

Enhancing Coastal Management in the Adriatic and the Black Sea by Using Nuclear Analytical Techniques

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Introduction: Nuclear and nuclear related techniques, when applied together in analysis and dating of environmental archives such as sediments and corals, can provide information on spatial and temporal trends of pollutants. They can also be used as a record of historical temperature variations and fate of carbon in sediments, thus enabling carbon storage assessment and evaluation of positive and negative synergies between pollution loading, and the potential of sediments to sequester carbon. By the recognition of spatial patterns and temporal trends in pollutant levels and isotope ratios in environmental archives, the future predictions of changes in marine processes and adaptation measures may be proposed. The regional project RER7009 is unique in the sense that it brings together countries bordering the two separate semi-closed seas, the Adriatic and the Black Sea. The countries are Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Georgia, Italy, Montenegro, Romania, Russian Federation, Slovenia, Turkey and Ukraine), to jointly evaluate and demonstrate processes that influence levels of contaminants and construct temporal trends of pollution (radionuclides, heavy metals and organic contaminants) related to urbanization using sediments as environmental archives. This has formed a strong collaborative network of analytical laboratories and experts, and is facilitating the harmonization of methodologies. The outcome of the project is expected to assist decision makers to adopt and synchronize future environmental protection policies to ensure the sustainable management of these very special environments.

Methods:

In order to achieve the goal of accurate, precise and comprehensive monitoring data for the Adriatic and Black Sea's coast, the following strategy was chosen:

- 1) To review existing national data on marine pollution studies for radionuclides, heavy metals and organics,
- 2) Identify knowledge gaps, constraints and bottlenecks in their respective marine monitoring programs

- 3) To propose a harmonized suitable field sampling and sample preparation strategy for the regional monitoring programmes
- 4) To agree on standardized and validated analytical methods with a sufficient quality assurance component and to build capacity to apply these methods
- 5) To establish a harmonized monitoring data base

Results: The project is currently in its second year and good progress has been made. Up until now we held two project meetings in Vienna, as well as one workshop in Varna, Bulgaria. There, step 1 – 3 were addressed, which included a day voyage on RV Akademik to collect sediment samples.

Furthermore, two proficiency tests have been organized to evaluate the quality of analytical data for trace metals and radionuclides in sediment and water respectively.



Fig. 1: Participants of first training course and sampling exercise taken place in Varna, Bulgaria in Sept 2018.

Discussion: This regional project to enhancing coastal management in the Adriatic and the Black Sea is well on its way. Technical problems with analytical equipment and the lack of certified reference material are being addressed. The participants of this project are highly committed, and a strong network is being built beyond national borders. Projects like this are invaluable to address pollution issues and global change impacts in marine environments that reach over several countries' territories.