarters of the country (hills: 41.6%. mountains: 35.2%). On a global level, mountains amount to 25% of the Earth's surface.

At the 2015 World Expo, with its focus on food security and other major environmental issues, the important role of mountains cannot be ignored. Climate change is first and foremost among the Expo topics that could benefit from the contributions made by mountain research, as are other key themes central to Italy's motivation to host the Expo. Italy's Foreign Minister, Franco Frattini, has declared that these global problems, already subject of intense international debate, will take center stage when Italy hosts the 2009 G8 meeting as well. Those issues include:

Environmental protection
Sustainable development
Renewable energies
Protection of biodiversity
Combating desertification
Prevention of natural disasters
Access to water for all

The problem of food security must be dealt with as a basic prerequisite to sustainable development. In order to address this issue, however, we need to better comprehend climate change processes and their impacts on ecosystems and environmental services in order to develop appropriate adaptation strategies at the local, national and global levels. A thorough understanding of our changing climate and the effects on fragile ecosystems and natural resources will only be possible if research and monitoring data from mountain areas is taken into account. Finally, it is also significant that 2015 marks the year by which 189 governments of the world agreed to meet the Millennium Development Goals and Expo 2015 will certainly be used as an opportunity to showcase Italy's contributions to their achievement. In line with the "No Excuse 2015" Campaign, which testifies that the goals are realistic and achievable, Italy therefore has an obligation to make sure all steps it takes between now and 2015 move in the direction of specific MDGs, like Eradicating Extreme Poverty and Hunger, and Ensuring Environmental Sustainability.

SESSION 1

ENVIRONMENTAL AND CLIMATE RESEARCH IN MOUNTAIN AREAS

SESSION 2

THE SHARE PROJECT - PHASE II

SESSION 3

ROUND TABLE: CLIMATIC RESEARCH AT HIGH ALTITUDE: ENVIRONMENTAL MONITORING AND INTEGRATED NETWORKS

PROMOTING COMMITTEE

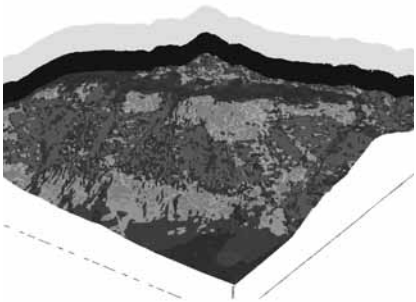
E. Belloni (DGCS – MAE)
C. Bouvier (Director, UNEP ROE)
C. Clini (Ministry of the Environment and Territory)
E. Croci (Comune di Milano)
A. Da Polenza (President, Ev-K2-CNR Committee)
L. Maiani (President, CNR)
D. McGuire (Mountain Partnership Secretariat UN-FAO)

SCIENTIFIC COMMITTEE

L. Barrie (WMO)
P. Bonasoni (CNR – ISAC, SHARE Project chair)
G. Cavaretta (DTA – CNR)
S. Fuzzi (CNR –ISAC)
F. Giorgi (ICTP)
A. Navarra (CMCC)
V. Ramanathan (SIO)
R. Valentini (University of Tuscia)
B. Villavecchia (Environment and Energy Dep. AMA)

ORGANIZING COMMITTEE

E. Brindisi (Ev-K2-CNR)
F. Sernia (CNR)



Speaker Biographies & Abstracts

SANDRO FUZZI

Dr. Sandro Fuzzi holds a doctoral degree in Physical Chemistry from the University of Bologna, Italy. He is currently Research Director at the Institute of Atmospheric Sciences and Climate of C.N.R. in Bologna and Head of the Group "Atmospheric Chemistry".

His main research interest is in the physical and chemical processes of multiphase atmospheric systems (aerosols and clouds) and their effects on atmospheric composition change, climate, ecosystems and human health.

Dr. Fuzzi was Visiting Scientist at the Atmospheric Sciences Research Center of the State University of New York at Albany, USA (1982-83). He is also currently Contract Professor of Atmospheric Chemistry at the Department of Environmental Sciences of the University of Urbino.

Dr. Fuzzi is/has been a member of several International Committees and Panels among which:
- Commission on Atmospheric Chemistry and Global Pollution, CACGP (1990-1994)
- Science Panel of the European Commission on Atmospheric Composition Change (1992-2004)
- Scientific Steering Committee of the EUREKA project EUROTRAC-1 (1992-1995)
- International Commission on Clouds and Precipitation, ICCP (1996-2004)
- Scientific Steering Committee of the EUREKA project EUROTRAC-2 (1998-2000)
- Scientific Steering Committee of the International Global Atmospheric Chemistry Project, IGAC (2000-present)
- In ternational Geosphere-Biosphere Program, IGBP (2003-present)
- Managing Committee of the European COST Action 633 "Particulated matter: Properties related to health effects" (2003-present)
- ESFRI (European Strategy Forum on Research Infrastructures) expert-group on Environmental Monitoring (2005-present)

Dr. Fuzzi is currently Co-chair of the International Global Atmospheric Chemistry Project (IGAC) and Coordinator of the European Network of Excellence "Atmospheric Composition Change, the European Network" (ACCENT) which includes 43 major European Institutions in the field of global change research.

Dr. Fuzzi has published over 120 scientific papers and has presented more than 160 contributions at national and international conferences. He is also a member of the Editorial Board of the following scientific Journals:
- Tellus B
- Journal of Geophysical Research-Atmospheres
- Aerobiologia

e-mail: s.fuzzi@isac.cnr.it

ATMOSPHERIC COMPOSITION CHANGE AT HIGH ELEVATIONS

Sandro Fuzzi
Institute for Atmospheric Sciences and Climate – National Research Council
Bologna, Italy

Changes in atmospheric composition directly affect many aspects of life, determining climate, air quality and atmospheric inputs to ecosystems. In turn, these changes affect the fundamental necessities for human existence: health, food production, and water availability. It is now well recognized that human activities have perturbed the chemical composition of the atmosphere on local, regional, and global scales. Mountains are marginal environments highly sensitive to global change and also provide unique opportunities to detect and analyze global change processes and phenomena. The Mt. Cimone Observatory in the Italian Northern Apennines and the Pyramid Observatory in the Khumbu Valley of the Nepalese Himalayas are two examples of such high mountain stations where long term monitoring of atmospheric composition are underway, providing important data to document changes due to human activity and to understand the associated effects on climate and ecosystems.

ACCENT: the European Network of Excellence on Atmospheric Composition Change

Sandro Fuzzi
Institute for Atmospheric Sciences and Climate – National Research Council
Bologna, Italy

Within the Earth System, the atmosphere has a central role since it is a very sensitive compartment where changes induced by anthropogenic activities often appear first and most clearly. Atmospheric composition change research is therefore fundamental for the future orientation of sustainable development strategies. The overall goals of ACCENT are to promote a common European strategy for research on atmospheric composition change, to develop and maintain durable means of communication and collaboration within the European scientific community and with the international scientific community at large, to facilitate this research and to optimise two-way interactions with policy-makers and the general public. The integrated approach to atmospheric research pursued by ACCENT can be particularly useful in dealing with changes in the highly vulnerable high elevation ecosystems.

G.R. CARMICHAEL

Academic Background:

- Ph.D. 1979 Chemical Engineering, University of Kentucky
- M.S. 1975 Chemical Engineering, University of Kentucky
- B.S. 1974 Chemical Engineering, Iowa State University

Academic Experience

- 1985 Professor of Chemical and Biochemical Engineering, University of Iowa
- 1981-85 Associate Professor of Chemical Engineering
- 1978 -8 Assistant Professor of Chemical Engineering

Present and Past Administrative Assignments

- 2001 - Associate Dean for Research and Graduate Studies, College of Engineering
- 1991 - Co-Director, Center for Global & Regional Environmental Research
- 1981 - 1995 Chairman, Dept. of Chemical and Biochemical Engineering and 1998 - 2000

Other Research Experience

Kyoto University, Visiting Distinguished professor, May-Aug, 2000
World Meteorological Organization, Visiting Scientist, Jan-Aug 1997
International Institute for Applied Systems Analysis, Luxenburg, Austria, Visiting Scholar, May-Aug, 1996
Max Planck Institute for Atmospheric Chemistry, Mainz, Germany, Visiting scholar, Jan-Aug, 1991
National Institute for Environmental Studies, Tsukuba Japan, Research Scientist, June-Dec, 1987

Scientific, Professional and Honor Societies

American Geophysical Union, American Institute of Chemical Engineers, American Meteorological Society, American Chemical Society, Sigma Xi, American Society of Engineering Education, Omega Chi Epsilon, American Association for Advancement of Science, Tau Beta Pi.

Honors and Awards

NASA Group Achievement Award, 2005; Priestly Lecture, CSIRO, Australia, 2001; Japan Ministry of Education and Culture, Distinguished Visiting Professorship Award, Disaster Prevention Research Institute, Kyoto University, May-Aug, 2000; Kammermeyer Chair of Chemical & Biochemical Engineering, 2001- ; College of Engineering Outstanding Research Award, 1999; International Atmospheric Science and Application to Air Quality, Research Recognition Award, 1998; Iowa Regents Faculty Excellence Award, 1998; Professional Progress Award, Iowa State University, 1989; Outstanding Young Alumni Award, Iowa State University, l986; ASEE Dow Young Faculty Award for the North Midwest Section, l986; University of Iowa Faculty Scholar, l982-85.

e-mail: gcarmich@engineering.uiowa.edu

ASIAN AEROSOLS: CURRENT AND FUTURE DISTRIBUTIONS AND 1 IMPLICATIONS TO HUMAN HEALTH AND REGIONAL CLIMATE CHANGE

Gregory R Carmichael1*, Bhupesh Adhikary1, Sarika Kulkarni1, Alessio, D'Allura1a4 ,
David Streets2, Qiang Zhang2, Tami C. Bond35 , Veerabhadran Ramanathan4,
1. Center for Global and Regional Environmental Research, University of Iowa, 424 IATL, Iowa City, IA 52242
E-mail: gcarmich@engineering.uiowa.edu, Tel: 319-335-3333, Fax: 319-335-3337
2. Decision and Information Sciences Division, Argonne National Laboratory, DIS/900 9700 South Cass Avenue, Argonne, IL, USA.
3. Department of Civil and Environmental Engineering, University of Illinois at Urbana- Champaign, Newmark Civil Engineering Laboratory, MC-250, 205 N. Mathews Ave., Urbana, IL 61801
4. Scripps Institution of Oceanography, University of California at San Diego, 9500 Gilman Drive # 0221, La Jolla, CA 92093

Asian environments contain high levels of aerosols and these have profound impacts on human health and on climate change. Vast regions (>80%) in Asia have PM2.5 concentrations that exceed on an annual basis the WHO guideline of 10 ?g/m3, often by factors of 2 to 4. The high aerosol loadings cause a significant dimming at the surface, and mask ~45% of the warming by greenhouse gases. In this paper, we present results using the STEM chemical transport model to help describe the regional distribution of Asian aerosols. We also discuss some of the important impacts of Asian aerosols on human health and the climate system. Finally we look to the future and discuss the implications for aerosol emissions in Asia, and the opportunities for win-win strategies built upon addressing air quality and climate change together.

Throughout the paper we focus special attention on black carbon (BC) because of its unique role as the aerosol that acts like a greenhouse gas and warms the atmosphere, and its importance in human health effects. Black carbon in soot is the dominant absorber of visible solar radiation in the atmosphere. Black carbon is often transported over long distances, mixing with other aerosols along the way. The aerosol mix can form transcontinental plumes of atmospheric brown clouds, with vertical extents of 3 to 5 km. Because of the combination of high absorption, a regional distribution roughly aligned with solar irradiance, and the capacity to form widespread atmospheric brown clouds in a mixture with other aerosols, emissions of black carbon are the second strongest contribution to current global warming, after carbon dioxide emissions. The interception of solar radiation by atmospheric brown clouds leads to dimming at the Earth's surface with important implications for the hydrological cycle, and the deposition of black carbon darkens snow and ice surfaces, which can contribute to melting, in particular of Arctic sea ice. Globally, sources of black carbon emissions include burning of forests and agricultural residues, combustion of fuels for residential energy, brick production, diesel transport and coal-fired thermal power production. In this paper the role of black carbon in climate change and implications for policies directed at reducing short term climate change by targeting BC reductions are discussed.

FILIPPO GIORGI

Education:
1982, Italian Laurea in Physics (emphasis Atmospheric Sciences), Department of Physics, University of L'Aquila, L'Aquila, Italy. Supervisors: G. Visconti and R. Benzi. Thesis Title: Development of a Two-Layer General Circulation Model for Studies of Climatic Sensitivity. Grade: Summa cum Laude.
1986, Ph. D., School of Geophysical Sciences, Georgia Institute of Technology, Atlanta, Georgia. Supervisors: W. L. Chameides and R. E. Dickinson. Thesis Title: Development of an Atmospheric Aerosol Model for Studies of Global Budgets and Effects of Airborne Particulate Material. GPA: 4.0 (100%).

Biography:
After obtaining a Ph.D. in June 1986, he was granted a post-doctoral appointment at the National Center for Atmospheric Research (NCAR) in Boulder, Colorado. He was then a research scientist at NCAR from October 1987 to April 1998. In May 1998 he moved to the ICTP, to be the head of the Physics of Weather and Climate Section. In April 2001 he was elected as vice Chair of Working Group I (The Physical Science of Climate Change) of the Intergovernmental Panel on Climate Change (IPCC). He has been the coordinator of the ICTP Scientific Programme since October 2002. Giorgi pioneered the field of regional climate modeling and contributed to the development of the first regional climate model. Over the years this model has become a community tool used by over 200 scientists. He authored or co-authored over 100 articles in peer reviewed scientific journals on a variety of topics pertaining to climate modeling, climate change and variability, chemistry-climate interactions, biosphere-atmosphere interactions. These articles have received over 3500 citations since 1989. In addition he has authored or co-authored about 20 additional peer reviewed book chapters and reports. Throughout the years Giorgi provided scientific supervision to 22 students, post-doctoral fellows and junior scientists and has been PI or CO-I of 18 research grants. He acts as regular referee for a number of scientific journals (reviews about 15 to 20 papers per year).

Collaborations:
At present, Giorgi is involved in the following international programs and projects:
Intergovernmental Panel on Climate Change (as vice Chair of WG I). Sponsored by the World Meterological Organization and UNEP.
Prediction of Regional Scenarios and Uncertainties for Defining European Climate Change Risks and Effects (PRUDENCE). Sponsored by the European Union.
COLUMBUS PROJECT, part of the Italy-USA collaboration agreement on Climate Change Research. Sponsored by the Italian Ministry of Environment.
ENSEMBLE-based predictionS of climate change and its impacts (ENSEMBLES). Sponsored by the European Union.
Giorgi also has a number of collaborations with laboratories in the U.S., Europe and developing countries.

e-mail: giorgi@eictp.it

CLIMATE CHANGE OVER THE CENTRAL-ASIA REGION: MODELS AND FUTURE CLIMATE PROJECTIONS.

Filippo Giorgi Abdus Salam International Centre for Theoretical Physics (ICTP), Trieste

The Central Asia region, including also the Himalaya chain and the Tibetan Plateau, is potentially one of the most vulnerable regions to global warming. An increase in surface temperatures might trigger the rapid melting of the region's glaciers and a substantial reduction of snow cover. This in turn could have large impacts on the water resources of many Asian countries. Global climate change also interacts with other environmental stresses important for the region, such as air pollution, emissions of atmospheric aerosols and land-use change. A hierarchy of modeling techniques is today available to study such processes and produce climate change projections at the global to regional scale. These include coupled Atmosphere-Ocean General Circulation Models (AOGCMs) and high resolution Regional Climate Models (RCMs). These models have been used to produce the climate change projections assessed in the Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC), which is used as scientific base for the international negotiations on the reduction of greenhouse gas emissions. In this talk a brief discussion will be first presented of global and regional climate models. Climate change projections for the 21st century produced with the latest generation climate models will then be presented, with particular focus on the central-Asia region. Finally a brief description will be given of the regional climate model RegCM developed at the ICTP, which is one of the few regional models in the world that include the representation of interactive aerosols. This model will be utilized for a new series of future climate scenarios over various regions of the World, including central-Asia.

DR. QAMAR-UZ-ZAMAN CHAUDHRY
Director General, Pakistan Meteorological Department

Educational Qualifications: B.Sc. (Hons), M.Sc. (Physics), Ph.D. (Meteorology)

Experience: 38 years experience in the field of Meteorology and related sciences. Served as an elected member of Executive Council of WMO (2003-2007)

Present Assignments: Director General, Pakistan Meteorological Department
Permanent Representative of Pakistan with WMO since 1996.
Vice President, WMO Regional Association-II (Asia) since December, 2008
Secretary, WMO/ESCAP Panel on Tropical Cyclones (PTC) for the Bay of Bengal & the Arabian Sea since 2000.
Member of the Governing Board of SAARC Meteorological Research Centre

Field of Expertise: Operational meteorology, management of meteorological and hydrological services.
Forecasting of extreme weather events, high impact weather systems and natural disasters (monsoon depressions, cyclones, floods, droughts etc.)
Research work in global warming and climate change and their impact on environment, agriculture, glaciers, forests etc.

Awards: SAARC Best Young Scientist Research Award for 1993.
National Civil Award of President's Pride of Performance - 1999.
International Award by American Biographical Institute (ABI). ABI has included his name in the "Five Thousand Personalities of the World" for his outstanding contributions to science.

Scientific Publications: More than 50 research papers / technical reports which have been published in the various scientific journals of international repute and /or presented at international conferences.

Membership: Member of about 25 various Committees at National Level.

International Conferences: Attended over 50 international conferences/symposia/ seminars/WMO meetings etc.

Address: Pakistan Meteorological Department, Headquarters Office, Sector H-8/2, Islamabad – 44000, Pakistan.
Telephone: +92–51–9250367 Fax:+92–51–9250368
E-mail: dgmetpak@hotmail.com

IMPACT OF CLIMATE CHANGE ON HINDU KUSH - KARAKORUM REGION

Dr. Qamar-uz-Zaman Chaudhry Pakistan Meteorological Department

Hindu Kush - Karakorum region in the north of Pakistan is house to world's highest peaks and is the most heavily glaciated part of the world after the Polar Regions. Glaciers are one of the most sensitive precursors of climate change, advancing and receding with long-term changes in temperature and precipitation. In this study, glaciers behaviour has been examined in the perspective of climate change in the recent history. Using meteorological and hydrological data in combination with remote sensing data from various sources, the dynamics of the isotherms in upslope direction have been evaluated on pentad basis. It has been revealed that 30ºC isotherm has crept upward by 725m higher elevation than 28 years before. Frequency and duration of heat waves have been observed to be increased by twofold. The rate of increase since 1990 has also been doubled resulting into frequent occurrence of severe thunderstorms and lightening events. As an example of anthropogenic factor in climate change, ever fastest rate of glacial depletion is presented on Siachen glacier which has lost about 2 km of its length and 17% of ice mass since 1989. Surface velocity of the glacier has also been increased considerably due to the interaction of the frozen water reserves with warmer atmosphere (in the presence of large human concentration). Glacier lake outburst flooding (GLOF) events have also been increased in the region during the recent years. It is estimated that projected temperature rise in future may further exaggerate the ice depletion and drift related dynamic processes making the situation more complex for the planners and dependants.

Key words: Glaciers, Siachen, Climate Change

COLLABORATION BETWEEN PMD AND EV-K2-CNR

Dr. Qamar-uz-Zaman Chaudhry
Pakistan Meteorological Department

The history of Ev-K2-CNR dates back to 1987 when this project was launched for remeasurement of K2 and Everest using GPS technology which was later coupled with laser technology in 1992. Travelling over the wheel of time, it devoted its efforts to improve the quality of life of the mountain population along with the conservation of nature. Two Automatic Weather Stations at Askole and Urdukas were established in 2004 which started recording meteorological data on the southern slopes of HKH. Its active role in diagnosis of the health of cryosphere in HKH region motivated Pakistan Meteorological Department to join hands with Ev-K2-CNR and to contribute its share through collaborative research. The first interaction between the two organizations happened in 2005 when both principally agreed to share the data and carry out joint field visits. Ev-K2-CNR invited PMD scientists to present their research work in a seminar on "Mountains Witnesses of Global Changes" in Rome 2005 which was published by Elsevier in its volume 10 of Earth Series. Later on mutual interactions and exchanges increased and a formal MoU was signed by Mr. Austino Da Polenza and me on 1st March 2008. Since then two visits to Askole and Urdukas lead by Mr. Michael accompanied by two PMD technicians have been made for data download and training purpose. Due to the generous support of Ev-K2-CNR, PMD's young scientists joined the field visit to Hinarchi Glacier which was the great opportunity to learn through interaction with senior scientists and experimentation. PMD highly appreciate the constructive role of all the colleagues of Ev-K2-CNR in general and the generous support of Mr. Austino Da Polenza, in particular. PMD is lacking in expertise to study the complex behaviour of Atmosphere-Cryosphere interaction and Italian scientists have vast experience in this field. They may help in building the capacity of PMD's research staff through involvement in more and more field visits as well as scientific exchange visits. There is also a dire need to increase the AWS network to know the details about the fate of cryosphere in HKH region. Ev-K2-CNR may initiate a collaborative research project involving PMD scientists to further enhance the knowledge about the great glaciated reserves of HKH. I do hope that the cooperation and collaboration will strengthen further between PMD and Ev-K2-CNR in future.

DANIEL VIVIROLI

Studies in Geography and Geology at the University of Bern, Diploma in Geography 2002. Post-graduate studies in Hydrology at Institute of Geography, University of Bern and Institute for Atmospheric and Climate Science, ETH Zürich. Dissertation (Dr. phil.-nat.) in 2007. Currently Post-Doctoral Research Associate at Oeschger Centre for Climate Change Research and Institute of Geography, University of Bern. Research interests: Mountain hydrology; water resources; flood estimation; water cycle; regionalisation; hydrological modelling.

E-mail: viviroli@unibe.ch

THE ROLE OF MOUNTAINS AS 'WATER TOWERS' FOR HUMANKIND: GLOBAL OVERVIEW AND REGIONAL EXAMPLES

Daniel Viviroli, Oeschger Centre for Climate Change Research and Institute of Geography, University of Bern, Switzerland

Mountains and highlands provide essential freshwater resources for populations both upstream and downstream. Therefore, they are often called the world's natural 'water towers'. Although the crucial role of mountains for lowland water resources is undisputed, knowledge about this contribution still lags behind other areas of hydrologic research. Particularly because freshwater resources are under increasing pressure, the contribution of mountains needs to be clarified in order to establish sustainable management schemes and identify critical regions where water resources are likely to become scarce in future.

