Geophysical Research Abstracts
Vol. 18, EGU2016-16818, 2016
EGU General Assembly 2016

Ozone and some of the precursors at an urban site in the Kathmandu Valley, Nepal: Observations and modeling

Piyush Bhardwaj (1), Manish Naja (1), Rajesh Kumar (2), Maheswar Rupakheti (3), Arnico K Panday (4), Gabriele Pfister (2), Sasha Madronich (2), Mary C Barth (2), and Mark G Lawrence (3)

(1) Aryabhatta Research Institute of Observational Sciences (ARIES) Nainital, India (piyush@aries.res.in), (2) National Center for Atmospheric Research (NCAR) Boulder, USA, (3) Institute for Advanced Sustainability Studies (IASS), Potsdam, Germany, (4) International Center for Integrated Mountain Development (ICIMOD), Lalitpur, Nepal

An international field campaign SusKat-ABC (a Sustainable atmosphere for the Kathmandu Valley - Atmospheric Brown Clouds), was conducted during Dec 2012 – June 2013 in Kathmandu and surrounding regions to assess the influences of local and regional scale emissions in the Kathmandu Valley. Continuous surface based observations of O_3, CO and air sampling for light hydrocarbons were conducted at the supersite Bode (27.59N, 85.39E, 1326 amsl), near the center of the valley. The diurnal variations at Bode were typical of a polluted urban site with sharp day time build-up in O_3, and CO having higher levels during morning/evening hours. The average early morning CO levels were higher during winter (Jan-Feb, $\sim$ 1250 ppbv) than spring (Mar-May, $\sim$1000 ppbv) and reached as high as $\sim$3000 ppbv. However, daytime O_3 levels were slightly higher during spring ($\sim$62 ppbv) when compared with those during winter ($\sim$54 ppbv). A distinct seasonal change in the diurnal cycle of O_3 was observed and the local sources within the valley were often supplemented by regional scale pollution. The influence of northern Indian biomass burning was observed during the first week of May, during this period daily averaged O_3 and CO mixing ratios were about twice as high at Bode and at the Indian sites. WRF-Chem v3.6.1 simulations showed large day to night variations in meteorological parameters at supersite Bode. The daytime differences in temperature and RH between model and AWS were $\sim 1^oC$ and 10% respectively, however large variations (4-8^{o}C and 40-60% respectively) were observed during night time. Model was able to capture winds well over the valley and $<$ 10% differences were observed, however it failed to simulate fog during first few weeks of January over the Kathmandu valley which might be the reason for large night-time variations in Temperature and RH. O_3 and CO also showed large differences and showed little to no improvement with increasing model resolution. The day and night-time differences in O_3 were $\sim$25 and $\sim$50ppb respectively. NO in the model was very low $\sim$0.2 ppb. Similar differences were also calculated for a mountain top Nagarkot (1898m amsl, east of Bode) and model performed very well there with differences in temperature and RH during day and night were $< 2\ ^oC$ and $<$ 15% respectively. Detailed results will be presented during the meeting.