Geochronology of Danube Delta sediments

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Abstract.
It is highly important to know the geochronology of the lakes and streams of the Danube Delta, in order to determine the sediment deposition rate. Several lakes are being investigated; physical parameters and chemical composition are being examined.
Keywords: Danube Delta, sediment, geochronology.

The aim of this study is to examine the sedimentation pattern of the Danube Delta as well as of the continental shelf lying in front of it based on radiological methods: ^{210}Po, ^{137}Cs and ^{226}Ra. The evaluation of the sedimentation rates in fine-grained deposits from deltaic systems, costal zones and shelves are important because of the association with such deposits of chemical pollutants, their impact on biological processes and their relationship on stratigraphic considerations, including changes in sedimentary environments.
River deltas are the product of fluvial sediment supply and reworking by waves and currents whose relative importance varies in space and time. The sedimentation process and the associated morphological changes in the Danube Delta along the deltaic coast are complex and less understood. The rates of sedimentation are continuously changing due to both natural and anthropogenic factors. Understanding the relation between the sedimentation process and the morphological changes within the Danube Delta and deltaic shoreline is a crucial step in predicting how the sedimentary system will evolve in the near future and in assesing its vulnerability to extreme events.
The aim of this poster is to present the phases of the ongoing study regarding the Danube Delta stream sediments, as well as presenting a detailed state of the research at this moment.

The Danube Delta is the second largest river delta in Europe after the Volga Delta. Its approximate surface is 4152km^2 and it is part of the UNESCO World Heritage. The Danube branches into three main distributaries into the delta, Chilia, Sulina, and Sfântul Gheorghe. The last two branches form the Tulcea channel, which continues as a single body for several kilometers after the separation from the Chilia. At the mouths of each channel gradual formation of new land takes place, as the delta continues to expand.

Analytical field sampling

The coring transects are performed within the marine part of the Danube Delta. The bottom sediments are extruded with a piston core that enables the capture of up to 2 m long mud and sandy cores from up to -15m depths.

The main requirement for the sampling points is that the sediment did not suffer any perturbation in the last 150 years. Each core is sub-sampled every 2,5 cm on the top 30 cm of section. Furthermore the following 40 cm (31 to 70 cm) of the section are sub-sampled every 5 cm and the last 30 cm (71-100 cm) are sampled every 10 cm. This sampling plan will be followed considering the depth of the bottom sediments.

Methodology

Bibliographic revision and knowledge improvement of the principal dating methods

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Expandable and equipment acquisition

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Analytical field sampling

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Physical properties, gamma and alpha spectrometry measurements

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Application of radiometric dating method

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Preparation of findings, reporting and publications

Physical properties

The water content and sediment porosity is determined for each sediment sample in order to established the mass sedimentation rate.

Gamma spectrometry

The ^{137}Cs and ^{226}Ra activity is then measured by non-destructive direct gamma spectrometry (after ^{222}Rn and ^{226}Ra reached equilibrium).

Alpha spectrometric measurements

Alpha spectrometry determinations of ^{210}Po and ^{210}Pb have been already used for this purpose because of its accuracy and lower detection limit.
In order to determine the activity of alpha emitters ^{210}Po and ^{210}Pb is necessary to apply a radiochemical procedure permitting, on one hand, to isolate the element to avoid interference, and other sources getting very thin to minimize self-absorption property of alpha particles.