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A method for estimating the elastic thickness under seamounts in areas of sparse bathymetry.

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Estimates of the elastic thickness (T_e) under seamounts constrain the thermal state of the oceanic lithosphere at the time the seamounts were emplaced. Most methods for determining T_e involve calculating a set of predicted gravity anomalies from the bathymetry, but sparse data coverage in the deep ocean has often forced authors in the past to work with either individual tracks or widely interpolated grids, both of which can be misleading. However, the quality and coverage of marine gravity data has improved greatly in recent years; therefore we instead calculated a grid of predicted bathymetry by multiplying a grid of satellite-derived free-air gravity data by a thin-plate flexural transfer function in the frequency domain. After correcting for the local offset due to plate subsidence, we compared our predicted bathymetry with archived soundings over ten clusters of seamounts in the Pacific, and repeated the procedure for a range of T_e, crustal densities and subsurface load fractions. We assumed a constant convective admittance at long wavelengths. Although the uncertainties are large, our best-fit elastic thicknesses were similar but slightly smaller than estimates published in the literature. Our method provides a quick and reliable means of estimating T_e in areas where the bathymetry is too sparse to permit more detailed studies.