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## Hydrodynamic Assessment of Natural and Nature-Based Features for Escatawpa River and Grand Bay in the Northern Gulf of Mexico

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# HYDRODYNAMIC ASSESSMENT OF NATURAL AND NATURE-BASED FEATURES FOR ESCATAWPA RIVER AND GRAND BAY IN THE NORTHERN GULF OF MEXICO



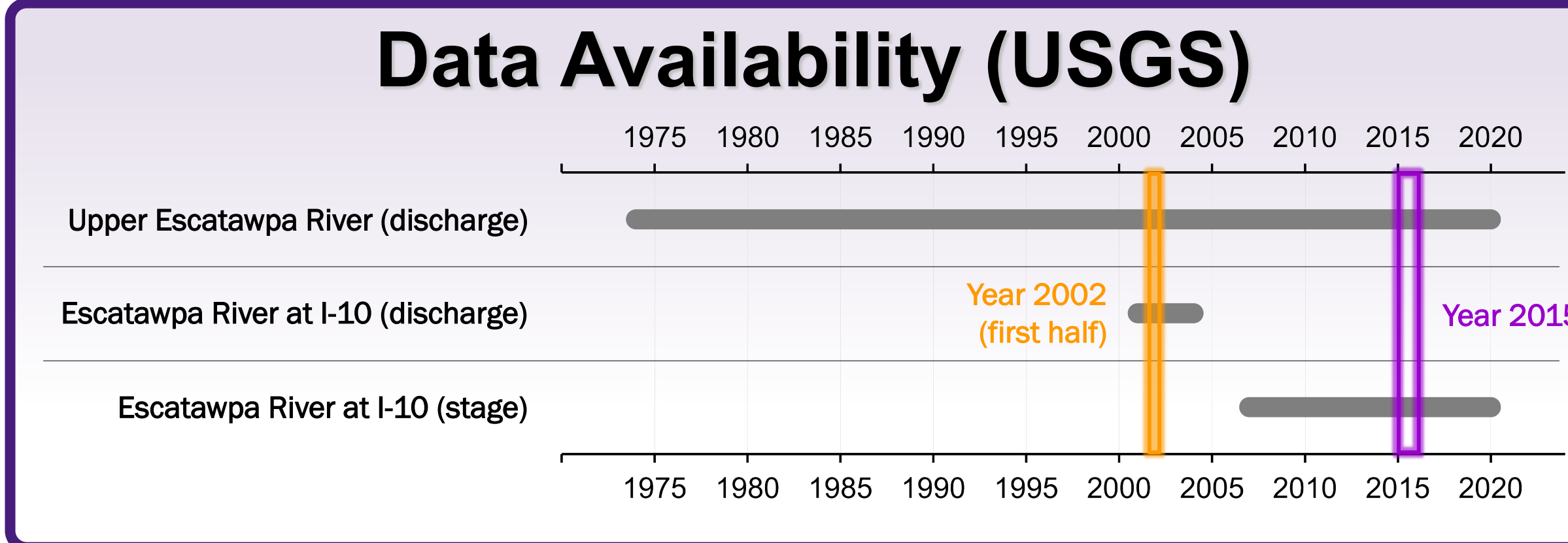
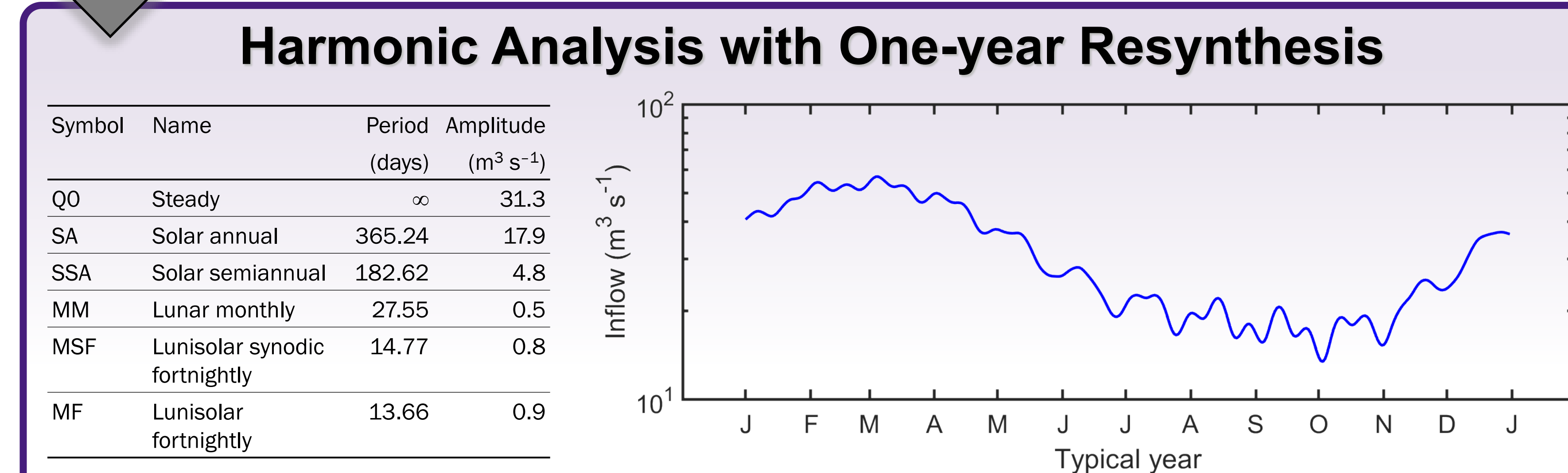
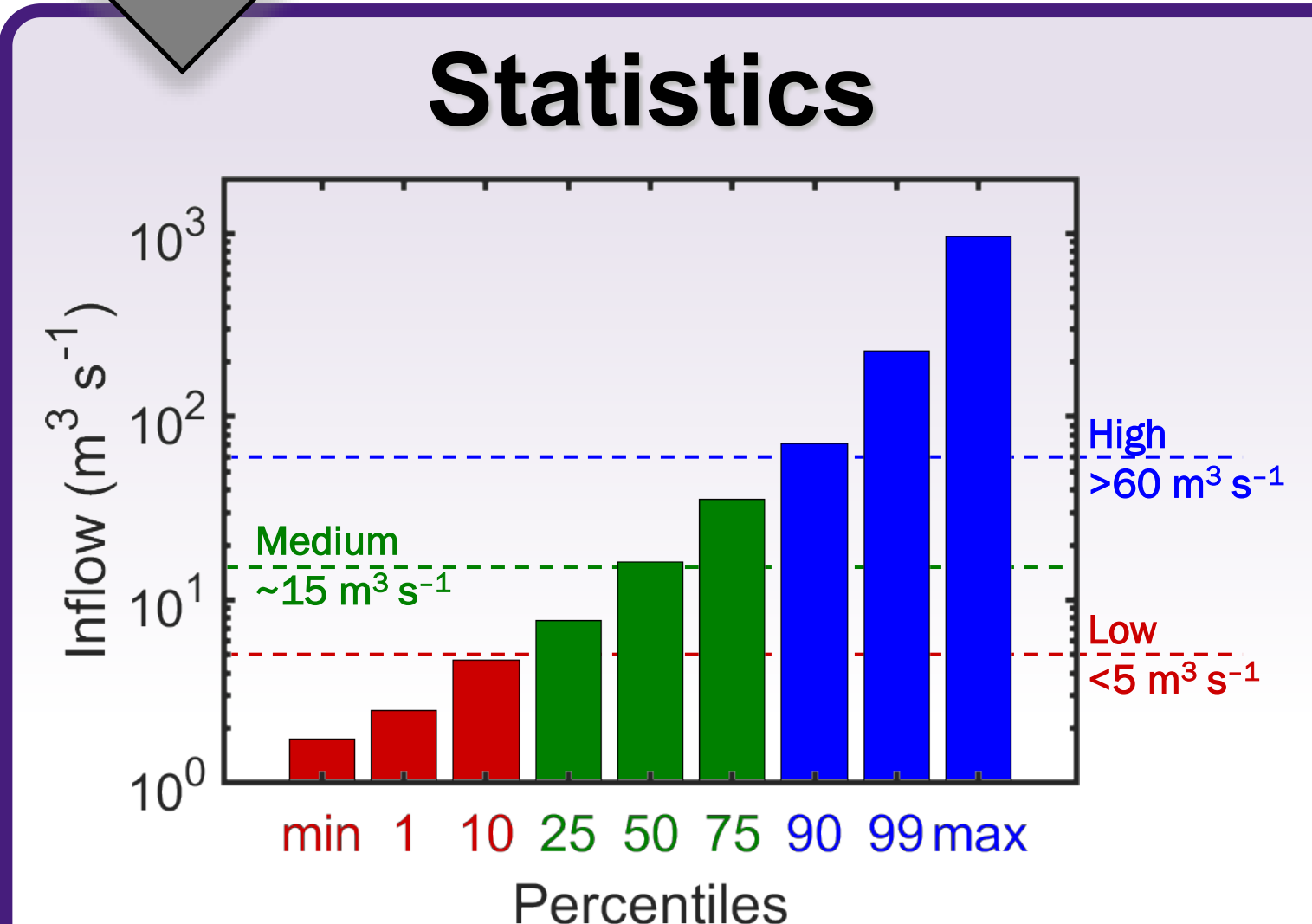
