Response of Geochemical Proxies in Coastal Lakes to Storm Events

Project Overview
Not only are catastrophic storms that produced overwash and seawater inundation recognizable in coastal lake sediments, severe storms that resulted in freshwater flooding can also be identified in water sample sediments from coastal lakes by examining the patterns in multiple geochemical proxies.

Objectives
To calibrate geochemical proxies in the modern environment in coastal lakes as they vary natural vs. how they respond to storm events.
- What are the ranges of OGP values under “normal” (isolated) conditions in coastal lakes?
- How do OGP respond to severe storm events?

Methodology

Isotopes of Interest and Their Natural Abundance

<table>
<thead>
<tr>
<th>Isotope</th>
<th>Natural Abundance</th>
</tr>
</thead>
<tbody>
<tr>
<td>δ13C</td>
<td>70-60 ppm</td>
</tr>
<tr>
<td>δ15N</td>
<td>40-30 ppm</td>
</tr>
<tr>
<td>δ18O</td>
<td>10-30 ppm</td>
</tr>
</tbody>
</table>

Sources of Geochemical Proxies

- δ13C, δ15N, δ18O, C/N, C/O
- Sources of the OM in sediments
- Lake environment
- Storm history
- 

Method Summary
Sample the lakes on a seasonal basis (and more frequently following large storm events) for measurements of:
- δ13C, δ15N, C/N of POM
- δ18O, pH and salinity of lake water

Mass Spectrometer
A mass spectrometer is an instrument designed to separate charged atoms and molecules on the basis of their masses (or mass-to-charge ratios).

Gloves must be worn and sterile instruments used for all steps which require handling of samples.
1. Place collected filter samples into dryer overnight.
2. Test water for salinity utilizing water quality test strips.
3. Once samples are completely dry, using a blade, scrape the POM onto clean weighing paper.
4. Place POM into sterile glass tubes utilizing tweezers and label tubes with location and date collected.
5. Using a calibrated analytic balance measure desired amount of POM into a tin capsule.
6. Prepare 2 sets of each standard material, YW1, YW2, YW3, YW4, YW5, and U2, in the same manner of the POM samples.
8. Prepare 2 sets of capsules for each sample.
9. Prepare 2 sets of each standard material, YW1, YW2, YW3, YW4, YW5, and U2, in the same manner of the POM samples.
10. Once samples are completely dry, using a blade, scrape the POM onto clean weighing paper.
11. Using a calibrated analytic balance measure desired amount of POM into a tin capsule.
12. Prepare 2 sets of each standard material, YW1, YW2, YW3, YW4, YW5, and U2, in the same manner of the POM samples.
13. Prepare 2 sets of each standard material, YW1, YW2, YW3, YW4, YW5, and U2, in the same manner of the POM samples.

Collection and Analysis

- Fig. 4
- C/N ratio vs. δ13C values of organic matter (from Meyers, 1997; Lamb et al., 2006)

Results

- Fig. 3
- C4 terrestrial plants
- δ13C = 27%
- C4 plants
- δ13C = 12%
- Warm season grasses
- Trees, shrubs, forbs and cool season grasses

Acknowledgements:
Dr. Yang Wang – Thank you for hosting and mentoring me in the studies I conducted at the Florida State University MagLab. Thank you for your guidance and patience.
Shakura Jahan, Graduate Assistant – Thank you for working with me and guiding me through the research process. Thank you also for stepping back and allowing me the hands on experience.
Burt Wolff – Thank you for all the lessons of the Mass Spectrometer and sharing your hands on experience.
Jose Sanchez, Shannon Gooden, and the CIRL staff – Thank you for choosing us to participate in such a fantastic and enriching program.
Angela Nader – Thank you to my principal for your support.

References:
- Fig. 1 Isotopes of Interest and Their Natural Abundance (from Wang, 2017, MagLab RET Program)
- Fig. 2 Sources of Geochemical Proxies (from Wang 2017 MagLab RET Program)
- Fig. 3 ‘Mass Spectrometer Diagram’, 2017 http://www-pub.iaea.org/books/AEABooks/Subject_Areas/0402/Hydrology
- Fig. 4 C/N ratios vs. δ13C values of organic matter (from Meyers, 1997; Lamb et al., 2006)

Tuesday, April 30, 2017 N2 Standards

- δ13C = 11
- δ15N = -2.52
- Deduction = Freshwater algae

This research is funded through DMR 1157490