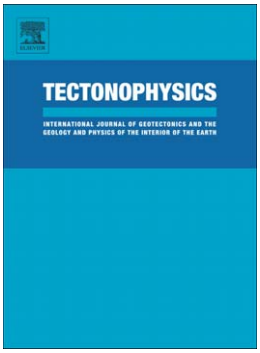

Extensive seismic anisotropy in the lower crust of Archean metamorphic terrain, South India, inferred from ambient noise tomography

Ritima Das, S.S. Rai

PII: S0040-1951(16)30596-0
DOI: doi:10.1016/j.tecto.2016.12.002
Reference: TECTO 127344

To appear in: *Tectonophysics*

Received date: 24 May 2016
Revised date: 29 November 2016
Accepted date: 1 December 2016

Please cite this article as: Das, Ritima, Rai, S.S., Extensive seismic anisotropy in the lower crust of Archean metamorphic terrain, South India, inferred from ambient noise tomography, *Tectonophysics* (2016), doi:10.1016/j.tecto.2016.12.002

Extensive seismic anisotropy in the lower crust of Archean metamorphic terrain, South India, inferred from ambient noise tomography

Ritima Das*, S. S. Rai

*Department of Earth and Climate Science, Indian Institute of Science Education & Research Pune, Homi Bhabha Road, Pune-411008. India (*E-mail:* ritima08@gmail.com)

ABSTRACT

We use Rayleigh and Love wave empirical Green's function (EGF) recovered from the cross correlation of seismic ambient noise to study the spatial distribution of radial anisotropy in the southern India crust. The corresponding dispersion curves in the period 2 to 32 s are measured from ambient noise data recorded at 57 sites, and the strength of anisotropy computed from the discrepancy between shear velocities obtained from Rayleigh (V_{SV}) and Love (V_{SH}) at various depths down to 40 km. In upper crust (up to a depth of 20 km) the region is characterized by anisotropy coefficients of -2 to +2% that could be explained due to a combination of fluid-filled open cracks and foliated metamorphic rocks. At deeper levels (beyond 20 km), except for the Archean metamorphic terrain, most part of south India has anisotropies of up to 5%. This may be due to rocks with varying degree of metamorphism. Beneath the Archean metamorphic terrain, the anisotropy is recorded up to 9% in the depth range of 20-40 km. This high anisotropy is unlikely to be the manifestation of any recent geodynamic process, considering that the region has low surface heat flow (~30 mW/m^2). We propose that the observed strong anisotropy in the metamorphic belt of southern India crust could best be explained as due to the presence of micaceous minerals or amphiboles in the deep crust that are formed possibly during the evolution of granulite terrain at ~2.5 Ga.