$^{87}Sr/^{86}Sr$ signature in the Po river water and its implication on rock weathering at basin scale

MARCHINA C.[1], NATALI C. [2], BRYCE J. G, [3], PENNISI M. [4], FAHNESTOCK M.F. [3], BIANCHINI G. [2]

[1]Department of Land, Environment, Agriculture and Forestry, University of Padova, Legnaro (PD), Italy
[2]Department of Physics and Earth Sciences, University of Ferrara, Italy
[3]Department of Earth Sciences, University of New Hampshire Durham, NH, United States
[4]Institute of Geosciences and Earth Resources (IGG), National Research Council (CNR), Pisa, Italy

The geochemistry of riverine dissolved load affords a means to evaluate rock weathering and geochemical fluxes in dynamic environments affected by high erosion rates [1], [2], [3]. In this view solute chemistry and isotopic composition in water parcels can be regarded as a chemical mixture from several sources, thus making an arduous task to discriminate contributions from different geological formations. The Alps and the Apennines chains both provide water and sediments to the Po river, the longest river in northern Italy which flows through a multi-lithological catchment. Samples collected from the source to the deltaic part and in ten of the main tributaries were analyzed for major and trace elements composition, total dissolved solids and strontium isotopes ($^{87}Sr/^{86}Sr$). Resulting total dissolved solids (TDS) and isotopic data allow for the classification of the upper Po as scarcely mineralized (with TDS < 300 mg/l, up to 100 km from the source) to a middle stretch of more mature waters (TDS around 300 mg/l) and to the terminal part of the river where waters have higher TDS (up to 400 mg/l). Strontium isotopes vary along these reaches as well, ranging between 0.70960 and 0.70975 in the upper Po and corresponding tributaries, to $^{87}Sr/^{86}Sr$ ranging between 0.70894 and 0.70945 in the middle stretch and to between 0.70892 and 0.70975 in the river terminus. Taken together these data provide a means to extract the various roles of carbonate versus silicate weathering in a major European river system giving a “picture” of the existing weathering processes at regional scale and on the lithologies that are involved in these exogenous processes, which are in turn related to natural and anthropogenic influences. Variations could be related to ongoing climatic changes and/or to human activities that modify the territory and the landscape.

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