Extending concepts from earlier work on basis of representative case studies (Viviroli et al., 2003), a first spatially distributed assessment of the hydrological significance of mountains on a global scale was recently conducted by Viviroli et al. (2007). It is based on modelled runoff (Fekete et al., 2002), covers the global land surface area at a resolution of 0.5 ? 0.5 degrees and includes lowland climate conditions and potential human water use. With help of this global overview, regions are identified where the contribution of mountains to lowland water resources is extraordinarily high. Such regions are found in the Himalayas, Andes and Rocky Mountains as well as in the Middle East and southern, eastern and northern parts of Africa. A global analysis by climate zone reveals that mountains deliver clearly the highest disproportional discharge as compared to their share in total area in the arid climate zone (share in total arid zone area 29.8%, in discharge 66.5%). Even in the temperate zone, the disproportionality in favour of runoff is marked (share in area 43.4%, in discharge 60.8%). The European Alps, for example, supply about two times more water than might be expected on the basis of surface area alone (Viviroli and Weingartner, 2004).

Moreover, results show that when the actual lowland water use is considered, 7% of global mountain area is essential for downstream water resources, while another 37% provides important supportive supply. These contributions are highly reliable and therefore of vital importance in arid and semiarid regions where vulnerability for seasonal and regional water shortage is high. Furthermore, climate change and population growth must be expected to worsen water resources supply in these regions significantly, particularly through altered discharge patterns from mountains and increasing water demand for food production.
It is important to note that advancements in understanding of processes and possible future changes in mountain hydrology depend on the availability of adequate – i.e. high-quality and representative – long-term field measurements. This is also true for models which always need to be calibrated to real-world observations. Mountain regions are still challenging for hydrological science and water resources management because of remoteness of the study area, the major strain placed on gauging devices and the highly variable conditions. It is therefore of paramount importance to establish and maintain gauge networks in high altitudes, to disseminate the data, and to make the best possible use of them.

Fekete, B. M., C. J. Vörösmarty & W. Grabs. 2002. High-resolution fields of global runoff combining observed river discharge and simulated water balances. Global Biogeochemical Cycles, 16 (3), 1042. doi:10.1029/
1999GB001254.

Viviroli, D. & R. Weingartner. 2004. The Hydrological Significance of the European Alps. In: Hydrological Atlas of Switzerland, Plate 6.4. Federal Office for the Environment, Bern, ISBN 978-3-95202620-5.

Viviroli, D., R. Weingartner & B. Messerli. 2003. Assessing the hydrological significance of the world's mountains. Mountain Research and Development, 23 (1): 32–40.

Viviroli, D., H.H. Dürr, B. Messerli, M. Meybeck & R. Weingartner. 2007. Mountains of the world – water towers for humanity: Typology, mapping and global significance. Water Resources Research, 43(7): W07447, doi:10.1029/2006WR005653.

MARTIN BENISTON

Professor Martin Beniston teaches Climate Change and Climate Impact at the University of Geneva, has a PhD in Atmospheric Science from the Ecole Normale Supérieure of Paris and an habilitation in Climate Research from the Swiss Federal Institute of Technology.

Professor Martin Beniston started his academic career on 1973 at the University of East Anglia, School of Environmental Sciences, Norwich, Great Britain, where he got the Bachelor of Science degree in Environmental Sciences. Two years later he obtained the Master of Science degree in Meteorology and Atmospheric Physics at the University of Reading, Department of Meteorology, Reading, Great Britain. In 1978, he concluded his PhD study in Atmospheric Sciences at the Ecole Normale Supérieure, Laboratoire de Meteorologie Dynamique, CNRS, in Paris.
In 1997 he received the Habilitation in Climate Research at the Swiss Federal Institute of Technology (ETH) in Zürich, Switzerland. Currently he teaches Climate Change and Climate Impact at the University of Geneva.
Lead Author and Reviewer for the Intergovernmental Panel on Climate Change (IPCC) since 1992.
Former vice-chair of the IPCC WGII-C and member of the IPCC Bureau (Management Board) from 1992 to 1997. The IPCC was awarded the 2007 Nobel Peace Price.
Elected member of the Academia Europea.
Series editor of "Advances in Global Change Research" (Springer Publishers, Heidelberg and New York, ex Kluwer Academic Publishers); he is amongst founding members of "Regional Environmental Change" (Springer Publishers, Heidelberg and New York).
Initiator and organizer of the annual "Wengen Workshops on Global Change Research" since 1995. He is member of the Climate Sciences Section of the European Geophysical Union (EGU) and convenor of session on Climate Extremes from 2001.
He collaborates with the following organizations:
Swiss National Science Foundation
5th Framework Program of the European Union on Environment and Climate
German Ministry for Research (DEKLIM program)
Canadian Foundation for Climate and Atmospheric Sciences (CFCAS)
Natural Sciences and Engineering Research Council of Canada (NSERC)
The Norwegian Research Council
The Czech Academy of Sciences

E-mail: martin.beniston@unige.ch

POTENTIAL IMPACTS OF CLIMATIC CHANGE ON SNOW, ICE AND HYDROLOGY IN MOUNTAIN REGIONS

Martin Beniston, Geneva Environment Institute, University of Geneva, Switzerland

Mountains are recognized as particularly sensitive physical environments with populations whose histories and current social positions often strain their capacity to accommodate intense and rapid changes to their resource base. As the evidence for human induced climate change becomes clearer, so too does the realization that its effects will have impacts on a range of environmental and socio-economic sectors. Some regions are more vulnerable than others, both to expected physical changes and to the consequences they will have for ways of life. Mountains represent a local resource (freshwater supply, hydropower generation, irrigation), but in most cases also considerably influence the runoff regime of the downstream rivers and the related water availability. Such an influence is reflected mainly in the amount of surface water available for supplying irrigated agriculture and water supply systems, but also in the amount of groundwater recharge that can take place in river–fed aquifers. Already today, glacier retreat, permafrost degradation and snowfall decrease have been observed in many mountain regions, thus suggesting that an enhancement of global warming and associated shifts in precipitation patterns and atmospheric circulations may seriously affect streamflow regimes. Changes in the seasonality and quantity of discharge would in turn threaten the availability of water resources, increasing the risks of landslides and floods, impacting hydropower generation, agriculture, forestry, tourism and aquatic ecosystems. As a consequence, socio-economic structures of populations living downstream of mountains will also be affected, calling for better preparedness and policies aimed at reducing the risks associated with these expected changes.

MICHAEL P. BISHOP

Education

• Ph.D., August, 1987 (Physical Geography/Remote Sensing/GIS) Indiana State University, Terre Haute, Indiana.
• M.A., May, 1984 (Physical Geography/Remote Sensing/GIS) Indiana State University, Terre Haute, Indiana.
• B.S., April, 1982 (Geography) Western Michigan University, Kalamazoo, Michigan.

Employment

1996- Associate Professor of Physical Geography - Department of Geography and Geology, University of Nebraska at Omaha, Omaha, Nebraska.
1992-1996 Assistant Professor of Physical Geography - Department of Geography and Geology, University of Nebraska at Omaha, Omaha, Nebraska.
1987-1992 Assistant Professor of Physical Geography - Department of Geography, University of Wisconsin at Eau Claire, Eau Claire, Wisconsin.
1986-1987 Instructor of Physical Geography - Department of Geography and Geology, Indiana State University, Terre Haute, Indiana.
1985-1986 Technical Coordinator - Indiana State University Remote Sensing Laboratory (ISURSL), Department of Geography and Geology, Indiana State University, Terre Haute, Indiana.
1984-1985 Senior Computer Programmer - Indiana State University Remote Sensing Laboratory (ISURSL), Department of Geography and Geology, Indiana State University, Terre Haute, Indiana.
1984-1985 Instructor of Remote Sensing - Department of Geography and Geology, Indiana State University, Terre Haute, Indiana.
1982-1984 Research Laboratory Assistant - Indiana State University Remote Sensing Laboratory (ISURSL), Department of Geography and Geology, Indiana State University, Terre Haute, Indiana.
1981 Cartographer - Geological Research Center, Department of Geology, Western Michigan University, Kalamazoo, Michigan.

Awards

2005 Most Outstanding Recent Contribution for the book entitled Geographic Information Science and Mountain Geomorphology, Mountain Geography Specialty Group, Association of American Geographers.

Contact Information

Department of Geography and Geology
University of Nebraska at Omaha
Omaha, Nebraska 68182 U.S.A.
Email: **mpbishop@mail.unomaha.edu**

GLACIER RESPONSE TO CLIMATE FORCING IN THE KARAKORAM HIMALAYA, PAKISTAN.

Michael P. Bishop, Department of Geography and Geology, University of Nebraska at Omaha Omaha, Nebraska

Himalayan glaciers are thought to be extremely sensitive to climate change. Relatively little is known about glacier sensitivity to climate forcing in the western Himalaya. Consequently, we conducted an extensive investigation of glacier fluctuations in the Karakoram Himalaya of Pakistan, which is part of the international Global Land Ice Measurements From Space (GLIMS) project. Our specific objective was to assess glacier fluctuations. To accomplish this, we utilized a variety of multi-temporal imagery including ASTER (Advanced Spaceborn Thermal Emission and Reflectance Radiometer), Landsat ETM (Enhanced Thematic Mapper), and declassified satellite imagery (KH-9), acquired from approximately 1980 to 2004.

Climate reanalysis data sets (NCEP/NCAR and ERA40) and TRMM (Tropical Rainfall Mapping Mission) data were also utilized. We sampled 230 glaciers in the region. Our results reveal glacier advances and spatio-temporal clustering of surging glaciers. Satellite observations and climate data indicate advancing glaciers caused by climate change.

This has been confirmed by analysis of GRACE (Gravity Recovery And Climate Experiment) gravity field data, which depicts a positive mass anomaly, caused by increasing snowfall. Regional climate simulations using MM5 indicate that the mass anomaly is located at the confluence of the Westerlies and the southwest Asian Monsoon. The circulation and precipitation dynamics have been found to be influenced by ENSO, and support temporal variations in GRACE mass estimates. These new results clearly demonstrate glacier response to climate forcing that is in opposition to the general world pattern of rapid glacier retreat.

BRUNO MESSERLI

Born 1931, married, 4 children, school and studies in Bern, Switzerland.
1962 PhD, 1968 Full Professor, 1978 Director Geographical Institute, 1986 Rector University of Bern, 1996 Prof. emeritus.

Research Activities

1968-1976 - Fieldwork in the mountains of the Mediterranean Region and in Africa: Geomorphology, Paleoecology, Natural Resources.
1977-1986 - Director UNESCO-MAB National Research Programme in the Swiss Alps
1979-1996 - Coordinator UNU-Mountain programme (United Nations University).with fieldwork in the Himalaya and Bangladesh: Mountain Ecology, Land Degradation and Natural Hazards, Water Resources
1987-1996 - Fieldwork in the High Andes of the Atacama region; Climate Change and Natural Resources

Special nominations and awards

1976-82 - Vice President and 1997 Honorary member of the Swiss Academy of Sciences
1989-97 - Member Research Council of the Swiss National Science Foundation
1995-2001 - Director IGBP-PAGES-Office (Past Global Change Program)
1996-2000 - President International Geographical Union
2000-2004 - Chairman Board of Trustees of IFS (International Foundation for Science, Stockholm) Several national and international awards
Honorary member of the Geographical Societies of France, Russia, Italy and member of 4 European Academies
1988 - Global 500 Honour Roll of UN-Environment Program
1991 - Marcel Benoist Prize of the Swiss Government for Scientific Achievements
1998 - Dr.h.c.rer.nat. Free University of Berlin
2002 - Founder's Medal of the Royal Geographical Society, London

Special Mountain Activities

1986 and 1991 - Founding member of the African and Andean Mountain Association
1992 - Member Research Council of the Swiss National Science FoundationContribution and participation Rio Conference: Mountain Chapter of Agenda 21
1997 - Contribution and participation to UN General Assembly Rio+5, New York
2001 - Official Launch of the International Year of Mountains, UN New York
2002 - Contribution to the International Year of Mountains

Research in the Mountains of the World

1. The Mediterranean and the African Mountains (1958 -78)
2. Himalayas and Bangladesh (1979 - 1988, 1992 - present)
3. The arid Andes (1988 - 1996)

Responsibilities for planning and management of interdiscipli-nary research projects:

1. UNESCO-MAB in the Swiss Alps (1978 – 1988)
2. UNU Highland-Lowland-Interactive System
3. Homework for Geography and Environmental Sciences

Engagement for Agenda 21 (1990 until now)

During the 3rd PrepCom in Geneva in 1991 for the Conference in Rio de Janeiro, Dr. R Högger, as representative of Switzerland and I as representative of UNU made a common proposal for a special mountain chapter in Agenda 21.
A UN special General Assembly in 1997, 5 years after Rio, convened to evaluate the progress of the different chapters of Agenda 21. For this event, Jack Ives and I as editors, together with an efficient editorial board and nearly one hundred authors and contributors prepared a book called "Mountains of the World. A Global Priority™, which has been translated and published in Russian, French, Italian and Spanish.
Since 1997, a group of authors annually produce a brochure for the CSD (Commis-sion for Sustainable Development) in New York concerning mountain aspects using multi-disciplinary themes such as freshwater in 1998, tourism in 1999, and forestry in 2000.
The last step was the declaration of UN International Year for the Mountains 2002, decided in the General Assembly on November 10, 1998.

Activities today

President IGU (International Geographical Union) 1996 - 2000
Director PAGES-IGBP (Past Global Changes of the International Geosphere- Biosphere Programme), 1995 - 2001
UN and FAO Mountain programme until 2002
Chair Board of Trustees International Foundation of Science, Stockholm, 2000-2003

Email: bmesserli@blurwind.ch

THE HINDU KUSH -HIMALAYAN REGION HIGHLAND WATERLINES – LOWLAND LIFELINES

Bruno Messerli, University of Bern

INTRODUCTION

The assessment of mountain water resources has changed significantly since the Rio conference 1992. At that time, the mountain chapter of Agenda 21 stated that mountains are an important source of water, energy and biological diversity. In 2007, the UN-General Assembly Resolution recognized the global importance of mountains as the source of most of the Earth's fresh water. This shift shows very clearly the fundamental change in our perception about the rapidly increasing significance of mountain water resources for energy and food security, especially in connection with the growing population in the developing world in these 15 years from 1992 to 2007. Overlooking the world's mountains it is obvious that the Hindu Kush-Himalayan Region (HKH) and the Tibetan Plateau are together the most important water tower of our planet.

HIGHLAND WATERLINES

The source of the following 10 major rivers in SE Asia is in the HKH region and on the Tibetan Plateau: Amu Darya, Indus, Ganges, Brahmaputra, Irrawady, Salween, Mekong, Yangtse, Yellow, Tarim. All these rivers are flowing for longer distances in higher altitudes and this means that snow and ice can play an important role, but the today data are full of uncertainties and even contradictions. . Our knowledge about the runoff generation in different altitudes and under different natural conditions and land use systems is very limited. We should keep in mind that the assessment of climate change and the projections of future climate change scenarios need not only reliable data series of climate and hydrology, but also an open and transparent data exchange between different countries and different river basins in order to understand the upstream-downstream processes.

LOWLAND LIFELINES

Today 97% of the Brahmaputra water flows unused into the gulf of Bengal, while India is suffering from water scarcity. Therefore, India has a plan to establish river linkages from north to south through 37 big river systems with 32 dams, canals, pump and power stations. China has the so-called South-to-North Water Transfer from the Yangtze to the Yellow river on three levels, the lowest and longest seems to be in construction. There are some estimates that the population of India and China together could reach about 3 billions in the year 2050, this was about the number of the whole world population in the year 1965. Not only water for food security, also water for energy with dams and reservoirs will have an impact on the upstream-downstream water flow and on the mountain landscape and mountain population.

CONCLUSIONS

A new dialogue between science and policy is needed more than ever before. Without a transboundary and regional cooperation the risks of water conflicts will increase. Participation in Global Change Programs will help to create the necessary regional networks with comparable data and this again will be the basis for mitigation and adaptation measures in a time of environmental and climate change.

RICHARD ARMSTRONG

Richard Armstrong is Associate Professor of Geography, Adjunct, at University of Colorado. He is Senior Research Scientist and member of the Cooperative Institute for Research in Environmental Sciences (Cires), in Colorado. He studies especially snow, snow cover and glacier.

Senior Research Scientist
Associate Professor of Geography, Adjunct, University of Colorado at Boulder
CIRES (Cooperative Institute for Research in Environmental Sciences) Fellow

Education
PhD, University of Colorado at Boulder, 1985

Research interests
Remote sensing of snow, ice, and frozen ground; physical and mechanical properties of snow; snow cover and glacier mass/extent as indicators of climate change

Recent Highlights and Upcoming Expeditions
October 2007: The Intergovernmental Panel on Climate Change (IPCC) was named to receive the 2007 Nobel Peace Prize, along with former Vice President Al Gore. Armstrong contributed to the most recent IPCC report, Climate Change 2007: The Physical Science Basis.
Developed and distributed a global snow extent and snow water equivalent data set for 1987 to 2005

Current Research
Enhancing methods to map global snow cover by combining optical data from MODIS and passive microwave data from AMSR-E; Mapping glaciers at two spatial resolutions using data from ASTER (60 m) and MODIS (500 m); Investigating temporal and spatial snow cover distribution over the Tibetan Plateau and the synoptic patterns contributing to extreme winter snowfall events; Studying microwave sensor calibration: Developing a systematic method to evaluate the spatial and temporal variability of brightness temperatures over selected land surface types (ice sheets and tropical forests) to locate stable calibration targets ; Managing the NSIDC State of the Cryosphere Web site

Activities
Member, American Geophysical Union
Member, International Glaciological Society
Member, International Association of Hydrological Sciences (IAHS)
International Commission on Snow and Ice (ICSI) representative, International Association of Hydrological Sciences (IAHS)
Chairman, ICSI Snow and Climate Working Group

Email: rlax@nsidc.org

THE ROLE OF GLACIERS IN THE HYDROLOGY OF NEPAL

Richard Armstrong, CIRES, National Snow and Ice Data Center, University of Colorado
Donald Alford, 1831 Poly Drive, Billings, Montana
Adina Racoviteanu, Dept. of Geography and Institute of Arctic and Alpine Research, University of Colorado

Glaciers are a component of the hydrologic regime of many large mountain ranges and regions, including the Himalayas. However, the hydrologic regime of Himalayan catchment basins, and the role of glaciers in the hydrologic regime of this mountain range, is not well understood. As a result of a general unavailability of hydrologic, climatic and topographic data for Himalayan catchment basins, the application of hydrologic concepts and models developed for mountain catchments in Europe or North America is difficult, and sometimes misleading. Current concerns over the impact of the retreat of Himalayan glaciers on water supplies poses an urgent need to resolve questions related to specific aspects of the water budget cycle, and to determine the impact of glacier change on regional-scale water supplies. The present study focuses on assessing and quantifying the specific role of glacier melt, in contrast to seasonal snow melt and rainfall, in the hydrologic regime of the Nepal Himalaya. The overarching goal is to estimate the potential impact of continued glacier retreat in this region.

The methodology developed for this ongoing study involves establishing a relationship between the area-altitude distributions of catchment basins and glaciers, and associated water and energy exchange gradients. Two area-altitude distributed process models were developed: an orographic runoff model and a glacier melt model. The orographic runoff model was based on the relationship between mean specific runoff and the mean altitude of each basin. The area-altitude distribution of streamflow was calculated for 1000 meter belts as the product of the specific runoff depth and the area of the belt. The glacier melt model was based on melt from 100 meter area-altitude belts for the glacierized portion of each catchment and involved defining an "ablation gradient" (the rate of increasing specific ice melt with decreasing altitude in the ablation zone, taken as 0.6 to 1.4m/100m for this region); defining the mean maximum altitude of the 0 degree C isotherm during the ablation period (~5400 m); determining the volume of ablation as the product of specific ice melt values taken from the ablation gradient and the area-altitude values of corresponding belts in the glacier ablation zone. Topography was defined by digital elevation data sets acquired from the Shuttle Radar Topography Mission (SRTM) for both models, and glacier outlines were provided by the International Center for Integrated Mountain Development (ICIMOD), Kathmandu, Nepal.

Preliminary results indicate that the annual contribution of glacier melt water to streamflow in the Nepal Himalayas varies among catchment basins, but is not likely to exceed 2-13% of the total annual flow volume measured at lower altitude hydrometric stations. This represents 2-3% of the total annual streamflow volume of the rivers of Nepal. Preliminary results also suggest that neither the timing nor the volume of the streamflow of rivers of Nepal will be significantly affected in the near future by a continued retreat of the glaciers.

SHIRISH GARUD

Fellow and Area Convenor, Renewable Energy Technology Applications, TERI.

Mr Shirish Garud, Fellow, TERI is a well known specialist in solar energy and technology applications, and has over 20 years of experience in renewable energy sector. After his Masters in Energy Systems Engineering from IIT Bombay in 1986 he has been working in the solar energy sector at various positions. He has led many research and field projects in solar thermal and solar PV power generation. He has deep understanding of solar energy technologies, practical experience in project execution and sound research background in both technology as well as policy and regulatory issues. Currently, Mr Garud is leading projects ranging from feasibility studies on solar thermal and PV power plants to solar PV technology assessment to development of financial incentive structure for roof top solar PV based distributed generation systems. He is also working on development of framework for renewable energy trading certificate scheme for the state of Maharashtra. He is a member of ISO committee on energy. He is also Coordinating the activities of the south asia secretariat of REEEP (Renewable Energy and Energy Efficiency Partnership) program.

Email: shirishg@teri.res.in

SUSTAINABLE ENERGY PLANNING FOR MOUNTAIN COUNTRIES- EXPERIENCE OF BHUTAN

SHIRISH GARUD, THE ENERGY AND RESOURCES INSTITUTE, DELHI

Background

Bhutan is a landlocked Himalayan country situated between 160 m to 7500 m above mean sea level. Mountainous terrain and abundance of glacier fed rivers and streams makes it rich in hydro potential. Bhutan has area of 38 394 km2 and its population in 2005 was 634 982.
Bhutan has an estimated hydropower potential of 30000MW of which 23760 MW has been identified and assessed as technically feasible. So far 1488.67 MW has been exploited. The country is fully dependent on India to meet its fossil fuel needs.
Bhutan's energy demand was 402102 TOE in 2005. The sectorial energy consumption is shown in Figure 1.0 below

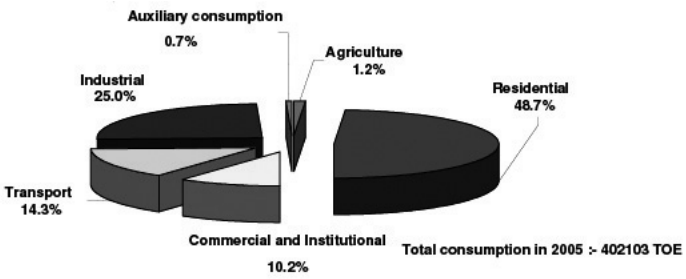


Figure1.0 Sectorial energy consumption for Bhutan in 2005

Energy sector has major contribution to Bhutanese economy since more than 50% of the foreign exchange earnings are through export of electricity produced from hydropower plants. However, as all hydropower is mainly from run of the river type power plants seasonal variation in power production is a major concern.

