



Transport of particle pollution into the Maipo Valley: winter 2015 campaign results

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Each winter, Santiago (33° 27'S, 70° 40'W) the capital of Chile with a population of about 7 million people, experiences episodes with particulate matter (PM) concentrations larger than allowed by Chilean environmental regulations. Transport and residential heating largely dominate emissions prior to and during these episodes. Important impact of black carbon (BC) on the cryosphere has been documented in other parts of the world associated with urban pollution. In order to explore if BC from Santiago has the potential to reach the Andean cryosphere during the aforementioned episodes, a one week-long campaign was conducted in Santiago and the Maipo Valley between 18th and 25th of July 2015 when the air quality conditions of the city reached twice the critical levels (pre-emergency in Chilean regulations). Measurements were carried out at three sites: downtown Santiago, the entrance of the valley (and outskirts of Santiago) and 12 km inside the Maipo Valley. At each of these sites both surface and vertically distributed measurements were conducted. A meteorological station measuring standard meteorological parameters and an E-Sampler measuring PM10 concentrations were installed at each site. In addition, a tethered balloon equipped with a sonde and a mini-aethalometer was used in each site to measure vertical profiles of standard meteorological parameters and BC concentrations, respectively. The tethered balloon was raised every three hours up to a maximum of 1000 meters above ground level, whenever meteorological conditions allowed. In general, the BC concentrations inside the valley, both at the surface and in the vertical, were dominated by emissions within the valley and BC was limited to shallow layers above the ground. However, on both days with critical air quality levels, winds blowing from the city and deeper BC layers were observed inside the valley. Furthermore, during these days observations at the entrance of the valley and those taken inside were coupled, contrary to the other days when they were decoupled. This deeper BC layer and the coupling of observations at the entrance and inside the valley suggest that pollutants are transported into the Maipo Valley and thus could potentially reach the snow and ice covered areas in the Andes.