Uncertainty of Satellite-gravity-derived Moho Estimates: Contribution of Data Reductions

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Background
- Global satellite-only gravity models provide unparalleled spatial homogeneity in coverage and quality, at lengthscales suitable for lithospheric density modeling.
- Seismic and remote sensing problems require isolating an anomalous signal in the observed gravity field, through removal of the effect of known mass (data reduction, e.g. topography, crustal mass, mantle discontinuities).
- Error characteristics of gravity models; 5-10 orders of magnitude smaller than the uncertainty at the same length scales. Data reduction and inversion parameters are the main error sources.

Forward Modelling Algorithm
We rely on the SRTOLS (1) implementation of Wieczorek & Phillips (1998) algorithm (2) spectral forward modeling algorithm for the potential of a relief with internal variations of density, referred to a spherical surface.

Density reference and layer splitting
Layer density reference (obtained from ANDRES), discretized in geocentric ellipsoidal shells (AK135) [4], discretized in geocentric layers.

Terrain correction: input topography, water, ice
We use the Earth2014 1 arc-degree model (5) to obtain reference corrections. For the forward modeling, we apply the reference topography and partial ice and water stripping. When this TC is removed, the parameter of interest is isolated.

Sub-surface data: LITHO1.0 [7]
- Readily available, global depth density model, layer defined topography to lithospheric asthenosphere boundary.
- Surface wave based, from an integrated starting model (multiple sources), so informed on coverage and data uncertainty, the output model.

From disturbance-uncertainty to Moho-uncertainty
- Surface without correction in Moho-uncertainty.

References