Geophysical Research Abstracts
Vol. 18, EGU2016-14294, 2016
EGU General Assembly 2016

A Seven-Year Major and Trace Element Study of Rain Water in the Barcés River Watershed, A Coruña, NW Spain

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Precipitation constitutes an important source of soluble materials to surface waters and, in areas where they are diluted precipitation (either dry or wet) it can be the most relevant solute source. Certain trace elements may have a limited natural availability in soils and rocks although they can be important with respect the operation of different biogeochemical cycles, for the computation of local/regional atmospheric pollutant loads or from the global mass budget. In the present study we report the results obtained in a long-lasting (December 2008-December 2015) monitoring survey of the chemical composition of bulk precipitation as monthly-integrated samples taken at the headwaters of the Barcés river watershed (A Coruña, Spain). This location was selected based on the necessity of quantification of the chemical composition and elemental loads associated with the different water types (stream water, ground water and precipitation) contributing to the flooding of the Meirama lake. Available data includes information on meteorological parameters (air temperature, relative humidity, atmospheric pressure, wind speed and direction, total and PAR radiation and precipitation) as well as a wide bundle of physico-chemical (pH, redox, electrical conductivity, alkalinity, Li, Na, K, Mg, Ca, Sr, Mn, Fe, NH4, Cs, Rb, Ba, Zn, Cu, Sb, Ni, Co, Cr, V, Cd, Ag, Pb, Se, Hg, Ti, Sn, U, Mo, F, Cl, Br, SO4, NO_3, NO_2, Al, As, PO4, SIO_2, B, O_2, DIC, DOC) and isotopic ([U+F064]18Ov-smow and [U+F064]2Hv-smow) constituents. The average pH of local precipitation is 5.6 (n=65) which is consistent with the expected value for natural, unpolluted rain water. Most of the studied elements (eg. Na, Ca, K, Mg, SiO_2, etc.) shows significant increases in their concentration in the dry period of the year. That points towards a more significant contribution of dry deposition in these periods compared with the wet ones. The average electrical conductivity is about 67 [U+F06D]S/cm while the average chloride concentration 8 mg/L. Based on standard normalization procedures, the source of some major and trace precipitation elements have been identified, including sea water, soil and pollution/anthropogenic sources as well as multiyear trends. Available data has allowed also the computation of elemental loads in the studied area.