Solving Uncertainties in Dutch Crustal Structure Using Distant Earthquakes

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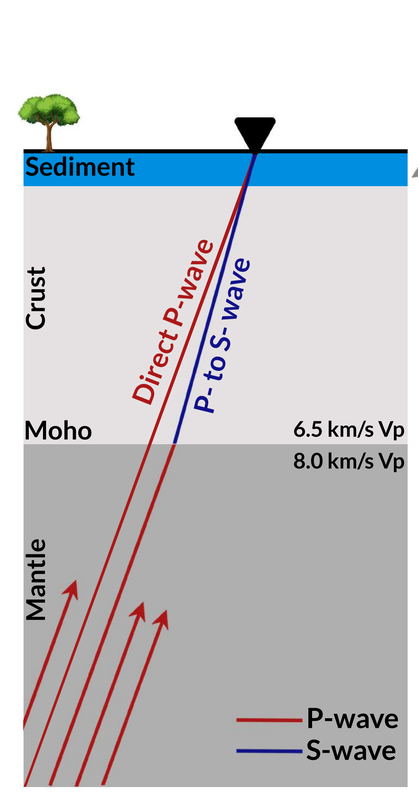
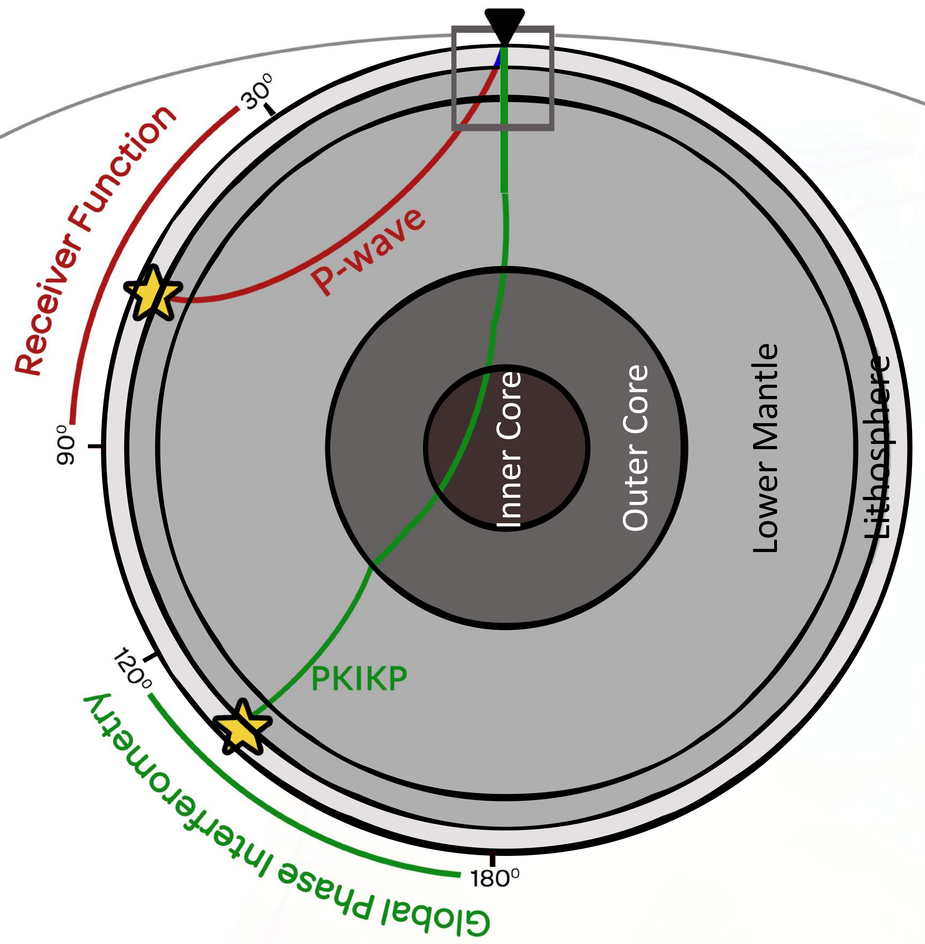
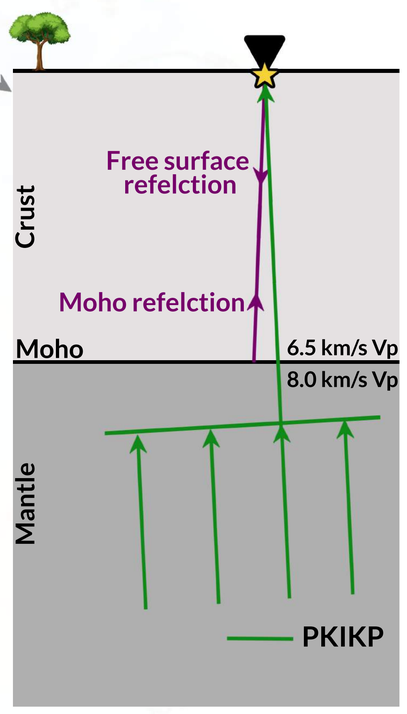
Knowledge of crustal structure is crucial for understanding its origin, and recent geodynamic processes and for constraining tectonic models. Moreover, crustal thickness is relevant in understanding heat flow in the deep subsurface. However, the available Dutch crustal models show significant inconsistencies (e.g., Duin et al. 1995, Yudistira et al. 2017).



