Geophysical Research Abstracts
Vol. 14, EGU2012-4898, 2012
EGU General Assembly 2012

Preliminary sediments quality assessment of the Midia Port aquatorium – Black Sea – Romania

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This study shows the present environmental quality of superficial sediments within the aquatorium of an industrial harbor. These results help better understand the correlation between historical pollution and present environmental state of the harbor sediments and related environmental hazards in case of dredging.
The study area is the Port of Midia, situated in Romania, western Black Sea coast. The port is located at the boundary between the Danube Delta coast (widest nature protected biosphere reserve in the EU) in the north – and the almost entirely human controlled coast – starting south of the port. Midia Harbor was first built in 1942, expanded during the late 1970‘s, and currently operates as an oil and general merchandise terminal. This port receives a double impact of waters: brackish Black Sea waters, as well as Danube fresh waters arriving into the aquatorium through the inshore Danube – Black Sea Canal Lock.
To understand the environmental status of the port aquatorium one sampling campaign was performed during August 2011. Samples were collected within the aquatorium and in in the surrounding area outside the harbor. For a better correlation with the particularities related to the transitions in water salinity, the aquatorium was divided into five sectors with specific characteristics: Cargo Terminal Area, Oil Terminal Enclosure Area, Ships Transit Area, Waste Oil Buffer Area and Marine Area.
The following analyses were performed on water and sediment samples: physical and chemical characteristics of the waters (dissolved oxygen, temperature, electrical conductivity, total dissolved salts, pH, redox potential, nitrates, nitrites, phosphates, sulphates, heavy metals), bulk sediments (particle size, grain size distribution, mineralogy, organic matter and carbonates content, heavy minerals load, organic compounds) and microbiological and ecotoxicological assays.
The grain size analysis reveals the prevalence of very fine-silt and silty-clay fractions, and in a smaller quota sandy fractions. Mineralogically, quartz dominates the sandy and silty fractions of sediments mass, being subsequently followed by a large spectrum of other minerals: feldspar, mica minerals, chlorite, heavy minerals, etc. Besides the mainly siliciclastic mass, sediments are rich in organic matter, with lower contents of carbonates.
Some of the sediments are contaminated with petroleum products.
All measured water samples were polluted with heavy metals (As, B, Se) and sulphates. Sediments show different contents of chemical compounds, in relation with the spatial distribution of the harbor sectors. Highest concentrations of total volatiles compounds were found in sediments from Waste Oil Buffer Area and Ships Transit Area. Microbiologically contaminated sediments were found in Cargo Terminal Area, Waste Oil Buffer Area and Ships Transit Area. Some samples from Cargo Terminal Area and Ships Transit Area present toxicity signs.
Acknowledgments: „This work was supported by the strategic grant POSDRU/89/1.5/S/58852; Project „Postdoctoral program for training scientific researchers” co-financed by the European Social Found within the Sectorial Operational Program Human Resources Development 2007 – 2013”, and was performed with scientific and technical assistance provided by NIRD GeoEcoMar – Romania, during the Sedi Port Sil –Project, Life 09ENV/IT/000158