ANNUAL REPORT ON GEOTRACES ACTIVITIES IN SLOVENIA
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New results

- Our research performed in the Gulf of Trieste confirmed that the Gulf is the sink of CO2 throughout the year. The river plumes of particulate matter and dissolved nutrients play an important role in carbon cycling by direct inputs of terrigenic carbon, enhancing increased biological activity of the Gulf through the supply of riverine nutrients.
- Measurement of 226Ra activity concentrations are often used to estimate supported levels of 210Pb for purposes of geochronology. However, the implicit assumption that supported 210Pb and 226Ra are in secular equilibrium may not always be true because the migration of an intermediate product, gaseous 222Rn. As a consequence, supported 210Pb activity concentration might be lower than the measured 226Ra value, which was the case in a core collected from the South Adriatic Pit. Therefore, we proposed a new approach to improve the determination of supported 210Pb, which is based on correction of 226Ra activity concentrations using the average (210Pb/226Ra) activity ratio in deeper sediment layers.
- Mercury (Hg) concentrations and isotopic compositions were examined in surficial sediments in Mediterranean Sea to assess the use of Hg isotopes to trace sources of Hg in deep-sea sediments. The concentrations of total Hg in selected sediments ranged between 0.07 and 0.76 nmol g-1 and vary irregularly with depth, which may reflect changes or redistribution during diagenetic processes. The highest concentrations were determined in Algerian Sea, while the lowest was found in Levantine Basin. At most sampling locations the data deviate from an average δ202Hg of -0.76 ± 0.16‰ established for background sediments in Mediterranean Sea. The δ202Hg values were variable ranging between -2.30 and 0.02‰ indicating different Hg origin. Both odd isotopes deviate from the theoretical mass-dependent fractionation line (Δ199Hg, Δ201Hg), showing that surface sediments were subject to mass-independent fractionation (MIF) with Δ199Hg = +0.10 ± 0.04‰ and Δ201Hg = +0.04 ± 0.02‰. These slightly positive values indicate that the cause of MIF could be photochemical reduction of Hg2+. Down-core δ202Hg values do not show a clear pattern and were site specific implying either multiple sources, or varying amounts of microbial Hg reduction and loss, or a combination of both. Further evaluation is in progress in order to fully explain the distribution of Hg stable isotopes in Mediterranean Sea.
- In the framework of the GMOS project further measurements of Hg in air, precipitation, and water continued. In 2013 the measurements of Hg in air using research aircraft were done in the western part of Slovenia.

Publications

Original scientific articles

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Scientific conference contribution

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PhD thesis
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Submitted by Nives Ogrinc (nives.ogrinc@ijs.si).