ÉCOLE DOCTORALE SCIENCES DE LA TERRE

Subject offered for a contract starting in October 2015

SUBJECT TITLE: ***Multiple removal using multi-component streamer data***

Advisor: GPX Team
Second Advisor/ Supervisor: Satish Singh (IPGP), Ahmed Sameh and Pascal Edme (SLB)
Host lab/ Team : **Marine Geoscience**

Financing: GPX/IPGP

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In deep water environment, the reverberation in the water column (multiples) dominate the seismic signals and hence hamper imaging of the deeper structures. There are two main techniques to remove these multiples (1) accurately modelling of these multiples and subtracting them from the data, such as surface related multiple elimination (SRME) technique and (2) moveout based technique, such as Radon multiple removal (RMR) technique. The SRME-type techniques work well for a flat seafloor and near offset data but break down for rough seafloor, which is very common subduction zone or oceanic zone. RMR-type techniques require ultra-long offset data, which work for the first multiples but becomes less effective for 2nd and 2rd multiples, which are much stronger than weak reflected energy from deep earth.

Recently, Schlumberger has developed a new type of streamer, called IsoMetrix, where along with pressure data, vertical acceleration (velocity) field data are also recorded. Using these two independent measurements, one can separate the wave-field into up-coming and down-going wave-fields. On the seafloor, the multiples will be down-going wave-field whereas the reflections from deep earth will be up-coming wave-field. Since the wave-field using IsoMetrix streamer is sampled at every 3.125 m, both pressure and vertical velocity fields could be downward continued to the seafloor accurately through the water column, as if the streamer was deployed on seafloor. We propose to develop a new multiple removal algorithm based on downward continuation, wave field decomposition and specially designed filter.

Both single and multi-streamer (5) IsoMetrix data was acquired in March-April 2015 in Atlantic Ocean, where the seafloor is complex. We propose to test our new algorithm on one or both data sets.

Students with strong background in mathematics and computing with interest in development of new algorithms are encouraged to apply. The student will be a member of the Paris Exploration Geophysics Group (GPX) and will benefit from its wide-ranging projects and interaction with industry partners. The student will have opportunity to work with our industry partners and may spend some time at their premises.