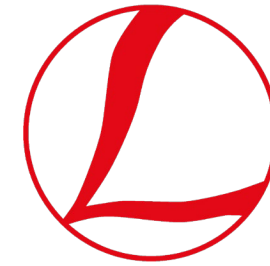


# International Lithosphere Program

Regional Coordinating Committee TOPO-EUROPE

Leader(s): Sierd Cloetingh, Todd Ehlers, Istvan Kovacs, Pietro Sternai, Alexander Koptev



## Highlights of recent work/results

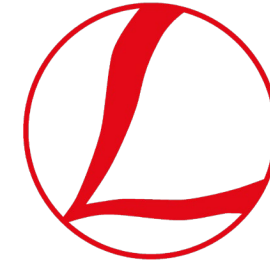
- Development of new models for plume-lithosphere interactions and initiation of subduction and application to lithosphere of Europe and its continental margins
- Invited review paper for Global and Planetary Change with TOPO-EUROPE Science Plan 2023-2028
- Workshops and short courses in Sopron, Hungary

## Some recent TOPO-EUROPE publications

- Cloetingh, S., Sternai, P., Koptev A., Ehlers, T.A., Gerya T., Kovács, I., and TOPO-EUROPE team, 2023. Frontiers of research on coupled surface-deep Earth processes: Perspectives from TOPO-EUROPE on climate and energy societal challenges. Global and Planetary Change, invited review paper
- Liptai, N., Gráczér, Z., Szanyi, G., Cloetingh, S.A.P.L., Süle, B., Aradi, L. E., Falus, G., Bokelmann, G., Timkó, M., Timár, G., Szabó, C. & Kovács, I. J., 2022. Seismic anisotropy in the mantle of a tectonically inverted extensional basin: A shear-wave splitting and mantle xenolith study on the western Carpathian-Pannonian region. Tectonophysics. 845, 229643.
- Cloetingh, S., Koptev, A., Lavecchia, A., Kovács, I. J. & Beekman, F., 2022. Fingerprinting secondary mantle plumes. Earth and Planetary Science Letters 597, 117819.
- Kovács, I.J., Liptai, N., Koptev, A., CLOETINGH, S., Lange, T.P., Matenco, L., Szakács, A., Radulian, M., Berkesi, M., Patkó, L., Molnár, G., Novák, A., Wesztergom, V., Szabó, C., Francsik, T., 2021. The 'pargasosphere' hypothesis: Looking at global plate tectonics from a new perspective. Global and Planetary Change, 204, 103547.
- Koptev, A., Cloetingh, S., & Ehlers, T. A., 2021. Longevity of small-scale ("baby") plumes and their role in lithospheric break-up. Geophysical Journal International.
- Cloetingh, S., Koptev, A., Kovacs, I. et al., 2021. Plume-induced sinking of intracontinental lithospheric mantle: An overlooked mechanism of subduction initiation ? Geochemistry, Geophysics, Geosystems.



