Geophysical Research Abstracts
Vol. 18, EGU2016-11085-1, 2016
EGU General Assembly 2016
© Author(s) 2016. CC Attribution 3.0 License.

Marine-to-lacustrine transition, mud volcanism, and slope instability in an active tectonic setting: the MIS 5 to 4 transition in the Sea of Marmara, Turkey

Céline Grall (1), Pierre Henry (2), Julia Kendé (2), M. Namık Çağatay (3), K. Kadir Eriş (3), Christine Paillès (2), Christopher Sorlien (4), Donna Shillington (1), Cecilia McHugh (5), Michael Steckler (1), Günay Çifçi (6), and Louis Géli (7)

(1) Lamont-Doherty Earth Observatory of Columbia University, Palisades, NY, USA, (2) CEREGE, CNRS, Aix-Marseille University, Marseille, France, (3) Istanbul Technical University, EMCOL and Faculty of Mines,Istanbul, Turkey, (4) Earth Research Institute of University of California, Santa Barbara, California, USA, (5) School of Earth and Environmental Sciences Queens College, NYC, NY, USA, (6) Institute of Marine Sciences and Technology, Marine Geophysics, Izmir, Turkey., (7) IFREMER - French Research Institute for Exploration of the Sea, Marine Geosciences, Plouzané, France.

In the Sea of Marmara, glacio-eustatic cycles set the tempo of a complex history of disconnection and reconnection with the Black Sea and with the global ocean through the Mediterranean Sea. As a result, the sedimentary record consists of alternating high stand marine sediments and lowstand sea or lake sediments. The Sea of Marmara is also an active transtensional basin along the Northern branch of the North Anatolian Fault (NNAF), which accommodates most (∼3/4) of the 21-27 mm/a dextral slip between Eurasia and Anatolia. This peculiar setting makes the Sea of Marmara an exceptional site to study the interplay of paleo-environmental factors and seismotectonic processes. Notably, Mass Transport Deposits (MTDs) crossing the faults provide offset markers although their age remains uncertain.

A high resolution seismic stratigraphic model has been proposed for 100 ka glacial cycles, based on onlap sequences within basins, and paleo-deltas at shorelines. The sedimentation rate in basins decreases during episodes of sea-level rise and reach maximum values during low stands. Remarkably, seismic reflector sequences display nearly identical character for locations with similar sedimentation rate. The uppermost sequence boundary reflector (Red-H1) has been recently cored at several locations during MARSITECRUISE (Ifremer R/V Pourquoi Pas?, Oct-Nov. 2014), enabled us to correlate high resolution seismic data with core data. The Red-H1 reflector is regionally characterized by a high amplitude and a reverse polarity. Correlations between seismic data and piston core logs indicate that the reverse polarity of this reflector may be explained by a negative density contrast between lacustrine sediments above and a greenish sapropellic layer of several meters thickness below. On shelves, Red-H1 is on top of the low stand wedge. On slopes and topographic highs, Red-H1 appears as an erosional surface laterally correlative with an onlapping unit in basins and is frequently overlain by MTDs.

At the transition from Marine Isotope Stage (MIS) 5 to 4, sea-level fell from 25 to 85 m below the modern sea-level resulting in the disconnection of the Sea of Marmara. Sapropels deposited on the shelf before the disconnection and are attributed to MIS-5 (Cagatay et al. 2009). Grall et al, (2014) proposed that MTDs found above the Red-H1 were deposited at the beginning of MIS-4 at ∼70 ka and that MTD complexes found during earlier glacial cycles also accumulated after marine to lacustrine-disconnections, possibly in relation with hydrate dissociation and/or clay swelling. Buried mud volcanoes located within the NNAF damage zone pierce the Red-H1 reflector but not the reflector above, suggesting that the last main eruption may also happens at the beginning of MIS-4. We will present preliminary assessment of the paleoenvironmental changes across the MIS-5 to 4 transition from bio-indicators and geochemistry.