Long-term drivers of dissolved organic matter (DOM) composition in the Everglades

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Goals

- We want to explain how DOM composition relates to environmental drivers, particularly hydrology, in the Everglades.

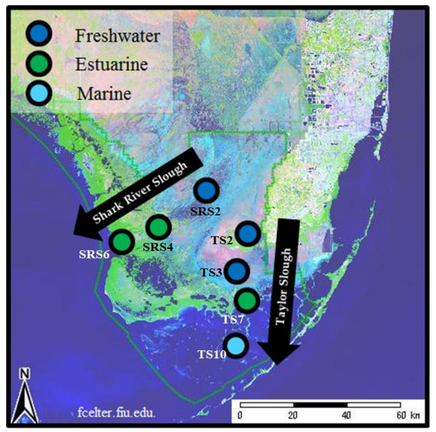

Figure 1. Sampling sites in Everglades National Park.

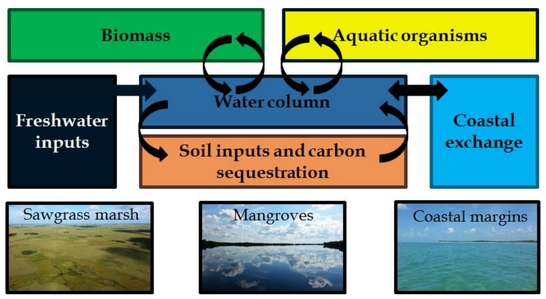

Figure 2. Conceptual model of DOM sources, sinks and transportation through the Everglades.

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Methods

1. Collect long-term data for DOM optical properties.
2. Apply parallel-factor analysis (PARAFAC) to separate optical properties into individual components.
3. Use statistics to decipher drivers of DOM composition across the Everglades landscape.

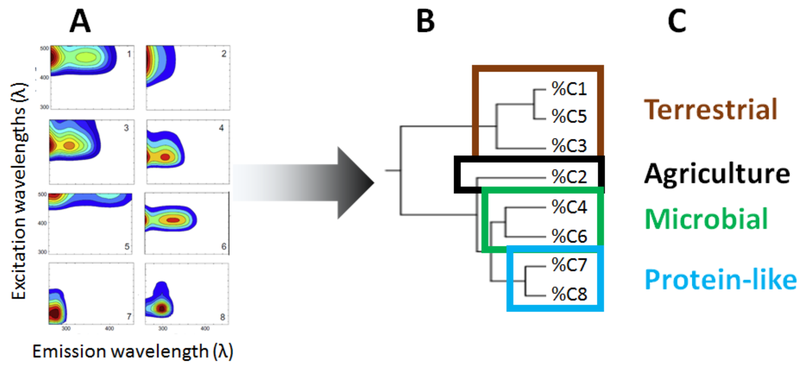

Figure 3. DOM composition was characterized with a PARAFAC model producing 8 distinct fluorescence signatures (**A**). These components were clustered to combine similar fluorophores (**B**) yielding 4 groupings of DOM composition (**C**).

Take-home message

Links between DOM composition and hydrology (both natural and managed) indicate the Everglades carbon cycle is strongly coupled to ecohydrology. Continued monitoring of DOM quality will help us interpret biogeochemical responses to Everglades restoration and climate change.

Results

- Freshwater drives DOM concentration: Inflows are a significant driver in Shark River Slough, rainfall is a significant driver in Taylor Slough.
- Terrestrial and microbial groups follow seasonal hydrology (opposite trends).

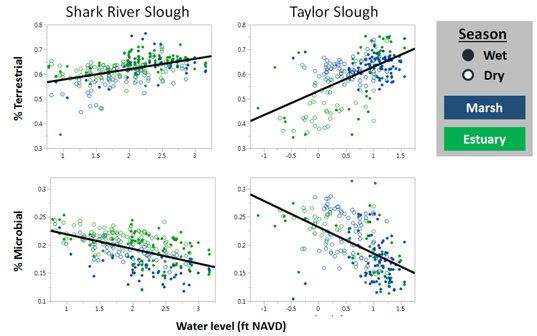

Figure 4. Regressions of percentages of terrestrial and microbial components against water level.

- Evidence of declining agricultural inputs to Everglades National Park decouple from water management trends.

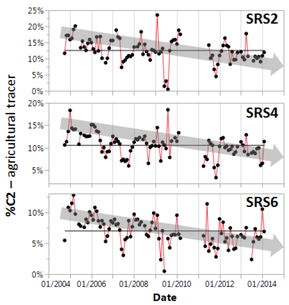

Figure 5. Time-series for Shark River Slough show change in %C2 (an agricultural tracer) from 2004 to 2014. The consistent decreasing trend match other proxies for upstream agricultural lands like chloride concentration. However, equivalent decreases in freshwater inputs are not observed.

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