

## MAVEPROS EVEREST (Earth Visco-Elastic anisotRopic propErties SimulaTor)

a new open source software to predict mantle viscoelastic properties and build realistic tomographic models

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- EVEREST builds on D-REX (Kaminski et al., 2004), written in FORTRAN, run in parallel with shared-memory architecture.
- Computes the strain-induced fabrics of mantle aggregates with abundant anisotropic phases (OI, Opx, Wd, Brd) taking into account the strain history.
- **Input**: velocity, temperature, pressure fields of your 2D/3D geodynamic model.
- **Output**: elastic tensors of mantle aggregates scaled by local P-T conditions and their Finite Strain Ellipsoid (FSE).
- Visual output for inspection of FSE and elastic properties with **Paraview**:
  - FSE as a 3D ellipsoid or directions of its min/max axes.
  - Vp<sub>max</sub> / dVs<sub>max</sub> / Trans. Isotropy symmetry axis directions.
  - Vp, Vs, dVp, dVs isotropic or as seen by incoming waves.
  - Radial/Azimuthal anisotropy, SKS splitting.
  - **P-P or P-S Energy Reflected/Transmitted** at discontinuities (useful for receiver functions studies).

In addition, the package:

- includes routines from FSTRACK (Becker et al., 2006) to estimate SKS splitting.
- generates tomographic grids for SPECFEM3D with the 21 elastic moduli on each node (see in this session EGU2020-14886, VanderBeek and Faccenda).
- estimates **extrinsic elastic and viscous anisotropy** due to grain-/rock-scale layering or fluid filled cracks.
- single aggregate LPO evolution + MTEX/MatLab files for visualization of the output. Useful to test the LPOs as a function of the D-Rex parameter.



## Examples:

- Analytical convective patterns in 2D annulus (this slide)
- 3D half-slab subduction in spherical coordinates (next slide)
- 3D symmetric plume upwelling in spherical coordinates (2<sup>nd</sup> next slide)









Radial anis. + SKS splitting



## Upwelling thermal plume



## **EVEREST** road map

- Summer 2020: release of the beta version with the manual and intrinsic/ extrinsic elastic anisotropy simulator.
- Fall 2020: add extrinsic viscous anisotropy simulator (see in this session EGU2020-13325, Navarro and Faccenda).
- Winter 2020-2021: add a new tool to automatically perform synthetic teleseismic Vp-Vs tomographies on the domains modelled with D-Rex (see in this session EGU2020-14886, VanderBeek and Faccenda).