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Introduction

BACKGROUND:

- The Arch Creek Basin is characterized by low-lying topography and historic housing infrastructure, which over 80% were built prior to enforcing flood criteria (ULI, 2017).
- Flood risk is exacerbated by a rising water table caused by rain, tides, and sea level rise (Sukop et al., 2017). Conditions are expected to worsen due to climate change (SLSC, 2019).
- Miami-Dade County has recently experienced a paradigm shift on how to approach climate change and build more flood resilient communities with short-term adaptation and long-term mitigation strategies.

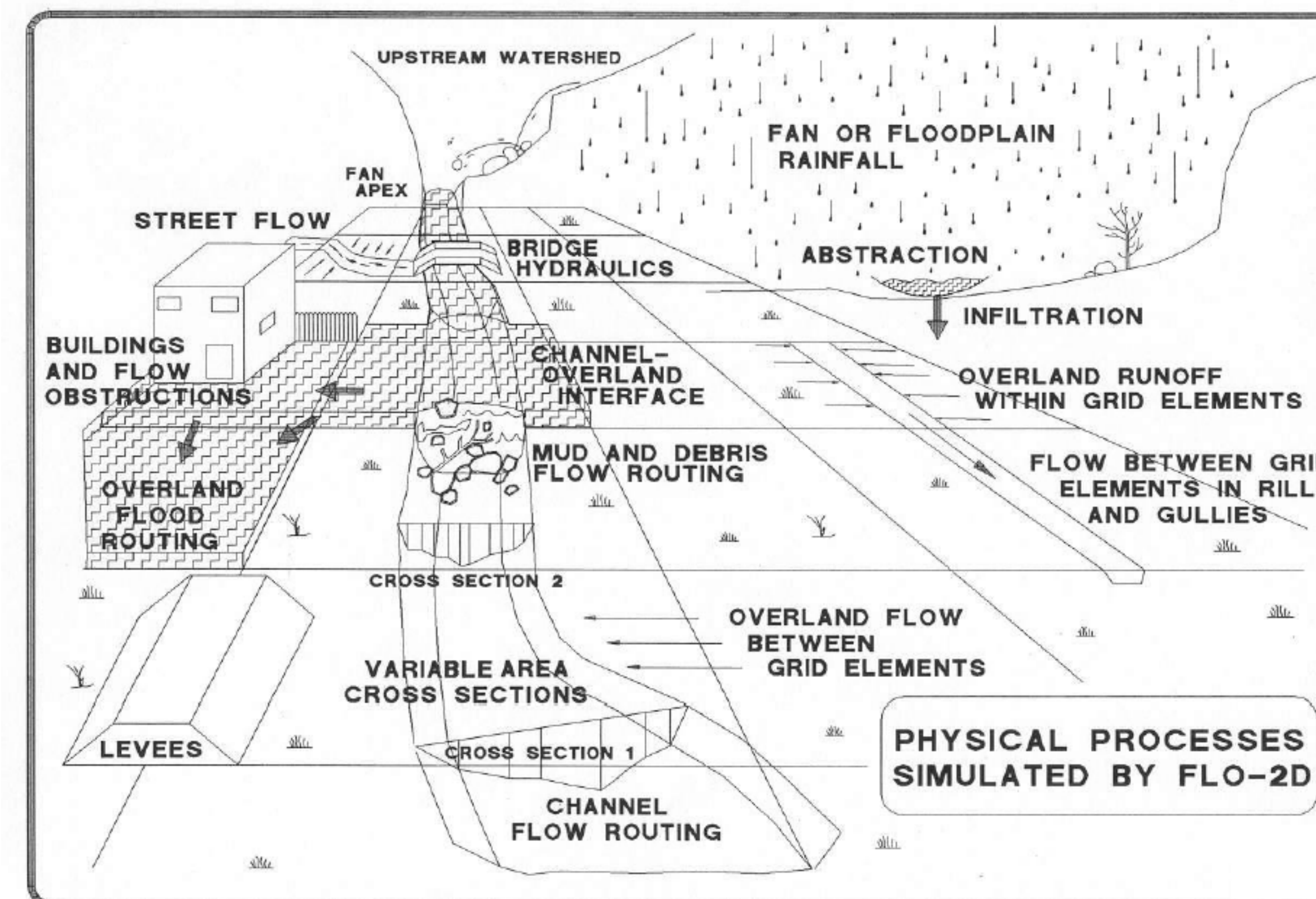
PROPOSED RESEARCH:

- Development of a holistic 2D hydraulic model able to simulate the complex interactions of fluvial, pluvial, and coastal flooding conditions: surface runoff, storm drain systems, coastal surge, and groundwater flow.
- Evaluate the potential of coarser resolution models in urban settings to identify the maximum grid resolution thresholds (i.e. 10ft, 25ft, 50ft) for model optimization.

