

Tracing geogenic and anthropogenic sources in the Po river dissolved load with a multi isotope approach

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The Po river cross Northern Italy and flows within a densely populated area characterized by intense agriculture and industrial activities. The presented data represent a follow up of a previous study that discussed dissolved components and oxygen-hydrogen isotope composition of its waters in distinct seasons of the year 2012, all along the river course [1]. In this contribution the study of Po river water is implemented with further sampling campaigns of the year 2013, to provide a more complete chemical and multi-isotopic investigation. $\delta^{18}\text{O}$ - δD data on riverine waters conform to the meteoric trends, and their analogies with the local groundwater rule out significant warming trends. The comparison of the new data with historical analyses indicates that the Ca- HCO_3 hydrochemical facies remained constant over the decades; in contrast, nitrate drastically increases from less than 1 mg/L to an average value of 9 mg/L.

$\delta^{13}\text{C}$ (between -11.4‰ and -4.4‰) and $\delta^{34}\text{S}$ (between 4.2‰ and 8.0‰) are compatible with the weathering and dissolution processes that involve the lithologies outcropping in the basin, while extremely variable $\delta^{15}\text{N}$ (between -4.1‰ and 18.0‰) indicates contribution of pollutants from mixed anthropogenic sources (urban wastewater, agricultural and zootechnical activities). These observations suggest that although the origin of the main constituents of the Po river water is geogenic, anthropogenic contributions are also effective.

[1] Marchina *et al* (2015) *Environ. Sci. Pollut. R.* **22**, 5184-5203