

Abstract Preview - Step 3/4

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Session: EN-7 Biogeochemical cycling in the Polar Regions: Terrestrial and Ocean interactions

Polar program: None

Title: Tracing controls on iron export from high latitude peat soils

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Text: Incipient warming of peatlands at high latitudes is expected to modify soil drainage and hence the redox conditions, which has implications for Fe export from soils. To disentangle the complex biogeochemical interactions in soils controlling the sources and processes which govern this vital function, understanding the controls on stable isotope fractionation of Fe in peat soils is essential. This study uses Fe isotopes to assess the processes controlling Fe export in a range of Icelandic soils including peat soils derived from the same parent basalt, where Fe isotope variations principally reflect differences in weathering and drainage. An additional constraint on soil weathering is provided by Si stable isotopes. Si supersaturation in solution with respect to amorphous silica is reached upon freezing when Al availability to form aluminosilicates is limited by the affinity of Al for metal-organic complexes. Therefore, the precipitation of amorphous silica in peat soils indirectly supports the formation of metal-organic complexes in poorly drained soils. The influence of organic matter on metals is confirmed using Zn stable isotopes. These observations highlight that in a scenario of decreasing soil drainage with warming high latitude peatlands, Fe export from soils as Fe-organic complexes will increase, which in turn has implications for Fe transport in rivers, and ultimately the delivery of Fe to the oceans.

Preferred Presentation Type: **Oral Presentation**

Conference: POLAR 2018 · Abstract: A-938-0041-00362 · **Status: Draft**

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