Geophysical Research Abstracts
Vol. 15, EGU2013-2869, 2013
EGU General Assembly 2013

Influence of biomass burning emissions on black carbon and ozone variability in the Southern Himalayas (NCO-P, 5079 m a.s.l.)

Davide Putero (1), Tony Christian Landi (1), Paolo Cristofanelli (1), Angela Marinoni (1), Paolo Laj (2), Rocco Duchi (1), Bhupesh Adhikary (3), Francescopiero Calzolari (1), Ubaldo Bonafè (1), Paolo Stocchi (4,1), Elisa Vuillermoz (4), Paolo Bonasoni (1,4)

(1) ISAC-CNR, Institute for Atmospheric Science and Climate, National Research Council, Bologna, Italy (D.Putero@isac.cnr.it), (2) Glaciology and Environmental Geophysics Laboratory, CNRS, S. Martin d'Hères, France, (3) Ev-K2-CNR Committee, Kathmandu, Nepal, (4) Ev-K2-CNR Committee, Bergamo, Italy

Black carbon (BC) and tropospheric ozone (O_3) play a key role in the climate system, since they are short-lived climate forcers (SLCF) that contribute to climate change. BC and O_3 precursors are emitted from several natural and anthropogenic sources; one of the most important is biomass burning, i.e. the combustion of organic matter from natural or man-made activities. Studying BC and O_3 variations in connection to biomass burning is critical, mainly because of the effects that these SLCF have on the ecosystems, agriculture and human health. The issue appears urgent in several regions of the world, such as South Asia, where a vast region extending from the Indian Ocean to the Himalayas is characterized by large amounts of aerosols and pollutant gases. Here we present the variability of BC and O_3 concentrations observed at the Nepal Climate Observatory-Pyramid (NCO-P, 5079 m a.s.l.), the highest WMO-GAW global station, installed in the high Khumbu valley (Nepal, Everest region) since March 2006. Considering over 5 years of continuous measurements, the BC and O_3 concentrations have shown an average value of 48.7 $\pm$ 12.6 ppbv and 208.1 $\pm$ 364.1 ng m^{-3}, respectively. The possible contribution of open biomass burning to the average BC and O_3 levels is investigated, using various satellite observations, such as MODIS fire products, the USGS Land Use Cover Characterization and TRMM rainfall measurements, linking these products to the air-mass back-trajectories reaching the sampling site (computed using LAGRANTO model). On 162 days (9% of the entire dataset), characterized by acute pollution events at NCO-P, 90 days (56%) were characterized by the transport of pollutants originated by agricultural and forest fires located in regions very close to the Himalayan sampling site. These analyses have shown that biomass burning emissions, especially at regional scale, are likely to play a key role in BC and O_3 variations at NCO-P, particularly concerning the development of acute pollution events.