The sedimentologic parameters of earthquake related turbidites in lake Hazar (Turkey) along the Est Anatolian Fault Zone

Dila Doğa Gökgöz[1], Kürşad Kadir ERİŞ[2], Gülsen Uçarkuş[2], Nurettin Yakupoğlu[2], Erdem Kırkan[2], Ahsen Uçar[2], Cerennaz Bozyiğit[1], Asen Sabuncu[1], Ahmet Şaşmaz[3], and Mehmet Köküm[3]

[1]Istanbul Technical University, Eurasia Institute of Earth Sciences, Istanbul, Turkey, [2]Istanbul Technical University, Department of Geological Engineering, Istanbul, Turkey
[3]Fırat University, Geological Engineering Department, Istanbul, Turkey

INTRODUCTION

The Lake Hazar (Elazığ) is situated as an inter-mountain basin located on the East Anatolian Fault Zone (EAFZ) which is a major continental left-lateral strike-slip fault in Eastern Turkey. Since mostof the major cities in the eastern part of Turkey with high populations are located along or nearthe EAFZ; studies focused on earthquake risk in the near-future have a significant importance of carrying in terms of socio-economic conditions. Relevant with massive earthquakes duringdifferent geologic periods due to local and regional tectonic conditions; occurred earthquakes are measured between 6.7-7.8 Mw in Lake Hazar during the last 50 years.Therefore, Lake Hazar is considered to be archive as receiving most of the past earthquake records that are considered to be deposited as turbidites along the lake floor. For this reason, this study aims to investigate the earthquake-related turbidites (seismo-turbidites) in Lake Hazar and special interest on their sedimentological parameters. For this purpose; seven sediment cores retrieved from Lake Hazar have been examined by using multi-parameters, including mainly sedimentologic analyses together with physical and geochemical imprints. Grain size parameters of the seismoturbidites such as mean, mode, and median together with sorting and skewness reveal depositional processes during the turbidite deposition along the lake floor. According to lithologic and grain size parameters; deciphered distinct facies variations of seismoturbidites, eachof them was indicated various sedimentologic processes related to different depositional dynamics. The geochemical analyses of the seismoturbidite allow us to define the deepwatercondition during and after its deposition and the source of the transported sediments.
The formation of laminated seismoturbidites is characterized by the finest-grain size that was presumably formed by suspended deposition under a strong seiche effect in deep parts of the lake. The coarser seismoturbidites represent massive and graded facies that are mainly deposited by traction carpet along the lake slopes as a result of slumps triggered by the earthquakes. The high fluctuation in grain sizes of the coarser seismoturbidites also indicates the existence of seiche effect during/or after the earthquakes that may have resulted in strong grain segregation of the transported sediments from slope to the basin of the lake.

Fig 1.*Map showing location of studied area*

REFERENCES

- Eriş, K. K., Çağatay, N., Beck, C., de Lepinay, B. M., & Corina, C. (2012). Late-Pleistocene to Holocene sedimentary fills of the Çınarcık Basin of the Sea of Marmara. Sedimentary Geology, 281, 151-165.
- Folk, R. L. (1980). Petrology of sedimentary rocks. Hemphill publishing company.

ACKNOWLEDGEMENTS

This study is supported by the TUBITAK with project number of 119Y251 and ITU-EMCOL (Eastern Mediterranean Centre for Oceanography and Limnology) Research Centre

RESULTS & DISCUSION

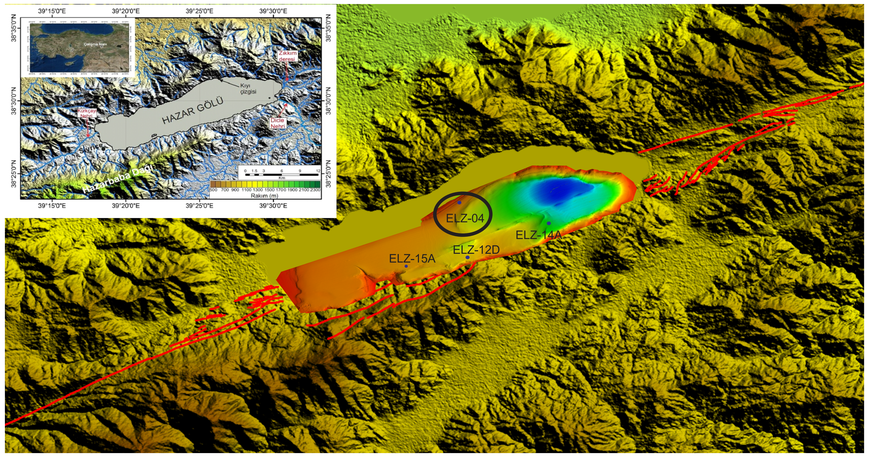

Fig 2. *Bathymetry, elevation, depth and location Map of the Lake Hazar (Elazığ). Bathymetry made on the basis of the data set acquired R/V URANIA expeditions.*

