SHIFTING GROUND: LANDSCAPE-SCALE MODELING OF BIOGEOCHEMICAL PROCESSES UNDER CLIMATE CHANGE IN THE FLORIDA EVERGLADES

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Scenarios modeling can be a useful tool to plan for climate change. In this study, we help Everglades restoration planning to bolster climate change resiliency by simulating plausible ecosystem responses to three climate change scenarios: a Baseline scenario of 2010 climate, and two scenarios that both included 1.5 °C warming and 7% increase in evapotranspiration, and differed only by rainfall: either increase or decrease by 10%. In conjunction with output from a water-use management model, we used these scenarios to drive the Everglades Landscape Model to simulate changes in a suite of parameters that include both hydrologic drivers and changes to soil pattern and process. In this paper we focus on the freshwater wetlands; sea level rise is specifically addressed in prior work.

The decreased rainfall scenario produced marked changes across the system in comparison to the Baseline scenario. Most notably, muck fire risk was elevated for 49% of the period of simulation in one of the three indicator regions. Surface water flow velocity slowed drastically across most of the system, which may impair soil processes related to maintaining landscape patterning. Due to lower flow volumes, this scenario produced decreases in parameters related to flow-loading, such as phosphorus accumulation in the soil, and methylmercury production risk.

The increased rainfall scenario was hydrologically similar to the Baseline scenario due to existing water management rules. A key change was phosphorus accumulation in the soil, an effect of flow-loading due to higher inflow from water control structures in this scenario.

PRESENTER BIO: Dr. Flower is an Assistant Professor of Environmental Studies at Eckerd College. Her research focuses on the geochemical consequences of sea level rise and climate change in wetlands.