



Sedimentological and deformational evidence for a terrestrial deglaciation: Ballyhorsey, eastern Ireland

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A sand pit located in eastern Ireland displays an exceptional transition between glaciogenic sedimentation and glaciolacustrine sedimentation.

Comparison of these two different depositional environments at the same location will help to differentiate between two very similar and easily confused deposits, both formed by subaqueous sedimentation. The bottom-most sediments are characterized by vertically stacked subglacial tills corresponding to ice/bed coupling phases. Lenses of sorted sediments that resulted from deposition within cavities are intercalated between these till layers. Subglacial cavity deposits are characterized by deformation structures produced by the direct action of ice on the sediments (dykes, folds, inverse faults, and step normal faults). The upper deposits correspond to the deposition of successive hyperpycnal flows in a proglacial lake leading to the onset of an ice-contact subaqueous fan. The fan shows sediment progradations, and deformation structures linked to gravity destabilization (convolutes and normal faults).

Observation and analysis of the depositional sequence lead to a better understanding of the main mechanisms involved in a deglaciation phase at a local scale. The principal feature recorded in the sediment is the progressive increase of meltwater content in the glacial system. Subglacially, this increase in meltwater content is shown by larger water-filled cavities, by greater hydrofracturing intensity and by outburst flood deposits. Proglacially, the increase is illustrated by the storage of water within an ice-contact lake, which is characterized by intense calving, coupled with surface melting, leading to fast flowing ice and a decrease in ice thickness. Later, when iceberg production decreases, surface melting represents the dominant mechanism for the rapid retreat of the glacier.