

Land use change impacts on soils and vegetation: examples from Italian Alps

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Since the half of 20th century, land use and land cover changes have occurred in the Italian alpine ecosystem due to land abandonment driven by social, economic, and climatic factors. These changes trigger forest recolonization and can have intense implication on the alpine Critical Zone (CZ). We investigate the impact that changing management strategies have on the geochemical, isotopic and microbial characteristics of the soil and on the functioning and diversity of vegetation. Biogeochemical cycles at the soil-plant interface were studied at three sites located in the eastern Alps (at Gran Paradiso and Val Grande National parks) and western Alps (Altopiano Tesino). Main lithologies at the sites are gneiss, micaschist and carbonaceous rocks, respectively. Soil (0-20 cm), litter and plant samples were collected, and chemical and isotopic tools were used to investigate transition marked by old forest, advancing front of young forest and pasture. Soil organic carbon and nitrogen (N) isotopes revealed to be promising proxies for land use change. Leaf isotope composition of the main plant species sampled in the different ecosystem types unravelled changes in N source and water-use efficiency along the pasture-forest transition. In situ measurements were scaled up and compared with land cover maps extracted from both satellite and aerial imagery and snow cover duration maps.

This activity is part of the Belmont Forum project ABRESO, that aims integrating biogeochemical and earth observation tools of Natural Science with the socio-economic investigation approaches of the Social Science. Understanding ecosystem response to land abandonment for a sustainable management of CZ is the main goal of the project.