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# Coupling carbon, nitrogen and water chemistry with plant distribution in two alpine wetland ecosystems

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Alpine peatlands are scattered in the mountain landscape, but often control the nutrient status of drainage water, having important consequences on water quality at the catchment level. In such ecosystems, the biogeochemical cycles of carbon (C) and nitrogen (N) compounds are strongly controlled by the combination of water status, soil temperature and the unique vegetation, all of them controlling the organic matter decomposition. The vegetation type strongly changes at the scale of meters, presumably due to concomitant differences in water and soil properties.
In this work, we analysed soil and surface water chemical and physical properties at high spatial resolution in two alpine wetland ecosystems and correlated them to plant distribution to identify any relationship among them.
The two alpine minerotrophic wetlands are located at 1600 m (San Bernardo, SB) and 2000 m ASL. (Vannino, VA), in the municipalities of Bognanco and Formazza, respectively, in the North-western Italian Alps. The two sites differ in their topography, hydrology and vegetation. SB is constituted by mosaics of hummocks and flat areas with very different vegetation types. A large area of the wetland is completely saturated with water for the whole year. VA is a system of three wetlands separated by some “roches moutonnées”. Compared to SB, it shows a higher topographic homogeneity and relatively less harsh water-logging conditions.
The sampling campaign was carried out in summer 2009. At each site a $\sim$ 20 m x 20 m grid was established and at each node soil samples were taken at 0-20 cm depth and 50 cm depth. At the same points water was collected from or near the surface, when possible. Furthermore, at each point the vegetation was carefully described. In the surrounding of each node, the sampling point was in some cases arbitrary replaced in order to cover a vegetation spot otherwise unaccounted, resulting therefore in a semi-random sampling.
Soil samples were analysed for organic C (TOC) and total N (TN) content, pH and gravimetric water content. Water samples were analysed for main elements and dissolved organic C (DOC) and N (DON).
Several chemicals showed a consistently higher concentration in VA than in SB. In particular, cations such as ammonium, potassium and calcium, anions such as nitrate, and compounds such as DOC were significantly higher in VA than in SB ($p<0.05$). In contrast, pH was higher in SB than in VA. The higher water content in SB than in VA may explain the overall lower chemical content by a dilution effect. Alternatively, a higher catchment buffering capacity may be expected at lower altitude, which may have reduced concentrations of chemicals entering the wetland system. The relationships between vegetation distribution and soil/water properties are carried out with multivariate statistical techniques and are currently under investigation.

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