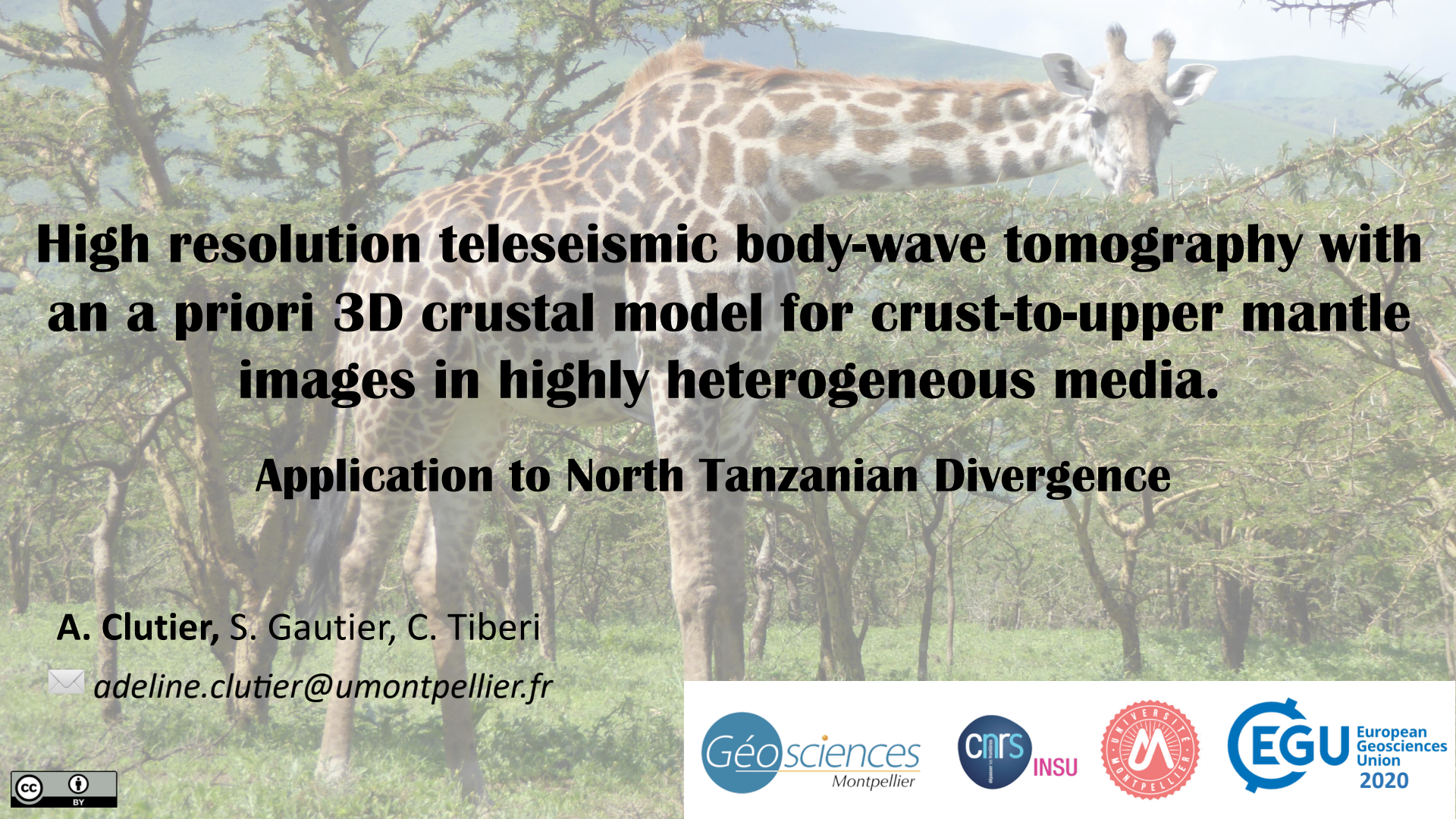


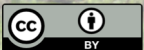


High resolution teleseismic body-wave tomography with an a priori 3D crustal model for crust-to-upper mantle images in highly heterogeneous media.

