Geophysical Research Abstracts
Vol. 18, EGU2016-10242, 2016
EGU General Assembly 2016

Buddha's birthplace (Lumbini, Nepal) is polluted

Dipesh Rupakheti (1,2), Bhupesh Adhikary (3), Siva Praveen Puppala (3), Shichang Kang (4,5), Manish Naja (6), Arnico Panday (3), Qianggong Zhang (1,5), Maheswar Rupakheti (7,8), Khadak Mahata (7), and Mark Lawrence (7)

(1) Key Laboratory of Tibetan Environment Changes and Land Surface Processes, Institute of Tibetan Plateau Research, Chinese Academy of Sciences, Beijing 100101, China, (2) University of Chinese Academy of Sciences, Beijing 100049, China, (3) International Centre for Integrated Mountain Development (ICIMOD), Kathmandu, Nepal, (4) State Key Laboratory of Cryospheric Science, Cold and Arid Regions Environmental and Engineering Research Institute (CAREERI), Lanzhou 730000, China, (5) Center for Excellence in Tibetan Plateau Earth Sciences, Chinese Academy of Sciences, Beijing 100085, China, (6) Aryabhatta Research Institute of Observational Sciences (ARIES), Nainital, India, (7) Institute for Advanced Sustainability Studies (IASS), Berliner Str. 130, 14467 Potsdam, Germany , (8) Himalayan Sustainability Institute (HIMSI), Kathmandu, Nepal

Lumbini, in southern Nepal, is a UNESCO world heritage site of universal value as the birthplace of the Buddha. Poor air quality in Lumbini and surrounding regions is a great concern for public health as well as for preservation, protection and promotion of Buddhist heritage and culture. Measurements of the ambient concentrations of key air pollutants (BC, PM, CO, O_3) were conducted in Lumbini, first of its kind in Lumbini, during an intensive measurement period of three months (April-June 2013) in the pre-monsoon season. The measurements were carried out as a part of the international air pollution measurement campaign; SusKat-ABC (Sustainable Atmosphere for the Kathmandu Valley - Atmospheric Brown Clouds). Hourly average concentrations were: BC: 4.9±3.8 (0.3-29.9) μg/m3; CO: 344.1±160.3 (124.9-1429.7) ppbv; O_3: 46.6±20.3 (0.85-118.1) ppbv; PM10: 128.8±91.9 (10.5-603.9) μg/m3; and PM2.5: 53.1±35.1 (6.1-272.2) μg/m3. These levels are comparable to heavily polluted sites in the region. The 24-h average PM2.5 and PM10 concentrations frequently (94% and 85%, respectively, of the sampled period) exceeded the WHO guideline, which implies significant health risks for the residents and visitors in the region. Clear diurnal cycles were observed for the pollutants. Occurrences of peak concentrations during the study period were due to regional forest fires and meteorological conditions conducive of transport to Lumbini. The WRF-STEM model was used to simulate the meteorology and the pollution concentration, and showed the model concentration to be lower by a factor of ∼1.4-5, even though the model was able to capture the observed variability. Regionally tagged CO tracers and the chemical composition of fine mode PM2.5 was obtained from the model. The aerosol spectral light absorption coefficients obtained from Lumbini indicated presence of BC from both biomass burning and fossil fuel combustion, with more than half of the ambient BC attributable to fossil fuel combustion. Given the high pollution levels, there is a clear and urgent need for setting up a network of long-term air quality monitoring stations in the greater Lumbini region. This is a special place which demands special attention to safeguard the valuable world heritage properties as well as public health and agro-ecosystems in the region from impacts of air pollution.