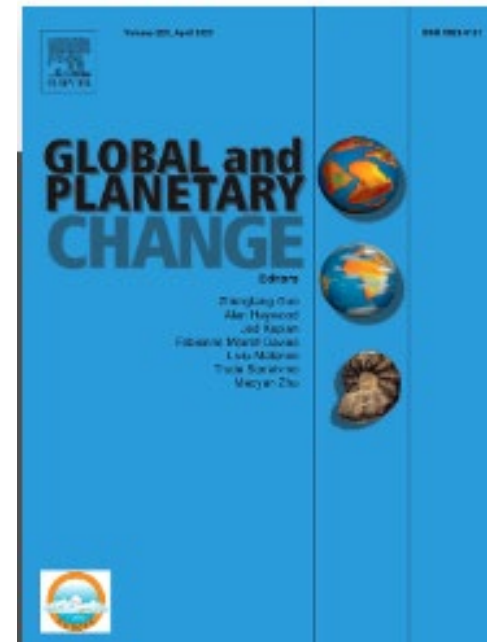
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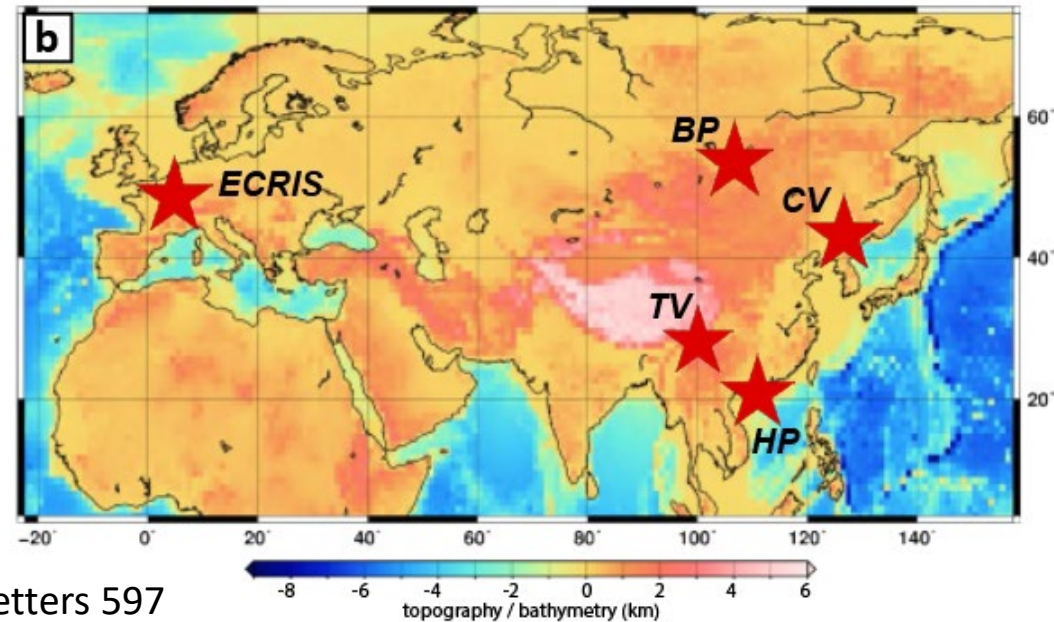
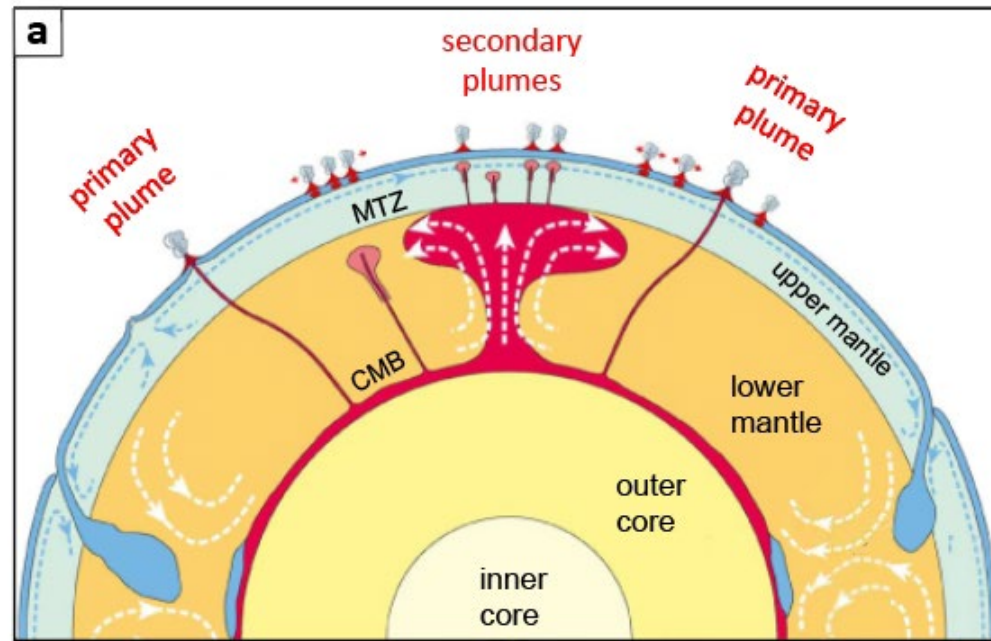
## Frontiers of research on coupled surface-deep Earth processes: Perspectives from TOPO-EUROPE on climate and energy societal challenges

