

The Boulder Story: Kvarken archipelago

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Kvarken archipelago in Gulf of Bothnia lay in the southern part of Fennoscandian Ice Sheet frozen-bed region during the Late Weichselian glaciation (cf. Kleman et al., 1999, Lundqvist 2007). A complex glaciated terrain development is indicated by highly variable geomorphology. The region is characterized by fields of hummocky and ribbed moraines, glacial lineations, and the De Geer moraine field in Raippaluoto island (Breilin et al. 2011). The final shaping of the terrain suggests rapid retreat of the ice margin in relatively deep water. This presence of angular boulder fields in the region remains mysterious, because the traditional formation story connected to iceberg calving or ribbed moraine formation is not fully agreed.

In recent studies, special attention has been paid to the erosion by pressurized meltwater in the subglacial environments (cf. Hall et al. 2020). The latest LiDAR mapping and field studies at Kvarken has provided new evidence for pressurized subglacial waters providing both channelized and sheet flow of the melt waters. According to the broken rocks in many locations they may became disrupted by over pressured water pulses or hyper-concentrated slurries during subglacial floods resulting rock damage and / or rubble diamicton surfaces. Excluding the surfaces of the ribbed moraines, these terrains are so widely exposed that it is possible to represent wide areas that have undergone these conditions leaving behind rough boulder dominated glaciated terrain. These observations show a previously unknown role of the subglacial waters in glaciated terrain formation in the region.

References

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