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Pierre Henry
CEREGE
Europôle de l'Arbois, BP 80
13545 Aix-en-Provence Cedex 04 (France)
henry@cerege.fr
tel: +33 686782856

Chair of the COST Action: ES1301
Dr. Christian Hensen
GEOMAR Helmholtz-Zentrum für Ozeanforschung Kiel
Wischhofstr. 1-3
24148 Kiel (Germany)

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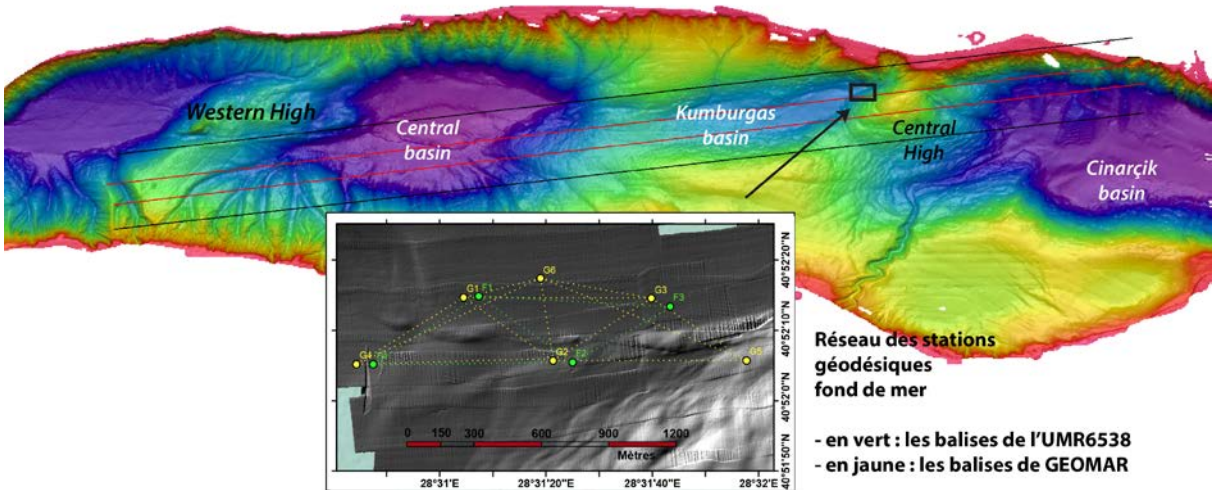
The objectives of the short-term scientific missions "Sea of Marmara geodesy and geohazard" were to combine participation to a research cruise on Ifremer vessel « Pourquoi Pas ? » with a stay at ITU to work with Sinan Ozeren, and Nazmi Postacıoğlu to pursue work on data acquired at sea and to set up a new collaborative project between ITU and my institution.

The "Pourquoi Pas ?" cruise comprised three Legs. I participated to Leg 1 (Oct 29-Nov2) and lead Leg 3 (Nov 13-Nov 16) as chief scientist. The main objective of Leg 1 was to install a network of acoustic ranging beacons on the Central Marmara Segment of the North Anatolian Fault, which is suspected to present aseismic creep (Ergintav et al., 2014). This deployment, planned for 6 years is the first attempt to measure fault creep with a seafloor geodetic network. Coring aimed (1) at sampling reference stratigraphic horizons to ground truth seismic stratigraphic interpretations and estimations of fault slip rates (Sorlien et al., 2012; Grall et al., 2013) (2) at sampling seismoturbidites at sedimentary basin depocenters for paleoseismological studies.

During Leg 2, I stayed in Istanbul to work with Turkish colleagues on fine tuning of the coring plans, on the treatment and interpretation of pressure time series, and on the set up of a project for the 2015 march ANR/TUBITAK joint call for Turkish-French collaborations.

Two geodetic networks were jointly deployed in the Sea of Marmara by IUEM Brest (Anne Deschamps) and GEOMAR Kiel (Joerg Bialas) teams and the first three weeks of data downloaded trough acoustic modems during Leg 3. The installation was successful, with all 4 IUEM beacons and 6 GEOMAR operational and communicating. Baseline lengths ranged 400 to 900 m and a precision better than 5 mm was achieved on all baselines, with good stability of bottom water conditions and beacon tripod stands. As the geological fault slip rate is 18±3 mm/yr, aseismic creep occurring at only a fraction of this rate may be detected in the time frame of the experiment. Geomar RV Poseidon will retrieve the first 6 months of data in 2015.

A total of 4 long cores were taken for paleoseimological studies in Kumburgaz and Imrali Basin. Long cores wee taken with tubes of nominal length 24 m and recovery was excellent (exceeding 20 m) for three of them (exceeding 20 m). In addition, 3 interface cores about 1 m length were taken at these three sites. Cores targeting reference stratigraphic intervals were also mostly successful. One key horizon, which is hypothetically associated to MIS 5e/5d transition, has been reached at least at three different sites near topographic highs in the western and eastern regions of the Sea of Marmara. Coring of older horizons on eroding slopes was attempted with shorter (12 m) tubes and a total of 9 cores were thus taken for stratigraphic correlation objectives. Cores have been shared between ITU and CEREGE and several Master and PhD students from both institutions (this includes Julia Kende at CEREGE), will be involved in post-cruise work on cores.



At the end of the cruise, a press conference was held at the former French Embassy in Istanbul, which gathered most project partners, and the last two stays of my stay were spent at KOERI (Kandilli Observatory Earthquake Research Institute) for the MARSITE EU FP7 general assembly.

Spectral analysis of Differential Pressure Gauge (DPG) time series from Ocean Bottom Stations deployed in the Sea of Marmara could be initiated during my stay at ITÜ, but then required complementary information on sensor type and calibration from KOERI and GURALP. The records were then compared with absolute bottom pressure records acquired in Tekirdağ basin in 2007. In spite of different sensor specifications, two peaks in the power spectrum (24 and 40 minutes) were observed in both data sets, and likely correspond to resonant oscillations in the water column. The fundamental seiche oscillation mode in the Sea of Marmara is, however, of longer period. The records examined also contain a magnitude 5 earthquake, which induced pressure variations at the sea floor within a broad frequency range, but apparently did not trigger resonant oscillations. Work will be continued with Sinan Özeren and Nazmi Postacıoğlu with the objective to submit a publication in 2015.

The outline of a joint ANR-TUBITAK project has been submitted to the ANR website before the November 18th deadline. The French and Turkish parties must now submit the full proposal in March 2015. Meetings during the cruise and during my stay in Istanbul have been essential to build the partnership on the Turkish side with Namik Çağatay (ITÜ) as coordinator, and to define the main tasks of the project, named MAREGAMI for MARine Earthquake Gap Assessment and Monitoring for Istanbul. This project focuses on specific developments in marine geosciences for earthquake hazard assessment that comprise core analysis, tsunami and sediment transport modeling, geodesy, seismology and long term monitoring.

Sincerely yours,

Pierre HENRY