



Eastern Mediterranean Centre for Oceanography and Limnology
Doğu Akdeniz Oşinografi ve Limnoloji Araştırmaları Merkezi
İstanbul Technical University

İstanbul, 28 November 2015

Dr. Christian Hensen

Chair of the COST Action: ES1301

GEOMAR Helmholtz-Zentrum für Ozeanforschung Kiel

Wisshofstr. 1-3

24148 Kiel, Germany

Reference Number: COST-STSM-ES1301-30321

Period: 2015-11-15 00:00:00 to 2015-11-20 00:00:00

COST Action: ES1301

STSM type: Regular (from Turkey to France)

Report on Short Term Scientific Mission (STSM) between ITU-EMCOL (Istanbul, Turkey) and CEREGE (Aix-en-Provence, France) during 15-20 November 2015

The collaboration between ITU-EMCOL (Istanbul, Turkey) and CEREGE (Aix-en-Provence, France) is based on examining the past earthquake, mass transport, tsunami and fluid expulsion events in the Sea of Marmara. Beside this objectives, our aim is to determine the slip rates on different segments of the North Anatolian Fault (NAF) by determining ages for some key seismic reflectors. These stratigraphic horizons can be dated by establishing a reliable chronostratigraphy of cores and correlating it with seismic sections. For these purposes, we recovered 11 piston cores and 3 gravity cores from the Sea of Marmara on board the Ifremer vessel RV "Pourquoi Pas?" during the Marsite cruise held from October 28th to 17th November, 2014 (Fig. 1). The core sediments are estimated to cover the time period of few hundred thousand years before present. The results of the collaborative studies between ITU and CEREGE will have important implications for seismic risk assessment for the different segments of NAF, and for deciphering the relations between earthquakes and fluid activity. This Cost short-term scientific mission 30321 was carried during 15-20 November, 2015 at CEREGE to contribute mainly to the ongoing core chronostratigraphic studies at ITU and CEREGE.

Two sets of cores in Istanbul and Aix-en Provence are being studied by the ITU-EMCOL and CEREGE groups involving one PhD student (Julia Kende) in CEREGE and one PhD (Nurbike Sađdıç) and one MSc (Nurettin Yakupođlu) students in ITU. The STSM study at CEREGE involved lithostratigraphic description of up to 23 m-long cores MRS-CS-22, MRS-CS-23 and MRS-CS-26 and their correlation with the cores MRS-CS-18, MRS-CS-19 and MRS-CS-27 in Istanbul, using lithology (tephra, sapropels) and physical properties (MSCL magnetic susceptibility and gamma density). Some cores (e.g., MRS-CS-19, MRS-CS-22) extend back to Marine Isotope Stage 5 (MIS-5) while the base of others (e.g., MRS-CS-18) are possibly as old as MIS-7. The study group involved Namık Çađatay, Pierre Henry, Kürşad Kadir Eriş and Julia Kende. The core studies were made mainly for the PhD thesis work of

Julia Kende and her training in core description, including the identification of key stratigraphic marker horizons (e.g., marine/ and lacustrine transitions, tephra, sapropels), early sediment diagenesis and diagenetic structures (e.g., redox fronts, carbonate nodules, Fe-monosulfide bands, spots and patches) and other sedimentary structures (e.g., soft sediment deformation, gas escape, turbidites) (Fig. 2).

