



Subject offered for a contract starting october 2016

SUBJECT TITLE: Spatio-temporal models of noise sources

Advisor: Prof. STUTZMANN Eléonore (stutz@ipgp.fr)

Host lab/

IPGP-Seismology group – UMR7154

Financing: Doctoral contract without teaching assignment (ANR MIMOSA)

For more information go to <http://ed560.ipgp.fr>, section: Offres de these (PhD offer), You must apply on the Doctoral School website

Subject:

Seismic noise is recorded by broadband seismometers in the absence of earthquakes. It is generated by the atmosphere-ocean system with different mechanisms in the different frequency bands. Even though some mechanisms have been known for decades, an integrated understanding of the noise in the broadband period band 1-300 sec is still missing. The purpose of the PhD is to use novel theoretical, numerical and signal processing methods to provide a unified understanding of the noise sources and quantitative models of the broadband noise.

Most noise sources are located in the oceans, they vary over time and many sources continuously generate seismic waves that propagate within the Earth in the broadband period range 1-300sec. Depending on the period range, the source can be created by mutual interactions of ocean waves or by the interaction of waves or infragravity waves with the bathymetry at the coast (e.g. Longuet Higgins, 1950; Arduin et al., 2011; Stutzmann et al., 2012, Arduin et al., 2015).

Body waves provide useful information on noise sources but they are not directly visible on seismic records because they are weak signals. The purpose of the PhD is to develop novel signal processing and inversion tools and to apply them to detect body waves in a data mining approach. The objective is to obtain spatio-temporal models of the sources. These models will enable to better understand the noise generation in the broadband frequency range. They will also be used to improve ocean wave models.

The second part of the PhD will be dedicated to the modelling of noise considering seismic propagation in 3D Earth and to investigate the generation of the different waves, in particular SH body waves and Love waves.

Context:

Institut de Physique du Globe de Paris (<http://www.ipgp.fr>) is a leading research institute in Earth science with specialists in seismology, fluid mechanics, volcanology and computational sciences. The PhD position is part of a large project funded by the French Research Agency (ANR MIMOSA). The applicant will work within an international and interdisciplinary team with seismologists, oceanographers and mathematicians whose purpose is to understand the interactions between atmosphere, oceans and solid Earth. The team is composed of experienced researchers who

made major contribution on seismic noise modelling, wave propagation and seismic data analysis.

Salary and term:

The position is full-time (100 %) for 36 month duration. Salary is in accordance with the French public service rate (1 560€ net/month).

Required qualifications and skill:

- Good knowledge in seismology, seismic wave propagation, signal processing,
- Strong programming and organizational skills

Application:

To apply for this position, please send your curriculum vitae and the names of a reference to Prof. Eléonore Stutzmann (stutz@ipgp.fr).

Bibliography:

- Ardhuin F., L. Gualtieri, E. Stutzmann. How ocean waves rock the Earth: two mechanisms explain microseisms with periods 3 to 300 s 2015, Geophys. Res. Lett. 42, 765-772, doi:10.1002/2014GL062782
- Gualtieri L., E. Stutzmann, V. Farra, Y. Capdeville, M. Schimmel, F. Ardhuin and A. Morelli Modelling the ocean site effect on seismic noise body waves. 2014, Geoph. J. Int, 197, 1096-1106, doi: 10.1093/gji/ggu042
- Stutzmann E., F. Ardhuin, M. Schimmel, A. Mangeney, G. Patau, Modelling long-term seismic noise in various environments 2012, Geoph. J. Int, doi:10.1111/j.1365-246X.2012.05638.x.
- Ardhuin F., E. Stutzmann, M. Schimmel, A. Mangeney. Revealing ocean wave sources of seismic noise, 2011, J. Geophys. Res., 116, C09004, doi:10.1029/2011JC006952