This paper covers major issues of energy sector, barriers in achieving sustainable development in energy sector and novel approaches Bhutan can adopt to overcome the same.

Submitted to Conference on "Mountains: Energy, water and food for life. The SHARE project: understanding the impacts of climate change"

WOLFRAM SPARBER

Education and training

1996 - 2003 — Studies of applied physics
Title of qualification awarded: Graduate Engineer (Diplom Ingenieur)
Principal subjects: Studies of applied physics
Name and type of organization: Graz – University of Technology, Universitat Autonoma de Barcelona (1998 – 1999)

1990 – 1995 — Technical high school
Name and type of organization: Gewerbe Oberschule / Istituto Tecnico Industriale
Field of study: Information technology

Personal skills and competences

Mother tongue(s): German and Italian
Other language(s): English (Fluent), Spanish (Fluent), Modern Greek (Basics)
Further international experience: 1995-1996:-Several month journey through Cental and South-East-Asia

Work experience

Dates Occupation or position held

Since June 2005: EURAC research, Institute for Renewable Energy – Bolzano, Italy
Head of Institute
Responsible for a research team in the field of energy systems in buildings, especially solar heating and cooling, energy efficiency in buildings and building integrated photovoltaics.
Type of business or sector: Applied research

Since 2006: Free University of Bolzano, Master CasaClima – Bolzano, Italy
Responsible within the 2nd level master course for the lessons on solar thermal systems.
Type of business or sector: Teaching

Since June 2004: TIS-RENERTEC, Regional Centre for Renewable Energy - Bolzano, Italy
Since 2004 Responsible for the establishment, development and growth of the centre. Since 2007 limitation on the project management for the support of companies within the foundation of new business areas in the field of renewable energy and allocation of companies active within this sector in the region.

Type of business or sector: Technical consulting, regional development

May 2002 – June 2004: Fraunhofer, Institute for Solar Energy Systems – Freiburg, Germany - Department of Solar Cells, Materials and Technology; Production Technology Group Collaborator and later technical manager of scientific projects for the introduction of surface treatment methods in various European solar cell production lines. First month: Elaboration of diploma thesis in solid state physics in the field of sur face treatment of crystalline silicon solar cells. Type of business or sector: Applied research

Several month in 2001, 2000, 1999: STENUM, Energytech, SOLID

STENUM: Business consulting company for energy and environment in Graz - Austria
ENERGYTECH: Engineering office for energy technology in buildings and district heating systems, Bolzano - Italy
SOLID: Company for solar thermal installation and design in Graz - Austria
TYPE OF BUSINESS OR SECTOR: Consulting, engineering, engineering and installation respectively

Membership in committees

Membro della Commissione "Concorso nazionale energia sostenibile nelle città – Ministero dell'Ambiente - Istituto Nazionale di Urbanistica", Milan - October 2008. Membro della Commissione di valutazione all'interno del Concorso "KlimaEnergy Award" - fiera KLIMAENERGY, Bolzano - September 2008. Member of the scientific committee of the "1st International Conference on Solar Heating, Cooling and Buildings, EUROSUN 2008", Lissabon – March to October 2008. Member of the evaluation committee of the PHD thesis "Studies on biomass assisted absorption cooling systems" presented by a student at the Anna University, Chennai – India, August 2008

Email: wolfggram.sparber@eurac.edu

THE ROLE OF LOCAL AUTHORITIES IN BOOSTING ENERGY EFFICIENCY AND RENEWABLE ENERGIES

Wolfram Sparber[1], Sepp Waldner[2], Alexandra Troi[1]
[1]EURAC research, Viale Druso 1, 39100 Bolzano, www.eurac.edu" www.eurac.edu
[2]TIS Innovation Park, Via Siemens 4, 39100 Bolzano, www.tis.bz.it" www.tis.bz.it

Within a centralized energy structure communities and local authorities do play only a limited role in the overall energy management. This was common practice in many European countries till the end of the last century.

With increasing importance of energy efficiency and possibilities of distributed energy generation this picture changed dramatically. In fact certain actions are still dependent from European and National legislations and actions but many others depend from local authorities.

In order to understand this better a look on thermal energy consumption figures may help. In figure 1 a subdivision of the final energy use on European level is shown.

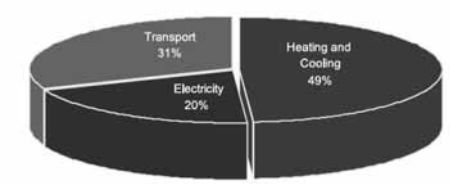


Figure 1: Breakdown of final energy consumption in Europe (EREC, ESTTP)

Following the data elaboration of ECTP buildings are responsible for 40% of overall energy consumption in Europe and 36% of overall CO2 emissions (including electricity consumption in buildings).

In both cases - heat provision as well as building standards - local authorities have several possibilities to act:
On the heat provision side especially in urban areas with a high density of buildings district heating systems can be applied. With such a centralized heat production energy efficiency measures can be implemented (co – or three generation), different fossil fuels can be used (e.g. natural gas, waste) and different renewable sources can be used (wooden biomass, biogas, biofuels). These technologies can be applied in a single or combined way.
In addition or in areas with low building density decentralized incentives / obligations can be implemented regarding the utilization of renewable energies for heating and domestic hot water (solar thermal, biomass and under certain circumstances geothermal heat pumps).
On the energy efficiency side local authorities can act by implementing strict energy certification labels and / or minimum requirements for new buildings and renovations. Financial and other incentives (eg. allowed volume per surface) can be coupled to energy efficiency standards. Further public buildings can act as best practice and cover a light house function. Last but not least communication, education and awareness rising can have a strong impact on the speed of implementation of Rational Use of Energy (RUE) and the utilization of Renewable Energy Sources (RES).

In the presentation concrete examples regarding energy certification, energy provision in villages and low energy city quarters will be shown. Further the possibilities and limits of local authorities regarding action in the transport and electricity sector will be discussed.

M. AKRAM KAHLOWN

Dr.Muhammad Akram Kahlown is well known engineer and esteemed professional in the field of water resources (research, management and development). He remained chairman of Pakistan Council for Research in Water Resources (PCRWR) for 8 years and developed a strong institution for research and management in water resources in Pakistan. He is Chairman of International Hydrological Program of UNESCO, Pakistan Chapter. He obtained his PhD in Civil Engineering from the University of Idao, USA. He conducted post doctoral research at the Research & Extension Center of the University of Idaho, USA with Dr.Charles Brockway a renowned Hydrologist. He worked as Project Director Mona Reclamation Experimental Project –WAPDA for 3.5 years. Dr.Kahlown has published over 100 research papers in national and international journals of high profile. He has represented Pakistan in various international for a. For his research achievements and development in water sector, he was awarded the WATSAVE ANNUAL AWARD 2003 by the International Commission on Irrigation and Drainage (ICTD) for high proficiency in introducing water saving technologies. Presently he is Chairman of Hindu Kush Himalayan-Flow Regimes from International Experimental and Network Data 9 HKH-FRIEND) and technical and advisory member of various high level water related committees of the government. Pakistan Academy of Sciences (PAS) awarded him a Gold Medal for the year 2002 in recognition of his outstanding research work in the areas of water resources development, water conservation and introduction of high efficiency and water saving irrigation technologies. He co authored a book on Pakistan Water Resources Development and Management, which is widely admired.

On 23rd March 2006 President Islamic Republic of Pakistan awarded him high civil award, "Tamgha e Imtiaz" … Medal of Distinction in recognition of his contribution in development and management of Water Resources of Pakistan.

Email: kahlown@hotmail.com

MOUNTAINS, GLACIERS AND WATER SITUATION IN PAKISTAN

Muhammad Kahlown, WAPDA, Pakistan

Mountains occupy about 20% of the earth's land mass. About 10 percent of world's population live in the mountains, while 40 percent occupy the watershed areas below them. Thus half of the world's population depends directly or indirectly on the mountains. Mountains provide water, energy, minerals, and forest, agricultural products and areas for recreation. Mountain environments are essential to the survival of global ecosystems. The Hindu Kush-Himalayas is a mountain chain extending over 3500 km, the home of over 140 million inhabitants and encompassing the mountain areas of parts of Afghanistan, Bangladesh, Bhutan, China, India, Myanmar, Nepal, and Pakistan. The principal problems faced by the mountains include: standard of living, resource degradation, human resource development, institutional gaps, problems of marginality, and knowledge constraints. The mountain ranges of Pakistan include the Himalayas, the Karakoram, and the Hindukush. The Himalayas spread in the north-east and the Karakoram rises on the north-west of the Himalayas and extends eastward up to Gilgit. With the assemblage of 35 giant peaks over 24000 ft. high (7,925 m), the region is the climber's paradise. Many summits are higher than 26000ft (7,925 m) and the highest K-2 is expected only by Mt.Everest. The world's largest volume of fresh water is stored in the glaciers. The northern region of Pakistan is the house of more than 134 glaciers. Out of these, Siachen, Biafo, Baltoro, Batura, and Hisper are the largest glaciers covering an area of more than 3470 sq.km. These glaciers are natural endowment, contributing more than 154 million acre feet of water. The climate change is affecting the glaciers. These are shrinking, moving and melting at faster rate. The temperature, rainfall variations are the main drivers which are affecting the annual river flows. Per capita water availability in Pakistan has reduced from 5600 cubic meters to less than 1200 cubic meters during the last 60 years. In year 2012, Pakistan will be among the water scarce countries with per capita water availability of less than 1000 cubic meters if additional water resources are not developed.

PETER SHADIE

Peter Shadie has worked for over 30 years in the environment and conservation field focusing on natural and cultural heritage conservation and protected areas.

Peter graduated from the University of Sydney in 1979 with qualifications in Botany and Zoology and his professional career has concentrated on all facets of protected area establishment and management at field, national, regional and international levels. Peter enjoyed a long and successful career with the New South Wales National Parks and Wildlife Service, a protected area and heritage management agency within Australia. He has worked in the field as a Park Ranger, Park Superintendent and District Manager, Regional Operations Manager and within a number of other managerial positions at a senior level within the agency. He has extensive experience in the establishment, planning and management of protected areas in a wide range of different circumstances.

Peter commenced work with the International Union for the Conservation of Nature (IUCN) in February 1999 under a secondment from the Australian Government. As Executive Director for the IUCN Vth World Parks Congress, his assignment focused on planning and delivery of the Congress which took place in September of 2003. With nearly 3,000 delegates from 160 countries, the Congress represented the largest gathering of protected area specialists ever assembled. The Congress addressed a wide range of 'state of the art' issues for protected areas and charted a global course for the future of these precious sites. The Executive Director was instrumental in coordinating the programmatic content, international fundraising and all logistical aspects of the staging of the event.

Peter continued his work within IUCN's global Protected Areas Programme building considerable experience in a wide variety of protected area issues at the global level including the development of policy and technical advice; development and application of protected area management guidance; and the integration of protected area issues within international agreements and conventions relevant to environment and development, such as the Convention on Biological Diversity. Peter is a member of the World Commission on Protected Areas and has worked actively with the Commission for more than 10 years. He has extensive experience with the UNESCO World Heritage Convention, undertaking work on evaluating proposed additions to the World Heritage List; state of conservation monitoring and the provision of technical support to Parties to the Convention.

In August 2006 Peter took up his current position as Head of IUCN's Protected Areas Programme in Asia. He leads IUCN's work on protected areas across 23 countries in Asia with the aim of strengthening the capacity for protected area establishment and management. The approach is to generate, integrate, and disseminate information and knowledge on the most appropriate responses to emerging protected area issues in the region, build capacity among individuals and institutions to plan and manage protected areas most effectively in collaboration with all major stakeholders, and to improve laws, policies and institutions for the conservation and sustainable and equitable use of protected area resources.

Email: shadie@ivcnt.org

CLIMATE CHANGE IMPACTS IN THE CENTRAL KARAKORAM MOUNTAIN SYSTEM OF NORTHERN PAKISTAN: understanding the role of mountain protected areas in climate change

Peter Shadie, Head IUCN Protected Areas Programme, Asia

As we enter the 21st Century climate change impacts are being felt and responses considered at all scales and across all sectors of society. The impacts of warming temperatures; more erratic and extreme natural phenomena; and shifts in hydrological regimes are similarly being considered for the world's protected area estate. For the past 100 years protected areas have been the global community's foremost response to conserving biodiversity and natural ecological processes. The global protected area estate has expanded in less than 50 years from an area the size of the UK to one the size of South America. However, the climate change threat is now challenging the fundamental parameters of our thinking in ways never before imagined. How will the protected areas that were set up to conserve significant ecosystems, habitats and wildlife continue to be an effective conservation tool?

This presentation will examine how the protected area community of practice is seeking to respond to climate change impacts through a range of mitigation and adaptation strategies. It focuses on the challenges of climate change in the fragile high mountain ecosystems of the Central Karakoram mountain system in Northern Pakistan where a local population of around 100,000 people live and depend on the natural resources of the 10,000 km2 Central Karakoram National Park. The presentation will examine the learning from local community surveys on climate change in valleys surrounding the national park and how these findings can be integrated into planning and future management of the park.

RICCARDO VALENTINI

Professor Riccardo Valentini works at the Laboratorio di Ecologia Forestale della Facoltà di Agraria of the Università degli Studi della Tuscia, in Viterbo. He studies forest ecology and biogeochemistry, particularly carbon balance estimation by means of different methodologies including eddy covariance measurements and models.

Education
Degree in Biophysics at the University of Rome, 1985

Research interests
Forest ecology and biogeochemistry, particularly carbon balance estimation by means of different methodologies including eddy covariance measurements and models

Activities
Chairman of the CARBOEUROPE cluster of EC projects dealing with the Carbon balance of Europe.
Coordinator of the EC Environment and Climate programme EUROFLUX - Long term carbon dioxide and water vapour fluxes of European forests and interactions with the Climate System.
Coordinator of the EC Environment and Climate (ENRICH) programme EURASIA-NET A contribution to the development of a joint Europe Asia collaboration in understanding carbon and water exchanges of terrestrial ecosystems.
Scientific responsible in the EC Environment and Climate programme VOCAMOD - Biogenic volatile organic compound emission modelling for European forest canopies.
Scientific responsible in the EC Environment and Climate programme MEDEFLU - Carbon and water fluxes of mediterranean forests and impacts of land use/cover changes.
Scientific responsible in the EC Environment and Climate programme LBA - EUSTACH European studies on trace gases and atmospheric chemistry as a contribution to the large scale biosphere atmosphere experiment in Amazonia.
Member of the Editorial Board of the journal Global Change Biology.
European Commission expert on the Panel " Grenhouse gases sinks related to Kyoto protocol".
Nominated in the IPCC board for "Land change use and forestry".
Member of the IGBP Terrestrial Carbon Working Group, The terrestrial Carbon Cycle: Implications for the Kyoto Protocol.
Member of the Scientific steering Committee of the IGBP - BAHC core project.
Task leader of the IGBP - GCTE core project 1.3.2 : Ecological controls on biosphere - atmosphere CO2 and H2O fluxes.

Email: rik@unitus.it

MOUNTAINS AND GLOBAL CHANGES : THREATS TO BIODIVERSITY

Riccardo Valentini, University of Tuscia

The biosphere plays an important role in the Global Carbon Balance. Today, the biosphere, especially the areas in the Northern hemisphere, act as a carbon sink. Most uptake occurs in northern temperate areas and decreases towards the pole. As temperature increases globally due to climate change, the biosphere will most likely turn from a carbon sink to a carbon source within the next century. Global warming will also affect the species distribution within different ecosystems. Models made on forest biomes in the Italian Alps show that 77-82% of the biomes will be affected by climate change. Some biomes will move upwards, others will disappear and a few will expand. As a result, the biodiversity will decrease. Forests in mountain areas, especially the European ones, are influence by human activities, which influence the forests' carbon budget. Younger forests (<10 years) act as a carbon source, whereas older forest act as a carbon source. Even very old forests (> 110 years) still accumulate carbon. Therefore, conservation of old forests must be reconsidered as they accumulate carbon and provide essential ecosystem services. Not only forests are affected by global changes, but also mountain grasslands. Data from Malga Arpaco, Italy, indicated an increased productivity and an increased carbon accumulation for the year 2003. While the productivity in low elevation ecosystem decreased strongly in this very hot year, ecosystems at higher elevation seem to have profited from higher temperatures. In conclusion, climate change will influence mountain ecosystems in different and possibly unexpected ways, like increased productivity or decreased biodiversity.

GIOVANNI AMORI

Dr Giovanni Amori is a senior research scientist at the National Reasearch Council. His research interests include evolutionary biology, biogeography, ecology and conservation biology of shrews and rodents. He is author of more than 100 scientific papers, co-author of the Atlas of European Mammals and has contributed a book chapter to Ecotoxicology of Mammals. He has been President of the Italian Mammal Society, member of the Scientific Authority of Italian CITES, Chairman of the IUCN/SSC Rodent Specialist Group and currently he is the focal person for the IUCN/SSC Red List Authority for the Small Non Volant Mammals.

Email: giovanni.amori@ise.cnr.it

POTENTIAL EFFECT OF CLIMATE CHANGE ON A PREY-PREDATOR SYSTEM: MOUNTAIN VIPERS AND THEIR SMALL MAMMAL PREY

Giovanni Amori CNR – Institute of Ecosystem Studies, Rome, Italy

Global climate change impact on the animal and plant species and ecosystems. The distribution range of species is deeply influenced by climate as well as biomes. Ice ages have always been factors affecting distribution ranges, evolution, and ecological relationships among species. The very recent, quick climatic changes that many species have experienced may constrain, in theory, the targeted organisms to shift their distribution ranges either north-forward or towards higher altitudes. In this case, I analyse a special study system where the second type of distribution shift may be taken into consideration. For this special study, I analyse a full prey-predator system based on two viper species (Reptilia, Viperidae), and two small mammal species (Mammalia, Soricomorpha and Rodentia). The species were: the adder Vipera berus and the meadow viper Vipera ursinii for the snakes, and the Alpine shrew Sorex alpinus, and the European snow vole Chionomys nivalis as for their mammalian prey. Projections show deep changes in all species range sizes and an high extinction rate for the next future. C. nivalis is predicted to suffer an slightly the lowest increase in its extinction rate between 2002 and 2080. A more severe situation is predicted for both S. alpinus and V. berus, with an extinction rate increasing up till 85% for the snake species in 2080. Even if we admit a dispersal scenario, that permits the colonization of new suitable areas, the predicted rates of recolonization still are quite low, especially for the last two species. A dramatic future situation is predicted for V. ursinii. In fact, according to the considered climatic forecasts, the ensemble future models project no suitable areas for this species starting from 2020. Moreover, the extinction probability for V. berus in the Italian Alps could be increased by the diminishing reduction of its range overlapping with its mammals prey.

ALEXANDER BAKLANOV

Education and Grades

2008 (February)	Professor in Meteorology (Russian State Hydrometeorological University, St.-Petersburg)
1998 (October)	Dr. Scient. in Physics & Mathematics (Meteorology and Climatology) (Russian State Hydrometeorological University, St.-Petersburg)
1996 (Septem.)	Senior research fellow in Atmosphere and Hydrosphere Physics (Russian Academy of Science, Moscow)
1988 (October)	Senior research fellow in Mathematical Methods in Environmental Sciences (Kola Science Center of USSR Academy of Sciences, Apatity, Russia)
1983 (March)	PhD. in Physics & Mathematics (Math. Methods in Geophysics/Atmospheric Science) (Novosibirsk Computing Center, USSR Academy of Sciences)
1979 (July)	MSc. in Physics (Yaroslavl State University/Novosibirsk State University, USSR)

Employment

01/07-present	Vice-director of Danish Strategic Research Center for Energy, Environment and Health (CEEH) under Niels Bohr Institute, University of Copenhagen.
08/98-present	Senior scientist at Danish Meteorological Institute, Meteorological Research Division.
01/94-07/98	Visiting scholar, project scientist at University of Umeå and Swedish Defence Research Establishment (FOA), Umeå, Sweden.
06/95-03/96	Research scholar at International Institute for Applied Systems Analysis (IIASA), Laxenburg, Austria.
01/89-01/94	Head of Department of Mathematical Modeling of Environment at Institute of Northern Environmental Problems, Russian Academy of Sciences, Apatity, Russia. Director of Econord Center.
08/79-01/89	PhD-student, young scientist, scientist, senior scientist at Novosibirsk State University, Computing Centre of Siberian Division, Kola Science Center, USSR Academy of Sciences, Russia.

Research Profile

Research interests: Atmospheric aerosol dynamics modelling; Boundary layer meteorological processes; Integrated numerical modeling of atmospheric dynamics and pollution; Microscale / urban meteorology and climatology; Environmental impact and risk assessments.

25 years of experience in developing and using numerical atmospheric dynamics and pollution models (including atmospheric aerosol dynamics) at different scales: from local- to meso- and regional scales.

Participations in International Projects (since 1998)

4FP EC projects: 'SFINCS: Surface Fluxes in Climate System' (1998-2001),'RTMOD: real-time model inter-comparisons' (1998-2001), NorFA/NARP project ArcticRisk: 'Atmospheric Transport Pathways, Vulnerability and Possible Accidental Consequences from Nuclear Risk Sites in European Arctic' (2001-2003), COST-715: WG2 'Mixing heights and surface energy budgets' (1998-2004), 5FP EC projects: 'ENSEMBLE: Methods to Reconcile Disparate National Forecasts of Medium and Long Range Dispersion' (2000-2003), 'ELCID: Evaluation of Climatic Impact of Dimethyl Sulphide' (2000 - 2003), 'FUMAPEX: Integrated Systems for Forecasting Urban Meteorology, Air Pollution and Population Exposure' (2002-2005).

Teaching and Supervision

Have taught at several courses on atmospheric physics, numerical and environment modeling, aerosol dynamics at the Universities of Novosibirsk, Umeå, Copenhagen, etc. Supervisor of 7 PhD students (4 are successfully defended) and many BS or MSc students since 1988.