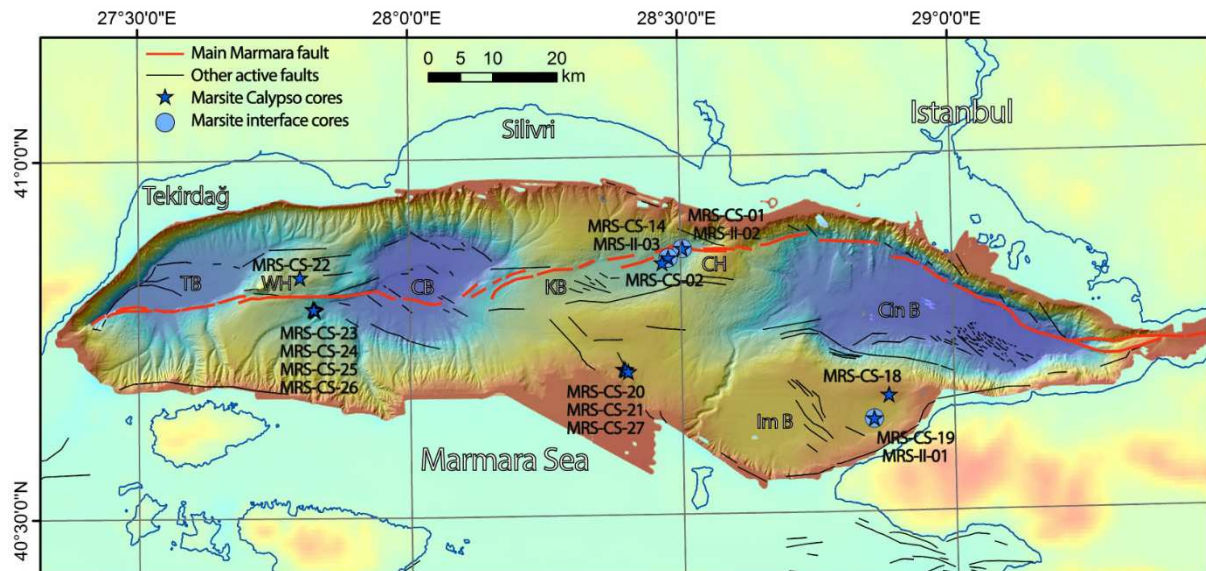


Figure 1: Multibeam map of the Sea of Marmara, with northern branch of NAF (red lines) and location of Calypso and Interface cores recovered during MARSITECRUISE in Oct.-Nov. 2014 (cores MRS-CS 17 to 21 in Imali Basin (Im B) in the east and MRS-CS-01, MRS-CS02, all cores in Kumburgaz Basin (KB) are at ITU-EMCOL; cores MRS-CS-22 to 26 on the Western High (WH) are at CEREGE).

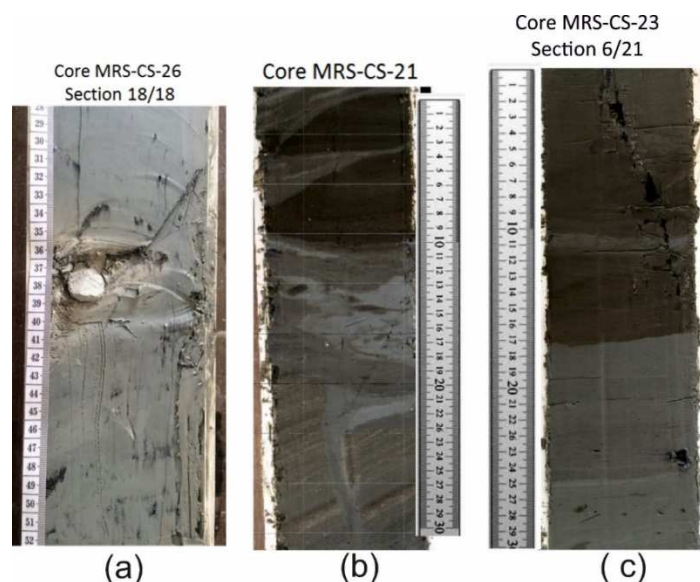


Figure 2: (a) A diagenetic carbonate nodule surrounded by a beige carbonate rich zone in lacustrine mud, possibly formed at methane/sulphate boundary. Note also the 4-5 mm-thick dark elongated sand pipes. (b) A vertical fluid vent, which is infilled with grey mud, cuts through tilted laminated sapropel. It is overlain by deformed grey mud possibly supplied by the pipe, which is in turn overlain by deformed marine and lacustrine sediments. The whole sequence is part of a slumped sedimentary succession. (c) Grey lacustrine mud is overlain by the dark green sapropel that is dissected by a gas escape structure which is partially filled with coarse silt-sand and black sulphide globules. This interval is characterized by high magnetic susceptibility and density.