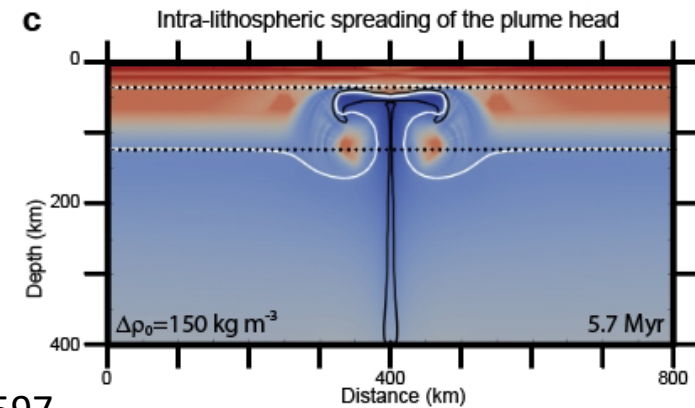
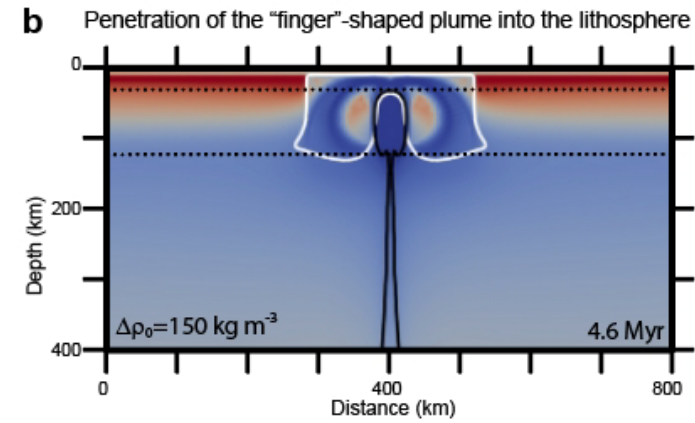
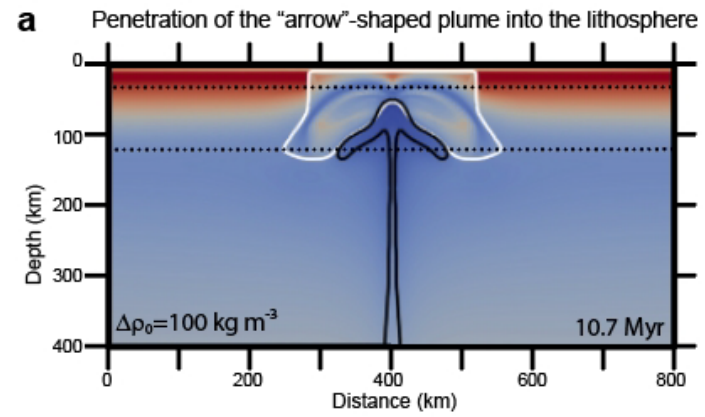
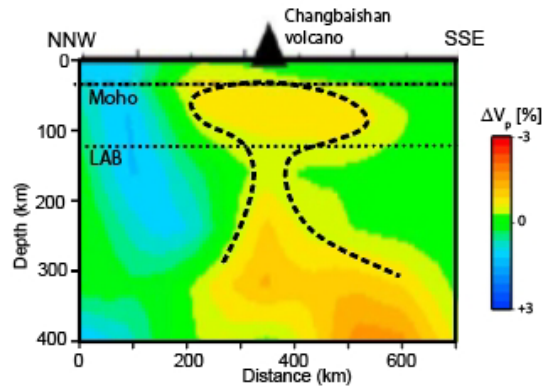
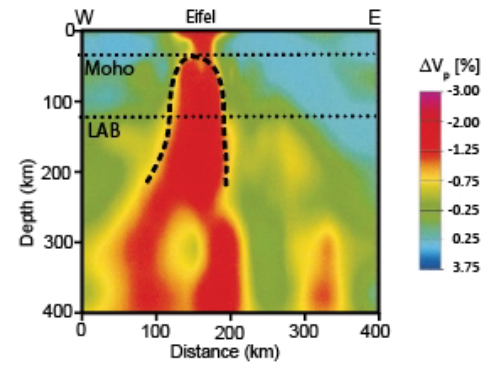
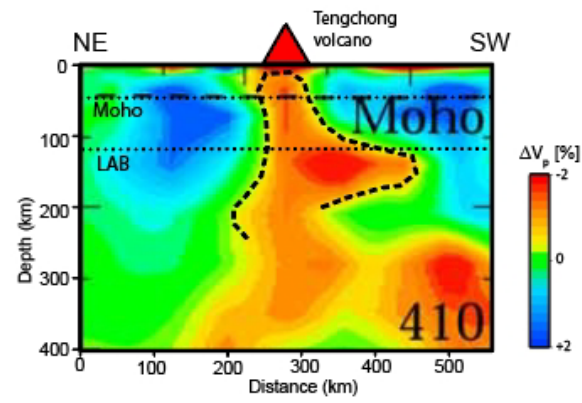
Sierd Cloetingh<sup>1</sup>, Pietro Sternai<sup>2</sup>, Alexander Koptev<sup>3,4</sup>, Todd A. Ehlers<sup>3,5</sup>, Taras Gerya<sup>6</sup>, István Kovács<sup>7</sup>, and  
TOPO-EUROPE team

