

Early Holocene in Siljan Lake District – a nature in strife

The early-Holocene is a period of revelations and unrest in previously glaciated areas of the planet. Glacial retreat exposed back to light redesigned topographies and initiated a new era characterized by meltwater transformations. The early Holocene climate, post-glacial rebound on land after the removal of heavy load of ice, and local and eustatic changes in sea-levels acted in concert to produce a profoundly altered landscape where life was making a fresh start.

The Siljan Lake District is formed in the Siljan impact structure, the eroded remnant of the most prominent impact crater in Europe, in the Dalarna province of south-central Sweden. After non-uniform deglaciation at around 10.6 kyr ago, the Baltic stage of the transgressive Ancylus Lake inundated the area. The highest shoreline was formed at 205 m a.s.l. but relict beach ridges can be found up to 220 m a.s.l. due to differential isostatic uplift. Lake Siljan got isolated from the regressive Ancylus Lake because of the post-glacial isostatic rebound. The threshold of isolation in the southernmost side of the Lake District was 168.5 m a.s.l. and was reached at approximately 10 kyr BP. Nowadays, Lake Siljan is around 162 m a.s.l. but intense precipitation and snowmelt can lead to significantly higher lake levels.

In 1934, the Swedish geologist Lennart von Post postulated the scenario that Lake Siljan drained catastrophically and dropped to the present lake-level after the opening of a new outlet channel in the mid-Holocene. The old drainage channel at Åkerö (Fig. 1A) got abandoned while areas above 162.5 m, like Heden (Fig. 1B), were cut-off from the lake and gradually dried-up.

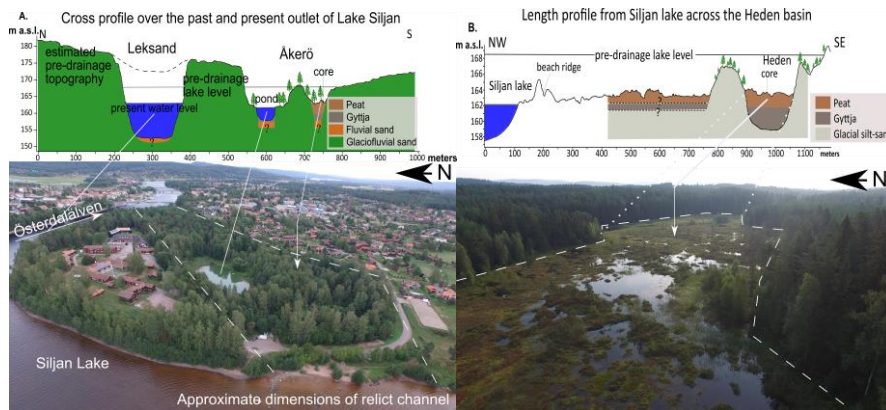


Figure 1. Cross profiles over the old and new channel at Åkerö (A) and the Heden basin (B). Question marks indicate unknown lithological boundaries. The topographic profiles are a product of a digital elevation model with 3D Analyst in ArcGIS. Distribution permit from LMV, LM2020/009398 & LM2020/009398.

Drainage of ancient Lake Siljan – a scenario test

The drainage scenario was tested from two sites, Åkerö and Heden (Fig. 1). After the application of traditional and modern geological surveying techniques, the findings strengthen the view that an abrupt event caused the abandonment of the Åkerö channel and led to the separation of Heden from Lake Siljan. The results extend previous findings concerning the timing of the event and are in line with the notion that a higher water level stand preceded the catastrophic drainage.

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