The Urban Flood Pulse Concept:
Quantifying Water Source Contributions to Coastal Urban Flooding

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Goals

- Determine influence of wet-dry seasonal hydrology and episodic tidal flooding on dissolved organic carbon (DOC) concentration and composition
- Quantify relative contributions of precipitation, groundwater, and marine water contributions to coastal urban canals

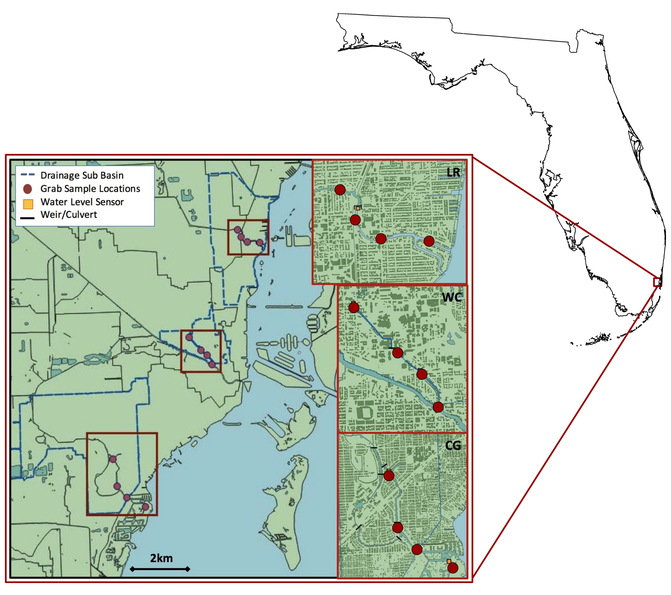


Figure 1. Study locations in three urban canals of Miami-Dade County including Little River (LR), Wagner Creek (WC), and Coral Gables Waterway (CG)

Research Methodology

- Monitor fluctuations in water level and baseline conditions of temperature, dissolved oxygen (DO), salinity, and DOC concentration
- Measure DOC fluorescence, δ^2H and $\delta^{18}O$ stable isotopes, and chloride (Cl^-) during (1) monthly baseflow events, (2) high v. low tide, and (3) wet v. dry season
- Develop endmember mixing model (EMMA) to differentiate between three water sources (precipitation, groundwater, marine water) in mixed canal water

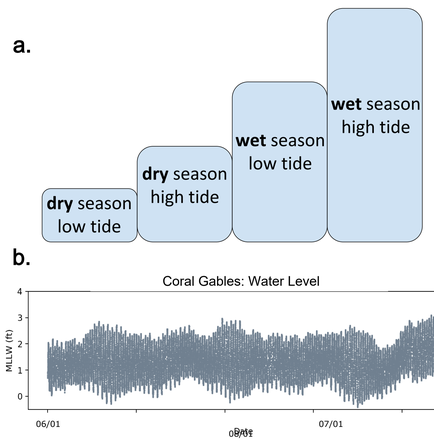


Figure 2. (a) Sampling design during wet-dry season and high-low tide (n=175), and (b) sub-hourly water level time series in Coral Gables Waterway

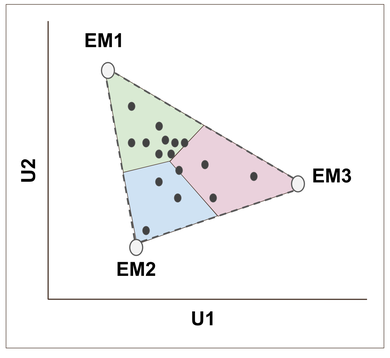


Figure 3. Graphic representation of sample differentiation between three endmembers (precipitation, groundwater, marine water) in mixed canal water

Results

- Shifts in rain and marine water contributions during baseflow reflect variation in local precipitation and tidal amplitude
- Increased groundwater contributions are expected during the wet season, particularly during seasonal high tide events

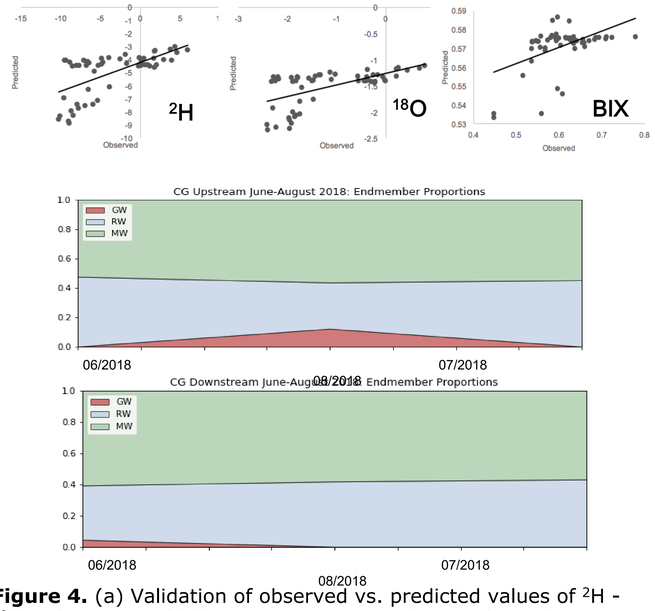
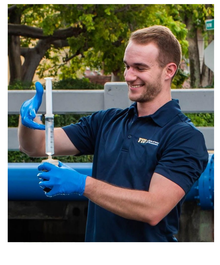


Figure 4. (a) Validation of observed vs. predicted values of ^2H - ^{18}O isotopes and DOC biological fluorescent properties (BIX) as tracers using preliminary mixing model data (b) Constrained proportions of water endmembers in upstream and downstream locations from June - August 2018 in Coral Gables Waterway calculated from EMMA projections



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