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Conversion of forest to arable land in Southern Brazil has led to an increase in dissolved silicon flux

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Hydrology plays a major role in controlling biogeochemical fluxes at various scales. Among the various controlling factors of water fluxes at the hillslope or catchment scale, land use change is a direct human effect which has been relatively under-examined despite its potential important impact. The overall objective of this research is therefore to investigate how land use change can affect water fluxes and how these changes may, on their turn, affect biogeochemical fluxes, with a particular focus on silicon (Si) dynamic.

We selected two small catchments with contrasting land use (agriculture vs. natural forest) in a subtropical region in the south of Brazil. The conversion of forest to arable land in the agricultural catchment is relatively recent, as deforestation started at the beginning of the 20th century. Stream, pore and groundwater were monitored, sampled and analyzed for major elements concentrations and δ18O.

Preliminary results showed that deforestation and agriculture led to an increase in solute export at the catchment outlet, with for example dissolved Si (DSi) concentration and flux two times higher for the agricultural catchment. δ18O and DSi concentration data showed the importance of preferential flow in macropores in the forested catchment, probably because of the high root and low bulk densities. This led to a reduced mobilization of the pore water during rainfall event, contrarily to the agricultural catchment. As a result, there is almost no contribution of this relatively DSi-enriched pool to the river discharge in the forested environment.

Those results indicate that the conversion of forest to arable land has had a significant impact on the biogeochemical fluxes, highlighted in this study with observed changes in DSi flux. Those changes could be partially attributed to changes in water fluxes and pathways.