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Weathering of the Öræfajökull 1362 and the Vatnaöldur 1477 tephra and their impact on soils south of Vatnajökull, SE-Iceland

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Icelandic soils are highly influenced by volcanic activity and most have developed from igneous rocks of basaltic composition. Volcanism has impacted the settlement south of Vatnajökull since the area was colonised in the late 9th century AD. The most devastating eruption occurred in Öræfajökull volcano in 1362. The eruption was explosive and produced large amounts of rhyolitic tephra, which at present can be found in soil profiles as a light coloured layer with thickness of up to tens of cm. Another important tephra layer preserved in the soils of this area is the basaltic tephra from a Vatnaöldur eruption in 1477, within the Bárðarbunga volcanic system.
We investigated two wetland sites in Kálfafell (64°10,749'N, 15°53,236'W) and Reynivellir (64°7,731'N, 16°3,245'W) in the lowlands close to the sea, south of Vatnajökull in SE-Iceland. The predominant climate in the study area is humid and mild with cool summers and mild winters with a mean annual temperature of approximately 5°C and a lot of precipitation. The soils can be classified as Histosols with a large quantity of organic matter and show clearly formed tephra layers. This provides a unique opportunity to study not only the weathering of tephra, but also the formation and development of soils originated from these tephra layers. Tephra and soil samples were analysed concerning their chemical properties, mineralogy and a special focus on the clay content. Complementary studies regarding the soil organic matter (SOM) were done and entered into the question of how the organic carbon is bound in the soil. We present the results of the weathering of the two different tephra layers and their contrasting mineralogy. In addition, the weathering and transformation of the minerals in the soils are presented. This approach enables comparison between the weathering behaviour of tephra of different composition and their impact on soil.