

EGU21-15898

<https://doi.org/10.5194/egusphere-egu21-15898>

EGU General Assembly 2021

© Author(s) 2021. This work is distributed under the Creative Commons Attribution 4.0 License.



Pelagic *Sargassum* as an emergent high-rate importer of carbonate sediment to tropical Atlantic coastlines

Michael Salter¹, Chris Perry¹, Rosa Rodríguez-Martínez², Lorenzo Alvarez-Filip³, and Eric Jordan-Dahlgren²

¹Department of Geography, University of Exeter, Exeter, UK

²Instituto de Ciencias del Mar y Limnología, Universidad Nacional Autónoma de México, Puerto Morelos, Quintana Roo, México

³Biodiversity and Reef Conservation Laboratory, Unidad Académica de Sistemas Arrecifales, Instituto de Ciencias del Mar y Limnología, Universidad Nacional Autónoma de México, Puerto Morelos, Quintana Roo, México

The composition of modern carbonate sediments in nearshore tropical marine settings typically reflects a suite of somewhat proximal processes of carbonate production and erosion. Here, we document pelagic *Sargassum* as an emergent vector of carbonate sediment import to tropical Atlantic and Caribbean shorelines: a process with distal (oceanic) origins that has the potential to impart a distinct record of regional to global change within nearshore sediments. This process arose as recently as 2011, when a major new *Sargassum* bloom region emerged in the central Atlantic Ocean and resulted in Caribbean, West African, and northern Brazilian shorelines being inundated with *Sargassum* at unprecedented scales. Subsequent near annual recurrences of these coastal inundations at increasingly large scales suggest they are becoming an established norm. Socio-economic and ecological implications are widespread and potentially serious, and include potential impacts on the established sources and stability of nearshore carbonate sediments. This study, however, focuses on new sediment delivered to these coastal settings in the form of calcareous epiphytic communities that colonise *Sargassum* (i.e., bryozoans, serpulid worms, and red algae). Our analysis of *Sargassum* collected from coastal waters of the Mexican Caribbean in 2018 indicates a mean carbonate content of 2.09% wet weight at shoreline arrival. Based on data from 11 sites in Quintana Roo, Mexico (spanning 11.15 km of a 60 km section of shoreline), we further estimate the average drained weight of *Sargassum* that arrived at the coast during 2018 to have been 7.0×10^3 kg m⁻¹ of shoreline. Together, these findings indicate that mean import of new carbonate sediment by *Sargassum* was 179 kg m⁻¹ of shoreline in 2018, which is close to our upper estimate of annual proximal sediment production by *Thalassia* seagrass epiphytes (210 kg m⁻¹ of shoreline). Prior to the onset of these massive *Sargassum* inundations, grains recognisable as bryozoan skeletons and serpulid tube casings were rare in coastal sediments of the Mexican Caribbean. Consequently, if these calcareous *Sargassum* epiphytes that are evidently now being imported in large volumes are retained and preserved, they can be expected to impart a distinct record within these coastal sediments. Although quantitative data on *Sargassum* inundations from other locations are sparse, numerous reports from the scientific community and the media suggest the scale of these events is comparable for many exposed

tropical Caribbean and Atlantic shorelines. This represents the first documentation of pelagic *Sargassum* as a major vector of coastal sediment import, the significance of which has likely only arisen since the onset of large-scale inundations in 2011.