SEMINAIRE GEO-OCEAN

****

Vendredi 18 Mars 14h30

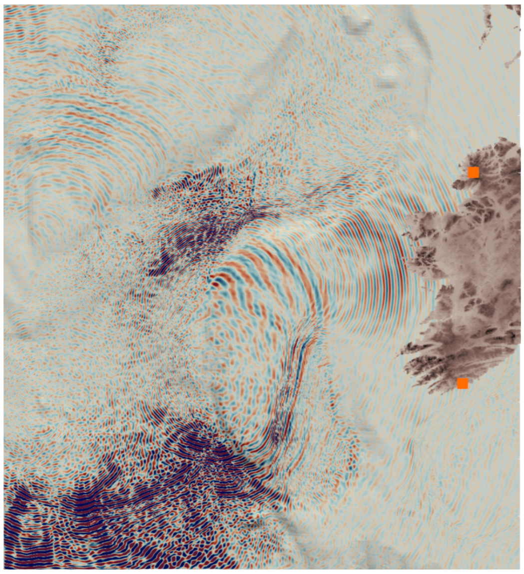
https://join.skype.com/zXKgriOQWTAG

Understanding the ocean wave generated seismic noise observed in Ireland and its connection with the North Atlantic climate variability

Florian LE PAPE

Dublin Institute for Advanced Studies, Ireland

Wind driven ocean wave-wave interactions produce continuous Earth vibrations at the seafloor called secondary microseisms. With the role of surface winds in the generation of ocean waves, secondary microseisms induced by ocean wave-wave interactions represent a unique interconnection between the solid Earth, the ocean and global atmospheric circulation patterns. Due to its proximal position to the main North Atlantic low-pressure systems, Ireland is ideally located for the study of ocean microseisms. In fact, specifically tuned land seismic arrays in Ireland consistently point at very localized secondary microseism sources at or near the shelf edge. This observation is not consistent with the expected broad distribution of sources, based on ocean wave simulations. Regional 3D numerical acoustic-elastic simulations covering most of the Irish offshore hyper-extended margin are used to investigate those discrepancies. The results show that, observed from land, our general understanding of Rayleigh and Love wave microseism sources is significantly impacted by 3D propagation path effects. While Rayleigh to Love wave conversions occur along the microseism path, Love waves predominantly originate from steep subsurface geological interfaces and bathymetry, directly below the ocean source that couples to the solid Earth. In contrast to Rayleigh waves, microseism Love waves observed on land do not directly relate to the ocean wave climate but are significantly modulated by continental margin morphologies, with a first order effect from sedimentary basins.



In addition, microseism energy will vary with seasons due to changes in storm activity but microseism sources are also likely fluctuating with the changing storm track. Here, temporal changes in the ocean generated seismic wavefield in Northeast Atlantic are monitored offshore West of Ireland using ocean bottom seismometers. Deep water seismometers located on top of a thick sedimentary basin highlight significant excitation of Rayleigh higher mode seismic energy as secondary microseism sources become more common on top of the basin. Comparisons with numerical seismic simulations and ocean wave model hindcast data suggest those variations reflects the fluctuation of secondary microseism sources with the changing storm track in response to variations in the NAO.