Geophysical Research Abstracts
Vol. 16, EGU2014-10619, 2014
EGU General Assembly 2014

Tracing organic matter sources in a tropical mangrove ecosystem (Pichavaram, India) - a stable isotopic approach

Swati Mohan Sappal (1,2), Tim Jennerjahn (1), and Alagappan Ramanathan (2)

(1) Leibniz Center for Tropical Marine Ecology, Fahrenheitstraße 6, 28359 Bremen, Germany (swati.sappal@zmt-bremen.de; tim.jennerjahn@zmt-bremen.de), (2) School of Environmental Sciences, Jawaharlal Nehru University, 110067, New Delhi, India (alrjnu@gmail.com)

Mangroves are among the most productive ecosystems on earth and thus highly efficient carbon sinks with most of the carbon stored in the sediments. These are the sites for accumulation and preservation of both autochthonous and allochthonous organic matter (OM) due to their strategic location at the interface between land and sea and prevailing reducing environment. Recent studies suggest that vegetated coastal habitats are more important quantitative carbon sinks than previously thought. However, for global carbon budgets it is important to know whether the carbon buried is freshly fixed from atmospheric CO_2 or relocated, and possibly very old, carbon from another reservoir. Therefore, the identification of OM sources is a critical issue for constructing the carbon budget in mangrove ecosystems so as to differentiate between the recent autochthonous or relocated allochthonous carbon that gets accumulated in the sediments.

In this context the Pichavaram mangrove complex (comprising of a core mangrove area and the Vellar and Coleroon rivers) in the South of India was sampled along the estuarine gradient and in its different environmental settings, as these influence the carbon dynamics through differences in tidal flushing and relative importance of allochthonous versus autochthonous inputs. A total of 11 sediment cores, 18 surface sediments, 18 suspended sediment samples, 13 true mangrove plant species, 2 mangrove associate plants, 4 marsh shrub samples and 4 algae samples were collected from the Pichavaram mangrove complex in January 2012 and January 2013. The samples were analysed for carbon (C), nitrogen (N), stable carbon ($\delta^{13}C_{org}$) and stable nitrogen ($\delta^{15}N$) isotope composition. Our results highlight the relative abundance of terrestrial and mangrove derived organic matter over the marine dominated organic matter in the mangrove sediments. The sites with dense mangrove vegetation showed higher sediment carbon content as compared to the sites with degraded vegetation or estuarine sites thus indicating mangrove plants to be the dominant source of carbon to the sediments. Depth distributions of biogeochemical parameters in sediment cores indicate a shift from a terrestrial/mangrove carbon dominance to a present-day marine carbon dominance at some sites and vice versa at other sites. Our preliminary results suggest that variations in hydro- and sediment dynamics and in vegetation cover and composition appear to be the responsible factors.