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CV
Education:
Master degree in Physics at the Bologna University (1999)
Doctoral degree in Environmental Sciences at the University “Carlo Bo” of Urbino (2003).
Present Position:
Researcher at the Institute of Atmospheric Sciences and Climate of the Italian National Research Council;
Head of research activities concerning reactive gases and meteorological parameters at the WMO/GAW global stations Nepal Climate Observatory -Pyramid and at the Italian Climate Observatory "O. Vittori" at Monte Cimone; Leader of the WP "Atmospheric Sciences and Climate" within the SHARE Project.
Responsible of the Sub-Project "Integrated observation system for environment and climate monitoring"
Scientific Interest:
Processes (formation-transport-removal) able to influence the atmospheric variability of trace gases and aerosol in remote areas, i.e. Antarctica and high-altitude regions.
Long experience in the execution of atmospheric measurements in remote areas and in the application of specific statistical and numerical methodologies for the analysis of atmospheric compound time series and atmospheric Circulation (from local to synoptic-scales).
Author or co-author of “peer-reviewed” publications as well as congress, workshop and science outreach Presentations.

Ozone and black carbon: short-lived climate forcers in Himalaya-Karakorum

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Elevated concentration of tropospheric ozone has implications to human health, agriculture, ecosystem and earth’s radiative balance. Mineral dust and particulate air pollution emitted from fossil fuel combustion, biomass burning and biofuel cooking activities in South Asia lead to formation of widespread layers of brownish haze, which is referred to as Atmospheric Brown Clouds (ABC). Absorbing aerosols (e.g. black carbon) represents important constituent of ABCs. Both ozone and BC are important short-lived climate-forcers and pollutants (SLCFs/SLCPs). Ozone is the third significant greenhouse gas in terms of direct anthropogenic radiative forcing and black carbon (BC) is estimated to have a global radiative effect which exceeds that due to methane, thus both these compounds represent important contribution to the observed global warming. By interfering with solar radiation, atmospheric BC can also modify the surface energy and the atmospheric temperature lapse rate on regional scales, thus impacting the hydrological cycles and precipitation patterns. High BC concentration also has significant effect on human health. Favorable meteorological conditions coupled with large emissions from desert regions, fossil fuel combustion, biomass burning, biofuel cooking and heating, favor the occurrence of ABCs over South Asia during the dry season (winter and pre-monsoon).

To study the behavior of ABCs and SLCPs, continuous atmospheric composition observations are carried out at the Nepal Climate Observatory – Pyramid (27.95N, 86.95E), located at 5079 m a.s.l. in the high Khumbu valley (southern Himalayas) since March 2006. This observatory is a Global Station of the WMO/GAW program and is also a part of the ABC (UNEP) and SHARE (Ev-K2-CNR) Projects. The measurements clearly show that due to conducive atmospheric circulation, the polluted air masses coming from the Indo-Gangetic Plain and the Himalayas foothills can be transported up towards the high Himalayas and vented along the mountain valleys and directly impacting mountain ecosystems. Polluted air-masses originating from far westerly regions like Northern Africa, Middle East and Europe can further contribute in determining the variability of these observed SLCFs/SLCPs.

A very few atmospheric composition related data existed in the Karakorum region. A field campaign was executed in the Baltoro region (Pakistan Northern Areas, Askole) during summer 2012, in the framework of the SHARE and SEED Projects. The data from the campaign revealed that both long-range and regional transport of polluted air masses contributed to variability of the observed surface ozone mixing ratio. Since different weather and atmospheric transport pattern affect the Karakorum region with respect to Himalayas, activation of long term continuous observation program in this region appears to be an urgent task to protect the people and environment of this important area.

Due to their relatively short atmospheric lifetimes, few weeks to months, measures to reduce BC and ozone can be very effective in reducing the anthropogenic impact on regional climate. Therefore, it is very important that governments together with local and international agencies develop appropriate policies to promote reduction of emissions of these particulate pollutants and SLCP gases.