Related to earthquake activities in the Kumburgaz Basin, core MRS-CS01 is being studied by İTU group to define past earthquake records that have been appeared as seismoturbidite layers in the core (Figure 3). Precisely dating these unique layers together with core-seismic correlations allow us to development of stratigraphic age models for sedimentary infills of the Kumburgaz Basin. Based on the sedimentological and paleontological observations by İTU group on core MRS-CS18, different lithostratigraphic units have been subdivided that extends back to MIS-8 (prior to 300 ka BP) (Figure 4). During our STSM study in CEREGE, this core has been decided to correlate with cores MRS-CS22, -CS23 and -CS26 in order to determine lithological similarities. Such correlations allowed us to define chronostratigraphies of the core sediments (MRS-CS22, MRS-CS23 and MRS-CS26).

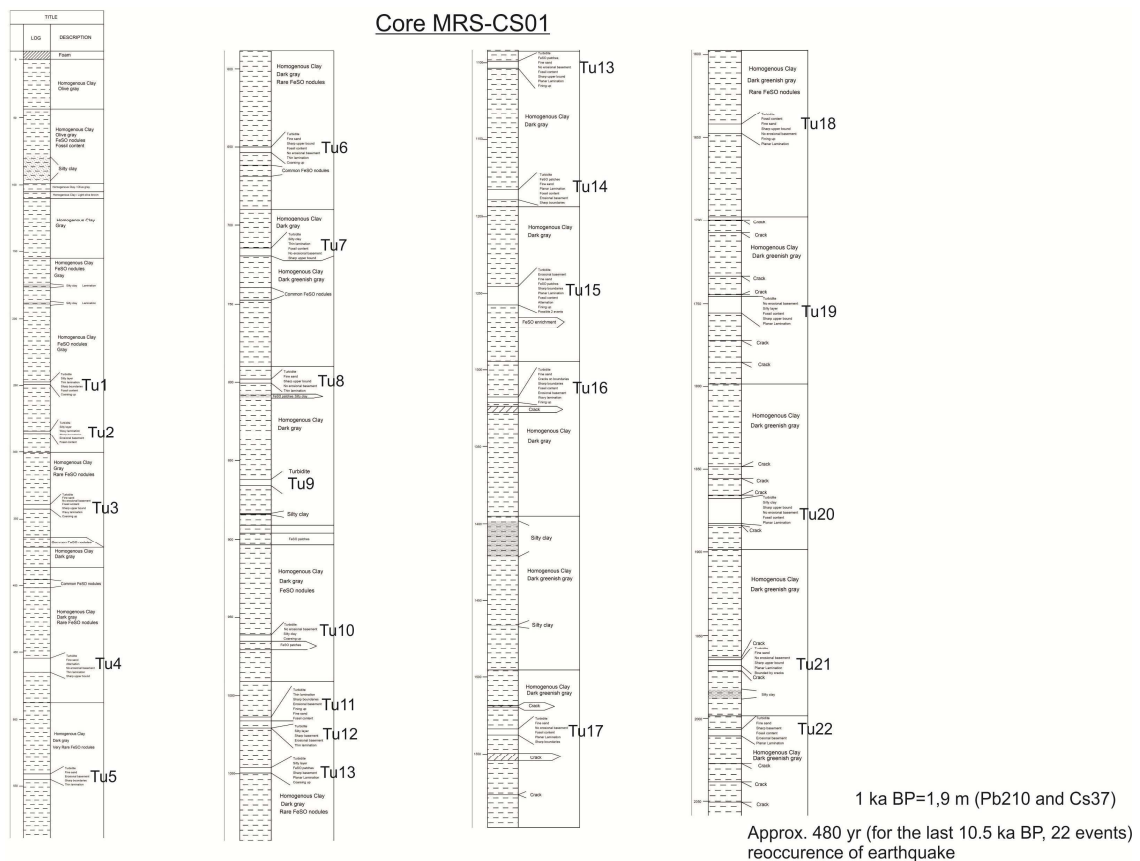


Figure 3: Lithologic description of Core MRS-CS01 recovered from the Kumburgaz Basin showing differentiated twenty-two seismo-turbidite layers covering the last 10.5 ka BP.