Methodology

The 2D dynamic flood routing model for open channel hydraulics and unconfined overland flow **FLO-2D** (O'Brien, 1993) can coupled:

- 1D Pipe hydraulics: **EPA SWMM** (Rossman, 2009)
- 3D Groundwater conditions: **MODFLOW-2005** (Harbaugh, 2005)



Components

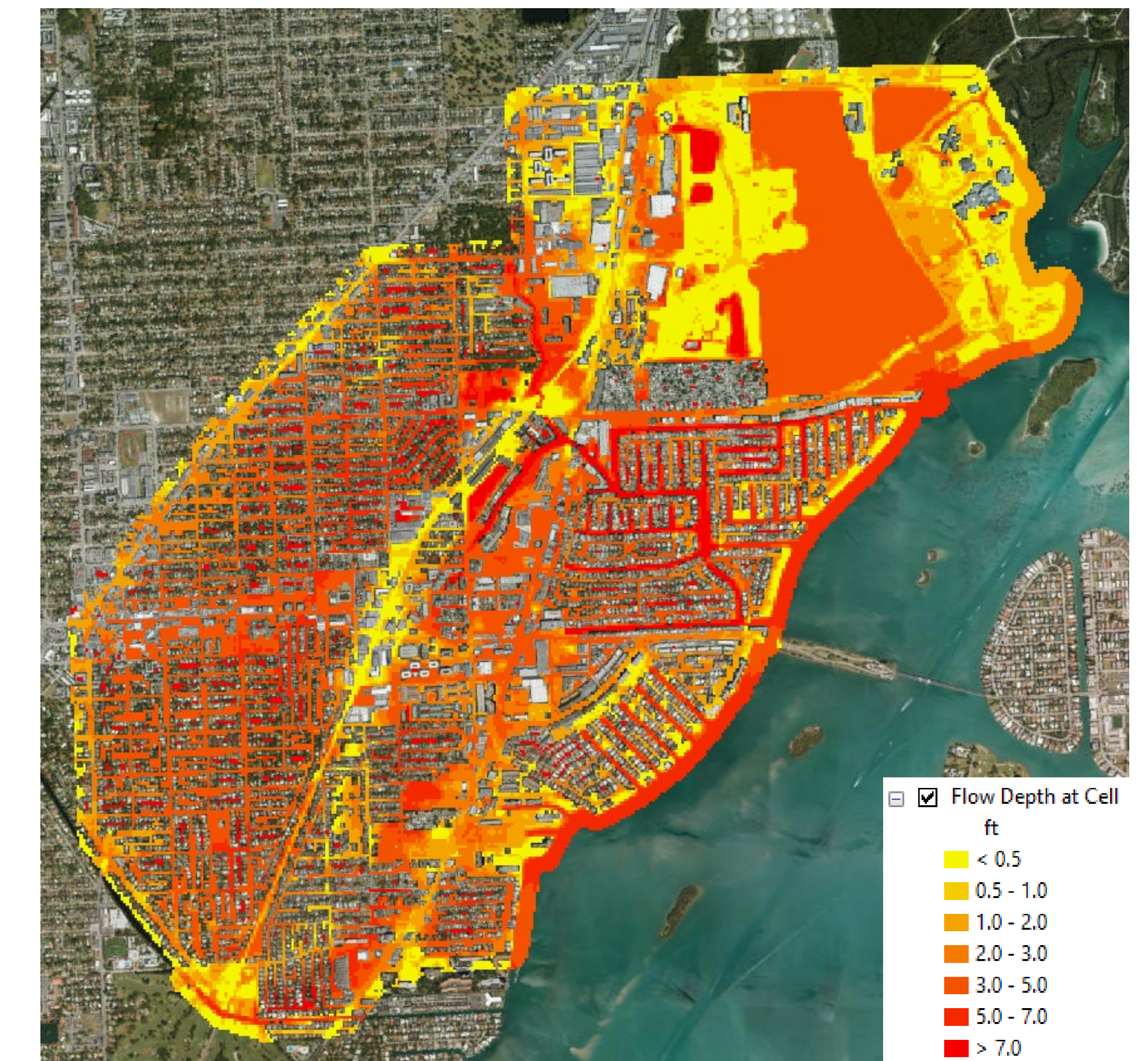


Figure 1: Flooding levels Arch Creek Basin

Results and Opportunities

- This research investigates the development of a coupled 2D hydraulic model that captures the complete picture of flooding due to rainfall, storm surge, and sea level rise using a 50ft grid resolution.
- This research can set the foundation to investigate the ripple effects of flooding in multidisciplinary fields (i.e. socio-economic costs, performance of structural measures, septic tanks, urban and ecological degradation).

References

- Urban Land Institute (2016). Arch Creek Basin Miami-Dade County, Florida. Addressing Climate Vulnerabilities and Social Equity with an Adaptation Action Area Framework. May 22-27, 2016.
- Sukop, Michael & Rogers, Martina & Guannel, Greg & Infanti, Johnna & Hagemann, Katherine. (2017). High temporal resolution modeling of the impact of rain, tides, and sea level rise on water table flooding in the Arch Creek basin, Miami-Dade County Florida USA. Science of The Total Environment. 616-617. 10.1016/j.scitotenv.2017.10.170.
- Sea Level Solutions Center (SLSC), Florida International University (FIU) (2019), Potential Implications of Sea-Level Rise and Changing Rainfall for Communities in Florida using Miami-Dade County as a Case Study



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