PI or project leader for 14 national and bilateral (with USA, UK, Norway, Sweden, Finland) research projects of USSR/Russian Academy of Science. PI of international projects 'Origins of Arctic Haze', KOLANET, 'Risk & Nuclear Waste', 'Arctic Risk'. Co-ordinator of 5FP EC project of FUMAPEX (2002-2005), 6FP EC EnviroRISKS (2005-2008), national representative at COST Action 715 (1998-2004), Action 728 (2004-2009, vice-chairman), Action 732 (2005-2009), International Commission for Polar Meteorology (2003-).

E-mail: alb@dmi.dk

URBAN AIR QUALITY: INTEGRATED SYSTEMS FOR FORECASTING, ASSESSMENTS AND MITIGATIONS (EXPERIENCE FROM FUMAPEX AND MEGAPOLI PROJECTS)

Alexander Baklanov*, Sandro Finardi, Otto Hänninen and FUMAPEX and MEGAPOLI teams

*** Danish Meteorological Institute (DMI), Copenhagen, Denmark, e-mail: alb@dmi.dk**

The quality of the urban air pollution forecast and the Urban Air Quality Information and Forecasting Systems (UAQIFS) critically depends on the mapping of emissions, the urban air pollution (UAP) models, and the meteorological/climate data. The quality of the meteorological data should be largely enhanced by using downscaled data from advanced numerical weather prediction (NWP) models. These different topics, as well as the application of population exposure models, have traditionally been treated in distinct scientific and administrative communities whose expertise needs to be combined to enhance the possibilities of forecasting air pollution episodes in European cities. The main objectives of the EC FP5 project FUMAPEX (http://fumapex.dmi.dk) were thus the improvement of meteorological forecasts for urban areas, the connection of NWP models to UAP and exposure models, the building of improved UAQIFS, and their application in cities in various European climates.

The improved FUMAPEX systems can be used in two ways. Firstly, it can be the short-term episode forecasts for the next few days. Secondly, it is an integrated modelling system for long-term air quality management to predict future episodic pollution levels, taking into account different climate change scenario, estimated trends in local traffic and other emissions, etc. In both ways the modelling system can be employed to evaluate alternative scenarios and to develop efficient strategies to reduce emissions, pollution levels, and population exposure to prevent health consequences in a cost-effective way.

The new EC FP7 project MEGAPOLI (http://megapoli.info) brings together leading European research groups, state-of-the-art scientific tools and key players from third countries to investigate the interactions among megacities, air quality and climate. MEGAPOLI bridges the spatial and temporal scales that connect local emissions, air quality and weather with global atmospheric chemistry and climate. The main MEGAPOLI objectives are: (i) to assess impacts of megacities and large air-pollution hot-spots on local, regional and global air quality, (ii) to quantify feedbacks among megacity air quality, local and regional climate, and global climate change, (iii) to develop improved integrated tools for prediction of air pollution in megacities.

In order to achieve these objectives we are going to:

Develop and evaluate integrated methods to improve megacity emission data,

Investigate physical and chemical processes starting from the megacity street level, continuing to the city, regional and global scales,

Assess regional and global air quality impacts of megacity plumes,

Determine the main mechanisms of regional meteorology/climate forcing due to megacity plumes,

Assess global megacity pollutant forcing on climate,

Examine feedback mechanisms including effects of climate change on megacity air quality,

Develop integrated tools for prediction of megacity air quality,

Evaluate these integrated tools and use them in case studies,

Develop a methodology to estimate the impacts of different scenarios of megacity development on human health and climate change,

Propose and assess mitigation options to reduce the impacts of megacity emissions.

MEGAPOLI follows a pyramid strategy of undertaking detailed measurements in one European major city, Paris, performing detailed analysis for 12 megacities with existing air quality datasets and investigate the effects of all megacities on climate. The results will be disseminated to authorities, policy community, researchers and the other stakeholders in the corresponding megacities.

GIOVANNI VIEGI

Current Position: - Director, CNR Institute of Biomedicine and Molecular Immunology (IBIM), Palermo, Italy (since May 1st, 2008).
- Director of Research, Head of Pulmonary Environmental Epidemiology Unit at the National Research Council (CNR) Institute of Clinical Physiology, Pisa (on leave after April 30, 2008);
- Contract Professor at the Faculty of Environmental Sciences at the University of Pisa;

Education:

1978 Graduated full honor "cum laude" from the Medical School at the University of Pisa.
1980 Diploma of Specialist in Pneumology with full honor "cum laude", from the Medical School at the University of Pisa.
1982 Diploma of Specialist in Occupational Medicine with full honor, from the Medical School at the University of Pisa.
1983-90 Fellowship at the CNR Institute of Clinical Physiology in Pisa.

Current activity:

Coordinator of the research project "Respiratory allergic diseases: monitoring study of GINA and ARIA guidelines (ARGA"), funded by the Italian Agency of Drug (AIFA).
Participating in the following EU-funded projects: "Indicators for monitoring COPD and asthma in the EU (IMCAII)"; "Co-ordination action on indoor air quality and health effects (ENVIE)"; "Genomics to combat resistance against antibiotics in community-acquired lower respiratory tract infections in Europe (GRACE)"; "Geriatric study in Europe on health effects of air quality in nursing homes (GERIE)"; "For a better understanding of COPD exacerbations (COST B29)"; "Interventions on health effects of health environment (HESEINT)".
Member of the Executive Committee and Vice-President of the Italian Society of Respiratory Medicine (SIMeR).

Acknowledgments:

President Elect (September 2004 – September 2005), President (September 2005 – September 2006), Past (September 2006 – September 2007) of the European Respiratory Society (ERS) Group at IFC-CNR has realized the two largest respiratory epidemiological longitudinal studies on general population samples in Italy (Po Delta area and Pisa-Cascina) and other epidemiological studies on work-related respiratory illness, on community acquired pneumonia and on cardio-respiratory and psychiatric co-morbidity, as well as on smoking cessation, through research grants from: CNR, Italian Electric Energy Authority (ENEL), European Commission, Italian Ministeries of Labour and of Health, Boehringer Ingelheim, Pharmacia, Eli Lilly, GlaxoSmithkline.
Dr. Viegi published 229 original articles (144 in English), 50 book chapters (13 in English), 432 congress abstracts (298 in English) and 128 proceedings (44 in English) in Italian, English and French.

e-mail: viegi@ibim.cnr.it

IMPROVING GLOBAL LUNG HEALTH: THE ROLE OF THE GLOBAL ALLIANCE AGAINST CHRONIC RESPIRATORY DISEASES (GARD)

Giovanni Viegi, M.D. Director, CNR Institute of Biomedicine and Molecular Immunology (IBIM), Palermo (Italy); 2007-09 GARD Planning Group Member.

The Global Alliance against Chronic Respiratory Diseases (GARD) was launched in 2006 as a voluntary alliance of the World Health Organization (WHO) with national and international organizations, institutions and agencies committed to the vision of a world where all people breathe freely. Its goal is to improve global lung health. Its main objective is to initiate a comprehensive approach to fight chronic respiratory diseases (CRD) by: 1) developing a standard way of obtaining relevant data on CRD risk factors; 2) encouraging countries to implement health promotion and CRD prevention policies; 3) and making recommendations of affordable strategies for management of CRD. WHO has a dual role in the Alliance: it provides technical leadership and secretariat support. It is to mention that Ev-K2-CNR is a GARD partner.

The GARD report, published in September 2007, states that CRD burden does not involve developed countries only, as 80% of deaths comes from low-middle income countries.

It is an important source of estimates on prevalence rates of CRD, including pulmonary hypertension in highlanders.

Such burden is growing and contributes to make many countries poorer, though efficacious and economically favourable solutions are present. An integrated and large scale action, led by Governments at national level, must be implemented.

During the last GARD meeting, held in Istanbul (Turkey) in September 2007, Italy was chosen as Country hosting the next international GARD meeting which will be held in Rome, on the 12th-13th June, 2009. GARD-Italy meeting will be on the11th. June.

Italy was chosen for two main reasons: the Italian Government's engagement in supporting GARD since its foundation, along with respiratory diseases' inclusion within the health policy priorities; the dedication of 2009 as Year of the Breath (Anno del Respiro, AdR). AdR has been considered a model for other countries in order to increase respiratory diseases awareness.

Indeed, the Forum of International Respiratory Societies (FIRS) has subsequently decided to dedicate 2010 as Year of the Lung.

The GARD-Italy program is based on a document stating specific respiratory health objectives which are in line with the general scope of GARD. Any interested stake-holder with an operating role will be allowed to take part in the Alliance. Cooperation will be set up with the Ministry of the Environment and M. of Education and of University and Scientific Research.

Thus, the biennium 2009-10 will be favourable also for the dissemination of research activities involving lung health, including projects such as SHARE.

ROJNA MANANDHAR

I started my career in European Union and Kathmandu Municipality Joint Kathmandu Valley Mapping Program as Solid Waste Management Intern in 2001, soon after my undergraduate degree in Environmental Science from St. Xaviers, Kathmandu, Nepal. My undergraduate thesis was on studying Forest Resource Management in Ghandruk Village of Nepal. I went on to work as Research Assistant in Terai Arc Landscape Program in WWF Nepal, 2001.

I pursued my MBA (specialisation: Environmental Management) at University of Twente, in Franeker-Friesland of The Netherlands under The Netherlands Government Fellowship Program (2001-2002). As part of MBA program, I interned in Derbyshire Resource Efficiency Partnership, The United Kingdom. I undertook research on evaluating environmental management initiatives in Small and medium scale enterprises in city of Derbyshire. The paper was presented in Environment Conference held in Manchestor, 2002 and published in the Proceedings.

I came back to Nepal, and worked as Environmental Consultant in Environment Sector Program Support with Ministry of Population and Environment for two years from 2002-2004.

I continued my environmental career as Climate Change Program Officer, Clean Environment Parternship program in IUCN Nepal from 2004-2005. I attended and presented in International Workshop on Community Level Adaptation to Climate Change, held in Dhaka, 2005. I presented a joint paper with Mr. Sugam Shrestha on Integration of Climate Change and Biodiversity Issues in Assessing Environmental Impacts on Hydro Resources in Nepal in International Conference on Security and Sustainability in Water Resources, held in 2004, Nepal.

I was selected as a Fulbright Scholar from Nepal for Environmental Management study (MEM) at Nicholas School of Earth and Environmental Sciences, in Duke University, US. The Fulbright Program is an international educational exchange program established in 1946 under legislation introduced by the late Senator J. William Fulbright. Its purpose is to increase mutual understanding and peaceful relations between the people of the United States and the people of other countries.

Check other fulbrighters from across the world selected for studies in US in 2005....

I am currenly working with Prof. Ana P. Barros at Pratt School of Enginnering on Simulating energy fluxes using One-Dimensional version of Land-Surface Hydrology Model in Florida region, for my summer Internship (May-August 2006) at Duke University.

e-mail: rmanandhar@unfccc.int

ADAPTATION-FROM ASSESSMENT TO IMPLEMENTATION: PERSPECTIVES

Rojina Manandhar UNFCCC

CONTEXT

Different articles under the Convention call for cooperation in preparing for adaptation to the impacts of climate change, develop and elaborate appropriate and integrated plans for coastal zone management, water resources and agriculture. The Bali action plan identifies the need for enhanced action on adaptation by Parties to the Convention. Parties to the Convention must submit national reports on implementation of the Convention to the Conference of the Parties (COP). National communications contain information on national circumstances, vulnerability assessment, financial resources and transfer of technology, and education, training and public awareness. Water resources and agriculture have been idenfied as key vulernable sectors in national communications of non-Annex I Parties.

ADAPTATION ACTIONS UNDER UNFCCC PROCESS

The Nairobi work programme on impacts, vulnerability and adaptation to climate change, a global framework on adaptation, aims to help all countries improve their understanding and assessment of the impacts of climate change and to make informed decisions on practical adaptation actions and measures. Parties are also elaborating ways of implementing adaptation, under the Subsidiary Body for Implementation (SBI), including through the Buenos Aires Programme of Work (Decision 1/CP.10), so as to respond to the adverse effects of climate change and meet adaptation needs and concerns, especially those of developing country Parties. Within the Ad Hoc Working Group on Long-term Cooperative Action under the Convention (AWG-LCA), Parties have identified four areas as important elements to advance implementation of adaptation actions: national planning for adaptation; streamlining and scaling up financial and technological support; enhancing knowledge sharing; and institutional arrangements. National Adaptation Programmes of Action (NAPAs) provide a process for Least Developed Countries (LDCs) to identify priority activities that respond to their urgent and immediate needs with regard to adaptation to climate change. Rationale for NAPA rests on low adaptive capacity of LDCs.

FINANCIAL PROVISIONS UNDER UNFCCC AND KP

Funding for adaptation is provided through the financial mechanism of the Convention, currently operated by the Global Environment Facility. Funds managed by the GEF (Strategic Priority on Adaptation (SPA), Least Developed Countries Fund (LDCF) and Special Climate Change Fund (SCCF)) available for adaptation projects currently adds to about 275 million USD. A further source of funding is the Adaptation Fund (AF) under the Kyoto Protocol managed by the Adaptation Fund Board (AFB) and established at COP13. The Adaptation Fund currently holds 425 million USD till 2012.

CHALLENGES AND FUTURE DISCUSSIONS

There are existing challenges in accessing exisiting funding for adaptation. Gap exists between the available financial support for adaptation and the funds required for facilitating adaptation in developing countries. There is a need for additional, sufficient, predictable and sustainable financial resources, for diversifying the sources of these resources.

IYNGARARASAN MYLVAKANAM

Position:Coordinator (ABD Secretariat)
Phone:+66 02 288-2253
Area(s) of Expertise: Mylvakanam Iyngararasan heads the RRCAP team on emerging environmental issues. He formulates and implements projects on emerging environmental issues with extensive consultation with Governments, scientific institutions, sub-regional partners, and international agencies. Mr. Iyngararasan holds a Master of Engineering degree from School of Civil Engineering, Asian Institute of Technology, Bangkok, Thailand and a B.Sc. (Agricultural Engineering) form the University of Peradeniya, Sri Lanka. He joined the Regional Resource Center (RRCAP) initially as Reasearch Associate in September 1993. He was appointed as the head of emerging issue component in January 2001. He has 13 years experience in regional cooperation, stakeholders consultation and capacity building for monitoring emerging environmental issues. He has been involved in the development of Malé Declaration, establishment of EANET (East Asian Network on Acid Deposition) Secretariat at UNEP; and a scientific contact person at RRC.AP for the atmospheric environmental issues such as ABC, Dust and Sandstorms, and Glacial lake outburst floods.

e-mail: mylvakanam.iyngararasan@rrcap.unep.org

BRIDGING THE SCIENCE AND POLICY FOR CONTROL AND PREVENTION OF ATMOSPHERIC ISSUES

Iyngararasan Mhylvakanam, UNEP

Policies and infrastructure, which will decide the emissions in the next 25 years, are being planned now. There is an opportunity to choose an alternative development pathway to achieve societal goals avoiding some of the projected impacts of atmospheric emissions. Development and implementation of alternative pathways, which include strategies for adaptation and mitigation, should be supported by sound science. There is a need to facilitate interactions between scientific and policy-making process so that the policy-makers are equipped with science-based information and tools when the policy options are designed for adaptation and mitigation measures. By integrating science and policy with enhanced regional cooperation, it will be possible to avoid the impacts of atmospheric emissions. The Acid Deposition Monitoring Network in East Asia (EANET), Malé Declaration on control and prevention of air pollution and its likely transboundary effects for South Asia (Malé Declaration), and the project Atmospheric Brown Cloud (ABC) are good examples for facilitating the science – policy interactions on atmospheric issues in Asia.

EANET

The process for the establishment of the EANET was started in 1993 as an expert group meeting. Based on the discussion at the expert meetings, the First Session of the Intergovernmental Meeting on the EANET was held in March 1998. By 2005, there were 13 participating countries, namely: Cambodia, China, Indonesia, Japan, Lao.P.D.R., Malaysia, Mongolia, Myanmar, Philippines, Republic of Korea, Russia, Thailand and Viet Nam. In the preparatory phase of three years, harmonized guidelines were prepared and the participating countries developed further their national monitoring networks. Since then, EANET has been engaged in Acid deposition monitoring in the participating countries using common methodologies and provides sound science for policy making in the member countries.

MALÉ DECLARATION

Malé Declaration was started in April 1998 after the Governing Council of the South Asia Cooperative Environment Programme (SACEP) approved a UNEP sponsored draft Declaration on the Control and Prevention of Air Pollution and its likely Transboundary Effects for South Asia. The countries participating are Bangladesh, Bhutan, India, Iran, Maldives, Nepal, Pakistan and Sri Lanka. The implemented of the Declaration started with the compilation of baseline information and establishment of network of scientists and policy makers. Consequently, a capacity building programme for monitoring, impact assessment, and measures for adaptation and mitigation were initiated. Analysis of data has begun and inputs for policy measures and other regional understanding will follow.

ATMOSPHERIC BROWN CLOUD

Recognizing the importance of profound impacts of aerosols, as an emerging environmental issue, on regional climate, human health, crop yield and rainfall patterns, UNEP commissioned Project ABC in 2002 in collaboration with a team of distinguished international scientists. The project aims to study ABCs and its impacts to provide a scientific basis for informed decision making. The project has made progress in regional capacity building, including much needed physical infrastructure to monitor a broad range of atmospheric parameters, and identification of regional and megacity ABC hotspots that helped understand the science and impacts of ABCs.

ROBERTO TELLARINI

Roberto TELLARINI : C.E.O. of ACTELIOS S.p.A.
_ Degree in Mechanical Engineering by Politecnico University of Milan (major : energy)
_ Master in Production Engineering

Roberto TELLARINI started his professional career in 1984 with Franco Tosi Industriale (Pesenti Group) as Project Engineer and then as Project Manager. In 1989 he joined Pomini (Techint Group) as Proposal and Project Manager.
In 1991 he joined Sondel (Falck Group) working as Responsible for the construction of the Sesto S. Giovanni combined cycle plant. Afterwards he became Responsible of the strategic development of the Company, then Assistant to the Chief Executive Officer and finally Deputy General Manager.
In 2001 he joined Atel Energia S.r.l. (Atel Group) as General Manager.
Since September 2004 he is the Chief Executive Officer of Actelios S.p.A. (Falck Group) a Company, listed in the Star segment on the Milan Stock Exchange, that produces Energy from Renewable Sources.

Other positions in the Group:
• President of Frullo Energia Ambiente S.r.l.
• Vice President of Ecosesto S.p.A.
• Member of Elettroambiente S.p.A.'s Board Directors
• Member of P.E.A. S.c.p.A.'s Board Directors
• Member of Powercrop S.r.l.'s Board Directors
• Member of Actagri's Board Directors

Currently he holds other position :
• he is registered as Member of Assoelettrica's Board and is a Member of Assolombarda's technical committee (energy and environmental sector

e-mail: tellarini.actelios@falck.it

WE STARTED WITH KARAKORUM EARTH ECOLOGICAL ACTIVITY FOR REFUSE TREATMENT AT HIGH ALTITUDE

Roberto Tellarini, CEO Actelios Spa, Falck Group.

We started our mountain challenge in Karakorum and Everest, together with the Ev-K?-CNR, with an applied research project named EARTH - Ecological Activity For Refuse Treatment At High-Altitude, aimed at helping safeguard the environment in high altitude areas.
This project uses a prototype piece of equipment for the thermal treatment of waste from alpine expeditions, trekking, the local communities and high mountain parks, which is designed to operate in extreme weather conditions, where the thin air and total absence of electrical energy result in the requirement to find state of the art technological solutions.
Actelios couldn't stop here. We consolidated our partnership with Ev-K?-CNR and installed the Everest Pyramid with photovoltaic panels and this is not our final destination but merely the starting point for new challenges which have environmental protections as their main objective.
Actelios's mission is to create value through the development of innovative and competitive projects that provide solutions to environmental issues throughout the country and in specific industrial sectors, in accordance with the principles of sustainable development and the terms of the Kyoto Protocol. The plants are constructed applying the most innovative technology, which allows high volumes of energy to be generated while maintaining emissions to the atmosphere at levels significantly lower than those prescribed by law.
Actelios is one of the main players in the renewable energy market and has the first Italian centre of excellence for the production of energy from renewable sources, where both solar and biomass work together, both of which represent sources of zero impact energy in terms of carbon dioxide and greenhouse gases. The photovoltaic element of this centre, which is located in Rende in the Italian province of Cosenza, was constructed using materials that are entirely recyclable at the end of their useful life.
Actelios believes, and invests significantly, in the photovoltaic sector; for this reason Actelios Solar was set up recently and currently has approximately 50MW of projects in the pipeline.
Our commitment to the biomass sector is also considerable, and through Powercrop, a joint venture with Seci Energia of the Maccaferri Group, Actelios is involved in the conversion of five Italian sugar refineries that were closed down following the EC reform of the sugar industry, into plants with a total installed capacity of approximately 150MW.
Actagri plays an important role in the vegetable biomass field, this time for the production of biogas, and by the end of this year it will have its first operating plant.
Finally, Actelios continues to support waste to energy as the means of solving the waste disposal issue while safeguarding the environment: the use of innovative technology at the plants, allows the fraction of waste, after recycling, that would normally be sent to landfills, to be recovered and reused to generate energy: a ton of waste processed in this way is equivalent to approximately two barrels of oil.