Invited review paper **Global and Planetary Change 2023**



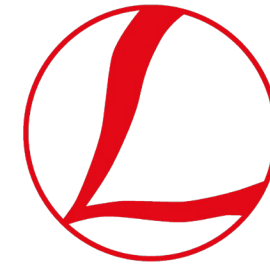
# Fingerprinting secondary mantle plumes







ACADEMIA EUROPAEA



*Lithospheric Dynamics and Evolution of the Sedimentary Basin Fill  
from 28th March to 1st April, 2022, Sopron, Hungary  
Institute of Earth Physics and Space Science*

# Frontiers of research on coupled surface-deep processes and perspectives on energy and climate societal challenges

Institute of Earth Physics and Space Science ([www.epss.hu](http://www.epss.hu)), Sopron, Hungary

18<sup>th</sup> April 2023, 10:15 – 16:30 (both onsite and online participation)

- 10:15 – 10:30** István Kovács and Viktor Wetztergom: Welcome and introduction
- 10:30 - 11:15** Sierd Cloetingh: From the deep Earth to the surface: Thermo-mechanical controls on lithosphere tectonics
- 11:15 - 12:00** Alexander Koptev: Geodynamic modelling of plume-induced rifting and continental break-up: application to the East African rift system.
- 12:00 – 12:30** Alessio Lavecchia: Role of crustal fluids and thermo-mechanical structure for lower crustal seismicity: the Gargano Promontory (southern Italy)

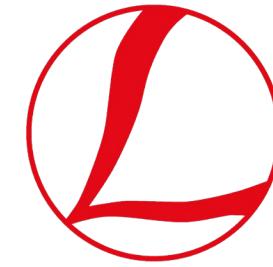
*12:00 - 13:00 Lunch break*

- 13:00 - 13:30** Eszter Békési: Stress field of the Pannonian basin and its anthropogenic perturbations: geo-energy implications
- 13:30-14:00** Kristóf Porkoláb: Neotectonic and active deformation of the Circum-Pannonian region: geodynamics, structure and GNSS-derived strain rates
- 14:00 - 14:30** Márta Berkesi: Lithosphere-scale fluid transport in light of geodynamics: examples from subduction zone and continental rift settings

*14:30 – 14:45 Tea break*

- 14:45 – 15:15** Dániel Kalmár: Lithospheric properties from seismological aspect: Case study at the Alpine-Carpathian-Pannonian region based on receiver function analysis
- 15:15 - 15:45** Nóra Liptai: Constraints on the depth of the lithosphere-asthenosphere boundary using combined petrological and seismological approach
- 15:45 – 16:15** István János Kovács: The importance of the asthenosphere in the recent geodynamics of the Carpathian-Pannonian region: implications for volcanism, outgassings and deformations

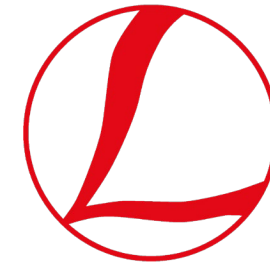
**16:15 – 16:30** Wrap-ups and Concluding remarks



## Sopron, 18 April 2023



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## New contacts

- Expansion of the TOPO-EUROPE community with new members from the petrological research domain. Development of new contacts with marine geoscientists active in the Northern and Central Atlantic Ocean and its margins in testing novel concepts for continental break-up.

## Usage of ILP funding

- Planning meetings, seminars, work visits, and workshops with support of Academia Europaea in Sopron, Hungary (28-30 September 2023); Nantesbuch, Southern Germany (October 2024)