Receiver Function (RF)

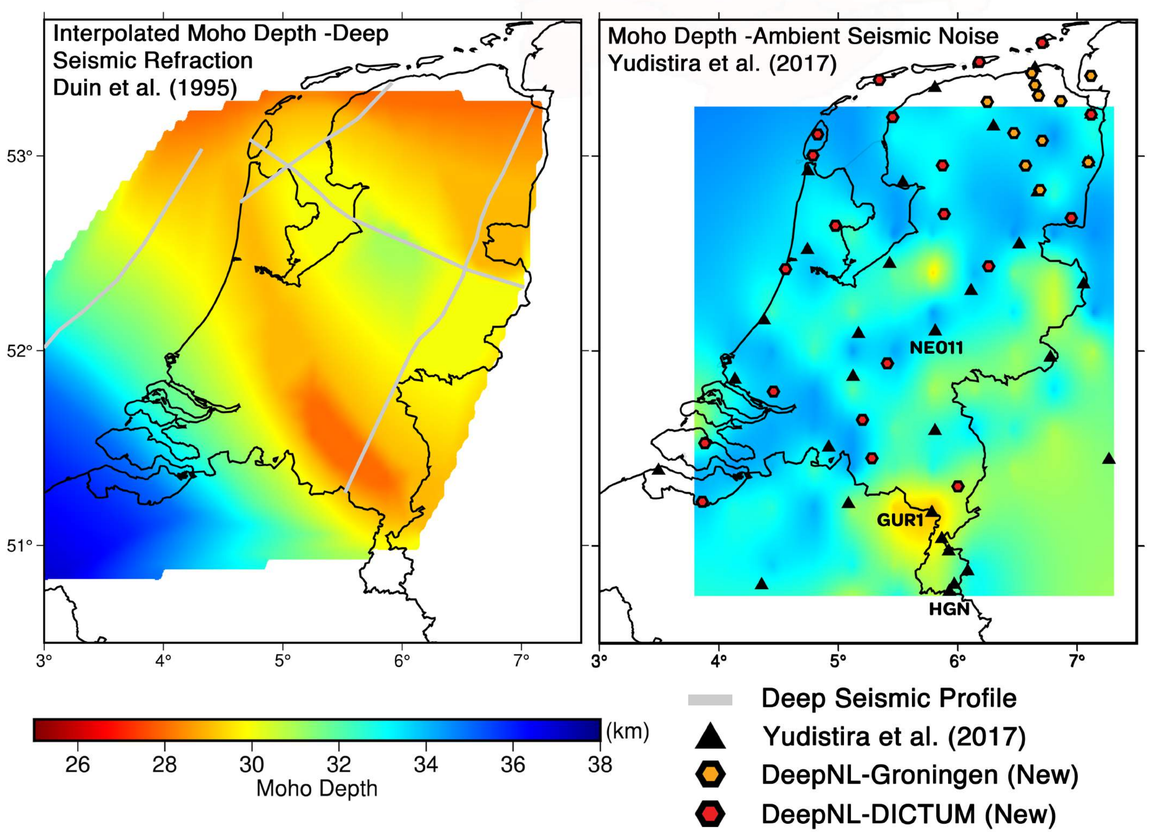


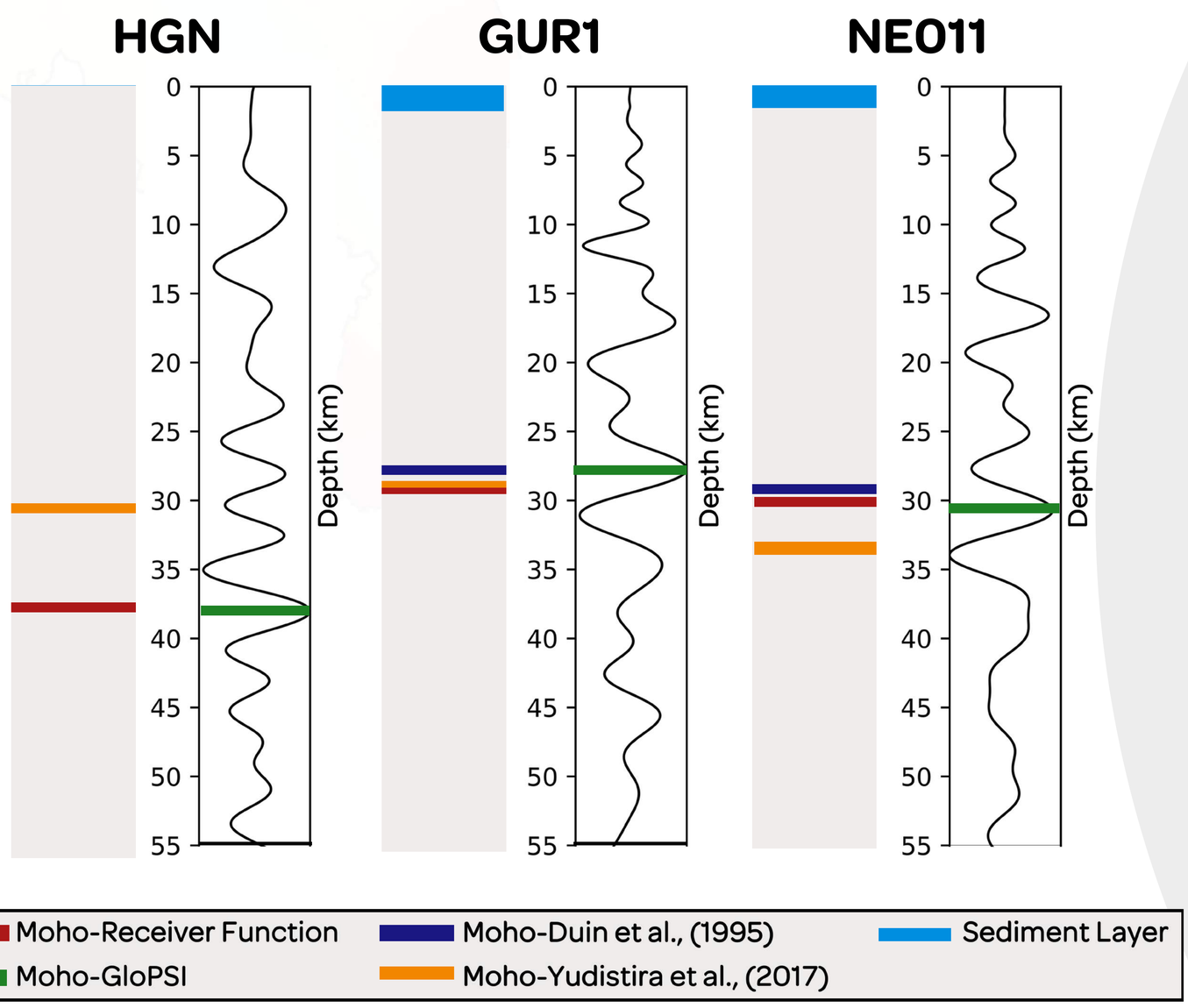


Global Phase Seismic Interferometry (GloPSI)

We use seismic wave mode conversions from teleseismic earthquakes from 30^0-90^0 distance (Receiver Functions-RF) to estimate the Dutch crustal thickness. The presence of sediment in the upper-crust introduces significant problem in crustal imaging with RFs. We solve this using a new and effective approach (Akinremi et al. 2024). We explore teleseismic earthquakes from farther distances (120^0-180^0) and use crustal reverberations from these global phases to further constrain our Dutch crustal models (Global Phase Seismic Interferometry-GloPSI: Ruigrok & Wapenaar, (2012)).

Examples for the Dutch Crustal Structure





References:
- Akinremi et al., (2024). J. of Geophy Research
- Duin et al., (1995) Netherland J. of Geosciences
- Ruigrok & Wapenaar, (2012). Geophy. Res. Lett.
- Yudistira et al., (2017) Tectonophysics

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