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Crustal radial anisotropy model along the POLENET-ANET transect

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Radial anisotropy, also called transverse radial isotropy, can indicate the dominant orientations of crustal fabrics. Along with isotropic velocities, radial anisotropy is a key component to understand crustal structures and their history. It can be extracted from the discrepancy between Rayleigh and Love wave propagation speed, indicating a difference between vertically polarized shear-wave speed and horizontally polarized shear-wave speed, respectively. It is only since the emergence of ambient seismic noise tomography that we are able to analyze surface wave propagation at periods short enough to be sensitive to the crust and the shallow subsurface.
We used 2 years (2010-2011) of continuous seismic records from the POLNET-ANET seismic network deployed in West Antarctica to compute the 9 components of the correlation tensor between each pair of stations. From the vertical and radial components, we extract Rayleigh wave propagation in the form of group and phase velocity dispersion curves. The transverse components give access to Love wave propagation. The different Rayleigh wave measurements are averaged before the tomography and their statistics are used to infer the measurements uncertainties. We regionalize the velocities along the transect at individual periods between 2 and 20 s for the 4 types of velocity, then we use a Neighborhood Algorithm to invert at depth the local dispersion curves to build a 2D anisotropic shear-wave velocity model along the POLENET-ANET transect. We relate and interpret the structures in both isotropic and anisotropic models to the known structures in West Antarctica as seen by previous works in the region.