



Glaciotectonic structures mapped by GPR, geoelectrical, high-resolution seismic and airborne transient electromagnetic methods

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Glaciotectonic structures have traditionally been recognized through observations in the landscape or exposures like cliffs. However, mapping of these structures can highly benefit from geophysical data, which can give information on buried glaciotectonic complexes. In the current study, we focus on the appearance of glaciotectonic structures in data from four commonly used geophysical methods: Ground penetrating radar (GPR), geoelectrical, high-resolution seismic and airborne transient electromagnetic (SkyTEM). The data are collected within a study area that covers 100 km² and is located in the western part of Denmark. The study area is characterized by a highly heterogeneous geological setting, which has been influenced by multiple glacial deformation phases resulting in a buried glaciotectonic complex. The glaciotectonic structures appear as folds and faults and are recognizable at all scales. As a consequence of the different resolution capabilities of the methods, different degrees of detail are observed: Large-scale structures are recognized based on the seismic and airborne transient electromagnetic data, whereas small-scale structures are interpreted based on the GPR and geoelectrical data. At the same time, the nature of the methods results in different types of information from the data: The GPR and the seismic data generally provide detailed structural information, whereas the electric and electromagnetic data provide a more 'blurred' resistivity image of the subsurface. In order to recognize geological structures on the electric and electromagnetic data, the structures therefore need to influence sediments with contrasting resistivities to the surroundings. The structures are recognizable on all the different data sets, but the understanding and thus, the interpretation, of the geological environment strongly benefits from the combined observations from the different types of data.