Notes on paper- “Global Crustal Thickness and Velocity Structure from Geostatistical Analysis of Seismic Data” Szwillus(2020)

Introduction-

* Data fits models in North America and Europe but in places like Africa uncertainties in the Moho can reach 10km.
* A major drawback of including predefined domains is that the uncertainty of the resulting crustal model is hard to estimate.

Data-

* Only use p-waves and model based off three-layer system taking data mainly from reversed refraction surveys

Geostatistical Analysis and Interpolation-

* Often use standard deviations bigger than the value of the mean to improve the results in areas where the clusters of data are smaller and less reliable.
* Results should follow normal distribution with standard deviation of one.

Results-

* Crustal thickness quite homogenous in oceans and will be unless affected by magmatism.
* Lower uncertainties and better results in data sets that are more recent and use a reversed refraction method.
* Method cannot account for rapid or unexpected changes that do not conform to the underlying assumptions of the interpolation.
* When comparing with CRUST1.0 the average difference is 2.9km with large differences in South America and Asia.
* Have not really got any values for oceanic Moho as the model shows these values are all very similar.
* Issues with South America as models all tend to vary from each other. When comparing to CRUST1.0 uncertainties can reach values of 12km or more.
* Need more clusters that do not cover two regions which will have vastly different Moho depths.
* In less well covered areas, there are larger discrepancies.

Application of Global Maps to Residual Topography-

* Still some residual topography ranging from -4 to 6km. However, these are often at places expected to have residuals like MOR.

Conclusions-

* Questions raised about if global statements about dynamic topography are even possible at this stage. As even in well studied areas there are still uncertainties.
* Best way forward is probably an integrated seismic and gravitational approach as gravity is sensitive to density structure.