Pre-monsoon air quality over Lumbini, a world heritage site along the Himalayan foothills

D. Rupakheti[1,2*], B. Adhikary[3], P.S. Praveen[3], M. Rupakheti[4,5], S.C. Kang[6,7*], K.S. Mahata[4], M. Naja[8], Q.G. Zhang[1,7], A.K. Panday[3], M.G. Lawrence[4]

[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]Institute for Advanced Sustainability Studies (IASS), Potsdam 14467, Germany

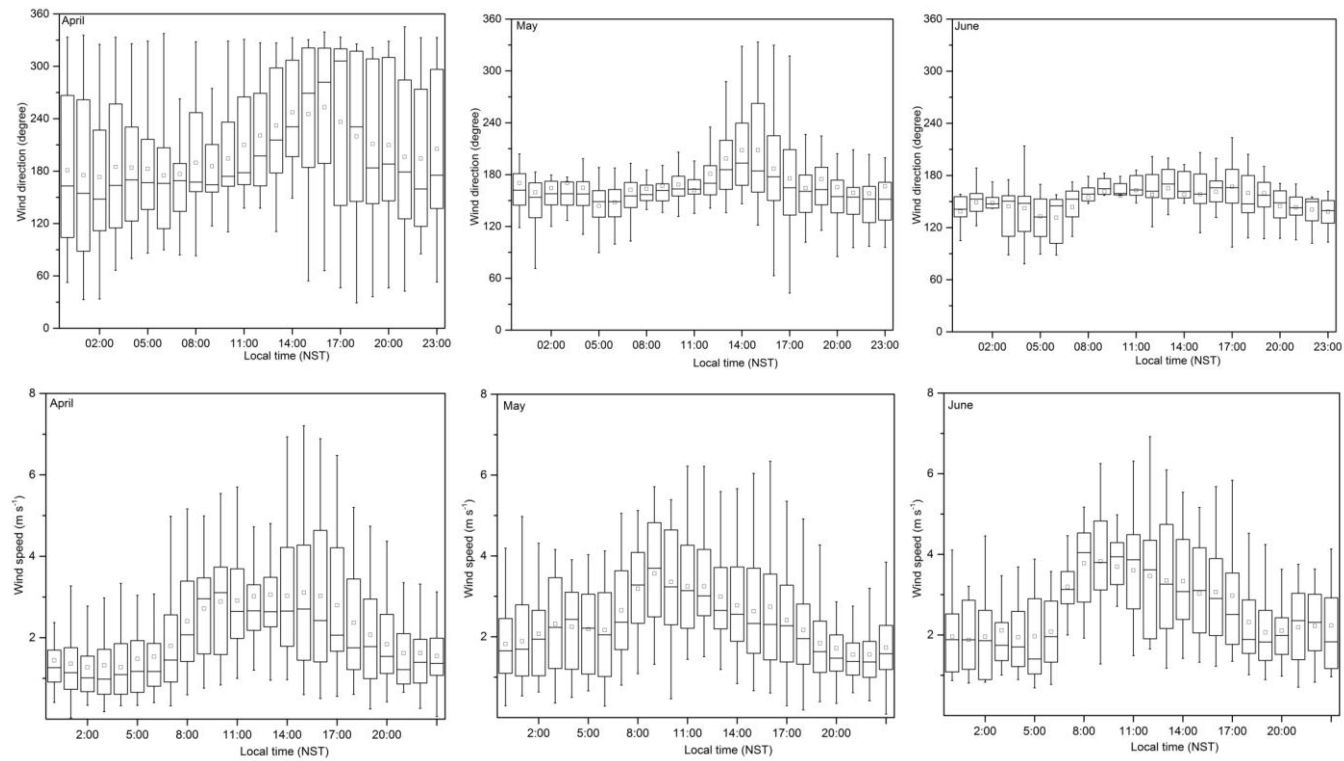[5]Himalayan Sustainability Institute (HIMSI), Kathmandu, Nepal

[6]State Key Laboratory of Cryospheric Science, Cold and Arid Regions Environmental and Engineering Research Institute (CAREERI), Lanzhou 730000, China

