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Glacial curvilineations (GCLs) at the southern periphery of the last Scandinavian Ice Sheet: distribution, morphological characteristics and origin

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Glacial curvilineations (GCLs) are spectacular landforms recently discovered along southern periphery of the last Scandinavian Ice Sheet (SIS). They were first described in central Poland (Lesemann et al., 2010, 2014) as multiple parallel, winding ridges several metres high and up to several kilometres long, systematically arranged in groups occurring in tunnel valleys, which form a complex and extensive geomorphic network. Lesemann et al. (2010, 2014) hypothesised that GCLs were likely eroded from older sediments carved by channelised subglacial meltwater flows. More recently, Clark and Livingstone (2018) detected GCL sets along the southern margin of the Laurentide Ice Sheet and suggested that they were produced by subglacial slope failures in tunnel valleys or near the shores of subglacial lakes.

An inventory of GCLs occurrences along the SIS margin in Poland, Germany and Denmark based on the analysis of high-resolution LiDAR digital elevation models is presented. We document a total 59 GCL fields and focus on the geomorphic characteristics of the 43 most conspicuous ones. Each of these fields consists of smaller units called GCL swarms, 137 in total. Based on the landscape characteristics of the GCLs in relation to the tunnel valleys they occur in, three types of tunnel-valley relationships were distinguished: simple tunnel valleys, compound tunnel valleys and tunnel-valley complexes.

The morphological characteristics and internal composition support the origin of GCLs as erosional remnants of antecedent landscapes carved by pressurized meltwater flows in subglacial channels (Adamczyk et al., 2022).

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