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## Origin and transport of organic matter in the mangrove dominated estuarine system (Indian Sundarbans)

R. Ray<sup>1</sup>, T Rixen<sup>1</sup>, A Baum<sup>1</sup> and T K Jana<sup>2</sup><sup>1</sup>Leibniz Center for Tropical Marine Ecology, Germany<sup>2</sup>University of Calcutta, India

We studied in the Indian Sundarbans and Hooghly estuarine system adjacent to the coastal Bay of Bengal during 2014 to examine the sources, transport and distribution of dissolved organic carbon (DOC), particulate organic carbon (POC) and dissolved inorganic carbon (DIC). In this study, both stable isotopes (<sup>13</sup>C, <sup>15</sup>N), elemental content (C, N) and their ratios in the suspended matter of Hooghly confirms its terrestrial source which is replaced by in situ production in the Sundarbans. DOC is the dominant form of the organic matter (OM) in the studied estuarine waters (DOC = 280±40 μM versus POC = 25±9 μM) and represents mixture of C3 dominated mangrove leaf litter and riverine sources. Microbial degradation of land derived OM results in a high pCO<sub>2</sub> in the Hooghly estuarine waters while an enrichment of δ<sup>13</sup>C-DIC ascribes to the in situ production in the Sundarbans water. Higher δ<sup>15</sup>N in the particulate organic nitrogen (PON) of the mangrove and marine zone could be associated with an enhanced phytoplankton production which is sustained by nitrate originated from mangrove derived OM decomposition and/or nitrate imported from the Bay of Bengal. Low organic carbon contents and elemental ratios (TN/TOC) indicate an intense mineralization and transformation of OM within the sediments, resulting significant deviation of its composition from that of three major sources i.e. land derived organic matter, mangrove leaf litter (*Avicennia marina*) and in situ phytoplankton.

[raghab.ray@univ-brest.fr](mailto:raghab.ray@univ-brest.fr)  
[raghab.ray@gmail.com](mailto:raghab.ray@gmail.com)

## Cesium base promoted alkylations-mild & efficient synthesis of carbon-heteroatom bonds and synthetic applications

Ralph Nicholas Salvatore

University of New England, USA

Cesium reagents are well known catalysts for a wide variety of synthetic transformations and the generation of pharmaceutically intermediates. In particular, cesium bases are generally far superior to their alkali metal counterparts with respect to decrease in reaction time and increased product yield. Also, cesium bases have excelled at controlling chemoselectivity and are highly compatible with a wide range of functional groups. This enhanced reactivity under mild conditions has been dubbed as the "cesium effect" stemming from better solubilities and the generation of highly reactive "naked anions". Striking efficiency and versatility of alkylations were found. However, the exact cause of the effect is still, to date, unknown. The first part of this seminar will provide a review of synthetic methodologies for numerous cesium-promoted alkylations developed in our laboratories for the construction of a plethora of carbon-heteroatom bonds. Second, utilizing our cesium base-promoted alkylation methodologies, the synthesis of various macrocycles, novel artificial biomolecules and heterocycles will be discussed

[rsalvatore@une.edu](mailto:rsalvatore@une.edu)