

SEDIMENTARY GEOCHEMISTRY OF MUD VOLCANOES IN THE ANAXIMANDER MOUNTAINS REGION (EASTERN MEDITERRANEAN SEA)

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Abstract

Investigations including sedimentary and geochemical properties were carried out on the surface sediments sampled by E/V Nautilus from the Anaximander mud volcanoes in the Eastern Mediterranean Sea. The sediment grain size distribution and geochemical contents were determined by grain size, organic and inorganic carbon content and element analysis. The results were evaluated according to Enrichment and Contamination Factor Analysis. These index analyses can also be used to evaluate of deep sea environmental and source parameters. The factor analysis results were interpreted as the biological and cold seep effects are the main factors of surface sediment characteristics from the Anaximander mud volcanoes.

Keywords: Mud volcanoes, Sediments, Geochemistry, Anaximander Seamount, Mediterranean Sea

Introduction

Anaximander Mountains contains a high number of deep marine mud volcanoes and mud domes. The methane fluxes are associated with the mud volcanoes, cold vents and cold seeps at deep marine mud volcano areas [1]. The aim of this study is to investigate the characters of geochemical effects in the deep-sea mud volcano sediments and determine the mud volcanism effects on environments of the Anaximander Sea Mountains using grain size, geochemical element and numerical factor analysis data.

Material and Methods

This study is based on nine ROV push core sediment samples taken from the Anaxagoras and Anaximenes regions during the 2012 The E/V Nautilus exploratory cruises. The particle size analysis carried on based Folk classification [2], carbonate-organic carbon content was determined by using a gasometric method modified from 'Scheibler' gasometer system [3] and multi element analyzes were performed by ICP-MS. The Contamination Factor, Enrichment factor and Principal Component Factor Analysis calculated according to grain size, carbonate - organic carbon and ICP results.

Conclusions

Investigations were carried out on surface sediments taken from Anaximander mud volcanoes in the Eastern Mediterranean Sea. The grain size distribution of surface sediments ranged between sand to sandy silt in the study area. The contamination degree values showed low contamination in the area and factor analysis revealed that there was no anthropogenic or any other pollution sources around the searched area. The highest values of these parameters evaluated that observed enrichment of elements caused by environmental conditions together with mud volcano process. Six main factors were determined effecting of the study area. Those are identified as biogenic, carbonate, cold seep and ophiolite, lithogenic, ferromanganese concretion and organic matter factors. Effects of cold seeps were clearly observed at the area and the benthic community linked to methane-rich fluid expulsion is the main factor of the surface sediments from Anaximander mud volcanoes interpreted as biogenic factor. The biogenic and carbonate factor more intense around the Thessaloniki, Amsterdam and Kazan mud volcanoes, pointing these regions probably have more active ecosystems in the study area and biological process in progress. The cold seep factor determined more intense around the Kula, Thessaloniki and partly Amsterdam suggesting that these areas have more active cold seep expulsions in the study area.

References

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