



Has Land Use/Cover Change affected the soil weathering degree in Southern Brazil?

Jérémy Robinet (1), Liesa Brosens (1), Yolanda Ameijeiras-Mariño (2), Jean Minella (3), Sophie Opfergelt (2), Gerard Govers (1), Jan Vanderborght (1,4)

(1) Division of Geography and Tourism, Department of Earth and Environmental Sciences, KU Leuven, Leuven, Belgium, (2) Earth and Life Institute, Environmental Sciences, Université catholique de Louvain, Belgium, (3) Department of Soil, Universidade Federal de Santa Maria, Rio Grande do Sul, Brazil, (4) Institute of Bio- and Geosciences, IBG-3: Agrosphere, Forschungszentrum Jülich GmbH Jülich, Germany

The soil weathering degree is an important soil characteristic as it represents how much the weathering processes progressed compared to the parent material. It can therefore yield important information regarding the formation and development of the Critical Zone. Factors influencing the soil weathering degree have been identified as for example the climatic conditions, the water availability, the parent material mineralogy, the biological activity, the vegetation type or the denudation rates.

Land Use/Cover Change has the potential to affect most of these factors, especially in (sub-) tropical environments where LUCC have been mainly taking place in the last century. However, little research has been conducted to evaluate the impact of LUCC on the weathering degree of soils.

We combined chemical analyses and Mid-infrared reflectance spectroscopy to obtain quantitative data regarding soil weathering degree in a small region in Southern Brazil. We used three chemical weathering degree indices: Chemical Index of Alteration, Total Reserve in Bases and the ratio between iron oxides and total iron concentration. It allowed us to investigate the impact of LUCC in a region strongly affected by deforestation and agricultural practices.

Our results showed that the slope was the main controlling factor of the soil weathering degree and explained 38 to 52% of its variability depending of the index used. We showed that, despite an impact of LUCC on many potentially controlling factors, the soil weathering degree was not significantly different between agricultural and forested land uses. One explanation could be the complex interaction between the different factors, with some potentially increasing the weathering processes while others potentially slowing down these processes. Besides, the complex and important soil redistribution caused by tillage erosion and translocation could also explain the identical weathering degree for arable land and forest.