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Reference Models for Lithospheric Geoneutrino Signal

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Geophysical models are combined with geochemical datasets to predict the geoneutrino signal at current and future geoneutrino detectors. We propagated uncertainties, both chemical and physical, through Monte Carlo methods. Estimated total signal uncertainties are on the order of ∼20%, proportionally with geophysical and geochemical inputs contributing ∼30% and ∼70%, respectively. Estimated signals, calculated using CRUST2.0, CRUST1.0, and LITHO1.0, are within physical uncertainty of each other, suggesting that the choice of underlying geophysical model will not change results significantly, but will shift the central value by up to ∼15%, depending on the crustal model and detector location. Similarly, we see no significant difference between calculated layer abundances and bulk-crustal heat production when using these geophysical models. The bulk crustal heat production is calculated as 7 ± 2 terrawatts, which includes an increase of 1˜TW in uncertainty relative to previous studies.

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