Application to North Tanzanian Divergence

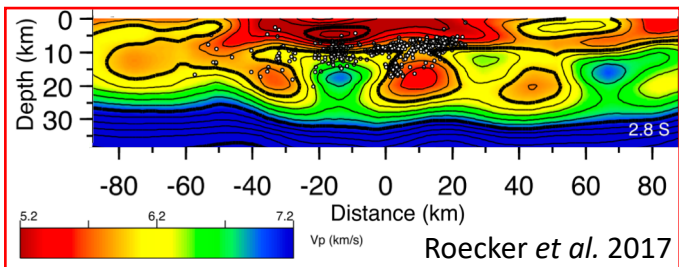
A. Clutier, S. Gautier, C. Tiberi

✉ adeline.clutier@umontpellier.fr

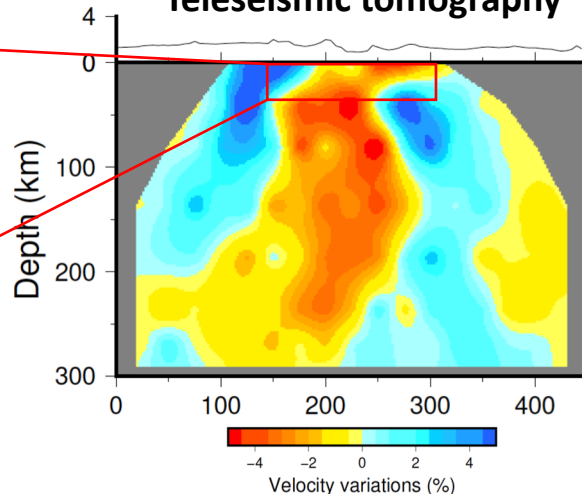


Different spatial scales

Local tomography



Teleseismic tomography



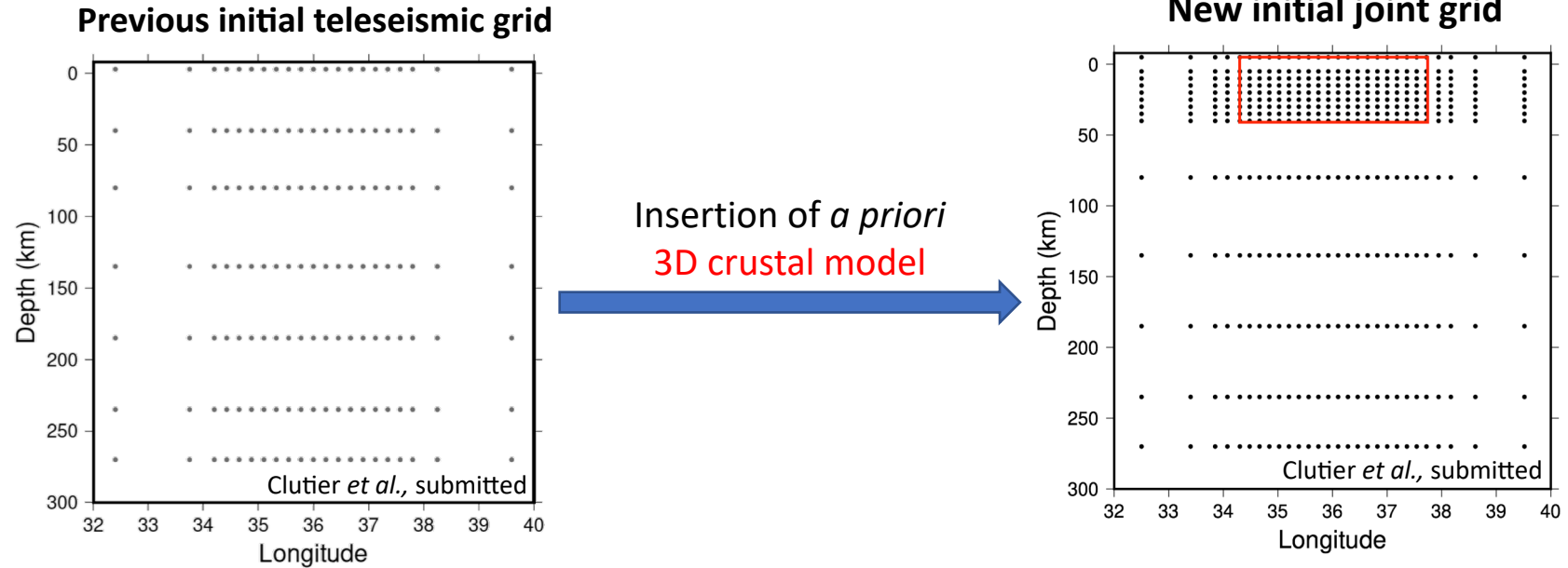
- Crustal scale
- High resolution from surface to 35 km depth

