

Lg wave attenuation tomography for Norway

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We studied the attenuation of Lg waves in Norway and surrounding areas based on data from the Norwegian National Seismic Network. The network has been operating since the 1980s and today consists of 33 mostly broadband stations. In addition, we used data from two temporary deployments. We restricted the study to hypocentral distances between 150 km and 1000 km, local magnitudes larger than 2.5 and only used events recorded by more than 5 stations.

In order to characterize the propagation of Lg we first quantified the efficiency of Lg relative to Pn. The data was selected using group velocity windows of 6.5 - 8 km/s for Pn and 3 - 3.7 km/s for Lg. We calculated the displacement spectra of Pn and Lg phases and then computed the Lg/Pn ratios for average amplitudes between 2-5 Hz. While Lg is generally efficient in much of Norway, mapping of the Lg/Pn ratio allowed for identification of areas where Lg is blocked or more strongly attenuated such as in the southern North Sea and along the continental shelf.

We then performed a least square damped inversion to derive tomographic images of Q Lg for a number of frequencies in Norway. A checkerboard test was performed to determine the resolution of the model. The tomographic inversion resulted in more detailed images compared to the mapping of efficiency and confirmed the main results mentioned above. We also obtained an average attenuation model. Our results can be used in the study of earthquake source parameters.