Contribution ID: **12**   Type: **not specified**

Geoneutrino Contributions from the Deep Lithosphere

Tuesday 22 October 2019 16:25 (25 minutes)

Calculations of the expected lithospheric contribution to the geoneutrino signal are essential for understanding the radiogenic power of the mantle. The density structure and distribution of heat producing elements (HPEs) and their uncertainties in the deep crust must be modeled in order to interpret Earth's U and Th abundances. Such calculations prove challenging because the deep crust is sampled only sparsely through high grade metamorphic lithologies. We can make in situ measurements, however, of the seismic velocity of the deep crust. We use empirical and theoretical relationships between composition and measured seismic wave velocity to derive deep crust silica content. Using a joint probability analysis, we then model U as a function of silica. A conserved chondritic Th/U ratio allows us to predict the U and Th content of the deep crust and its contribution to the geoneutrino signal.

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