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Titel
Detectable contributions of colloids to soil P and C content in arid and hyperarid region of the Atacama (Chile)

Abstract
Atacama Desert is mainly known as the driest place on Earth where life has been developed under arid to hyper arid conditions since Oligocene-Miocene. Therefore, soils of Atacama contain fingerprints of past and present life which might be used as an analog to study the evolution of life under equivalent arid conditions, like Mars. In this study, we quantify the colloidal phosphorus and carbon distribution in the first 10 cm of soil profile along an altitudinal transect. Samples were taken along a transect in the region of Quebrada Aroma spanning from the arid Percordillera of the Andes (2720 m a.s.l.) towards the hyper arid core of the desert (1340 m a.s.l.). Water dispersible colloids (WDC) were separated and measured using the field-flow-field fractionation (FFF) method and subsequently their C_{org} and P content were characterized and quantified by detectors (DLS, ICP-MS, UV, OCD, fluorescence). Data was compared to total C, P and (available) Olsen-P also measured in the samples.
The Olsen-P (available-P) varied within the Aroma transect from ca. 2 to 8 mg P kg^{-1}, but was not related to either altitude or depth in the upper soil (0-10 cm). Colloidal P contents ranged from <0.1 to 4 mg P kg^{-1} soil, with increasing trend from low to higher elevations. Thereby, suggesting an increasing proportion of the available P potential being present in the WDC fraction. The Colloidal C_{org} content of the Aroma transect did range from 65 to 90 (for sites 2020 to 1340m) and 110 mg C_{org} kg^{-1} soil WDC (2720 m). Colloidal C_{org} content as a function of the altitude showed a similar trend to the C_{org} content of the soils: the highest colloidal C_{org} content was found at 2720 m. The proportion of soil C_{org} within the colloidal fraction was up to 6% of the bulk soil organic matter (OM) content, as the OM content was intensively enriched in the colloidal fraction. Further quantification of phosphorus and carbon content in WDC in deeper part of soil is required to obtain a more comprehensive view of role of colloidal inputs and dynamics in the Atacama Desert.