MOSAIC: An organic geochemical and sedimentological database for marine surface sediments

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Modern ocean sediments serve as the interface between the biosphere and the geosphere, play a key role in biogeochemical cycles and provide a window on how contemporary processes are written into the sedimentary record. Research over past decades has resulted in a wealth of information on the content and composition of organic matter in marine sediments, with ever-more sophisticated techniques continuing to yield information of greater detail and as an accelerating pace. However, there has been no attempt to synthesize this wealth of information. We are establishing a new database that incorporates information relevant to local, regional and global-scale assessment of the content, source and fate of organic materials accumulating in contemporary marine sediments. In the MOSAIC (Modern Ocean Sediment Archive and Inventory of Carbon) database, particular emphasis is placed on molecular and isotopic information, coupled with relevant contextual information (e.g., sedimentological properties) relevant to elucidating factors that influence the efficiency and nature of organic matter burial.

The main features of MOSAIC include:
(i) Emphasis on continental margin sediments as major loci of carbon burial, and as the interface between terrestrial and oceanic realms;
(ii) Bulk to molecular-level organic geochemical properties and parameters, including concentration and isotopic compositions;
(iii) Inclusion of extensive contextual data regarding the depositional setting, in particular with respect to sedimentological and redox characteristics.

The ultimate goal is to create an open-access instrument, available on the web, to be utilized for research and education by the international community who can both contribute to, and interrogate the database. The submission will be accomplished by means of a pre-configured table available on the MOSAIC webpage. The information on the filled tables will be checked and eventually imported, via the Structural Query Language (SQL), into MOSAIC.
MOSAIC is programmed with PostgreSQL, an open-source database management system. In order to locate geographically the data, each element/datum is associated to a latitude, longitude and depth, facilitating creation of a geospatial database which can be easily interfaced to a Geographic Information System (GIS). In order to make the database broadly accessible, a HTML-PHP language-based website will ultimately be created and linked to the database. Consulting the website will allow for both data visualization as well as export of data in txt format for utilization with common software solutions (e.g. ODV, Excel, Matlab, Python, Word, PPT, Illustrator. . .).
In this very early stage, MOSAIC presently contains approximately 10000 analyses conducted on more than 1800 samples which were collected from over 1600 different geographical locations around the world. Through participation of the international research community, MOSAIC will rapidly develop into a rich archive and versatile tool for investigation of distribution and composition of organic matter accumulating in seafloor sediments. The present contribution will outline the structure of MOSAIC, provide examples of data output, and solicit feedback on desirable features to be included in the database and associated software tools.