Geophysical Research Abstracts,
Vol. 10, EGU2008-A-07164, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-07164
EGU General Assembly 2008

Seismic tomography applied to the Danish Basin.

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The Danish Basin is located on the southern edge of the Baltic shield in the Tornquist fan between two branches of the Trans European Suture Zone. The study area is located at the transition between Precambrian terranes of the Baltic Shield/East-European Craton and younger Phanerozoic terranes of Western Europe. A major goal of the study is to identify changes in the crustal and lithospheric properties across the Danish Basin. Another goal is to identify the source of the strong (>50 mGal) gravity anomaly, named the Silkeborg gravity high, and to determine the processes that formed it. We present the results of a seismic tomography study based on refracted first arrival phases. The data was acquired on a joint refraction/reflection seismic profile in 2005 on the Jutland peninsula in Denmark. The 190 km long north-south oriented profile is centered on the maximum of the Silkeborg gravity high. The acquisition parameters for the experiment were: 89 shotpoints, 940 one-component vertical geophones with a lateral spacing of 50 m in the central portion of the profile. The final processed dataset includes ca. 37,000 first arrivals phases, which are used for the seismic tomography inversion based on the codes by J.Hole and J.Korenaga. Our results show two tomographic models based on an identical dataset and processed with different codes. The sedimentary structure is similar in the two models down to a depth of 5 km. It is consistent with regional borehole data and potential field data. Both codes find a similar structure of the basement topography, which generally dip to the north from 5 to 12 km along the profile. The models include high velocity anomalies, which correlate with the location of the gravity high. One of the anomalies presents a lens 2 km thick and 20 km long with a velocities of >6 km/s in a host rock with a velocity of 5 km/s below a depth of 5 km. Another, large anomaly has velocities of 7 km/s within the crystalline crust with a velocity of 6.3 km/s at the upper part of the

body. We interpret this feature as a mafic intrusion which has dimensions of 30 km along the profile and at least 8 km thickness below a depth of 10 km. The profile is perpendicular to the main strike of the elongated gravity high, which can be explained by the deep anomalous body (the mafic intrusion) in the basement.