



Influence of the exploitation of an aquifer underlying a peatland on the peat quality : Use of SO₄ concentration as a proxy

C. Auterives (1), L. Aquilina (1), M. Davranche (1), V. Paquereau (2)

(1) Géosciences Rennes, CAREN, UMR 6118 CNRS, Univ. Rennes 1, (2) Parc naturel régional des marais du Cotentin et du Bessin (chrystelle.auterives@univ-rennes1.fr / Fax : 033 223 236 090)

A study has been carried out in order to evidence the impact of the exploitation of a sandy aquifer underlying a peatland, on the peat quality and hydrologic behaviour. Strong SO₄ concentrations were analysed in the peatland groundwater after the dry and hot summers seasons. The parameters and the mechanisms controlling the SO₄ concentrations in the peat groundwater are presented.

The hydrology study showed that the peat groundwater level is controlled by the sandy aquifer groundwater all over the year. Moreover, the peatland is crossed by streams that generally supply the peat groundwater except in summer where stream can be locally disconnected from the peat groundwater. In this context, two sites were chosen to evaluate the SO₄ hydrochemistry, (i) one where stream is connected during the whole year (Site S) but close to a pumping station, and (ii) one with summer stream disconnection but without pumping (Site G).

Over a 2-year period, physico-chemical parameters, major anions, major cations and trace elements were analyzed in rainwater, peat groundwater and stream. Eh is generally oxidant due to the connection between oxidizing stream water and peat groundwater. The strongest SO₄ concentrations (400 mg/l and 1170 mg/l respectively in site S and G) are observed after a peat desaturation time (minimum water level) in piezometer influenced by the stream summer disconnection in site G and close to the pumping station in site S.

The SO₄ increase is concomitant with a decrease of pH (< 5) and DOC and a strong

increase in major cations and REE concentration in solution. The strong REE increase and the change observed in REE pattern suggests a mineral dissolution. The dominant process is thus an inorganic S oxidation rather than an organic S compounds mineralization. Inorganic sulphurs present in the peat system is thus oxidized releasing H^+ . The induced decrease of pH involved a solubilization of carbonate releasing major cations such as Ca or Na. Therefore, the drying/rewetting cycle of the peat probably due to the disconnection of the stream in the site G and the pumping in the site S effectively induced the increase of SO_4 concentration. The major mechanism is the inorganic S oxidation and not the peat mineralization.