

Diurnal cycle of air pollution in the Kathmandu Valley, Nepal:

Observations

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Abstract

During the dry season of 2004–2005 we carried out field measurements of air pollution and meteorology in the Kathmandu Valley, Nepal, a bowl-shaped urban basin in the Himalayan foothills of Nepal. We measured the trace gases carbon monoxide (CO) and ozone (O₃) and particulates (PM₁₀), as well as meteorological variables. In our field observations we noted a very regular pattern of morning and evening peaks in CO and PM₁₀ occurring daily in the valley bottom, interspersed with low values in the afternoons and at night. This pattern occurred even on days with unusual timing of emissions and was influenced by the timing of ventilation from the valley. Meteorological variables showed great day-to-day similarity, with a strong westerly wind blowing through the valley from late morning until dusk. We found that the air mass on nearby mountaintops was disconnected from pollution within the valley during the night, but received significant pollution during the morning, when up-slope flows began. At a pass on the western edge of the valley we found a diurnal switch in wind direction, with an inflow from late morning until late evening, and an outflow during the rest of the time. We found that part of the morning peak in pollution was caused by recirculation of pollutants emitted the night before, which spend the night in elevated layers over the valley.