Poor resolution at the crustal/mantle boundary, where major geodynamic processes occur (e.g. magmatic underplating, mantle delamination, crustal thinning or thickening).

→ How to improve the resolution around Moho depth ?

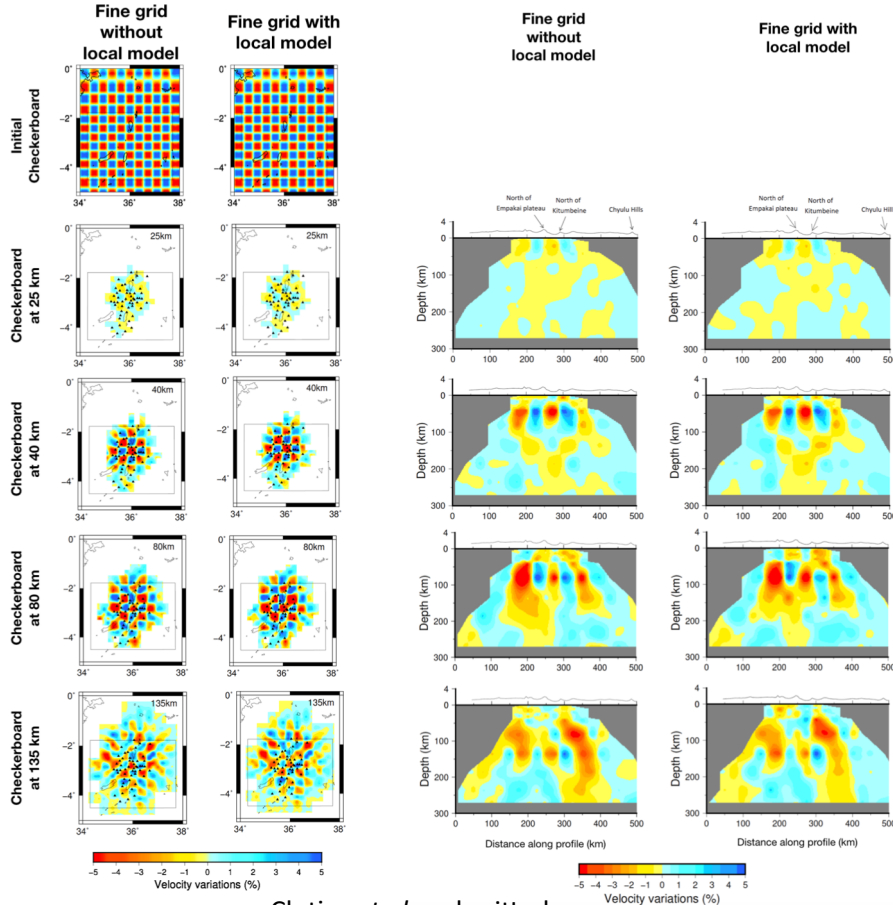
- Lithospheric scale
- No resolution for the first 40 km