ROSALAURA ROMEO

Programme Officer
Mountain Partnership Secretariat
Food and Agriculture Organization of the United Nations (FAO)

ACADEMIC BACKGROUND

- MSc in Agriculture – main subjects: Agronomy, Animal husbandry, Economy, Food Technology - Faculty of Agriculture, University of Viterbo, Italy
- Integrated Watershed Management Course, Institute for Resources, Environment and Sustainability (distance learning programme), University of British Columbia , Canada

AREAS OF EXPERTISE

- Sustainable mountain development
- Forestry research and education
- Agricultural research
- International processes
- Promoting international alliances

PROFESSIONAL OVERVIEW

Food and Agricultural Organization (FAO)

Forestry Department:

2003 – to present: programme officer, Mountain Partnership Secretariat (MPS) - main areas of responsibility include:

- promote members' active involvement in MP activities, namely in the following initiatives: Sustainable Livelihoods, Research, Watershed Management, Gender, Policy and Law, Europe, Andes and Central Asia
- responsible for coordination of the following cross-cutting activities: a) feasibility study for the diffusion of the broadband technology in mountain area; b) potential of the microfinance tool for the sustainable development of mountains
- relations with members
- relations with donors
- drafting of project proposals
- representing the Secretariat at regional and international event
- organization of international events

1999 – 2003: forestry officer, International Year of Mountains Coordination Unit; main areas of responsibility include:

- contribution to the coordination of the Year
- relations with the National Committees established by countries to observe the year
- outreach
- relations with donors
- technical organization of events

1993 – 1999: consultant on Forestry Research and Education

- contribution to FAO normative work in these areas
- backstopping of projects
- drafting of project proposal
- preparation of background documents

AGRICULTURAL DEPARTMENT:

1989 – 1992: associated professional officer on agricultural research

- ontribution to FAO normative work in this area
- contribution to the backstopping of projects
- participation in research review missions (looking at the NARS system)
- creation of a database on NARS

CERFE – ITALIAN NGO

- 1997 - Latin America desk officer

ITALIAN MINISTRY OF FOREIGN AFFAIRS

- 1987: fellowship to assist an Italian member of the advisory group of the CGIAR
- 1988: food technology expert in an Italian funded project in Argentina

e-mail: rosalaura.romeo@fao.or

HIGH VALUE MOUNTAIN PRODUCTS AS A MEANS FOR PROMOTING FOOD SECURITY IN MOUNTAIN AREAS

Rosalaura Romeo, FAO

There is increasing demand around the world for high-quality, high-value products such as coffee, honey, herbs and spices or speciality items such as handicrafts, cosmetics and medicines, many of which come from mountain areas. This 'globalization of markets' is offering important new opportunities for competitive producers at the national, regional and international levels.

But even although many of these sought-after products and services come from mountain areas, mountain people rarely exploit the market potential and reap the benefits. Indeed, they are often still engaged in producing staple commodities whose prices are declining and markets are being squeezed.

The potential for high-quality, high-value products to increase the incomes and improve the livelihoods of mountain farmers exists in every major region of the world. So how can we transform products from mountains into high-quality, high-value products? And how can we enable mountain people to access niche markets, compete effectively and fetch premium prices for their high-quality, high-value goods and services at home and abroad?

The Mountain Partnership Secretariat has identified this theme as a key one to lift mountain communities out of poverty and hunger and it is facilitating the work of many Mountain Partnership members in order to provide a mechanism for sharing best practices and key lessons.

Our effort aims at bringing together partners from countries, UN agencies, IGOs, NGOs and the private sector to provide mountain people with the organization, market linkages, technology and know-how that will enable them to participate in markets for high-quality, high-value mountain products in the rapidly expanding urban centres of developing countries and for export to more industrialized countries.

STEPHEN A K MAGEZI

MEMBERSHIP TO VARIOUS ORGANISATIONS
- He is a Registered Environmental Practitioner and Auditor
- He has been a member of the World Meteorological Organisation (WMO) Commission for Atmospheric Sciences since 1983.
- He is a Member of the Working Group III of the Inter-Governmental Panel on Climate Change.
- He is a Member of Uganda's Meteorological Society.
- He is a Member of the Kenya Meteorological Society.

KEY QUALIFICATIONS:
S.A.K. Magezi is the Commissioner for Meteorology, Uganda's Permanent Representative with the World Meteorological Organisation {WMO) and also has been the United Nations Framework Convention on Climate Change (UNFCCC) focal person in Uganda. He is also one of Uganda's National Environment Management Authority's registered / certified Environmental Practitioners and Environmental Auditors. He has taught the Post Graduate Diploma course in Meteorology at Makerere University. He has been recognised by the Intergovernmental Panel on Climate Change (IPCC) as one of the 2000 scientists who contributed to IPCC winning the 2007 Nobel Peace Prise as a Lead Author. He is widely trained in Atmospheric and other Environmental sciences particularly with respect to Environmental Monitoring, Environmental Management, Climate change studies, climate change monitoring, Environmental Impact Assessments and Atmospheric Pollution studies. In the energy sector he was secretary to the energy and climate change task force in the development of the National Environment Action Plan for Uganda (1992-1994). He has worked on the energy policy implications of United Nations Framework Convention for Climate Change (UNFCCC) on the development of an efficient transport system in Sub-Saharan Africa (1995-1997). He has worked with Long Range Energy Planning (LEAP) models for energy studies and Climate change in Uganda (1995 to 2001). He has carried out an inventory of the green house gas emissions arising out of the energy sector in Uganda (1995-96). As commissioner for meteorology, he is conversant with the climatology of Uganda with respect to solar and wind energy potential in East Africa (1980-2000). He has been team leader on many Environment Impact Assessment (EIA) assignments in Uganda. He has a special training in Tropical Urban Pollution Potential Assessment.

EDUCATION:

1999	• Participated in a UREA organised course on the design and sizing of Photo Voltaic Systems.
Oct-Nov, 1996	• Certificate in Environmental Impact Assessment Practice (Makerere University, ODA & British Council).
Nov-Dec. 1995	• Postgraduate Dip. in Environment Management, Galilee College, Israel.
April 1990	• UNDP/FAO assisted programme on Environmental Protection Campaign and Community Forestry.
1983-1985	• M.Sc. (Meteorology) (Tropical Urban Pollution) University of Reading, U.K.
Jun-July 1987	• FAO/UNDP/WMO/ESA Training Course on Remote Sensing Applications to Agricultural Drought and Desertification, Rome, Italy.
1975-1975	• WMO Class I Certificate, East African Institute of Meteorological Training and Research, Nairobi-Kenya.
1974-1975	• Post-Graduate Dip. in Meteorology, University of Nairobi-Kenya
1971-74	• B.Sc. (Hons) Physics, Makerere University-Uganda

RELEVANT EXPERIENCE RECORD:
1 Lecturer at Makerere University 1998-99 He has been visiting lecturer and academic at Makerere University Teaching Instruments and Methods of Observation and Climate Change Impacts 2 Initial National Communication to the United Nations framework Convention on Climate Change – October 2002 • He was the lead consultant for the preparation of Uganda's initial communication to the UNFCCC completed by October 2002. 3 Climate –environment Interactions Project: 2003-2007 • He was among a team of scientists from Universities and Scientific Institutions under Michigan State University (USA) who were assessing climate change environment interactions/impacts in the East African Region 4 Adaptation Policy Framework to climate change impacts: - 2002 to date • He was one the fourteen member international team of lead authors preparing an Adaptation Policy Framework for the impacts of climate change for the developing countries. The work was a supported by the Global Environment Facility 5 Climate Change Impacts and Mitigation Measures for Uganda, 1997-1998 • He carried out a study on Climate Change Impacts and Mitigation Measures for Uganda in the Road Transport Sector. This work which involved the use of long-range Energy Planning (LEAP) models was supported by the African Energy Planning Research Network and the Norwegian Government 6 Energy and Climate Change Theme Group, 1995-1997 • He was a nominated Principal Researcher for the Energy and Climate Change theme group, which is handling opportunities and policy implications of the UNFCCC on the development of an efficient transport sector in Sub-Saharan Africa including the development of appropriate transport infrastructure for the sub-region. 7 African Case Studies on Incremental Costs: 1996 • He carried out a study on the incremental costs of greenhouse gas mitigation in Kampala's transport sector testing a number of energy scenarios up to the year 2010. The Global Environment Facility (GEF) supported this work. 8 Clean Development Mechanism (CDM) Project, 2000 • He has reviewed outstanding/current Project Proposals in the Transport Sector in Uganda to Identify those which may be suitable for consideration under the Clean Development Mechanism (CDM) of the Kyoto Protocol 9 Vulnerability Assessment to Environmental/CC Impact for Uganda, 1994-1997 • He carried out in conjunction with Ministry of Agriculture, Animal Industry and Fisheries, Departments of Forestry and Water a Vulnerability assessment to environmental/CC Impacts for Uganda. GEF and the World Resources Institute supported this work. 10 Climate Change Impacts and Mitigation Measures for Uganda, 1997-1998 • He carried out a study on Climate Change Impacts and Mitigation Measures for Uganda in the Road Transport Sector. This work which involved the use of long-range Energy Planning (LEAP) models is supported by the African Energy Planning Research Network and the Norwegian Government 11 IPCC working Group III • He is Uganda's Member to the Working Group III of the Inter-Governmental Panel on Climate Change (IPCC) 12 Climate and Africa Project 1994 • He has been Researcher for the Climate and Africa project and has prepared the Uganda status report. His main contribution covered climate change, energy and transportation related GHG emissions as well as climatic change abatement and mitigation strategies for Uganda. 13 Greenhouse Gas Emissions 1993-94 • He was a Consultant Researcher to the Greenhouse Gas Emissions Inventory Programme. The main task was to determine the man made emissions and pollutants from all over Uganda particularly those related to the petroleum fuels and the transportation sector. This work was completed in June 1994. 14 IPCC-Workshop 1992 • He organised the first ever WMO Inter-Governmental Panel on Climate Change workshop to take place in Uganda. The workshop studied the relevancy of Industrial energy consumption to Environmental damage and climate change. 15 NATCOM-1991-92 • He was a Member of the National Committee on the United Nations Conference on Environment and Development (UNCED) and was appointed Chairman of the Committee on Climate Change and Transboundary Air Pollution during the preparation of the country report for the United Nations Conference on Environment and Development.

CLIMATE VARIABILITY AND CHANGE AS THEY IMPACT ON THE FOOD AVAILABILITY IN UGANDA

Paper presented at the conference "Mountains: Energy, Water and food for life. The SHARE Project: Understanding the Impacts of Climate Change"

SAK Magezi, Commissioner for Meteorology, Uganda Meteorological Department

The main stay of Uganda's Economy is rain fed agriculture and over 80% of the working population is involved in the agricultural sector. Like most of the LDCs the country heavily depends on the exploitation of natural resources such as forest products and water resources among others. There is an important feedback between exploitation of natural resources and climate change forcing. Increased climate change leads to further land degradation and the cycle goes on. This will make the attainment of the Millenuim Development Goals (MDGs) even more difficult particularly the goal aimed at eradication of hunger and poverty. A limited preliminary Vulnerability to Climate change study has been carried out covering agriculture (Crop and Livestock), water resources, and the forestry sectors. All models used predicted an increase in temperatures of between 2 and 4 degrees centigrade. It is anticipated that this will lead to serious increase in the frequency and severity of severe weather events especially floods, drought, hail and severe storms. These will lead to increased stress in terms of food production and the secondary aspects related to poverty and food security.

Observations show that the climate change impacts are already being felt in Uganda. These now include those directly affecting agriculture which are:
- Severe droughts whose frequency has raised several fold since the 1980's (Fig 1) and accompanying floods during the El Nino years for example;
- Melting of the ice cap over the Rwenzori Mountains that has led to instability in the river flows out of the mountain areas. This affected agriculture;
- Increased soil erosion and siltation of the lakes and rivers;
- Water stress along the cattle corridor of Uganda

The indirect impacts have also been observed which include the following:
- Increased malaria incidences especially among the children;
- Increased incidences of cholera and respiratory infections; and
- Increased plant pests;

All these have led to increased poor health in spite of the efforts of government to address the MDGs. Poor health directly feeds tom poverty and food insecurity for peasant communities such as those found in Uganda. On the other hand, there are various feed back mechanisms that have a tendency to reinforce climate change. Key among these is poverty and hunger. Because of hunger more people have invaded the forest and other delicate ecosystems such as wetlands and mountain ecosystems just to make ends meet. For example, various studies in Uganda have reported that the country is losing its forest cover through deforestation. (e.g. Forest Department, 2000; Ministry of Finance, Planning and Economic Development, 1994; Foof and Agricultural Organization, 2000 – cited in UNDP, 2004) report estimates of varying annual deforestation rates from 550 km2 per year to 700 km2-2,000 km2 per year, primarily due to deforestation for agricultural land. This has the tendency to reinforce global warming and subsequently climate change. As a way forward, it is recognized that there are two ways to handle climate change. The first one is mitigation where one tries to remove the emissions (sequestration) from the atmosphere and the second one is adaptation where one tries to adapt to live in spite of the climate change. Because Uganda's and indeed Africa's emissions are so few (apart from RSA and Egypt) compared to the Global average, what ever mitigation measures Africa puts in place, the impact to the over all emissions is likely to be insignificant. The main option is to adapt except in cases where mitigation measures make business sense and are in line with Uganda's sustainable development criteria.

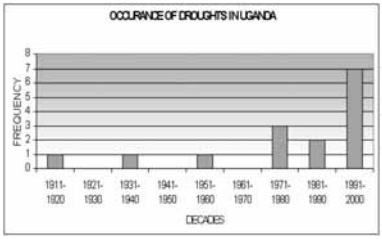


Fig 01: Frequency of droughts in Uganda
Source: Department of Meteorology Uganda

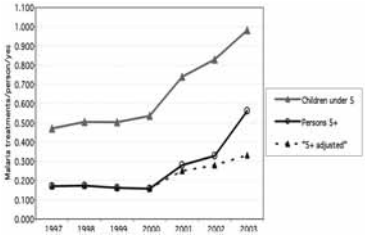


Fig 02 - Reported malaria morbidity in Uganda
Source: Ministry of Health, Uganda

MAURO CENTRITTO

Name: Mauro Centritto **Birth date**: 17 January 1958 **Nationality**: Italian
Contact: Institute of Agro-Environmental & Forest Biology (IBAF), National Research Council (CNR), via Salaria km. 29,300, 00015 Monterotondo Scalo (RM), Italy; tel. +39 06 90672 731; fax +39 06 906 4492; email: mauro.centritto@cnr.it.
Education: Doctorate degree in Agricultural Sciences, University of Naples, Italy; Ph.D. in Biological Sciences, Institute of Ecology and Resource Management, Faculty of Science and Engineering, University of Edinburgh, UK.
Overseas Experience (visits for research, teaching or study-tour): Argentina, Austria, Belgium, Bulgaria, China, Croatia, Finland, France, Germany, Greece, Hungary, Israel, Lebanon, Morocco,Netherlands, Pakistan, Philippines, Slovenia, South Africa, Spain, Sweden, Switzerland, Tunisia, United Kingdom.
Research Fields: Environmental Biology and Environmental Physiology of Plants, Agricultural and Forest Meteorology, Agronomy. Special interests in regulation of growth and functioning of plants subjected to environmental perturbation, extreme environments (water and carbon relations, growth and survival, energy balance; natural and polluted environments), carbon sequestration and evaporation of water in relation to global environmental change. Plant trace-gas emissions: study of the relationship between isoprenoid emissions and photosynthesis; Study of the relationships between biogenic emissions and the environment; identification of BVOC species, emission inventories and emission quantification; multiple roles of biodiversity in biogeochemical cycles (assessing the consequences of conflicts between climate-change mitigation and biodiversity protection). Monitoring characteristics and stress conditions of vegetation cover using remote sensing techniques.
Project coordinator: Over the past 15 years he has led research teams working on agricultural and forest related topics including: carbon assimilation and transpiration in agroforestry systems; photosynthesis, growth and carbon allocation; impact of elevated CO2 concentration and rising temperature on the physiology and growth of agricultural and forest ecosystems; plant growth and water use efficiency along the gradient of desertification; multiple roles of biodiversity in biogeochemical cycles to comply with the Kyoto protocol: conflicts between climate-change
mitigation and biodiversity protection.
Teaching Experience: Taught a variety of university courses at the University of Molise (Italy), supervisor of PhD and Postdoc students, many from overseas. Visiting Professor in China and Marocco.
Consultancy: Consultant of the Italian IPCC Focal Point. Consultancy fields: global carbon balance, climate change, teaching ecology, advice on postgraduate training, carbon sequestration and Joint Implementation.
Organisational skills: Member of the scientific committee of the Conference Forest Ecosystem: Ecology, Conservation and Sustainable Management, August 15-21, 2000, Chengdu, China. 2
Member of the scientific committee of the European Union High-Level Scientific Conferences Photosynthesis in a Changing World, May 27 - June 3, 2003, Chania, Crete, Greece.
Member of the International Organising Committee del Second Mediterranean Conference Water Resources in the Mediterranean Basin (WATMED 2), November 14-17, 2005, Marrakesh, Morocco
Member of the Scientific Committee of the International Conference IUFRO 'Forest and Water in a Changing Environment', August 8-10, 2006, Beijing, China.
Member of the Scientific Committee of The 3rd International Conference on the Water Resources in the Mediterranean Basin WATMED 3, November 1-3, 2006, Tripoli, Lebanon.
Member of the Organising Committee of the International Workshop on Carbon and Water Exchange in Plants under Changing Climatic Conditions, November 5-6, 2007, Rawalpindi, Pakistan.

GLOBAL CHANGE, LAND USE PATTERN AND CROP PRODUCTIVITY: IMPLICATIONS FOR ARID ENVIRONMENTS

Mauro Centritto Institute of Agro-Environmental & Forest Biology, National Research Council Via Salaria km 29,300, 00015 Monterotondo Scalo (RM), Italy.
E-mail: mauro.centritto@ibaf.cnr.it

At a global scale, 40% of crop production comes from the 16% of agricultural land that is irrigated, including much of the critical rice-growing areas. Thus, it is worrying to watch the two clocks on the International Rice Research Institute's homepage; with the population clock counting up (6.7 billion people, with half of this number predominantly dependent on rice), while the productive arable land clock is counting down. Agriculture requires more land, water, and human labor than any other industry. Continued increases in agricultural production will require sustained or increased supply of irrigation water. However, overpumping is a serious concern in many regions, old reservoirs are losing capacity due to siltation. Moreover, scarcity of water can be expected to increase as competition for withdrawals increases with human population growth and development. In addition to being an important user of a limited water supply, irrigated agricultural lands in the driest areas of the world, which are already home to more than 2 billion people, are being continuously degraded by salinization and waterlogging. In developing countries, approximately 15 million ha have experienced reduced yields due to salt buildup and waterlogging. Anthropogenic climate change is projected to further reduce the resilience of the agricultural sector. Climate change will affect food systems in several ways including direct effects on crop production, e.g. changes in rainfall leading to drought or flooding, or warmer temperatures leading to changes in the length of growing season and to increased water demand. Today, 30% of farmers in developing countries are food-insecure. Increasing temperatures and declining precipitation over semiarid regions are likely to reduce yields for corn, wheat, rice, and other primary crops in the next two decades. Thus, climate change may impact these undernourished communities by decreasing local yields while contributing to a global increase in commodity prices through significant global reduction in the production of primary crops. Moreover, arid areas may become hotter and dryer aggravating the process of land degradation and desertification. These changes may have a severe impact on global food security. However, the relative importance of climate change for food security will vary substantially within individual regions according to differences in biophysical resources, management, and other factors. Recent studies indicate that, without sufficient adaptation and mitigation measures, developing countries will likely suffer negative impacts on several crops that are important to large food-insecure human populations. Adaptation and mitigation are key factors that will shape the future severity of climate change impacts on food production. The identification of appropriate measures will result in strategies that can greatly reduce poor people's vulnerability to climate change by contributing to reduced risk and enhanced resilience of agricultural systems, through new "climate proof" crops (i.e., switching from highly impacted to less impacted crops), improved seed, fertilizer, land use, and governance.

ELISA VUILLERMOZ

Education
1996 – School leaving certificate awarded after five years of linguistic studies at Regina M. Adelaide Institute in Aosta
2000 – National Certificate of horse riding teacher
2003 – Environmental science degree at the University Milan Bicocca, Italy
Linguistc knowledge
Italian, French and English:
Professional experience
From May 1st 2008. Ev-K2-CNR Executive Coordinator of SHARE (Stations at High Altitude for Research in the Environment) program, and UNEP focal point.
February March 2007 and 2008. researcher involved in the field mission at the Pyramid Laboratory/Observatory for the calibration of the instruments at the Nepal Climate Observatory-Pyramid (NCO-P).
December 2006. Participation in the Second International Training School on AtmosphericBrown Clouds (ABC) organized by UNEP in the framework of ABC Project. The training course was held in December 4-14 at the Asian Institute of Technology (AIT) – UNEP RRC.AP office and at the Maldives Climate Observatory - Hanimadhoo (MCOH).
January-March 2006. researcher involved in the field mission at the Pyramid Laboratory/Observatory for the installation of the ABC-Pyramid Laboratory, UNEPAtmospheric Brown Clouds Project (ABC) Complementary Site and participation in the basic training course carried out for the Pyramid local technicians for instrumentation daily check, high volume and flasks weekly samplings and instruments maintenance basic procedures.
April 2005. researcher involved in the Ev-K2-CNR Project: Climatic study in the Himalayan region during the spring mission in Nepal (Pyramid Laboratory/Observatory) doing the following activities:
1. Pyramid MeteoNetwork data downnloading
2. Stations check and damage sensors substitution
From February 2005: environmental science technical and research assistant at the Ev-K2-CNR Committee
September-October 2004: researcher involved in the Ev-K2-CNR Project: Climatic study in the Himalayan region during the spring mission in Nepal (Pyramid Laboratory/Observatory) doing the following activities:
1. Pyramid MeteoNetwork data downnloading
2. stations check and damage sensors substitution
January-March 2004: Temporary collaboration in the project: Creation of the historicaldatabase (1984-2003) of the Italian CNR-Water Research Institute (CNR-IRSA, Brugherio,Milan, Italy) limnological analytical data.
January-December 2004: field researcher during the Italian Alpine scientific expedition "K2 2004–50 years later" involved in two research environmental sciences projects: projects:
1. Determination of pollutants species (nutrients, macroconstituents, persistent organic micropollutanta, trace metals) in K2 Southern slope snow depositions.
2. Climatic studies in Karakorum: implementation of an automatic weather station in the Baltoro glacier (Urdukas, 4000 m a.s.l.).
October 2003-March 2004: Co-examiner in the drawing up of the degree thesis "Autochthonous and allochthonous abiotic factors that influenced Pusiano Lake water quality".
Degree thesis in Environmental Sciences.
February 2002-July 2003: degree thesis at the CNR IRSA (Italian National Research Council-Water Research Institute), Brugherio, Milan laboratory. Main duties:
_ Lake and river sampling activities
_ Determination of the main hydrochemical parameters of lake and river samplings
_ Sampling and chemical-physics analysis of precipitation samplings
_ Use of UV-VIS spectrophotometer
_ Use of ionic chromatograph
_ Use of pH-meter
_ Use of conduttimeter
_ Alkalinity determination
_ Quality controls of laboratori procedures
_ Experimental results elaboration

E-mail: elisa.vuillermoz@evk2cnr.org

EV-K2-CNR: 20 YEARS OF RESEARCH ACTIVITIES IN HIMALAYA AND IN THE WORLD

E. Vuillermoz

Ev-K2-CNR Committee, Via San Bernardino, 145 – 24126 Bergamo, Italy

The Ev-K2-CNR project began in 1987, when 90-year-old explorer and geologist Prof. Ardito Desio launched a new research campaign in the Himalayan and Karakorum mountains with the help of climber and businessman Agostino Da Polenza. Just two years later, the Ev-K2-CNR Committee was registered as an independent non-profit association dedicated to technological and scientific research in the Hindu Kush - Karakorum - Himalaya (HKKH) region, with a particular focus on Nepal, Pakistan and the Tibet Autonomous Region of China. In 2006, the association gained national juridical recognition, and in 2007, to formalize Ev-K2-CNR's close collaboration with the Italian National Research Council (CNR) over the previous two decades, an official "External Research Unit" under CNR's Earth and Environment Department (DTA) was opened at Ev-K2-CNR headquarters.

