



Sedimentary thickness from Receiver Function analysis - a simple approach. Case study from North Greenland.

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Receiver Functions (RF) calculated at seismological stations contain information about changes in the subsurface, and are frequently used to obtain a depth to Moho. For some stations, it is clear from reverberations that there are several layers in the crust, often caused by a thick sedimentary cover of unknown thickness. Our approach is to determine basic information about the sedimentary thickness by forward modelling. We use a very simple model consisting of a sedimentary layer over a crystalline crust, and vary the thickness of the sedimentary. For each forward model, a synthetic RF is calculated, and the RMS difference to the observed data (the stack of all calculated RF) at a station is calculated. With only two variable parameters we can do a comprehensive search of the parameter field, and find the global minimum.

Case study:

A series of stations provide information on the crustal structure of the North Greenland. The thickness of the sediments in the Franklinian Basin is largest to the north where the basin is observed on the offshore. At the coast the thickness is a few km, and further south at the southern verge of observed rocks from the Franklinian basin the thickness is smaller than we can analyse – presumed less than 500m. The depth to Moho thins towards northwest; from typical values for a shield area to half the thickness at the coast. In the Wandel Sea Strike-Slip Mobile Belt we find a several km thick high velocity sedimentary basin. The thickness of Proterozoic sediments of the Thule Basin can be interpreted in good agreement with earlier geological estimates. Further south, on the NW coast of Greenland we see no indication of a sedimentary basin. The only inland station in this study is situated on 2.5 km thick icesheet. Treating the ice as a sedimentary layer allows the depth to Moho to be estimated in spite of the very strong reverberations from the 2.5 km thick ice layer.