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Bromine in peat and related humic acids from ombrotrophic bog and implications in the reconstruction of its fate.

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Bromine is one of the most abundant and ubiquitous of the recognized trace elements in the biosphere, although it has not been conclusively shown to perform any essential function in plants, microorganisms, or animals. The attention of soil scientists for the biogeochemistry of bromine is due mainly to environmental concerns, such as the stratospheric ozone depletion, but literature is rather controversial about the role of peatlands as sink or source of bromine. An ombrotrophic bog is a domed peatland in which the surface layers are hydrologically isolated from the influence of local groundwaters and surface waters, and are supplied only by atmospheric deposition; for this reason, they have been often used as archive of atmospheric metal depositions (e.g. Pb).

Two peat cores (2H and 2T) were removed from Etang de la Gruère (Switzerland), divided in several slices and humic acids (HA) were extracted. Both raw peat and related HA were analyzed using an Energy-dispersive miniprobe X-ray fluorescence multielement analysis (EMMA-XRF). In addition, Br mass balances were performed on 5 replicate cores of the same bog.

Data obtained show about 50 % of Br that reaches the bog surface by atmospheric deposition is entrapped into peat and, in particular, Br prefers to link to HA molecules via direct abiotic and biological bromination and/or production of several compounds that act as precursors of HA. The other 50 % of Br deposition could be released both in the atmosphere, as volatile Br-compounds (e.g., CH_3Br), and leached downward. Furthermore, Authors found a good correlation between HA Br content and the raw

peat Pb enrichment factor (EF), obtained normalizing the Pb content to the Ti one in the crust, especially in the upper part of the profiles. These data, together with the ^{210}Pb age dating, have confirmed that, beside the usual sources of Br, the use of leaded gasoline, protracted for several decades, has been a main source of both Br and Pb.

Thus, ombrotrophic bogs archive the atmospheric depositions of several trace elements either in raw peat or in the more stable and recalcitrant fraction of organic matter (HA), according to their specific biogeochemical behaviour.