Ev-K2-CNR is probably best known for the Pyramid International Laboratory-Observatory, the high altitude scientific facility located in Nepal's Sagarmatha National Park at 5,050 m a.s.l., installed in 1990 in collaboration with the Nepal Academy of Science and Technology (NAST). What began as a permanent high altitude research base has evolved to become one of the world's most complex and intriguing study sites, at which nearly 600 research missions have been carried out. Environmental observation and monitoring equipment installed at the Pyramid continuously collects data and information that are transmitted to researchers' institutes and international partners.

Working within a rich network of international collaboration, Ev-K2-CNR today concentrates its efforts on a select set of integrated, multi-disciplinary programs. One such initiative is the program SHARE: Stations at High Altitude for Research on the Environment. The main goal of SHARE is to contribute to the study of climate change and its related impacts and adaptation in mountain regions, providing information on atmospheric composition and meteorology, glaciology, hydrology and limnology, biodiversity and environmental medicine. This ultimately provides important benefits to governments and international agencies, as well as the international scientific community.
As part of the SHARE project, the environmental monitoring activities conducted in the framework of UNEP, WMO, GEWEX, etc. international programmes, supply data useful to several global networks like ABC, CEOP, GAW, AERONET and ILTER. To better respond to critical environmental problems, SHARE, originally operating in the Asiatic Himalayan-Karakorum region, has already expanded in Africa and Europe, and a further expansion to South America is planned. SHARE thus represents an international resource for integrated and multi-disciplinary studies at high altitude areas in the world, aimed at strengthening systemic approaches to sustainable ecosystem management in sensitive areas.

PAOLO BONASONI

Paolo Bonasoni: Doctoral degree in Physics at the University of Bologna. Research scientist at the Institute of Atmospheric Sciences and Climate of C.N.R. and Head of the "Ottavio Vittori" GAW Mt. Cimone Station. Devoted to scientific and experimental research activities. His main research interests concern the study of physical and chemical processes of ozone and other atmospheric compounds in background conditions. He participated to several international projects and has authored over 90 international and national scientific publications.

E-mail:p.bonasoni@isac.cnr.it

THE SHARE PROJECT: STATIONS AT HIGH ALTITUDE FOR RESEARCH ON THE ENVIRONMENT

P. Bonasoni1, 2, E. Vuillermoz2, P. Laj3, 2, F. Salerno4, 2

1 CNR-Institute of Atmospheric Sciences and Climate (ISAC), Bologna, Italy
2 Ev-K2-CNR Committee, Bergamo, Italy
3 CNRS-OBS-UJF, Grenoble, France
4 CNR-Water Research Institute (IRSA), Brugherio, Italy

Mountains represent 27% of the Earth's land surface and they are a unique source of water, energy, minerals, forests and agriculture. They harbour an amazing variety of plants and animals, and are precious reservoirs of biological diversity for food and medicine. "Mountains are barometers of climate change. As the world heats up, mountain glaciers — the source of water for many of the world's river systems and people — are melting at unprecedented rates, while rare plants and animals struggle to survive over ever diminishing areas. Mountain people, already among the world's most disadvantaged, face greater hardships. Understanding how climate change affects mountains, and learning how to manage and mitigate any negative effects, is vital for all of us, wherever we live." (FAO, 2008).

According to the IPCC report (2007), worldwide climate change threatens ecosystem balance and, as a consequence, life on Earth. In a recent General Assembly the United Nation recognized mountains as ideal and vastly representative locations for the study of climate change, calling for an enhancement of research efforts in these areas. For these reasons several international agencies and research institutions are engaged in the evaluation of actions for reducing global warming, and in the development of adaptation and mitigation strategies regarding the potential environmental and socioeconomic consequences.

In 2005 to better respond to critical environmental problems the SHARE project - Stations at High Altitude for Research on the Environment - was promoted by Ev-K2-CNR and supported by CNR, the Italian Ministry of Foreign Affairs and the Ministry of Education, Universities and Research, in collaboration with the Ministry of Economy and Finance and the Ministry of Agricultural and Forestry Policy and by the Italian Cooperation through UNEP, in order to improve knowledge in the fields of atmospheric composition, glaciology, water resources, biodiversity, ecosystem conservation, food security geophysics and natural risks in mountain areas, by making the obtained information available to governments and international agencies. Originally launched as an inte-

grated system of measurements in environmental and Earth sciences in the Himalaya – Karakorum region, SHARE has already expanded to Africa and Europe, and a further expansion to South America is planned. Technological activities and capacity building are also considered important by SHARE and, in particular, local institutions are directly involved in environmental and geophysical monitoring. The project also takes into account relations with the social system, as close collaboration is sought with stakeholders.

SHARE activities are developed according to four distinct tasks:

i) Scientific research. Multi-disciplinary and interdisciplinary scientific research is based on observation and sampling activities conducted at the high mountain stations. In order to study climate change in mountain ecosystems and better understand ongoing processes and phenomena, an integrated approach based on long-term observations is required, along with appropriate climate modelling. Only on the basis of such information can feasible mitigation strategies be developed . Thanks to the excellence and uniqueness of the data collected at its high mountain stations in Asia, Africa and Europe, SHARE provides a contribution to integrated monitoring programs such as UNEP-ABC, WCRP-CEOP, WMO-GAW, NASA-AERONET, ILTER.

ii) System Technology. One of the main reasons knowledge of climate and environmental processes is so limited in mountain areas is because of the objective difficulties of carrying out continuous measurements at high altitudes, especially in developing countries. Advanced technologies for climate change monitoring in high altitude areas are needed in order to perform high quality measurements. A first prototype of a sophisticated technological system is in development to facilitate the measurement activities at high altitude locations. It is being developed to function in extreme environmental conditions, and takes into account the complex logistics often involved in transporting scientific materials to remote, high altitude locations. Known technical difficulties, such as problems related to power supply and the need for real-time data transmission, will also be addressed. This innovative, high-tech, integrated environmental and geophysical monitoring system will be modular and adaptable, making measurements possible where installation of a permanent laboratory or standard station would be too difficult or expensive. The system will also use only renewable energy sources and ensure a low environmental impact.

iii) Electronic Information System. Data will be collected and organized within a synergic and integrated system, so that researchers can optimize their investments, harmonize their databases and improve collaboration. The system will also be made accessible to concerned stakeholders, such as governments, networks, consultants, scientific research institutions, policy-makers and all those interested in sustainable development or the environment. In fact, electronic information systems and databases on environmental monitoring in mountain areas that are accessible to governments and scientific research institutes facilitate the dissemination of knowledge, helping improve the understanding of climate change phenomena and mitigation of the effects.

iv) Capacity Building. The SHARE project supports the sustainable development of mountain regions and improves local environmental management systems by transferring technology and know-how in the fields of environmental and geophysical sciences. The effects of climate change and the consequences of the unsustainable use of mountain resources must be taken into account on both policy and administrative levels. The capacity to integrate such information in national and international development processes must however be strengthened. Institutions and societies need to become even more engaged in addressing the threat of global change, moving beyond emission reduction policy to the adoption of structures and lifestyles adapted to the ongoing social and environmental changes.

FRANCESCO ZARATTI

Born in Rome, Italy, where he earned the grade of "Dottore in Fisica", F.Z. moved to Bolivia in 1973, where he carried out a distinguished academic career.

At present, he teaches Electrodynamics at the Department of Physics of the State University at La Paz and leads the Atmospheric Physics Laboratory, an awarded research and dissemination center in the field of UV radiation, ozone layer and climate, especially at high altitude locations.

He is author and co-author of several books and scientific papers in his field of research, published in domestic and international magazines.

Since 2001 he also acts as a consultant in the field of energy and hydrocarbons. He collaborated as advisor of the President of Bolivia (2004-2005) and published a book and several papers in this area.

F.Z. is also a permanent columnist in one of the most influential newspapers of Bolivia, in topics such as science, society, energy and hydrocarbons, among others. Two books recollect the anthology of his columns.

www.lfabolivia.org
Phone & fax: +591.22799155
PO BOX 2275, La Paz, Bolivia

e-mail: fzaratti@fiumsa.edu.bo

THE MOUNT CHACALTAYA LABORATORY: PAST, PRESENT AND FUTURE

Francesco Zaratti
Atmospheric Physics Laboratory, Institute of Physical Research,
University of San Andrés, La Paz, Bolivia
fzaratti@fiumsa.edu.bo
www.lfabolivia.org

The Mount Chacaltaya Laboratory (MCL), located 30 km from the city of La Paz , at 5300 m asl, is well known as a cosmic ray laboratory that made important contributions to the Elementary Particles Physics in the 40's and 50's of the last century.

At present, even though its importance has decreased due to the competition of particle accelerators and satellite measurements, some relevant projects in that area are still being carried out.

Since its beginnings, the MCL has also hosted instruments and experiments devoted to atmospheric research and health studies at high altitude locations. In addition, the Chacaltaya glacier has attracted the interest of worldwide climatologists, due to its dramatic retreat. In fact, this glacier does not exist anymore.

Recently, the Atmospheric Physics Laboratory has begun to take permanent and field measurements of some relevant atmospheric parameters there, like carbon dioxide, aerosols and ultraviolet irradiance.

Looking towards the future and considering the scarcity of climate change laboratories at high altitudes in the tropical zone of the Southern Hemisphere, the MCL is an excellent candidate for this purpose, due to its peculiar geographic location and the facilities for researchers there.

In this talk, we would like to show some characteristics that make MCL a feasible international center for atmospheric measurements related to the climate change issues and mention some pioneering steps in this direction, in the frame of a regional GAW station and the SHARE project co-operation.

PAOLO LAJ

Dr. Paolo Laj is physicist at the Laboratoire de Météorologie Physique (LaMP) /Observatoire de Physique du Globe (OPGC Clermont-Ferrand-France). He is specialized in the interaction between aerosols and clouds and the indirect effect of aerosol on climate. He is in charge of the coordination of the integrated aerosol project within the national program for atmospheric chemistry (CNRS-PNCA) as well has of the national network for free-tropospheric monitoring stations. He is the leader of the aerosol group at . He participated in several EU projects within FP4 and FP5 and is coordinating the access to infrastructure activity within the NoE ACCENT (FP6). He is the scientific manager of the new I3-FP6 program EUSAAR. He is author or co-author of more than 40 peer-reviewed scientific papers.

e-mail: P.Laj@opgc.univ-bpclermont.fr

THE SHARE - TECHNOLOGY IN THE GLOBAL ATMOSPHERIC OBSERVING SYSTEM

Paolo Laj1, Paolo Bonasoni2

Information on atmospheric composition, from the local to the global scale, is of strategic value in particular for climate related studies. Despite important improvements of Earth observing strategy in the last decade in the development, there is still a crucial need for both consolidation of the existing observation infrastructure and development of a more efficient observing system that would narrow major data and information gaps, and assist stake holders in planning new investments. There is, in the atmospheric science community, a consensus that the observing system should provide well documented, global observations of the chemical composition and physical properties of the atmosphere from pole to pole with temporal, horizontal and vertical resolution sufficient to satisfy and verify current legislation, validate and help to improve our understanding of atmospheric processes and permit accurate predictions of future atmospheric states by providing inputs to forecast models.
Clearly, current gaps in the observing system for atmospheric composition changes are still numerous, in particular for its ground-based component. One of the drawbacks of ground-based networks is related to uneven global and regional coverage of atmospheric observations. A first conclusion from working groups on atmospheric observation strategies points to the need for additional information from the free troposphere. Observations of the free troposphere are needed to understand long-range transport, climate change, trends in the oxidizing capacity of the atmosphere, and as a 'baseline' for the characterization of atmospheric chemistry and physics (IGACO Theme Team, 2004; WMO, 2007). Further analysis of global networks also shows that mountain areas in both Northern and Southern Hemispheres are clearly under-sampled. This is partly due to logistical difficulties to implement research stations in extreme meteorological conditions but also due to the lack of trained personnel.

The SHARE strategy to contribute to the global observation system is clearly oriented to the provision of research data on atmospheric composition from mountain areas, with focus in the Hindu-Kush-Himalaya area. The strategy is based on a two-step action: 1- development of a cost-effective, robust and reliable integrated sampling station for aerosol particle and gases running autonomously in high altitude environments (SHARE-BOX), and 2- provision and rapid diffusion of data and information to the scientific community and to stake-holders involved in management of future environmental changes affecting high altitude areas.
The SHARE-Box program was initiated early 2009 as a joint CNRS/CNR activity, in the framework of SHARE. Preliminary results will be presented as well as the potential of the SHARE-Tech concept for providing key information to assess future environmental modification of the very vulnerable mountain areas, in particular linked to the impact of pollution on frozen water storage and resources.

1 : Laboratoire de Glaciologie et Géophysique de l'Environnement, Grenoble University – CNRS, Grenoble, France
2 : Istituto per lo Studio del Atmosfera e del Clima, CNR, Bologna, Italy

EUSAAR: THE EUROPEAN RESEARCH NETWORK FOR AEROSOL

The EUSAAR network (European Supersites for Atmospheric Aerosol Research) is a distributed network of 20 high quality ground-based measurement stations in Europe. Its primary goal is to integrate the measurement of atmospheric aerosol properties and to ensure harmonization, validation, and data diffusion of long-term measurements of particle optical, physical and chemical properties, as these properties constitute the critical parameters for quantifying key processes and the impact of aerosols on climate and air quality. The monitoring network covers a variety of representative environments from clean maritime to polluted continental, including several stations in extreme environments (e.g., arctic, high altitude). The establishment of the research-oriented EUSAAR network has clearly improved the comparability of measurements, best practices in aerosol monitoring procedures, and the availability of high quality aerosol data from the most advanced monitoring stations currently operational in Europe. There is a clear need to extend EUSAAR-like initiatives beyond the borders of Europe, in particular for the networking of high altitude mountain stations for which data availability is still very scarse.

MARIA TERESA MELIS

Occupational field	Geologist, Specialist in Remote Sensing and GIS technologies Professor in GIS at the University of Cagliari Consultant of the Italian Government of Environment Vice- president of the Italian Association of Remote Sensing Member of the Scientific Board of Ev-K2-CNR Committee European Commission FP7 Expert
EDUCATION AND TRAINING	
Dates	**1/1997- 12/1998**
Title of qualification awarded	Post-doctorate level
Principal subjects	Remote sensing and forest fires researching, GIS application, Land Use change, desertification
Name and type of organisation providing education and training	University of Cagliari, Italy
Dates	**6/1998**
Title of qualification awarded	Post graduate
Principal subjects	ERS SAR and other complementary spaceborne sensors for land use and land cover applications
Name and type of organisation providing education and training	ESA (European Space Agency) - ESRIN
Dates	**1/1993- 02/1995**
Title of qualification awarded	Doctorate
Principal subjects	Applied geology and geomorphology for land use planning in Tigray - Ethiopia
Name and type of organisation providing education and training	University of Genova, Italy
Dates	**01/1991 - 12/1992**
Title of qualification awarded	Post-graduated
Principal subjects/Occupational skills covered	Remote Sensing, Land cover/use change
Name and type of organisation providing education and training	Department of Physics-National Council of Research, Italy
Dates	**11/1981 - 11/1984**
Title of qualification awarded	Graduate level
Name and type of organisation providing education and training	Earth Sciences, Geology
WORK EXPERIENCES	
Dates	06/07
Occupation or position held	Remote Sensing Expert
Main activities and responsibilities	Consultant in remote sensing application and data sharing in the HKKH Partnership for eco-system management
Name and address of employer	Ev- K2- CNR Committee
Type of business or sector	Research and development
Dates	**From 07/06**
Occupation or position held	GIS specialist
Main activities and responsibilities	Implementation of a geographical information system for environmental risk managing.
Name and address of employer	Italian Ministry of Environment, Rome, Italy
Type of business or sector	Governemnt of environmental planning
Dates	**From 02/2006**
Occupation or position held	European Commission FP6/FP7 Expert
Main activities and responsibilities	Consultant evaluator
Name and address of employer	EUROPEAN COMMISSION - RESEARCH DIRECTORATE-GENERAL
Dates	**From 07/2005**
Occupation or position held	Specialist in Remote Sensing
Main activities and responsibilities	Multitemporal analysis of satellite data in the project: "Research, study and the evaluation of environmental impact as a consequence of farming, zootechnical and tourist activity in the National Park of Sagarmatha (Himalayas)". Ground truth and image processing for the evaluation of land use changes.
Name and address of employer	University of Perugia - Italy
Type of business or sector	Research
Dates	**From 02/2005**
Occupation or position held	Specialist in Remote Sensing

Main activities and responsibilities	Land Cover and Land unit mapping of two areas in Marocco and Tunisia –SMAP EU Programme
Name and address of employer	NRD University of Sassari
Type of business or sector	Research and Education
Dates	**From 09/2003 to 12/2003**
Occupation or position held	GIS specialist
Main activities and responsibilities	Implementation of a geographical information system for environmental risk managing. Proposal of a sub regional and regional strategy for environmental knowledge exchange betweeen local organization.
Name and address of employe	Italian Ministry of Environment, Rome, Italy
Type of business or sector	Governemnt of environmental planning
Dates	**From 06/1999 to 06/2003**
Occupation or position held	Researcher and Project Consultant
Main activities and responsibilities	Research in the field of remote sensing and GIS application; project planner and manager of national and EU projects with developing countries, teaching in remote sensing, digital carthography and geographic information system; development of national, regional and university cooperation in the field of natural resources and environmental planning; secretary of the Italian Association of remote sensing.
Name and address of employer	University of Cagliari, Italy
Type of business or sector	Research and Education

e-mail: telegis@unica.it

THE SHARE INFORMATION SYSTEM; AN INTEGRATED GIS DATABASE FOR ENVIRONMENTAL DATA MANAGEMENT IN THE HIGH MOUNTAINS REGIONS.

Maria Teresa Melis (Cagliari University)

The preliminary stages in the design of the information system for the management of environmental data acquired from high altitude stations and field works are presented. The WP3 of the SHARE project plans to develop a database concerning climate monitoring activities at high altitude research stations for the collection of up-to-date information on ongoing research activities in mountains, including an electronic archive of relevant scientific publications according to the specification of international standard and in collaboration with UNEP.
Two principal and integrated actions are planned:
a shared database for the collection, management and access to spatial and non spatial data;
a dedicated thematic portal for the access to distributed databases.
The first point is strongly connected with the experiences of Ev- K2 - CNR Committee in the framework of the Project "Institutional Consolidation for the Coordinated and Integrated Monitoring of Natural Resources towards Sustainable Development and Environmental Conservation in the Hindu Kush-Karakoram- Himalaya Mountain Complex" (also known as HKKH Partnership project). The project that will be finish in June 2009 supports the development of institutional capacities for systemic planning and management of mountain resources at local, national and regional levels. Spatial and non-spatial databases on bio-physical and socio-economic indicators in the project areas were developed in collaboration with ICIMOD (International Centre for Integrated Mountain Development) and a WEB access is available.
GeoNetwork open source has been chosen by the HKKH partners as a platform to maintain the Metadata spatial, satellite images, maps, presentations, posters and bibliographic data. The main goal of the GeoNetwork open source software is to improve the accessibility of a wide variety of data, together with the associated information, at different scale and from multidisciplinary sources, organized and documented in a standard and consistent way. A new central data repository for the project will be established at Ev-K2-CNR. The custodians will provide the metadata of their data sets. They will also provide the data which they wish to share with the partners, stakeholder and/or the general public which should be made clear in the metadata. The custodian of the central repository will ensure regular backup of the repository on appropriate storage media.
The dedicated thematic portal that will developed in SHARE WP3 will provide a single entry point for users to access data and information from the research points and aims to achieve integrated objectives:
setting up a dedicated website (portal) for accessing to databases that collect data from high-altitude stations;
return results regardless of the data format, or where the data are located;
provide results back in a standard easy-to-read, easy-to-understand format;
allow users to determine the type and quality of the data through documentation provided by the participating data centers;
allow users to obtain data sets.
The creation of a database providing information on research in the mountains areas of high altitude aims to sharing the results for scientific and technological knowledge to support the studies into the climate global dynamics and the conservation of high altitude environments in an economic and social development.

FRANCO SALERNO

DATE OF BIRTH: 13/8/1973

EDUCATION:

2001 - Degree in Natural Sciences - Conservation of Nature and its Resources
2002 - Specialization course in Digital Cartography and GIS at the Italian Touring Club, Milan Course in "Environmental policies and Landscape" held by the University of Milan
Sept 2001 – Course on Naturalistic Engineering with AIPIN Genoa.
2005 - Ph.D. on Environmental Sciences at the University of Insubria

PROFESSIONAL EXPERIENCE:

2003 – He held a teaching activity, as GIS expert, at the Course of Applied Ecology and at the Second Level Master "Planning and Protection of surface waters' of the University of Pavia.

2005 – He had 6 months project contract at the Water Research Institute (IRSA)of the National Research Council, on behalf of 'Ev-K2-CNR to realize a high altitude lake GIS in the Sagarmatha National Park (Nepal).

2005 - He was a tutor at the First Level Master in Geographic Information for Economic and Spatial Decision "(GIS expert).

2005 - He was the owner of a professional office for Centro Volta (Co) for the study of the climatic, hydrological and anthropogenic of the Lake of Como Basin

2005 – currently: - Researcher at Water Research Institute (IRSA)of the National Research Council,). Activities: Research on environmental information systems and modelling tools (hydrological and transport of nutrients).

KEY QUALIFICATIONS .

Development of spatial databases (GIS), application of existing surface water models and water quality models, development of new models.
Eutrophication and effects on ecological quality of lakes and rivers.
Theoretical and experimental nutrient loads.
Climatic effect on rivers.
Monitoring assessment plan.

INTERNATIONAL PAPER

2005 Buraschi, E., F. Salerno, C. Monguzzi, G. Barbiero & G. Tartari. 2005. Characterization of the Italian lake-types and identification of their reference sites using anthropogenic pressure factors. Journal of Limnology. 64 (1): 75-84.

