MSc internship – 5-6 months

“Assessment of radar altimeter performance in the coastal zone”

Hosting laboratory
Laboratoire d’Océanographie Physique et Spatiale (LOPS) – IFREMER – Brest, France

Supervision
Guillaume Dodet (researcher at LOPS) – 60%
Yves Quilfen (researcher at LOPS) – 40%

Required skills
- Scientific background in Physical Oceanography, and/or Data Analysis
- Programming skills (Matlab, Python and / or Fortran90)
- Good written and verbal communication skills in English

Keywords
Radar altimetry, ocean wave measurements, coastal dynamics, numerical wave modelling

Context
Satellite altimeters have been monitoring surface ocean waves at global scale for more than three decades, revealing strong interactions with western boundary currents, extreme storm events in the mid-latitudes and intensifying wave conditions in the Arctic. Meanwhile, wave buoy networks deployed (principally) along the continental margins of the northern hemisphere, provide continuous but sparse observations of wave conditions in the coastal zone, that are critical for navigation safety and coastal hazard early warning systems. Despite this apparent space-time complementarity, *in situ* wave buoys and altimeter measurements in the coastal zone are difficult to inter-compare since altimeter radar signals are severly contaminated by coastal features. However, recent innovations in radar sensors and signal processing techniques are opening new doors for coastal altimetry: for instance, radar altimeters emitting microwaves pulses in the Ka band, such as AltiKa on-board the French-Indian SARAL mission, receive radar echoes from a much narrower footprint (~5 km) than the traditional Ku-band instruments; SAR altimeters, such as SRAL onboard the Copernicus Sentinel-3 mission, use the phase information of radar echoes to generate multi-looked waveforms over narrow (~300-m) slices of the radar footprint; optimized waveform retracking techniques reduce the impact of land contamination on the wave height estimates; and sophisticated denoising methods enhance the signal-to-noise ratio, necessary to reveal the small scale variability along the coast.
During this internship, the candidate will develop a new method to inter-compare wave height measurements from radar altimeters and wave buoys located in the coastal zone (within 20km from the coastline), making use of a high resolution regional wave model hindcast. The method will then be applied to several types of radar altimeter measurements (see above) in order to estimate the performance of the different instruments, and waveform retracking (and denoising) techniques in the coastal zone.

Application
CV and cover letter should be sent to guillaume.dodet@ifremer.fr and yves.quilfen@ifremer.fr.