

The role of sedimentological and geochemical indicators in the recognition of redox conditions in the southern part of the South Caspian Basin

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Abstract

An index analysis approach including sedimentological and geochemical (total organic carbon (TOC) and concentrations of redox-sensitive trace-metals (RSTM)) indices was used to find out redox conditions in the southern part of the South Caspian Basin (SPSCB). On the basis of sedimentological studies mud supported texture was dominated on the distal part of shelf, while interbedded debrite and pelagic-hemipelagic sediments were main textures in slope and proximal parts of the basin plain. Several factors (e.g. bottom dissolved oxygen (BDO), TOC, biota content, faecal pellets, and RSTM) suggest that these sediments were deposited under markedly different redox conditions, namely: (1) Shelf and slope settings (oxic sediments), and (2) intraslope basins and basin plain settings (dysoxic sediments). Observations suggest that basin plain and intraslope basins sediments were deposited under oxygen-depleted (oxygen minimum zone) conditions. The dysoxic sediments are enriched in RSTM (V, Zn, Cr, Cu, Ni), with high TOC values, with mud peloids, and contain type II OM, while the sediments of the oxic sediments are enriched in infaunal organisms (i.e. ostracods and gastropods), faecal pellets, and contain types III and mixture II/III OM. Type III OM implies terrestrial input to the shelf and slope deposits. Poor preservation of OM and bioturbation prohibited the accumulation of OM in the oxic sediments. This study revealed that the preservation of organic carbon in the SPSCB is controlled by several factors including BDO, composition of OM, and biota content.

Keywords: Dysoxic sediments, Oxygen minimum zone, Sediment cores, Redox-sensitive trace-metals, South Caspian Basin