2006 Tartari, G., E. Buraschi, D. Copetti, F. Salerno, C. Monguzzi, R. Pagnotta & A. Marchetto. 2006. Characterization of Italian lake types. Verh. Internat. Verein. Limnol., 29: 1811-1816.

Boguniewicz, J., F. Salerno, A.G. Capodaglio & G. Tartari. 2006. Impact of the Lambro River on the state of the Pusiano Lake: an in-stream nutrients modelling approach. Verh. Internat. Verein. Limnol., 29 (3): 1249 -1252.

2008 Tartari G., Salerno F., Buraschi E., Bruccoleri G., Smiraglia C. 2008. Lake surface area variations in the North-Eastern sector of Sagarmatha National Park (Nepal) at the end of the 20th Century by comparison of historical maps. Journal of Limnology 67(2):139-154.

Salerno F., Buraschi E., Bruccoleri G., Tartari G., Smiraglia C. 2008. Glacier surface-area changes in Sagarmatha national park, Nepal, in the second half of the 20th century, by comparison of historical maps. J. of Glaciology 54 (187): 738-752.

2009 Salerno F., G. Tartari. 2009. A coupled approach of surface hydrological modelling and wavelet analysis for understanding the baseflow components of river discharge in karst environments. Journal of Hydrology (in press).

NATIONAL MONOGRAPHS

2006 Salerno, F. & E. Buraschi. 2006. Antropizzazione del territorio In: Gruppo di Lavoro Lago di Como. 2006. Progetto PLINIUS. Criticità e azioni per il recupero della qualità delle acque del Lario. Centro Volta Como. 59–70.

Tartari, G., F. Salerno, R. Mosello & A. Brambilla. 2006. Valutazione del carico di nutrienti dal bacino imbrifero. In: Gruppo di Lavoro Lago di Como. 2006. Progetto PLINIUS. Criticità e azioni per il recupero della qualità delle acque del Lario. Centro Volta Como. 91–98.

C. Rossi, B. Sesana, B. Comin, A. Pintavalle, C. Romanò, P. Roncoroni, M. Corradi, F. Salerno & G. Tartari. 2006. Usi delle acque. In: Gruppo di Lavoro Lago di Como. 2006. Progetto PLINIUS. Criticità e azioni per il recupero della qualità delle acque del Lario. Centro Volta Como. 125–137.

2007 Lami A., Morabito G., Manca M., Mosello R., Tartari G.A., Piscia R., Tartari G., Salerno S., 2007. Influenze climatiche sui corpi lacustri del Sagarmatha National Park, Mount Everest, Nepal. Clima e cambiamenti climatici: le attivitá di ricerca del CNR, Roma - ed. DIPARTIMENTO TERRA E AMBIENTE – CNR. 597-600.

INTERNATIONAL MEETING AND PROCEEDINGS CONFERENCE

2008 Salerno F., Ceppi A., Di Pasquale D. and G. Tartari. 2008. Application potentiality of a cost-effective X-band weather radar for the quantification of precipitation in northern Italy. Proceeding of the conference of Weather Radar and Hydrology (WraH 2008), Grenoble and Autrans (France) 10 – 15 March 2008. P1-015.

Melis M. T., Anfodillo T., Smiraglia C., Diolaiuti G. A., D'agata C., Dessì F., Ficetola F., Salerno F., Basani M., Cuccillato E., Shrestha B., Bajracharya B. Remote sensing application to the knowledge of environmental dynamics for a project of management planning in Central Karakorum National Park, Pakistan. Proc. of the XXI ISPRS (International Society for

Photogrammetry and Remote Sensing) Congress. 3-11 July 2008. Beijing (China). IAPRS, Vol. XXXVII, ISSN 1682-1750: 1103-1108.
Salerno F., Cuccillato E., Muetzelfeldt R., Giannino F., Bajracharya B., Caroli P., Viviano G., Staiano A., Cartenì F., Mazzoleni S. & G. Tartari. 2008. CONCEPT MAPS FOR COMBINING HARD AND SOFT SYSTEM THINKING IN THE MANAGEMENT OF SOCIO-ECOSYSTEMS. Proc. of the 3rd International Conference on Concept Mapping (CMC2008). Tallinn, Estonia & Helsinki, Finland, 22-25 September, 2008. Vol. 1:298-305.

e-mail: salerno@irsa.cnr.it

SHARE PROJECT: THE CAPACITY BUILDING FOR THE MANAGEMENT OF SOCIO-ECOSYSTEMS

F. Salerno1, 2, B. Flurry1, G. Viviano2, S. Thakuri1, E. Vuillermoz1, L. Listo1, F. Stefanoni1, G. Tartari1, 2, R. Ul Hassan1, E. Manfredi2.
1 Ev-K2-CNR Committee, Bergamo, Italy
2 CNR-Water Research Institute (IRSA), Brugherio, Italy

In 2005 to better respond to critical environmental problems the SHARE project - Stations at High Altitude for Research on the Environment - was promoted by Ev-K2-CNR and supported by UNEP, in order to improve knowledge in the fields of atmospheric composition, glaciology, water resources, biodiversity, ecosystem conservation, food security geophysics and natural risks in mountain areas, by making the obtained information available to governments and international agencies. Originally launched as an integrated system of measurements in environmental and Earth sciences in the Himalaya – Karakorum region (Nepal, Pakistan and China), SHARE has already expanded to Africa and Europe, and a further expansion to South America is planned.
SHARE Project started its activities with a concept of capacity building restricted to the involvement of local stakeholders in specific activities as the environmental and geophysical monitoring. In the last years, the SHARE Project has implemented some specific sub-projects as Karakorum Trust-Phase I and HKKH (Hindu Kush-Karakoram-Himalaya) Partnership Project (www.hkkhpartnership.org). These projects had been more devoted than the previous ones to supports a sustainable development of mountain regions and improves local environmental management systems by transferring technology and know-how in the fields of environmental and geophysical sciences. In particular the HKKH Partnership Project aimed at consolidation of institutional capacity for systemic planning and ecosystem management in the region. As a multi-scale initiative, we work together with local, national and regional stakeholders on capacity building and decision support tools (DSTs) for ecosystem management on different temporal and spatial scales. Our activities supported the exchange of data, knowledge and experiences across the region and the development of a management-oriented research framework. This contest has been the right platform to reach the aim of creating a methodology providing suitable tools for the management of mountain areas in developing countries. In fact currently major gaps exist in the knowledge of crucial socio-ecosystem dynamics of the mountains is a no clear mechanism to link research with management priorities.
Key stakeholders have been involved in the iterative process of system conceptualization, development and implementation to assure that real user needs are answered and a sustainable process of improved natural resource management is established. This approach allowed to support the development of a systemic decision making framework through an improved understanding of environmental processes, the promotion of knowledge sharing and the availability of effective decision support tools.
We suggest the use of three kinds of tools:
a) Workshops to develop a common management process for researchers, stakeholders and modelers.
b) Scenario planning exercises to explore possible long-term scenarios for these ecosystems. Scenario planning is a technique means to identify and stimulate analysis around alternative futures as a way of short-circuiting biased and entrenched views of the world and prepare for developments which could not be anticipated by simply extrapolating past trends.
c) Capacity building of resource people involved in the management and study of socio-ecosystem is here considered an essential element in a participatory process that uses scientific and technological resources and tools.
This methodology requires that participants adapt to the overall approach. Through formal and informal training a higher awareness of the aims and the proposed methodologies is required for all actors involved in the process.

In the next future the SHARE Project will increase its activities for the capacity building. In particular in the Northern Areas of Pakistan, the sub-project Karakurum Trust- Phase II and the SEED Project yearn to create of the Central Karakorum National Park (CKNP). We think that a so ambitious aim can be reached only improving the main education levels from the primary school until the scientific capacity of the local university with the final aim to promote the social, economic and environmental development of the region.

CLAUDIO SMIRAGLIA

Claudio Smiraglia is a full Professor of Physical Geography – Geomorphology at the University of Milano, Italy;
President of Italian Glaciological Committee,
Member of AIGEO (Italian Association of Physical Geography and Geomorphology) central council;
Italian correspondent for the International Glaciological Society;
Vice-President of Central Scientific Committee of Italian Alpine Club;
Chairman of the Working Group on Debris Covered Glacier – AIGEO;
Leader of the Glaciology Research Group in the frame of Ev-K2-CNR;
His main research topics regard the recent environmental changes occurring at World's high mountain chains, in particular Alps, Himalaya – Karakoram, Andes and Antartica. His studies deal wiyh yhe geometry varations of mountain glaciers and the relations with climate driving factors.

e-mail: claudio.smiraglia@unimi.it

THE SHARE CONTRIBUTION TO THE KNOWLEDGE OF THE KKH GLACIERS, THE LARGEST ICE MASSES OF OUR PLANET OUTSIDE THE POLAR REGIONS

Claudio Smiraglia, Department of Earth Sciences "A. Desio", University of Milan, Italy

In the highest Asian mountain ranges (e.g. Karakoram and Himalaya) the largest ice masses of the Earth outside the polar region can be found. Runoff from these glaciers feeds rivers that provide water supply for several hundred million people. Most of these glaciers present morphological and typological features very different from other mountain chains, especially the debris cover of their ablation tongue, which has a strong effect on their energy and mass balance. Glaciological studies and observations on the glaciers of Eastern and Central Himalaya (Himalaya strictu sensu) report a very diffused shrinkage of debris-covered glaciers as well as debris-free glaciers which is accelerating in the recent years. More problematic is the definition of the real present behaviour of the Karakoram glaciers; in fact many recent results from satellite images analysis and field surveys point out a large number of advancing glaciers and of surging glacies as well. For giving a contribution to a better knowledge of this topic, in the frame of the SHARE project recent researches and surveys have been carried out on some glaciers of the Karakoram, regarded as significative samples of that mountain chain glaciation. In particular many field and satellite investigations have been devoted to the fluctuations of two glaciers well known from the end of the XIXth century, the Baltoro and the Liligo, both in the K2 region. Baltoro, one of the hugest debris-covered glaciers of the region, over the whole XX century was subjected to several small terminus fluctuations which make its front practically stable, even if the lower sector of its tongue reveals an evident thickness reduction due to downwasting. For this glacier a first approach to mass balance measurement based on an estimate of the accumulation and ablation with the support of data collected by two AWSs, suggests an equilibrium condition or even a sligthly positive mass balance. About Liligo, a smaller glacier on the left side of Baltoro, remarkable terminus and thickness fluctuations have been registered for all the XX century with a recent phase of strong advance (+1400 m) between 1986 and 2004. This particular evolution allows to define Liligo as a surging glacier, which is now in a new stagnant phase. The comparison of these results with other sample glaciers of Himalaya and Alps inserted in the SHARE project (Changri Nup and Forni, for instance) and with the general world trend of glacier retreat, underlines an anomalous response to global climate change of Karakoram chain and emphasizes the need for acquiring more information about this unique high mountain glacial region.

VLADIMIR RYABININ

Dr. Vladimir Ryabinin
Joint Planning Staff for the World Climate Research Programme

(vryabinin@wmo.int, c/o WMO, 7bis, Avenue de la Paix, Geneva, 1211 Switzerland)

Degrees:
Engineer-oceanographer, 1978, Leningrad Hydrometeorological University
Ph.D. in physics and mathematics, 1982, Hydrometeorological Research Centre of USSR, Moscow
Doctor of Sciences in geophysics and oceanography, 1995, Hydrometeorological Research Centre of the Russian Federation, Moscow

Positions:
1978-1998, career from junior researcher to a head of laboratory at the Hydrometeorological Research Centre of the Russian Federation
1998-2000, principal researcher of an EU project, Malta
2000-2001, consultant and Executive Director of the International Ocean Institute

Expertise/main scientific and practical results:
Conducted several theoretical studies in the area of physical oceanography
Implemented physical parameterisations of the first Soviet medium weather forecast model
Author of the wave model MOSCOW and coordinator of national marine forecasting research in Russia
PI of several shelf engineering projects in seas around Russia
Long-term engagement in coordination of scientific and practical activities under the umbrella of the World Meteorological Organization and Intergovernmental Oceanographic Commission of UNESCO.

Position and work since 2001:
Senior Scientific Officer, World Climate Research Programme, Geneva, international coordination of climate research with a focus on high latitudes, stratosphere, atmospheric chemistry, cryosphere, and the role of oceans in climate.
Involvement in the HE project of CEOP since 2008.

MAIN ACTIVITIES OF THE WORLD CLIMATE RESEARCH PROGRAMME IN HIGH ELEVATIONS

Vladimir Ryabinin
Joint Planning Staff for the World Climate Research Programme

(vryabinin@wmo.int, c/o WMO, 7bis, Avenue de la Paix, Geneva, 1211 Switzerland)

The talk will review the activities of the World Climate Research Programme (WCRP) and its Partners that are relevant to or dependant on the emerging High Elevations (HE) regional initiative of the new WCRP/GEWEX "Coordinated Energy and Water Cycle Observations Project". The purpose of the talk will be mostly to outline the necessary and desirable interactions for the HE.

The new strategic framework of WCRP, entitled "Coordinated Observations and Prediction of the Earth System" serves as a foundation for scoping the science promoted and facilitated by WCRP. WCRP strives to help generating meaningful climate predictions and projections on a wide range of time scales, from months to centuries, and for regional and global scales, and enable several key applications, for example in the areas of water resources, management of risks associated with climate extremes, and meeting requirements in several other sectors of economy. So far mountains have received considerably less attention in the international weather and especially climate prediction research than is necessary. While there are several international programs that study manifestations of the global change in alpine regions and help to protect the mountains and their ecosystems from various threats, the research on modulation of the water and energy cycle in the mountains and their climate has been relatively undeveloped. Several research projects have studied the atmospheric circulation in the mountain regions, and there are now some non-hydrostatic models of high resolution that are capable of explicitly resolving dominant scales of motion over mountains. Nevertheless, the need for a systematic project addressing mountain climate and the role of alpine regions in formation of the water and energy cycle and in the overall predictability of the atmosphere has been largely unmet.

The High Elevations project will start filling these gaps by initiating reliable observations in the mountainous regions. WCRP and its GEWEX project will have to frame these activities into a coherent program of modeling and process studies leading to improved quantitative description of the water and energy cycle in alpine regions, subsequently enabling estimates of how improved HE observations can help to increase the predictive skill of forecasting techniques for different forecasting ranges, and what will be the prospects for developing useful applications based on the predictions, especially for the purposes of water management.

GIANNI TARTARI

Gianni Tartari
Italian National Research Council at the Water Research Institute (CNR-IRSA)
Born in 1949, graduate at University of Milan, he is a head of research for the Italian national Research Council at the Water Research Institute (CNR-IRSA). He is working in the field of environmental chemistry since 1975. His research is mainly concerned with atmospheric deposition chemistry, pollutant cycling in lacustrine and rivers environments, in eutrophication and sedimentation process in lakes and in analytical real-time instrumentation.
He works on pollutant circulation study in the Himalaya – Karakoram region, studying the presence of acidifying species and nutrients in rain, snow and lake waters. In that areas he has carried out research on high altitude aquatic environments for over 15 years.
Since 1992, he is a member of the Ev-K2-CNR Committee and President of the Committee's Scientific Council as well as a member of the Bilateral Technical Committee which regulates Italian.
He participated in the activities of Bureau Communitaire of Reference and as EU consultants. He is involved as scientific responsible in several national and European Projects and other international researches (CEOP, ABC, etc.).

e-mail:tatrari@irsa.cnr.it

CEOP-HIGH ELEVATIONS AS KEY STRATEGIC ISSUE IN ENERGY AND WATER BUDGETS AT REGIONAL AND GLOBAL SCALE.

Gianni TARTARI, Water Research Institute, Italy & Ev-K2-CNR Committee, Italy
Roberta TOFFOLON, Ev-K2-CNR Committee, Italy

Earth's high elevation mountains play a fundamental role in redistribution of atmospheric energy and water cycle. In fact mountains above all high elevations areas, are the main Earth's water towers. Glaciers and seasonal snow present in these ecosystems are the most important buffer to assess the budget of sub-continental scale surface water cycle. Water accumulation in mountain snow and glacier ice forms a hydrologic regime, which is favourable for agriculture due to increased runoff during the growing season. Mountains are the only renewable clean water source in many regions and a significant contributor to the hydroelectric potential. Snow, glaciers and frozen soil at high elevations are a reserve for maintaining the river flow in dry years.
On the one hand mountains affect continental scale circulation and water and energy cycles in the lower troposphere and contribute to the establishment of regional climates (through either control of the water vapour (WV) advection, which has higher concentrations in the lower troposphere, or convergence and divergence of WV on the regional scale). On the other hand the accumulation of seasonal snow cover and glacier mass balance are defined by regime of regional climates (amount of winter precipitation and surface heat balance during the melt period). Moreover, some studies (Barry, 1990) seem show that significant changes in the glacio-hydrological response are related to WEC alterations in the global climate system.
Thus, mountains and high-elevations are strongly affecting the regional environment system through Water and Energy Cycles (WEC) in the atmosphere and land-surface. Also human life and society are strongly depending on the heterogeneous precipitation distribution and weather changes due to this (WEC) processes. Despite the importance of WEC is widely recognized, the function of these cycles, under the influences of continental scale climate variability, is still unclear due to the lack of intensive observation data and comprehensive data analyses.
Our knowledge of the high elevation environments are limited by both paucity of observations, short records that seldom span one hundred years, sparse station network and insufficient theoretical attention given to the complex interaction of spatial scales in weather and climate phenomena in mountains. The distribution of stations with altitude above 2500 m a.s.l (575 sites) belonging to the GTS (Global Telecommunication System), GPCP (Global Precipitation Climatology Project), FAO (Food and Agricultural Organization), NOAA (National Oceanic and Atmospheric Administration) and SHARE (Stations at High Altitude for Research on the Environment) global networks illustrates that the density distribution for different ranges of elevation above 4500 m a.s.l. is one observation site every 100000 km2, while between 2500 and 3500 m a.s.l. one site per 5000 km2.
For these reasons, the CEOP-HE (Coordinated Energy and Water Cycle Observations Project-High Elevations) initiative, launched and coordinated by Ev-K2-CNR Committee, goal is to study multiscale variability in energy and water cycles in high elevation areas. CEOP-HE will focus its attention on understanding the WEC processes in different mountain zones and on identification of regions sensitive in terms of water management and conservation of mountain environment in order to forecast the future developments and to reduce impacts of climate changes.

LIISA JALKANEN

Liisa Jalkanen is Chief of the AER responsible for the Global Atmosphere Watch (GAW) programme and the GAW Urban Research Meteorology and Environment (GURME) project of WMO, World Meteorological Organization.
Chief, Atmospheric Environment Research Division (AER) Research Department (RES) WMO

Studies:
B Sc mathematics University of Helsinki 1977
M Sc physical chemistry University of Helsinki 1979
Licenciate physical chemistry University of Helsinki 1995
Doctorate atmospheric chemistry University of Helsinki 2000

Professional career in atmospheric chemistry:
Scientist and senior scientist at the Air Quality Department of the Finnish Meteorological Institute (FMI), Helsinki, 1983-1996
Scientific officer and senior scientific officer at the Environment Division (ENV) of the World Meteorological Organization (WMO), Geneva, 1996 – 2006
Acting Chief, ENV, 2006-2007
Chief ENV since November 2007, after restructuring 1.1.2008 division is called Atmospheric Environment Division (AER) of the Research Department (RES).

Current professional activities:
As Chief /AER responsible for the Global Atmosphere Watch (GAW) programme and the GAW Urban Research Meteorology and Environment (GURME) project of WMO.
GAW is the only long-term global atmospheric chemistry programme, it focuses on greenhouse gases, ozone, UV, aerosols, selected reactive gases, and precipitation chemistry. It is a partnership involving contributors from 80 countries, currently GAW coordinates activities and data from about 24 Global stations, 200 Regional stations, and 20 Contributing stations. Many of these are located on mountains. GAW products include the WMO Greenhouse Gas and Antarctic Ozone Bulletins.

Co-chair of the Task Force on Measurements and Modelling (TFMM) of the Cooperative Programme for Monitoring and Evaluation of the Long-range Transmission of Air Pollutants in Europe (EMEP) of UNECE Convention on Long-range Transboundary Air Pollution (CLRTAP).

Lead for the WMO Shanghai Integrated Multi-hazard Early Warning System (MHEWS) Demonstration Project.
WMO focal point for COST actions.

Task leader in EC Seventh Framework Programme project "Megacities: Emissions, urban, regional and Global Atmospheric POLlution and climate effects, and Integrated tools for assessment and mitigation" (MEGAPOLI).

e-mail: ljalkanen@wmo.it

GAW MOUNTAIN OBSERVATORIES SUPPORTING CLIMATIC RESEARCH

TIZIANO COLOMBO

He was born on 12th of March 1952 at Novara (Italy); graduated in physics on 13th of July 1978 at Pisa (Italy); worked from 1981 at Mt. Cimone, Observatory of Italian Met. Service, dealing with conventional meteorological and Special observations like CO2 measurements, solar photometry and total ozone. He worked at Mt Cimone until 2001, being director for the 8 last years. On 2002 worked at Climate Department of National Centre of Aeronautical Meteorology and Climatology of Italian Met Service, Head of Climate Dept. from 2007.
He took lead to produce an Italian Climate Atlas for the period 1971-'00.
Partecipation to ECSN meeting as Italian Focal Point.
GCOS Focal Point from 2005.
Nominated referee on September 2005 and April 2006 of IPCC document inside WG1.
Teaching activity: General Meteorology Course during 2006-2007, 2007-2008 and 2008-2009 academic years at Naval Academy, graduated course of Naval Sciences.
He wrote 17 scientific papers on international journals and 80 on Italian Journals.

e-mail: colombo@meteoam.it

"HIGH ALTITUDE METEOROLOGICAL MEASUREMENTS: THE OPPORTUNITY TO TAKE FROM THE POINT OF VIEW OF GCOS FOCAL POINT AND FORMER DIRECTOR OF THE MOUNT CIMONE OBSERVING STATION".

Tiziano Colombo, Climate Department CNMCA

The aim of this communication is to stress the importance of measuring meteorological data at so high elevation as Piramide Laboratory, so long in time to obtain climate values from meteorological data, so for a time period of at least 10 years. This is the GCOS point of view.
So high measurements allow to achieve informations about much higher atmospheric layers, due to intense night breeze bringing trace gases together with humidity (or absence of it) to the measurement station.
Another important characteristic of Himalaya measurements consists in the latitudinal shift of different air masses depending on the season, in fact we can measure parameters typical alternatively of tropical air masses and mean latitude air masses over the measurement station; it cannot occur when the mountain site is located in the middle of a particular climate place, as like as Mt. Cimone.

