WET AND DRY DEPOSITION FLUXES OF SOLUBLE ELEMENTS IN THE CANARY REGION (2002-2022)

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Abstract: In this work, a data set of 20 years of dry (DD) and wet (WD) depositional fluxes in the Canary Islands region for the period February 2002 to February 2022 is presented. This is the longest time series of depositional fluxes in the eastern North Atlantic to our knowledge. The samples were collected at urban background site located in Tafira (269 m a.s.l), Gran Canaria. A total of 424 DD and 329 WD samples were collected. The average DD and WD fluxes were 33.82 ± 59.43 and 28.89 ± 89.90 mg m^{-2} d^{-1}, respectively. The DD and WD fluxes were determined by the seasonal patterns of the African dust inputs to the region. The air masses responsible for the highest depositional fluxes affect Canary Islands during the winter-early spring and summer in agreement with previous studies (López-García et al., 2013; 2017; 2021). The major ions (fluoride, chloride, bromide, nitrite, nitrate, phosphate, and sulphate), the dicarboxylic organic acids (acetate, formate and oxalate), the soluble trace metals (Ti, Fe, Mn, Co, Ni, Zn and Cu) and the pH were measured in the dust deposition samples using surrogate surfaces. Using the results obtained from Principal Component Analysis (PCA), a multivariate statistical method, three main sources from DD fluxes have been determined: marine (Na^+, Cl^-, K^+, Mg^{2+}), crustal-anthropogenic mixed (Ca^{2+}, PO_4^{3-}, $C_2O_4^{2-}$, $HCOO^-$, CH_3COO^-) and anthropogenic source (NO_3^-, $nssSO_4^{2-}$). Besides WD fluxes were characterized mainly by a marine component (Na^+, Br^-, Cl^-, Mg^{2+}) and two different anthropogenic sources: ($HCOO^-$, CH_3COO^-, NH_4^+) and (NO_3^-, nss-Ca^{2+}, nss-SO_4^{2-}). Although WD accounted for only 8.42 % of the total particle flux in the study period, the amount of atmospheric soluble metal inputs to the Region increased significantly during the raining seasons (more than 50% of the total Fe flux).

Key words: Particle Fluxes, Dry deposition, Wet deposition, major ions, trace metals

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