

## Hydrology of an acidic valley mire in a granitic headwater catchment of the French Massif Central

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The Massif Central is one of the areas with the highest density of mires in Metropolitan France, a large number of which are acidic valley mires located at the bottom of etch-basins on crystalline hard rocks. Many of these wetlands have been designated as Special Areas of Conservation under the EU Habitats Directive, yet very little is known about their hydrological functioning. Here we present results of a field and modelling study investigating the hydrology of a 231ha catchment and the mire located at its centre. Electrical resistivity tomography showed that saprolite has been almost entirely eroded away, and suggested that the wetland is hydrologically connected to the fissured granite aquifer. Hydraulic head monitoring demonstrated upwelling of groundwater from the underlying granite weathering formations into the peat. Upwelling sustains a groundwater table at or close to ground level for most of the year. The groundwater table in the peat only drops below the surface when groundwater upwelling is reduced or stops in late summer. A MIKE SHE model of the mire and its catchment was developed to investigate the water balance of the mire. The model reproduced the groundwater table depth and stream discharge observed at a number of locations across the catchment with satisfactory to excellent performance. Simulation results suggest that groundwater upwelling from the underlying granitic aquifer makes for a quantitatively important and functionally essential part of water inputs to the mire.