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Carbon isotopes of vegetation as proxy of natural or anthropogenic gas seeps

Wolfram Kloppmann, Frédérick Gal, Michaela Blessing, and Christine Fléhoc
BRGM, DEPA/ISO, Orléans, France (w.kloppmann@brgm.fr)

There is evidence that the emission of ^{14}C –free CO_2 during volcanic emissions creates a bias for radiocarbon dating of volcanic events (Holdaway et al., 2018), showing that integration of "dead" carbon by vegetation can serve as indicator of geogenic gas emissions. We tested ^{14}C activities and stable carbon isotope ratios of tree rings and herbal vegetation in the proximity of a natural gas seep in the French Subalpine chains where both methane (<90% in the main vent) and CO_2 (<11%) are present (Gal et al., 2018). Wood samples were taken from two alder trees, at different distances and directions from the main gas vent. Grass leaves and roots (*Carex* sp.) were analysed for two spots with contrasting soil methane concentrations and fluxes within the zone of diffuse gas emanation around the main vent (Gal et al., 2019). Grass and wood samples show contrasting isotope compositions depending on their species, age, and position with respect to the gas seep, some with ^{14}C activities significantly lower than present day values. This offers perspectives of using vegetation carbon isotopes as proxies for present and past gas emanations, including man-induced gas leaks, e.g. from gas storage or natural gas exploitation facilities.

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