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From data to a 3D model: a new method to build a crustal model, applied to Asia

W. Stolk (1,2), M. Kaban (2), F. Beekman (3), M. Tesauro (2), and S. Cloetingh (3)

(1) VU University Amsterdam, Faculty of Earth and Life Sciences, Netherlands (wstolk@vu.nl), (2) GeoForschungsZentrum Potsdam, Germany, (3) Utrecht University, Faculty of Geosciences, Netherlands

Crustal heterogeneities tend to mask underlying upper mantle heterogeneities. Accurate knowledge of the crustal structure is essential in order to investigate the underlying structures. However, current global crustal models, such as the still widely used Crust 2.0 show large differences with data. Additionally, it is often unclear how these models are created. It is therefore necessary to go back to the data and start a new model from scratch, clearly describing the process from data to model.

The inhomogeneous spread of data in the research area provides the researcher with many challenges. In order to obtain a robust 3D model, creative data analysis is required. We have applied our new methodology to estimate the depth to Moho and crustal velocities in Asia, based on seismic data. For the depth to Moho estimation we exploit knowledge of sediments and topography to apply a 'remove-compute-restore' technique, widely used in e.g. gravity field analysis. First the so called adjusted topography is removed from the data, followed by interpolation of the residuals using ordinary kriging and finally the adjusted topography is restored to the model. The crustal velocity structure is estimated by locally fitting velocity depth curves to the available data. Both methods allow us to assess the uncertainty of the model. This can help indicate areas where extra data is required to better constrain our crustal model.