Chemical composition of wet precipitation long range transport of mercury at in three sites of Taxco-Alarcon, Guerrero, Mexico

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The present study investigates the chemical composition of wet atmospheric precipitation samples on a daily and an intra-event timescales in Taxco-Alarcón, an experimental meteorological station located near Taxco-Alarcón, Guerrero, Mexico. The samples have been collected from November 2012 to October 2013. Three sites were selected to measure Hg, and the major inorganic ions SO_4^{2-}, NO_3^-, Cl^-, Ca^{2+}, Mg^{2+} K^+, Na^+, NH_4^+, PO_4^{3-}, HCO_3^- A total of 77 rainwater samples, integrated for 24 h, were collected and analyzed for The composition of the rainwater collected appeared to be controlled by the following potential sources: neutralization process (association among calcium, ammonium with nitrate and sulphate), marine and terrestrial sources. In order to determine the role of long-range transport, the integrated events were classified according to four origins of air-masses: (1) West, (2) North and East, (3) South and (4) Acapulco. Using the Weather Research and Forecasting model with Chemistry (WRF-Chem), we explored the impacts of nonlocal aerosol plumes transported at three different altitudes on a summertime convective system developed in two sites (Taxco and Acapulco). Idealized aerosol plumes from forest fire and volcano emissions, which are known to frequently be transported in this region, were prescribed at three separate altitudes on the upstream boundary of WRF-Chem. This analysis allows identifying the source areas of the different association of elements defined. Although calcium is always dominant, total content of rainfall is variable and neutralization process can be more or less efficient and specific. Rainout (long-range transport) and washout (below-cloud scavenging) were investigated through intra-event measurements of chemical species. Four rain-events have been selected according to the four classes of origins of air-masses. It appears that the first fractions are responsible for an important part of the chemical content of the whole event.