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# Linking regional atmospheric circulation patterns and air quality in the Sogamoso Valley, Colombia

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The Sogamoso Valley (5º 43' N, 72º 55' W, 2570 m ASL) is one of the most industrialized regions of Colombia and the most densely populated area of the Boyaca province. The air quality in this region is affected by a heterogeneous group of emission sources, which include truck traffic, heavy industry (e.g steelworks and cement), medium- and small-scale industry, and around 600 low technology, highly polluting brick and quicklime production furnaces.

The annual average concentration of PM10 in the Sogamoso Valley was 67 ug/m3 in 2004, and the 24-h average concentration reached a maximum of 300 ug/m3 in 2005. This value doubles the Colombian standard (150 ug/m3).

The complexity of the air pollution problem in this region is associated not only to the spatial, temporal and composition heterogeneity of the emission sources in the region, but also to the topographic complexity of the Sogamoso Valley, which inherently implies meteorological complexity. Measurements and analysis conducted in 2002 found that the regional meteorological circulation patterns play a major role on the Sogamoso Valley air quality. For instance, drastic PM10 concentration variations were observed during periods of fairly steady emissions. An analysis of the wind indicates that these variations are linked to rapid changes in the regional atmospheric circulation pattern.

Using long-term meteorological time series, and meteorological and air quality measurements carried out during the CAVASO 2002 measurement campaign, we explored associations between air pollution episodes and regional atmospheric circulation patterns, with emphasis on relatively rapid (daily) pollutant concentrations changes. We present diurnal cycles and statistically analysis of the correlation between meteorological variables and pollutants, with special emphasis on PM10 and ozone.

The results of this research will guide the validation of meteorological calculations with the Weather Research and Forecasting Model (WRF) model over the valleys of Sogamoso and Tundama. The validated model will allow identifying atmospheric circulation patterns in the Sogamoso Valley and determine their effect on air quality.