A meeting involving a series of seminars was held on Wednesday afternoon, 18th November 2015, with participation of Pierre Henry, Edouard Bard, Laurence Vidal, Kazuyo Tachikawa, Julia Kende, Namık Çağatay and Kürşad Kadir Eriş. Seminar presentations were delivered and discussions were held on the results of the ongoing studies on the cores in CEREGE and İstanbul. Plans for future studies were discussed especially regarding Julia Kende's PhD thesis work. In addition to developing based on analyses of especially core MRS-CS-22 and core MRS CS-01 recovered in the Kumburgaz Basin for the seismoturbidite studies, Julia will do μ -XRF analysis of the cores and calibrate total organic carbon analysis with μ -XRF Br and

μ -XRF Ca with ICP-MS Ca. Friday, 20th November 2015 was devoted to smear slide study of samples prepared from the described cores to identify lithology, tephra and nannofossils.

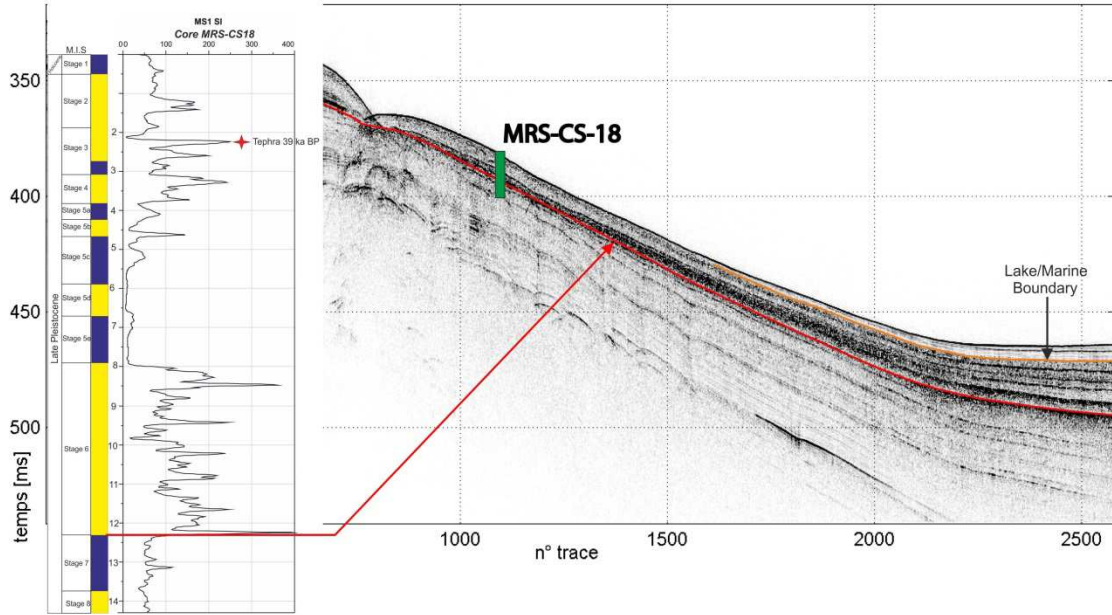


Figure 4: The studied core MRS-CS18 recovered from the eastern İmralı Basin has been examined in order to match with the seismic profile. Through the core we differentiated different lithological units on the basis of sedimentological observations together with magnetic susceptibility data. Yellow colour bar corresponds to lacustrine sediments whereas dark blue represents marine phase of the Sea of Marmara. Alternations of marine and lacustrine litho-units can be well correlated with Marine İsootope Stages that extends back to stage 8 in the core. This core can be very well correlated with core MRS-CS22 and Cs23 studied in CEREGE.

This STSM helped the effective coordination of the studies and discussion of the results obtained by the two groups at ITU and CEREGE. It was also important for the training of Julia Kende at CEREGE and planning of future work.

Assoc.Prof.Kürşad Kadir Eriş