



Temporal variability of mineral aerosol in the South Patagonia

Zihan Qu (1,2), Rémi Losno (3,1), Émilie Journet (1), Jacobo Salvado (4), Daniela Bulnes (4), Fabrice Monna (5), Jean-Paul Quisefit (1), Alexie Heimbürger (1), Pablo Ristori (4), Eduardo Jaime Quel (4), and Yves Balkanski (6)
(1) LISA UMR 7583, Université Paris Diderot, Université Paris Est, CNRS, 61 avenue du Général de Gaulle, 94010 Créteil Cedex, France, (2) Université Pierre et Marie Curie (UPMC), 4 Place Jussieu, 75005 Paris, France, (3) LGE, IPGP, 1, rue Jussieu, 75238 Paris Cedex 05, France, (4) División Lidar - CEILAP - UMI - IFAECI - CNRS 3351, CITEDEF UNIDEF (MINDEF - CONICET), Villa Martelli, Buenos Aires, Argentina, (5) ARTÉHIS (UMR 6298), Université de Bourgogne - CNRS, Dijon, France, (6) LSCE/IPSL, CEA-Orme des Merisiers, Bat 712, Point Courrier 132, 91191, GIF-SUR-YVETTE, France

Patagonia (South America) is a major atmospheric mineral dust source in the South Hemisphere. The input of Patagonian dust plays a critical role in the biogeochemistry of Southern Ocean. From November 2011 to August 2014, aerosol samples were continuously collected on a weekly basis in Río Gallegos (69.32°W, 51.60°S), by the south Patagonia east coast. This three-year measurement is the first long term time series of mineral dust concentrations obtained in the sub-Antarctic region. Backward trajectories by HYSPLIT model showed that up to 90% of air mass arrived at Río Gallegos originated from the west side (between NNW and SSW) of sampling site. Amounts of Al, Si and Fe were determined by XRF analysis. The compositions of the three elements remained stable during the three years samplings. Weekly dust concentrations measured in South Patagonia varied from 0.08 to 3.67 $\mu\text{g}\cdot\text{m}^{-3}$ and reveals a strong seasonal variation pattern. Average winter dust concentrations could decrease down to five times lower than in other seasons. Higher wind speeds unexpectedly did not result in higher dust concentrations. However, variations of the temperature and the air relative humidity well correlated with the dust concentration variation. This suggests that surface soil moisture changes are the primary regulating factor of dust concentration variation in Patagonia. Land frozen effect was potentially another factor resulting low level of dust concentration in winter. These results permit the improvement of atmospheric dust modelling in the South Hemisphere.

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