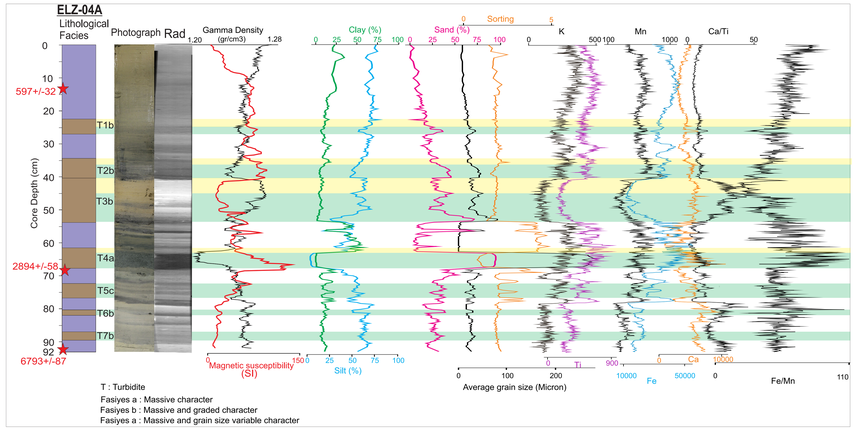

Fig 3. Photograph, radiography, MSCL, grain size parameters, XRF data of ELZ 04A core taken from Lake Hazar.

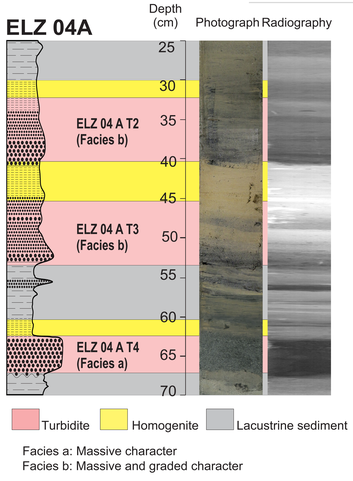

Fig 4. Detailed stratigraphy of the ELZ 04A core.

	Normal Turbidites	Seismo-turbidites
Sedimentary structures	One layer, Bouma Sequence	Irregular or incomplete
Grain size change	Normal Graded	Normal and reverse graded, sudden changes in grainsize, fluctiation
Compositional change	Continuous change across the layer	Different composition between layers and sudden breaks in the layer
Source	One source	Çoklu veya doğrusal kaynaklar
Precipitation process	Sedimantation by a single flow	Due to the same or different sources due to strong turbidite currents

Fig 5. Normal turbidites and seismo-turbidites differences (Nakajima and Kanai, 2000).

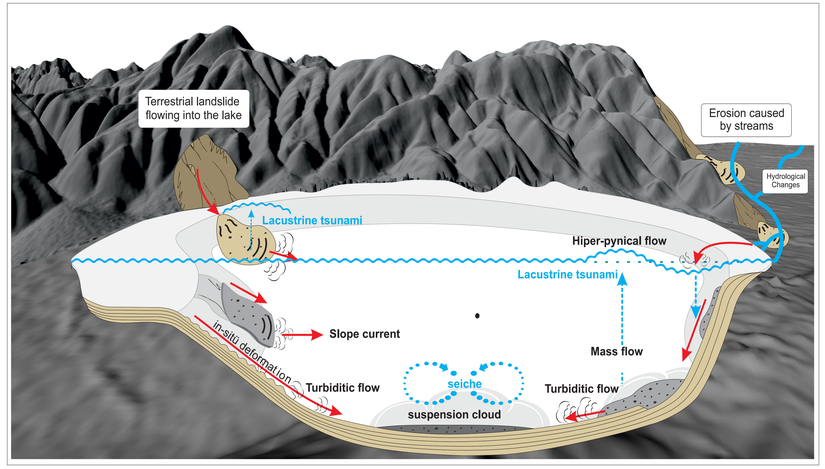

Fig 6. Mechanisms triggered by earthquakes in the lake environment; modified from Moernaut (2020).

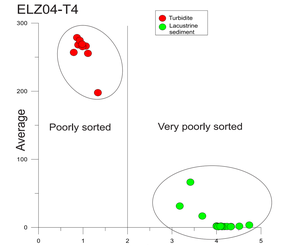

Fig 7. Average grain size - sorting graph of 04A core, T4 level.

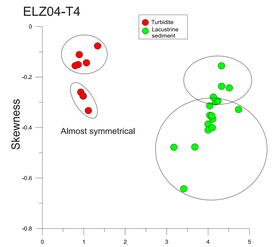

Fig 8. Skewness - sorting graph of 04A core, T4 level.

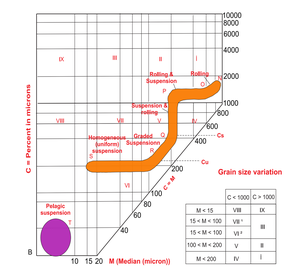

Fig 9. Passega Diagram (1969).

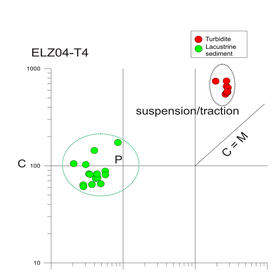

Fig 9. ELZ 04A core, Passega Diagram of T4 level.

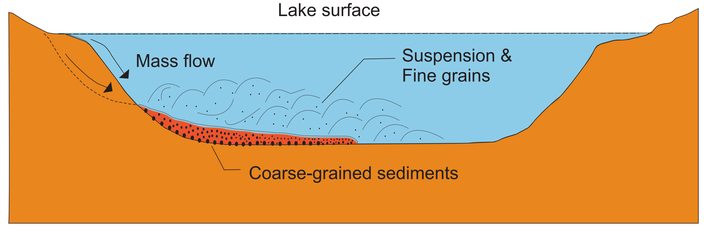

Fig 10. Settlement mechanism of ELZ 04A core T4 level.