Joint local/teleseismic tomography



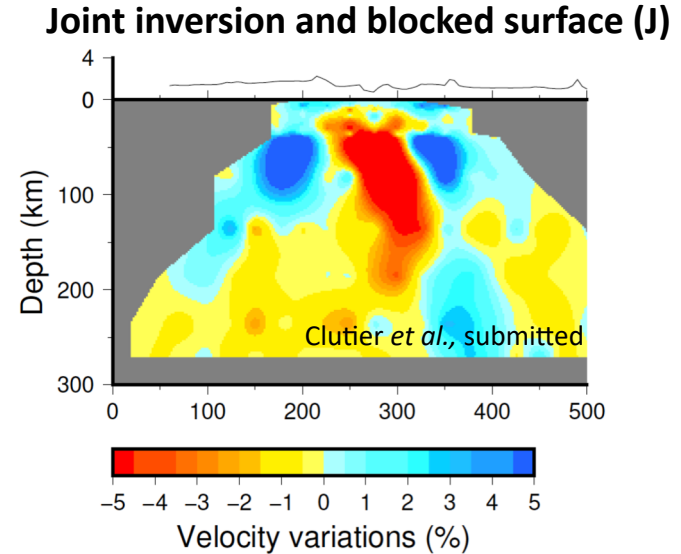
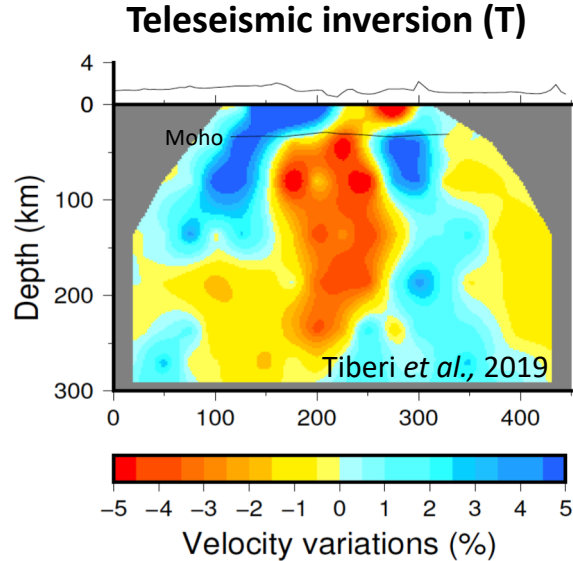
- P-wave velocity is associated to each node.
- The **3D crustal model** results from an independent local inversion.
- 2 independent datasets and inversion processes used (local and teleseismic).

Checkerboard resolution tests



- $\pm 5\%$ velocity anomalies.
- No resolution within the crust (0-35km), so the crustal nodes will be blocked for the final inversion with real data.
- Checkerboard well retrieved at 40, 80 and 135 km, no damage to the lithosphere resolution.
- Overestimated amplitudes.
- Decrease of vertical downward smearing. More accurate raypath.
- Checkerboard geometry better retrieved on the periphery.

P-wave inversion with real dataset



- Long wavelength anomalies similar between **T** and **J**
- Coherence and continuity between crustal and mantle parts in **J** inversion
- Sharpened and more contrasted anomalies for **J**

→ Impact on geodynamical interpretation



References

- Roecker, S., Ebinger, C., Tiberi, C., Mulibo, G., Ferdinand-Wambura, R., Mtelela, K., Kianji, G., *et al.* (2017) Subsurface images of the Eastern Rift, Africa, from the joint inversion of body waves, surface waves and gravity: Investigating the role of fluids in early-stage continental rifting. *Geophys. J. Int.*, **210**, 931–950. doi:10.1093/gji/ggx220
- Tiberi, C., Gautier, S., Ebinger, C., Roecker, S., Plasman, M., Albaric, J., Peyrat, S., *et al.* (2019) Lithospheric modification by extension and magmatism at the craton-orogenic boundary : North Tanzania Divergence , East Africa. *Geophys. J. Int.*, **216**, 1693–1710. doi:10.1093/gji/ggy521