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Establishing a dynamic reconstruction of the Weichselian glaciation in north-eastern Germany by applying a process based approach for the interpretation of glacial landform ages

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Throughout the last decades, an increasing number of numerical ages dating the glacigenic landform record of the Scandinavian Ice Sheet (SIS) were published, in many cases spawning controversy as ages inferred from different dating methods often disagreed with each other and opposed the concepts of established age models primarily based on morphostratigraphical analyses. The two most commonly applied dating techniques for the dating of glacigenic deposits are optically stimulated luminescence (OSL) dating and surface exposure dating (SED) of erratic boulders using cosmogenic nuclides.

With respect to the interpretation of numerical ages inferred from these dating techniques, it needs to be stressed, that they must be interpreted with respect to the specific processes in landscape development which are actually dated. Even when applied to glacial sediments associated with the same ice marginal position, the resulting ages of the two methods are strongly dependent on the sampling position within the geomorphological and stratigraphical framework. As a result, they theoretically must not be identical. To demonstrate this, the glacial landscape record of north-eastern Germany shaped by the Weichselian glaciation serves as an excellent example. Comprising three morphostratigraphically defined main ice marginal positions (IMPs), the area has been subject of a significant number of dating studies throughout the last years, making a solid database of numerical ages based on OSL dating of glaciofluvial sediments, as well as SED of glacigenic boulders, available. Here the OSL ages were mainly derived from sandur sediments and therefore represent the timing of the process of sediment aggradation linked to meltwater discharge from an active ice margin. In contrast, the SED ages from erratic boulders determine the age of the final stabilisation of the sampled boulders at the landscape surface after the downmelting of stagnant ice, landscape transformation under periglacial conditions and the melting of buried dead ice.

However, a process based approach for the interpretation of glacial landform ages derived from different dating methods may enable a more differentiated reflection of morphostratigraphically based chronologies against the background of the modern concepts of dynamic ice sheets.