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A dust event in Patagonia: Lidar observations, satellite data and modeling

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On 20 February 2016, mineral dust aerosols were detected using a ground-based lidar system located at Comodoro Rivadavia airport. The true color (RGB) images from the MODIS sensor onboard of the AQUA satellite, the identification of variables from TOA (Top-Of-Atmosphere calibrated radiances) and data of Aerosol Index derived from the OMI sensor onboard of the AURA satellite shows a dust cloud carried by strong westerly winds sweeping the Argentinian Patagonia. An analysis and interpretation of satellite imagery suggests that the emission source is located most likely in the lake "Colhué Huapi". This lake suffers from the lack of enough inflow due to the scarce precipitation and the water intake constructions in the surrounding area. Particularly, 2015 and part of 2016 show the lowest area of the Colhué Huapi lake compared to the average since 1998. The studies on the Lago Colhué Huapi, show that the geological profile presents two layers: the lowest pyroclastic-sedimentary and the higher of volcanic characteristics (vulcanites). We argue that the soil desiccation and the largest area exposed to the wind erosion created favorable conditions for dust mobilization due to the strong winds of the region. In this work, we conducted numerical simulations using the resuspension mode of the WRF-ARW/FALL3D modeling system in order to model the event on 20 February, 2016. The potential emission sources are determined by the Colhué Huapi lake area using a total grain size distribution (TGSD) based on field campaigns. The results are compared with the lidar measurements and satellite imagery. Although these comparisons are at first qualitative, they will help to assess the importance of a ground based remote sensing instrument to be able to detect dust/volcanic ash plumes, as well as to promote the development of algorithms for quantitative comparisons.