

CRUSTAL STRUCTURE OF SPITSBERGEN: WAVEFORM SYNTHESIS AND
SURFACE WAVE STUDIES

by

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The crustal structure of central Spitsbergen is investigated by analyzing waveforms recorded in a refraction profile and by inverting surface wave dispersion data. The reflectivity method is used to generate synthetic seismograms for two existing crustal models of Spitsbergen. These are compared to the observational record section obtained from a refraction profile across Spitsbergen. In both cases the degree of the agreement between observed and theoretical waveforms is unsatisfactory. Using direct arrival times from the observed data, a simple three layer model is obtained. Although the model falls short of describing the complex crustal structure, it provides velocity information for the three layers. A more detailed seven layer model is then obtained by inverting both the observed reflected and refracted travel times. Using a trial and error approach, the model is adjusted until it generates synthetic seismograms which exhibit satisfactory agreement with the observed data. A surface wave dispersion curve is obtained from an earthquake near the east coast of Spitsbergen. Inverting those data yields shear velocity information to supplement the model obtained from the refraction data.