Organic geochemical studies to determine the origin, transport, and ultimate fate of organic matter are crucial for understanding the global carbon cycle. This study was undertaken using specific molecular markers, geochemical proxies and compound specific carbon isotope measurements to assess organic matter sources in sediments of Florida Bay from the dominant local biomass species, Halodule wrightii and Rhizophora mangle. An alkane-based proxy (Pagu) and the n-alkane:total one C23/C29 ratio were successfully used to assess the relative contributions of mangrove derived organic matter on the composition of OM in seagrass beds throughout the bay. Mangroves were found to be particularly significant as an OM source in the northeastern and central section of Florida Bay. The distribution of Pagu was most enriched in samples from the NE to SW section of the bay, confirming the increasing proportion of seagrass derived organic matter. A gradually increasing seagrass influence over that of mangroves, based on biomass-specific molecular markers (Pagu, C25/C29 ketone ratio and taraxerol abundance) in a general northeast to southwest transect was observed throughout the bay. The compound specific 13C isotope composition can provide very useful and confirmatory information in this respect. The distributions of C25 and C27 HBIs in surface sediments of Florida Bay clearly reflect the geographical presence of cyanobacterial mats and the abundant diatom inputs in the Phosphorus rich SW Florida Bay.

**Methods**

Sediments were collected using an Eckman dredge and the surface layer of sediment was used for analysis. All samples were placed into sealed vials, Teflon lined glass jars and frozen until analysis. Sediments were decalcified by using 10% HCl and alkanes as determined by GC-IR/MS. Throughout the bay, the biomarker, and the changes in the stable isotopic composition of n-alkanes, n-alkane-2-ones and taraxerol, specifically stable isotopes were used to determine the origin and transport of organic matter in Florida Bay surface sediments. The n-alkane proxy, Pagu, which is expressed as the ratio of the sum of C19-C29 n-alkanes to C27 n-alkanes, can be used as a specific biomarker for mangrove, cyanobacterial mat and diatom derived OM input in the FCE ecosystem, respectively. The distribution of Pagu was most enriched in samples from the NE to SW section of the bay, confirming the increasing proportion of seagrass derived organic matter. A gradually increasing seagrass influence over that of mangroves, based on biomass specific molecular markers (Pagu, C25/C29 ketone ratio and taraxerol abundance) in a general northeast to southwest transect was observed throughout the bay.

**Results**

The molecular distribution of several biomarker compounds (such as n-alkanes, n-alkane-2-ones and taraxerol), 13C stable isotope and compound specific stable isotopes were used to determine the origin and transport of organic matter in Florida Bay surface sediments.

### 1) Bulk Sediment Parameters

<table>
<thead>
<tr>
<th>TC</th>
<th>DK</th>
<th>SK</th>
<th>BK</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.9</td>
<td>10.0</td>
<td>14.7</td>
<td>12.5</td>
</tr>
</tbody>
</table>

Stable carbon isotopes are widely used to differentiate organic matter sources in estuarine sediments. Generally, the δ13C values are c.a. -10% and c.a. 20% for seagrass and mangrove OM, respectively. From table 1, the δ13C values show an isotopic enrichment (heavier signal) from the northeast to the southwest portion of Florida Bay. This was likely caused by a gradual change in mixed input of organic matter from mangroves, which mainly occupy coastal fringe areas, and seagrasses, which are the dominant vegetation in Florida Bay.

### 2) Biomass-Specific Molecular Markers

The n-alkane proxy, Pagu, which is expressed as the ratio of the sum of C19-C29 n-alkanes to C27 n-alkanes, can be used as a specific biomarker for mangrove, cyanobacterial mat and diatom derived OM input in the FCE ecosystem, respectively. The distribution of Pagu was most enriched in samples from the NE to SW section of the bay, confirming the increasing proportion of seagrass derived organic matter. A gradually increasing seagrass influence over that of mangroves, based on biomass specific molecular markers (Pagu, C25/C29 ketone ratio and taraxerol abundance) in a general northeast to southwest transect was observed throughout the bay. The compound specific 13C isotope composition can provide very useful and confirmatory information in this respect. The distributions of C25 and C27 HBIs in surface sediments of Florida Bay clearly reflect the geographical presence of cyanobacterial mats and the abundant diatom inputs in the Phosphorus rich SW Florida Bay.

**Discussion**

Several geochemical proxies were applied to identify the sources of organic matter in Florida Bay. The bulk 13C data showed a mixed source of terrestrial (mangrove) and marine (seagrass) derived organic matter input for Florida Bay. A gradually increasing seagrass influence over that of mangroves, based on biomass specific molecular markers (Pagu, C25/C29 ketone ratio and taraxerol abundance) in a general northeast to southwest transect was observed throughout the bay. The compound specific 13C isotope composition can provide very useful and confirmatory information in this respect. The distributions of C25 and C27 HBIs in Florida Bay clearly reflect the geographical presence of cyanobacterial mats and the abundant diatom inputs in the Phosphorus rich SW Florida Bay.

**Conclusions**

Preliminary results indicate a significant influence of mangrove derived organic matter on the composition of organic matter in seagrass beds. The molecular and isotopic data suggests a significant decrease in the mangrove derived organic matter inputs from the northeastern to southwestern part of Florida Bay.

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**References**

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