



Foreword

Geochemical and isotopic record of anthropogenic activities – Thematic issue dedicated to Jean Carignan (1965–2012). Part 2: Traditional and non-traditional stable isotopes



The second volume of the thematic issue of *C. R. Geoscience* on the “Geochemical and isotopic approaches developed for tracing the impacts of anthropogenic activity on the environment” is devoted to the approaches based on the use and development of stable isotopes to describe the functioning of ecosystems and hydrosystems as well as their perturbation by anthropogenic activities. This volume is comprised of nine papers, including papers on both traditional isotopes (C, H, O, N, S) and the so-called “new stable isotopes”.

The first three papers are examples of the use of traditional isotopes to study water dynamics and nitrate and sulfate biogeochemical cycling in hydro- and agro-systems. In the first article, [Brenot et al. \(2015\)](#) compare sampling protocols for soil solutions by two different methods, and evidence that each protocol samples different water reservoirs, with different hydrological dynamics, the study of which is important for the understanding of chemical dynamics in agricultural systems. In their paper, [Paul et al. \(2015\)](#) focus on nitrate dynamics in a cultivated catchment and give an example of the use of nitrogen isotopes for describing such dynamics. The third article (by [Harker et al., 2015](#)) demonstrates how coupled geochemical and isotopic studies are important to identify sources of water, nitrates and sulfates at a river basin scale. The following six papers are devoted to the use of non-traditional stable isotopes. The first paper by [Lemarchand et al. \(2015\)](#) highlights the potential of B isotope analyses coupled with that of Sr and major element contents to understand water–rock interactions in an aquifer. The following two papers report the use of Hg isotopes at two different scales. Whereas [Wang et al. \(2015\)](#) use Hg isotopes to identify the source of Hg precipitated in urban rainfall, [Štrok et al. \(2015\)](#) present

the first data of coastal seawater Hg composition in the Canadian Arctic Archipelago while showing the artefacts resulting from the sample conditioning. The last three papers illustrate various applications of metal isotopes such as Fe and Zn to environmental issues, whether it be at a river scale ([Escoube et al., 2015](#)) or in plants and soils, which play an important role in metal isotopic fractionation in the critical zone, as shown by [Couder et al. \(2015\)](#) for Zn and by [Arnold et al. \(2015\)](#) for both Fe and Zn.

This second volume¹ as well as the first one (see [Chabaux et al., 2015](#)) features how large is the field in which various geochemical tools can be applied as well as the diversity of the issues they help to tackle. As the first one, it is dedicated to our colleague and friend Jean Carignan (1965–2012) who got deeply involved during his too short scientific career in developing geochemical and isotopic tools capable of tracing anthropogenic impacts on the environment.

References

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