Geophysical Research Abstracts
Vol. 12, EGU2010-12225, 2010
EGU General Assembly 2010

Recovering the effective elastic thickness, T_e, of oceanic lithosphere in the presence of long wavelength topography

L. M. Kalnins and A. B. Watts
University of Oxford, Earth Sciences, Oxford, United Kingdom (larak@earth.ox.ac.uk)

We have developed a moving window admittance technique to determine the relationship between free-air gravity anomaly and bathymetry as a function of wavelength over the world's ocean basins and their margins. Preliminary results from the western Pacific Ocean show that the technique resolves the effective elastic thickness of the oceanic lithosphere, T_e, to better than ± 5 km for $T_e < 30$ km over horizontal distances of a few tens of km. In this paper, we investigate the robustness of our results using different tapering schemes (e.g. single versus multitaper) and synthetic tests that illustrate our ability to recover T_e in the region of long wavelength features such as trench outer rises, mid-plate swells and mid-ocean ridges. By investigating observed admittances in the Pacific, Indian, and Atlantic Oceans, we have found that there is a "critical wavelength" that separates the relatively short wavelength contributions of lithospheric flexure to the gravity field from longer wavelength effects such as those associated with mantle dynamics. We examine here this "critical wavelength" and its implications for swell compensation depths, plate cooling models, and mantle convection.