Goldschmidt 2021 Abstract
https://doi.org/10.7185/gold2021.4208

# Technology-Critical Elements (TCEs) in the Caspian Sea

**MOHAMMAD ZENDEHBAD**[1], MAJID MOSTAGHELCHI[2] AND MOHSEN MOZHGANFAR[3]

[1]University of Natural Resources and Life Sciences Vienna (BOKU)

[2]University of Vienna

[3]Ferdowsi University of Mashhad

Presenting Author: mohammad.zendehbad@students.boku.ac.at

The ever-extending list of modern technologies and energy-related applications have demanded considerable extractions of a specific group of trace elements called Technology-Critical Elements (TCEs), leading to their remobilization and dispersion within the biosphere across the globe. The adverse health and environmental influences of TCEs have not been documented yet, and their concentrations within aquatic settings remain to be regulated. This novel study represents the first characterization of TCEs of the Caspian Sea coastal seawaters to identify their concentrations and to provide a reference for the potential implementation of executive plans on marine water quality and protection. Dissolved concentrations of TCEs in thirty-five locations (coastline and estuaries) encompassing the Caspian Sea's southern coastline were measured. Analyzes were conducted by Inductively Coupled Plasma-Mass Spectrometry. Mean concentration of TCEs show a sequence of gallium > thallium > niobium > tellurium > germanium > tantalum > indium. The TCEs' concentrations and spatial distribution exhibit concentration gradients that are potentially attributed to domestic and industrial wastewater sources. Mean concentration of TCEs, reaching up to 0.47 $ng.L^{-1}$, highlights the impact of the urban inputs into the seawater, mainly along the larger cities' coastline (compared to the smaller cities) as well as in the locations where rivers discharge into the sea. To identify the extent of the contaminations, the TCEs' concentrations of the Caspian Sea's northern waters are compared with the few data reported from other parts of the world. These first data of the Caspian Sea coastal waters suggest anthropogenic contamination when compared to the proposed surface seawater values of TCEs measured in other regions. The present study recommends further research to assess the impact of TCEs on marine organisms and the pollution concerns associated with the recent massive loss of migratory birds in the Caspian Sea urbanized coastal environments.