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Polycyclic aromatic hydrocarbons (PAHs) in aerosols over the central Himalayas along two south-north transects

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Our understanding of the transport of polycyclic aromatic hydrocarbons (PAHs) from the Indo–Gangetic Plains (IGP) to the Himalayas remains limited. Concentrations of PAHs were therefore measured in total suspended particles (TSP) from six sites along two south–north transects across the central Himalayas. Spatially, the annual average TSP and PAH (especially 5- and 6-ring) concentrations were found to decrease noticeably along both transects. The dry deposition fluxes had similar distribution pattern with the ambient PAH levels. Moreover, annual TSP and PAH concentrations exhibited a logarithmic decreasing pattern with increasing elevation especially in the non-monsoon seasons (TSP: y=-57.3lnx+552, R2=0.952; PAHs: y=-26.8lnx+229, R2=0.948). The TSP and PAH concentrations showed a clear seasonal variation, with the minimum concentrations around the mid-monsoon season and the maximum concentrations in winter season at Lumbini and Pokhara. While at other remote sites these pollutants were slightly higher during the non-monsoon season than those in the monsoon season. The diagnostic ratio suggested that atmospheric PAHs from the Nepal sites were mainly associated with emission of biomass, coal burning and petroleum combustion. A similar composition pattern was found between the two sides of the Himalayas, suggesting that the northern side of the Himalayas may be affected by anthropogenic emissions from the IGP due to long-range transportation as well as the unique mountain/valley breeze system which bring pollution from the IGP into Tibet across the high Himalayas.