[7]Center for Excellence in Tibetan Plateau Earth Sciences, Chinese Academy of Sciences, Beijing 100085, China
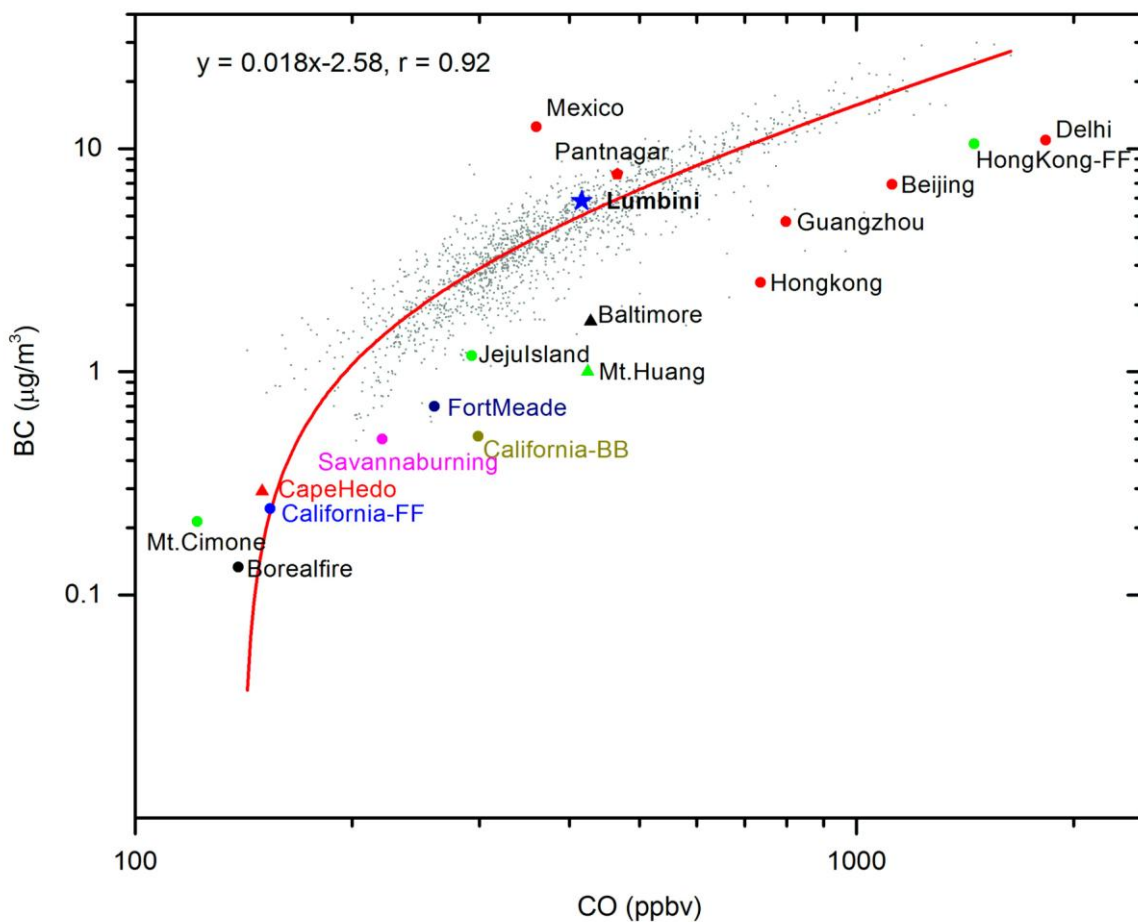
[8]Aryabhatta Research Institute of Observational Sciences (ARIES), Nainital, India
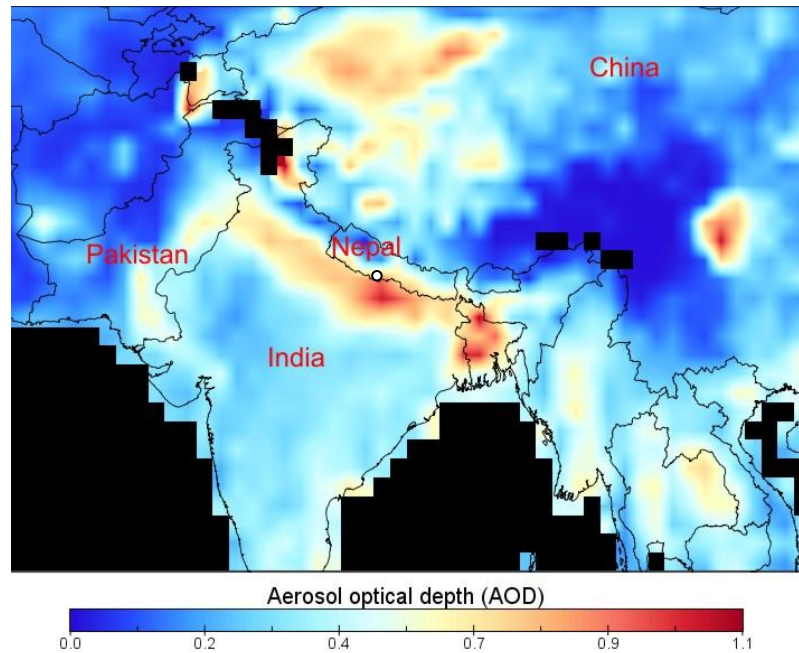

Correspondence to:

D. Rupakheti (dipesh.rupakheti@itpcas.ac.cn), S.C. Kang (shichang.kang@lzb.ac.cn)

Figure S1. Monthly average diurnal variation of wind speed (m s^{-1}) (upper panel) and wind direction (degree) (lower panel) for the months of April, May and (1st-15th) June respectively. In each box, the lower and upper boundary represents 25th and 75th percentile respectively, top and bottom of the whisker represents 90th and 10th percentile respectively. The mid-line in each box represents median and the square mark represents the mean for each hour.

Figure S2. Log-log plot showing the comparison of BC to CO ratio observed at Lumbini with other sites (urban, rural, and those affected by forest fire). Compared are urban sites like Delhi (Bisht et al., 2013), Beijing (Han et al., 2009), Guangzhou (Verma et al., 2010), Hong Kong (Lee et al., 2013), Mexico (Retama et al., 2015), Baltimore (Park et al., 2005); suburban site in Pantnagar, India (Joshi et al., 2016) and Maryland (Antony Chen et al., 2001); Forest fire observed in Hong Kong (Lee et al., 2013), California (Sahu et al., 2012), Boreal fire (Val Martín et al., 2006); biomass burning in Savanna in South Africa (Hobbs et al., 2003) and California (Sahu et al., 2012) and background/remote sites like Mt. Cimone (Cristofanelli et al., 2013), Cape Hedo (Verma et al., 2011), Jeju Island (Sahu et al., 2009), Mt. Huang (Pan et al., 2011)

Figure S3. Aerosol optical depth in South Asia acquired with the MODIS instrument aboard TERRA satellite averaged during an intensive ground-based measurement period in Lumbini, Nepal (1 April- 15 June 2013). High aerosol loading can be seen over entire Ingo-Gangetic Plains (IGP). It is seen in the figure that Lumbini (a white circle with black border) is covered by the northern edge of an aerosol hotspot south of Lumbini.