Geophysical Research Abstracts
Vol. 18, EGU2016-5660, 2016
EGU General Assembly 2016

Transboundary Air Pollution over the Central Himalayas: Monitoring network and Preliminary Results

Qianggong Zhang (1,3) and Shichang Kang (2,3)

(1) Key Laboratory of Tibetan Environment Changes and Land Surface Processes, Institute of Tibetan Plateau Research, Chinese Academy of Sciences(CAS), Beijing 100101, China, (2) State Key Laboratory of Cryospheric Science, Cold and Arid Regions Environmental and Engineering Research Institute (CAS), Lanzhou 730000, China, (3) CAS Center for Excellence in Tibetan Plateau Earth Sciences, Chinese Academy of Sciences, Beijing 100101, China

The Himalayas, stretching over 3000 kms along west-east, separates South Asia continent and the Tibetan Plateau with its extreme high altitudes. The South Asia is being increasingly recognized to be among the hotspots of air pollution, posing multi-effects on regional climate and environment. Recent monitoring and projection have indicated an accelerated decrease of glacier and increasing glacier runoff in the Himalayas, and a remarkable phenomenon has been recognized in the Himalayas that long-range transport atmospheric pollutants (e.g., black carbon and dust) deposited on glacier surface can promote glacier melt, and in turns, may liberate historical contaminant legacy in glaciers into downward ecosystems. To understand the air pollution variation and how they can infiltrate the Himalayas and beyond, we started to operate a coordinated atmospheric pollution monitoring network composing 11 sites with 5 in Nepal and 6 in Tibet since April 2013. Atmospheric total suspended particles (TSP < 100 μm) are collected for 24h at an interval of 3-6 days at all sites. Black carbon, typical persistent organic pollutants (PAHs) and heavy metals (particulate-bounded mercury) are measured to reveal their spatial and temporal distributions. Results revealed a consistent gradient decrease in almost all analyzed parameters along south-north gradient across the Himalayas, with a clear seasonal variation of higher values in pre-monsoon seasons. Analysis of geochemical signatures of carbonaceous aerosols indicated dominant sources from biomass burning and vehicle exhaust. PAHs concentrations and signatures from soils and aerosols indicated that low-ring PAHs can readily transport across the Himalayas. Integrated analysis of satellite images and air mass trajectories suggested that the transboundary air pollution over the Himalayas is episodic and is likely concentrated in pre-monsoon seasons. Our results emphasis the potential transport and impact of air pollution from South Asia to Himalayas and further inland Tibetan Plateau. The monitoring network will be continuously operated to provide basis for defining the transboundary air pollution and their impact on the environments and ecosystems over the Himalayas and the Tibetan Plateau.