Geophysical Research Abstracts
Vol. 20, EGU2018-16850, 2018
EGU General Assembly 2018

3D Structure of the Congo Basin from Surface Wave and Gravity Joint Inversion

Andriamiranto Raveloson (1), Andrew Nyblade (2), Charles Ammon (2), and Raymond Durrheim (1)

(1) University of the Witwatersrand, School of Geoscience, Johannesburg, South Africa, (2) Pennsylvania State University, USA

We simultaneously inverted the Rayleigh-wave group velocity measurements and gravity observations in order to investigate the structure beneath the Congo basin. The seismic dataset used in this study consists of a large number of regional seismic events with magnitudes greater than 4.5 and shallower than 100 km recorded by many stations belonging to various permanent and temporary networks. We measured group velocities of fundamental mode Rayleigh waves using narrow band filters and the phase matching method and inverted them to obtain maps of group velocities. The gravity observation was extracted from the dataset of the global Earth Gravitational Model (EGM2008) free-air gravity field. To combine these two datasets, we use a relationship between seismic velocity and density governed by two empirical relations. The Nafe and Drake is most appropriate for sedimentary rocks, while the linear Birch's law applies to denser rocks. An iterative, damped least squares inversion including smoothing is used to jointly model both datasets, using shear velocity variations as the primary model parameters. Results shows that the sedimentary strata in the Congo basin are about 9 km thick. Slower mantle velocities are found beneath the southeastern and northwestern portions of the Congo basin.

Keywords: Rayleigh waves, group velocity, gravity, joint inversion, Congo basin.