GRAZIANO ROSSI

Date of birth 06 09 1960; PhD 1991 (doctoral thesis in Geobotany); permanent researcher since 1991 at the University of Pavia, Italy. Since 2001 associate professor of Plant Ecology at the University of Pavia.
Research fields: high mountain ecology including vegetation analysis and classification, climate, evaluation of human influence on vegetation, taxonomical study of critical groups (i.e. Festuca, Sesleria), conservation biology and biodiversity. Research activity is documented by more than 70 papers on international (Vegetatio, Folia Geobotanica, Journal of Botany, Basic and Applied Ecology, Botanical Journal of the Linnean Society, Journal of Ecology, Flora, Biodiversity and Conservation, Biological Conservation) and national journals. Memberships: Italian Botanical Society, Society for Vegetation Science. Current work: autoecology and taxonomy of alpine species; geobotanical study of high mountain flora and vegetation and their ecology; study of the status of rare and endangered species; phyto-geomorphological studies in high mountain areas (N-Apennines, Alps).
Since 1986 his activity is also devoted to the revegetation of quarries. He has been also local coordinator of UE projects (GLORIA V F.P.; ENSCONET VI F.P.), national projects (C.N.R. n° 95.02761.CT04; INRM) and at a local scale (Lombardy Region for "Conservation activities of threatened and rare plants"; University of Pavia).

e-mail: graziano.rossi@unipv.it

CLIMATE CHANGE AND BIO-MONITORING AT HIGH ALTITUDE: THE GLORIA APPROACH

Graziano Rossi
Dipartimento di Ecologia del Territorio, University of Pavia, Via S. Epifanio 14, I-27100 Pavia, Italy
graziano.rossi@unipv.it www.unipv.it/labecove

The Earth's biosphere is experiencing a rapid change in climate, according to the recent assessment report of the IPCC (IPCC 2007). All ecosystems will be affected by climate change, but those of the alpine zone, like environments above the treeline, are considered to be particularly sensitive to warming because they are determined by low temperature conditions. Direct and indirect effects of climate change affect biodiversity and may lead to the extinction of a variety of species (Parolo and Rossi 2008). The gravity of these "extinction scenarios" can only be documented by long-term in situ monitoring. The research initiative GLORIA (Global Observation Research Initiative in Alpine Environments) was developed in this context: the purpose of GLORIA is to establish and maintain a world-wide long-term observation network in alpine environments for the comparative study of climate change impact on mountain biodiversity (Grabherr et al. 2000a, Pauli et al. 2003), using a standardised monitoring protocol in all major mountain systems on Earth. Data on plant species and temperature are collected for every GLORIA site and are used (i) to discern trends in species diversity and temperature, (ii) to assess and predict losses in biodiversity and other threats to these fragile alpine ecosystems, that are under accelerating climate change pressures. In situ observations on the species level appear to be crucial for this purpose, because plant communities will not respond to climate warming as a whole, but single species will respond in different ways (Ammann 1995, EEA 2008, Grabherr et al. 1995, Gottfried et al. 1998). Species migration driven by climate warming can form new assemblages at the current sites, but such differential movements of species could result in a disruption of the linkage among many species in current ecosystems (Root et al. 2003), and may be accompanied by significant biodiversity losses and by changes in ecosystem functioning (Hawkins et al. 2008). Therefore, the essential attempt of GLORIA aims to: (a) provide standardised, quantitative data on the altitudinal differen-

ces in species richness, species composition and plant cover, on the soil temperature and on the snow cover duration in mountain systems world-wide; (b) assess the potential risks for biodiversity losses due to climate change by comparing the current distribution patterns of species and environmental factors along vertical and horizontal gradients; (c) provide a baseline for the long-term monitoring and observation of plant species to detect climate-induced changes of plant cover and species migration; (d) quantify the temporal changes of biodiversity and vegetation patterns for providing a substantial input to data-based scenarios on risks for biodiversity losses and on risks for ecosystem instability. An other purpose is to stimulate the in/ex situ conservation actions on the alpine flora (see ENSCONET web site; Rossi et al. 2007). In January 2001, GLORIA-Europe started with 18 target regions in mountain areas of 13 European countries. In 2004 the total number shifted to 28 target regions, including 6 target regions outside of Europe (e.g., USA; Australia, New Zealand). In 2007 a first contribution on the ecology of alpine plants had been produced on the basis of data collected in Europe during 2001 (Dullinger et al. 2007). In 2008 GLORIA-Europe sites had been monitored for the first time (data are actually under processing). By the end of 2008, the network consisted of more than 60 active target regions, distributed over 5 continents. This number is still increasing: in 2009 new target regions will be placed, for example, in South and North America, in the Himalayas and in the Orobie Alps (Bergamo, Italy).

REFERENCES

Ammann, B. (1995). Paleorecords of plant biodiversity in the Alps. In: Chapin III, F.S. & Körner, C. (eds.). Arctic and Alpine Biodiversity: Patterns, Causes and Ecosystem Consequences. Ecological Studies. Springer, Berlin 113: 137-149.

EEA (2008). Impacts of Europe's changing climate - 2008 indicator-based assessment. European Environment Agency, Copenhagen.

Dullinger, S., Kleinbauer, I., Pauli H., Gottfred, M., Brooker, R., Nagy, L., Theurillat, J.P., Holten, J.I. Abdaladze, O., Benito, J.L., Borel, J.L., Coldea, G., Ghosn, D., Kanka, R., Merzouki, A., Klettner, C., Moiseev, P., Molau, U., Reiter, K., Rossi, G., Stanisci, A., Tomaselli, M., Unterlugauer, P., Vittoz, P. & Grabherr, G. (2007). Weak and variable relationships between environmental severity and small-scale co-occurrence in alpine plant communities. Journal of Ecology 95: 1284-1295.

Gottfried, M., Pauli, H., & Grabherr, G. (1998). Prediction of Vegetation patterns at the limits of plant life: a new view of the alpinenival ecotone. Arctic and Alpine Reseach 30/3: 207-221.

Grabherr, G., Gottfried, M., Gruber, A. & Pauli, H. (1995). Patterns and Current Changes in Alpine Plant Diversity. In: Chapin III, F. S. and Körner, C. (eds.). Arctic and Alpine Biodiversity: Patterns, Causes and Ecosystem Consequences. Ecological Studies. Springer, Berlin 113: 167-181.

Grabherr, G., Gottfried, M. & Pauli, H. (2000a). GLORIA: A Global Observation Research Initiative in Alpine Environments. Mountain Research and Development 20(2): 190-191.

Hawkins, B., Sharrock, S. and Havens, K. (2008). Plants and climate change: which future? Botanic Gardens Conservation International, Richmond, UK.

IPCC 2007. Climate Change 2007. The Physical Scientific Basis. Cambridge University Press, Cambridge.

Parolo, G. & Rossi, G. (2008). Upward migration of vascular plants following a climate warming trend in the Alps. Basic and Applied Ecology, 9(2): 100-107.

Pauli, H., Gottfried, M., Dirnböck, T., Dullinger, S. & Grabherr, G. (2003). Assessing the long-term dynamics of endemic plants at summit habitats. In: Nagy, L., Grabherr, G., Körner, C. & Thompson, D.B.A. (eds.). Alpine Biodiversity in Europe - A Europe-wide Assessment of Biological Richness and Change. Ecological Studies 167: 195-207, Springer, Heidelberg.

Root, T.L., Price, J.T., Hall, K.R., Schneider, S.H., Rosenzweig, C. & Pounds, J.A. (2003). Fingerprints of global warming on wild animals and plants. Nature 421: 57-60.

Rossi, G. Parolo, G. & Aplin, D. (2007). Ex situ conservation reaches out to save upwardly-mobile plants from extintion. ENSCOnews 3: 3-4.

CHRISTOPH KUEFFER

Christoph Kueffer Dipl. natw. ETH 13.04.1974

Education

April 2002 - PhD student, Geobotanical Institute, ETH Zurich.
Project title: "Invasion of woody plants into the Seychelles tropical forests: habitat invasibility and propagule pressure".
Nov. 2000 – July 2001 Collegiate at Collegium Helveticum, ETH Zurich.
Project title: "Computer modeling as a foundation for problem-structuring in transdisciplinary environmental research".
Oct. 1994 – March 2000 Studies in environmental natural sciences at ETH Zurich. Specializations in: environmental physics, aquatic ecosystems, philosophy, risk management.
Master thesis: "Modellierung der Habitatsnutzung des Rothirsches Cervus elaphus L. im Gebiet des schweizerischen Nationalparks – Ein individuenbasierter Ansatz".
June 1994 Matura, Gymnasium Biel. Specialization: mathematics & natural sciences (Typus C).

Professional experiences

2003 - Editor of Kapisen. Plant conservation newsletter. Seychelles.
2003 - 2005 Freelancer for ETH Life web journal, ETH Zurich.
June 2002 - March 2005 Employed as consultant for invasive species management and habitat restoration by Forestry & National Park Section, Seychelles Ministry of Environment and Natural Resources.
March 2002 – March 2003 Coordinator international projects, World Student Community for Sustainable Development (WSC-SD).
Jan. – March 2002 Employed by Geobotanical Institute, ETH Zurich. Pilot study for research project "Invasion of woody plants into the Seychelles tropical forests".
July 2001 – Dec. 2001 Employed by TD-Net. Design of a bibliography on transdisciplinary research (www.transdisciplinarity.ch/bibliography)
March 2001 - Co-founder of seed sustainability. Platform for transdisciplinary student research for sustainability.
(www.seed-sustainability.ch)
May – August 2000 Projects for Gammarus Unternehmensberatung für Umweltfragen Gmbh and Swiss Re.
July – Oct. 1997 Practical stage. Swiss National Park, Zernez.
May 1996 – May 1997 Editor of student magazine "Der NerV", ETH Zurich.
Oct. 1995 – March 1997 Part-time computer administrator, ETH Zurich.

RESEARCH INTERESTS

A) Biology and management of tropical woody invasive species
Seed dispersal and propagule pressure of invasive species
Habitat invasibility of tropical forests
Impacts of tropical woody invasive species on nutrient cycling
B) Ecological restoration of tropical forests
C) Ecology and sustainable development of tropical oceanic islands
D) Transdisciplinary research collaborations for ecosystem management

THE MOUNTAIN INVASION RESEARCH NETWORK (MIREN)

Christoph Kueffer, MIREN Coordinator
Mountain Invasion Research Network (MIREN)
kueffer@env.ethz.ch

The Mountain Invasion Research Network (MIREN, www.miren.ethz.ch), launched in 2005, initiates and integrates surveys, monitoring, experimental research, and management of plant invasions into mountains at a global scale.

As a result of globalization and climate change, mountains are increasingly threatened by the invasion of non-native plants. A review by MIREN has identified almost 1500 plant taxa worldwide that are naturalized or invasive in mountains. More than half the taxa in any mountain region are not found in other regions, suggesting that the total pool of potential invasive species is large and all regions can expect further invasions. The most widespread mountain plant invaders are species typical of European pastures (e.g. Holcus lanatus, Rumex acetosella, Trifolium repens), which appear to have had relatively little impact on local biodiversity. Some invaders (e.g. Hieracium spp., Cytisus spp., Salix spp.), however, have appeared recently, as mountain land use has shifted in many regions from agriculture to tourism. These species have often been selected for the cold adaptation and now pose an important threat to biodiversity.

The MIREN core research program includes currently 6 mountain regions (Pacific Northwest [USA], Swiss Alps, Chilean Andes, Australian Alps, Hawaii, and the Canary Islands [Spain]), covering the major climatic zones and including island and continental systems. All core areas participate in standardized monitoring of non-native plant distributions and demography, and comparative experiments. A particularly promising approach is to make reciprocal comparisons of mountain regions, using species native to one region but invasive in the other, and vice versa.

Prevention is widely considered the most cost-efficient management strategy against the threat posed by invasive non-native species. Mountains are one of very few ecosystems not yet badly affected by plant invasions. In mountains, thus, invasive species researchers and managers have the unique opportunity to respond in time to the threat by preventing invasions before they are actually happening. MIREN is therefore researching and promoting efficient implementation of proactive measures, such as restricting the transport of likely invasive species into mountain areas and early detection searches, to prevent invasions before they become another major threat of vulnerable mountain ecosystems.

PAVEL Y. GROISMAN

PAVEL YA. GROISMAN, Ph.D.
UCAR Project Scientist at NCDC, National Climatic Data Center,151 Patton Avenue, Asheville, NC 28801, USA. Ph. +1 828 271-4347; E-mail: Pasha.Groisman@noaa.gov

EDUCATION:
State Hydrological Institute, Russia: Ph. D. in geophysics (1975-1980).
Mathematical faculty of the Leningrad State University (1968 to 1973). Master degree in probability theory and mathematical statistics.

EMPLOYMENT:
U.S. National Climatic Data Center at Asheville, NC:
U.S. National Research Council Senior Associate (1990 to 1993)
UCAR Visiting/Project Scientist (September 1993 to September 1994, September 1996 to present)
Dept. of Geosciences, University of Massachusetts at Amherst, MA:
Research Associate Professor (September 1994 to August 1998)
State Hydrological Institute at St. Petersburg, Russia:
Scientist (1975 to 1984), Senior Scientist, (1984 to present).

RESEARCH INTERESTS: Climatic variability, global change, parameterization of climatic processes using observational data, water balance studies.

PROFESSIONAL MEMBERSHIPS: Russian Geographical Society, American Geophysical Union, American Meteorological Society, Canadian Geophysical Union

Major International Assignments:
The lead author and/or contributor to four consecutive IPCC Assessments (1988-2007)
Arctic Climate Impact Assessment [Contributing author, Chapter 2] (2002-2004)
Project Scientist for the Northern Eurasia Earth Science Partnership Initiative (NEESPI) (2004- to date).

PUBLICATIONS:
Complete list of publications contains more than 200 papers and book chapters of which 92 are in refereed journals. Additionally, one paper is in review and three are in preparation.

NEESPI RESEARCH IN HIGH ELEVATION AREAS OF NORTHERN EURASIA

Pavel Groisman
NEESPI Project Scientist, UCAR Project Scientist at National Climatic Data Center
Federal Building, 151 Patton Avenue, Asheville, NC 28801, USA.
Ph.: +1 828 271-4347; Fax: +1 828 271-4328; E-mail: Pasha.Groisman@noaa.gov

Northern Eurasia Earth Science Partnership Initiative (NEESPI) was established to address large-scale and long-term manifestations of climate and environmental change in the region. This is a megaproject with focus on Northern Eurasia. The major NEESPI science question is: How do Northern Eurasia's terrestrial ecosystems dynamics interact with and alter the biosphere, atmosphere, and hydrosphere of the Earth? Its Science plan is available at http://NEESPI.org. Several U.S. (NASA, NSF, NOAA) Russian (Russian Academy of Sciences, Roshydromet, Russian Foundation for Basic Research), China (Chinese Academy of Sciences) and some other national agencies, universities, and foundations are supporting more than 130 NEESPI projects and about 10% of them have a strong link with or a substantial focus on high elevation areas (HEA). Individual projects within NEESPI run for 3-4 years but the time horizon for the NEESP Initiative itself is ~ 10 years.

Northern Eurasia (north of ~40∞N) includes the mountainous regions of Carpathians, Caucasus, Central Asia, Southern and Eastern Siberia and excludes The Tibetan Plateau and Himalayas. However, an unveiling collaboration with MAIRS is pushing some NEESPI projects to expand their foci southwards of the Central Asian mountain systems. Climate changes in HEA and their impact on the cryosphere, natural hazards, and water supply to the downstream areas are among the objectives of the ongoing NEESPI projects in HEA. Potential feedbacks to the surrounding environment and climate conditions due to changes in the mountains are also within the NEESPI scope. Current NEESPI studies in HEA foci are: (a) state, structure and changes of glaciation at high altitudes, from Severnaya Zemlya in the Arctic to the Central Asian mountainous systems of Altai, Tian Shan, and Pamir (8 projects); (b) water supply dynamics generated in the mountains of Central Asia and Caucasus (4 projects); (c) studies of snow cover changes across the NEESPI domain and its mountainous part in particular (2 projects); (d) remote sensing information support of the NEESPI studies in HEA (1 project); and (e) a paleoclimatic reconstruction of physical and chemical climate over Central Asia using ice cores stored in HEA (1 project).

More recently, the NEESPI research focus has begun to shift towards modeling and its ability to project the future state of climate, environment, and societies in the NEESPI domain. This new focus requires a higher level of integration than in previous NEESPI studies. In a modeling context, it is not sufficient to describe a given environmental or societal process. This process should be linked to other processes in order to assess its actual role in the Earth system. Thus, modeling becomes an engine of integration of diverse regional NEESPI studies including those devoted to high elevation areas.

GELSOMINA PAPPALARDO

Dr. Gelsomina Papalardo (born in 1962, Laurea Degree in Physics, Ph.D. Methods and Technologies for Environmental Monitoring, Head of Lidar Group at the "Istituto di Metodologie per l'Analisi Ambientale del Consiglio Nazionale delle Ricerche, CNR-IMAA).
Dr. Pappalardo is the chief scientist of the CNR-IMAA lidar laboratory. She has over 15 years of research experience in the field of atmospheric studies with lidar techniques. She has authored or co-authored more than 40 papers in the peer-reviewed literature. Dr. Gelsomina Pappalardo participated as PI in several national and international projects. In particular, she coordinated the CNR-IMAA research activity in the validation program of the LITE experiment; she participated in the EU Project INFM "Innovative optical techniques for the environmental monitoring"; she participated in the EU Project "Atmospheric pollution monitoring in the urban and industrial areas"; she coordinated the WP "Compilation of lidar ratio data base" in the framework of the FP5 EARLINET Project; she coordinated the validation activity for MIPAS water vapour data in the framework of ENVISAT/Cal/Val/ESA project using the ground based measurements provided by the several involved groups.
Regarding current projects, she is the coordinator of the FP6 Project "European Aerosol Research Lidar Network – Advanced Sustainable Observation System (EARLINET-ASOS)" and she is also the EARLINET speaker.
Dr. Gelsomina Pappalardo is the coordinator of the program EARLINET correlative measurements for CALIPSO and key personnel in the ESA project titled "Aerosols and Clouds: Long Term Database from Spaceborne Lidar Measurements". PI of the ESA projects: "Multi-Mission Quality Analysis by LIDAR" and "CEOS Intercalibration of Ground-Based Spectrometers and Lidars". PI of the FP6 Project "Global Earth Observation and Monitoring" (GEOMon).
She is member of the steering group of GALION, the GAW Aerosol Lidar Observation Network and member of the WMO GAW Scientific Advisory Group on Aerosols.

e-mail: pappalardo@imaa.cnr.it

INTEGRATED LONG TERM OBSERVATIONS FOR ASSESSING THE IMPACT OF ATMOSPHERIC AEROSOL ON CLIMATE AND ENVIRONMENT

Gelsomina Pappalardo
Consiglio Nazionale delle Ricerche – Istituto di Metodologie per l'Analisi Ambientale (CNR-IMAA)

The present knowledge of the aerosol distribution is far from sufficient to properly estimate the role of aerosols in changes of the global and regional environmental conditions and climate. In view of the great importance of aerosols for many key processes governing, e.g., the atmospheric radiation budget, water cycle, and chemistry, which in turn affect human health, traffic systems, and development of ecosystems, it is of vital interest to improve observational capabilities for aerosol properties and distribution. The information on the vertical distribution is particularly lacking and lidar remote sensing is the most appropriate tool to close this observational gap.
All main long-term objectives of GAW, as stated in the WMO Global Atmospheric Watch (GAW) Strategic Plan: 2008-2015, are related to the 4-dimensional space-time distribution of aerosols.
Europe has taken the lead in this area of research by establishing in 2000, the European Aerosol Research Lidar Network (EARLINET) as a coordinated network of 25 stations using advanced lidar methods for the vertical profiling of aerosols. Since 2000 these systematic lidar observations are contributing significantly to the quantification of aerosol concentrations, radiative properties, long-range transport and budget, and prediction of future trends. These data can also contribute to improve model treatment on a wide range of scales and to a better exploitation of present and future data from satellite remote sensing for a variety of parameters.
At global scale much work needs still to be done. A strong effort to determine the spatio-temporal distribution of aerosol properties related to climate forcing and air quality up to multidecadal time scales is also in progress within the Global Atmosphere Watch (GAW) aerosol program where the establishment of a global lidar observation network has been considered of strategic importance. While within GAW an observing network for aerosol properties at ground-level is well established and a program has been initiated for the coordination of sun-photometer networks measuring column integrated aerosol optical properties, the vertical component is not yet covered.
It is the mission of the GAW Atmospheric LIdar Observation Network (GALION) to organize the observational capability for the 4-dimensional distribution of key aerosol parameters at global scale.
The specific objective of GALION is to provide the vertical component of this distribution through advanced laser remote sensing in a network of ground-based stations globally distributed. The aerosol properties to be observed will include the identification of aerosol layers, profiles of directly measured optical properties (backscatter and extinction coefficients at selected wavelengths, lidar ratio, Ängström coefficients, particle depolarization ratios) and indirectly inferred properties (e.g., profiles of light-absorption and single-scattering albedo), aerosol type (e.g. dust, maritime, fire smoke, urban haze), and microphysical properties (e.g., volume and surface concentrations, size distribution parameters, refractive index). Observations will be made with sufficient coverage, resolution, and accuracy to establish a comprehensive aerosol climatology, to evaluate model performance, to assist and complement space-borne observations, and to provide input to forecast models of "chemical weather".
GALION is based on the cooperation between existing lidar networks (Ad-NET, ALINE, CISLiNet, EARLINET, MPLNET, NDACC and REALM).

Conference secretariat
Ev-K2-CNR Committee

Via San Bernardino, 145
24126 Bergamo - Italy

Tel. +39 035 3230513
Fax + 39 035 3230551
www.evk2cnr.org

EvK2CNR

patronages

Sotto l'Alto Patronato della Presidenza della Repubblica

Ministero dell'Ambiente e della Tutela del Territorio e del Mare

Ministero degli Affari Esteri

Ministero dell'Istruzione, dell'Università e della Ricerca

cooperations

With the technical cooperation of the Food and Agriculture Organization of the United Nations

United Nation Environment Program

UNEP

patronages with contribution

RegioneLombardia

sponsors

a2a energie per l'ambiente

ACTELIOS GRUPPOFALCK

COREPLA Consorzio nazionale per la raccolta, il riciclaggio e il recupero dei rifiuti di imballaggi in plastica

CREDITO BERGAMASCO GRUPPO BANCO POPOLARE

Comyn

LSI LASTEM

frameworks

Mountain Partnership

planetearth Earth Sciences for Society