Geophysical Research Abstracts
Vol. 20, EGU2018-4947, 2018
EGU General Assembly 2018

Quantifying the contribute of seagrass carbonate factory from Paleocene to Present

Marco Brandano (1,2), Marco Cuffaro (2), Guillem Mateu-Vicens (3), Patrizio Petricca (1), Vincenzo Stagno (1), and giovanni gaglianone (1)

(1) Earth Science Department, Sapienza University of Rome, Rome, Italy (marco.brandano@uniroma1.it), (2) 2Istituto di Geologia Ambientale e Geoingegneria (IGAG) CNR, Sez. Sapienza, c/o Sapienza university of Rome, Rome, Italy (marco.cuffaro@igag.cnr.it), (3) Càtedra Guillem Colom Casasnovas, Universitat de les Illes Balears, Palma de Mallorca, Spain (guillem.mateu@uib.es)

Seagrass produces extensive submarine meadows in the euphotic zone along temperate to tropical coastlines worldwide. Seagrass meadows host a diverse array of organisms dwelling either as epiphytic forms or as infaunal forms. Many of these organisms possess a calcareous skeleton (e.g., echinoids, mollusks, bryozoans, foraminifers, red algae), which contributes to the role of the seagrass as carbonate-sediment factory through removal of carbon dioxide from the atmosphere then fixed as organic and inorganic matter. The inorganic carbon is represented by carbonates produced by calcareous organisms living as epiphytes on seagrass leaves and rhizomes. Here, we explore the potential contribution of seagrass as C sink on the atmospheric CO_2 decrease by measuring changes in seagrass extent, which is directly associated with variations in the global coastal length associated with plate tectonics. To this aim, simulations of the global coastline were also performed using GPlates software [1]. In addition, we performed seagrass sampling along the Mediterranean coasts and related laboratory analysis to investigate the rate of seagrass epiphyte production (leaves plus rhizomes).
When considering the Mediterranean as a proxy to estimate global seagrass-carbonate production, our results average 400 g·m-2·yr-1, indicating that seagrasses likely behaved as remarkable C sequestration sites during the whole Cenozoic era, especially over the Paleogene and Neogene,
We claim that global seagrass distribution significantly affected the atmospheric composition, particularly at the Eocene-Oligocene boundary, when the CO_2 concentration fell to 400 ppm, i.e. the approximate value of current atmospheric CO_2 [2,3,4].
References
[1] R. Dietmar Müller, Xiaodong Qin, David T. Sandwell, Adriana Dutkiewicz, Simon E. Williams, Nicolas Flament, Stefan Maus, Maria Seton, 2016, The GPlates Portal: Cloud-based interactive 3D visualization of global geophysical and geological data in a web browser, PLoS ONE 11(3): e0150883. doi:10.1371/ journal.pone.0150883
[2] Brandano, M., Cuffaro, M., Gaglianone, G., Pettricca, P., Stagno, V., and Mateu-Vicens, G. (2016). Evaluating the role of seagrass in Cenozoic CO_2 variations. Front. Environ. Sci. 4:72. doi: 10.3389/fenvs.2016.00072
[3] Macreadie, P. I., Serrano, O., Duarte, C. M., Beardall, J., and Maher, D. (2017). Commentary: Evaluating the Role of Seagrass in Cenozoic CO_2 Variations. Front. Environ. Sci. 5:55. doi: 10.3389/fenvs.2017.00055
[4] Brandano M, Pomar L, Mateu-Vicens G, Cuffaro M, Gaglianone G, Petricca P and Stagno V (2017) Response: Commentary: Evaluating the Role of Seagrass in Cenozoic CO_2 Variations. Front. Environ. Sci. 5:74. doi: 10.3389/fenvs.2017.00074