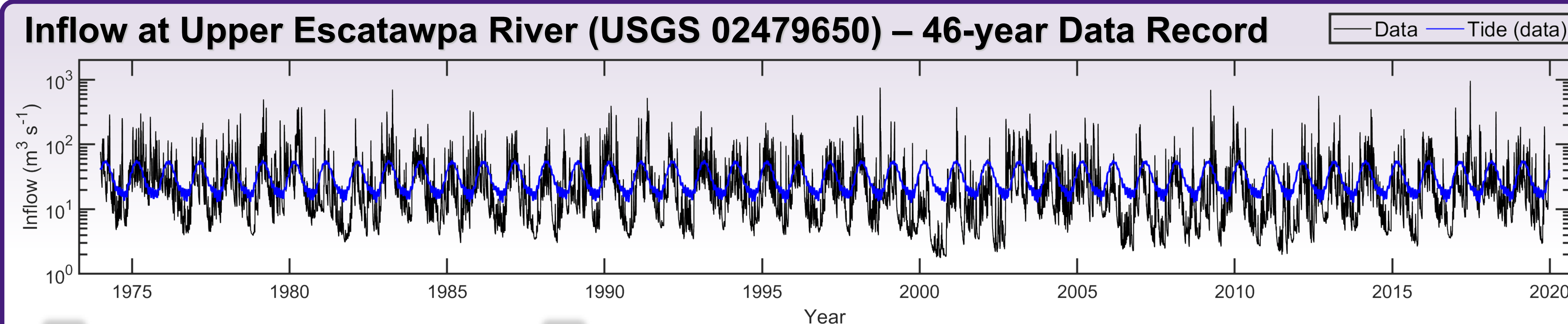
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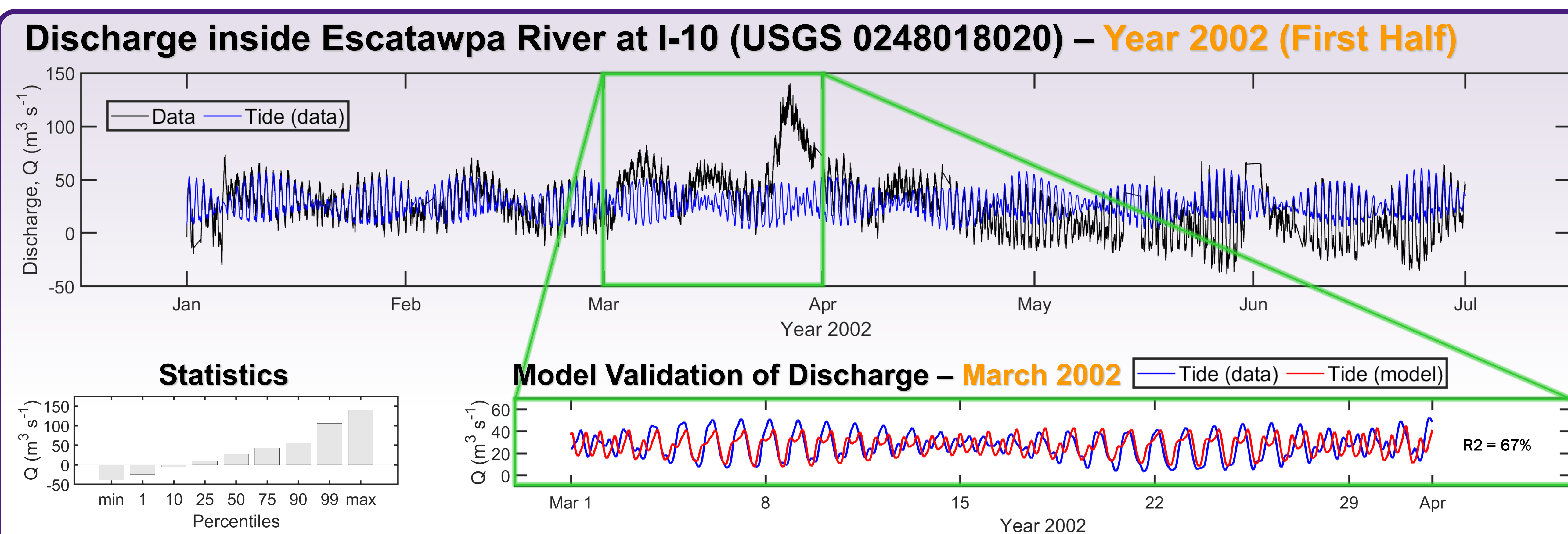
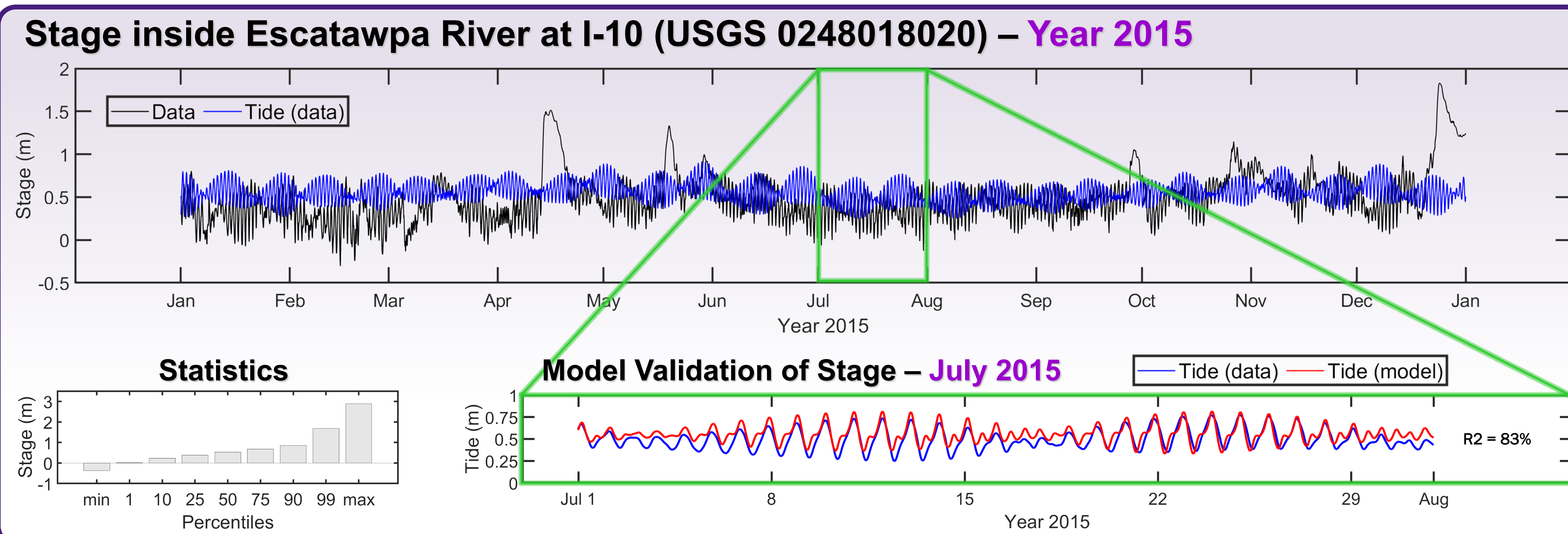
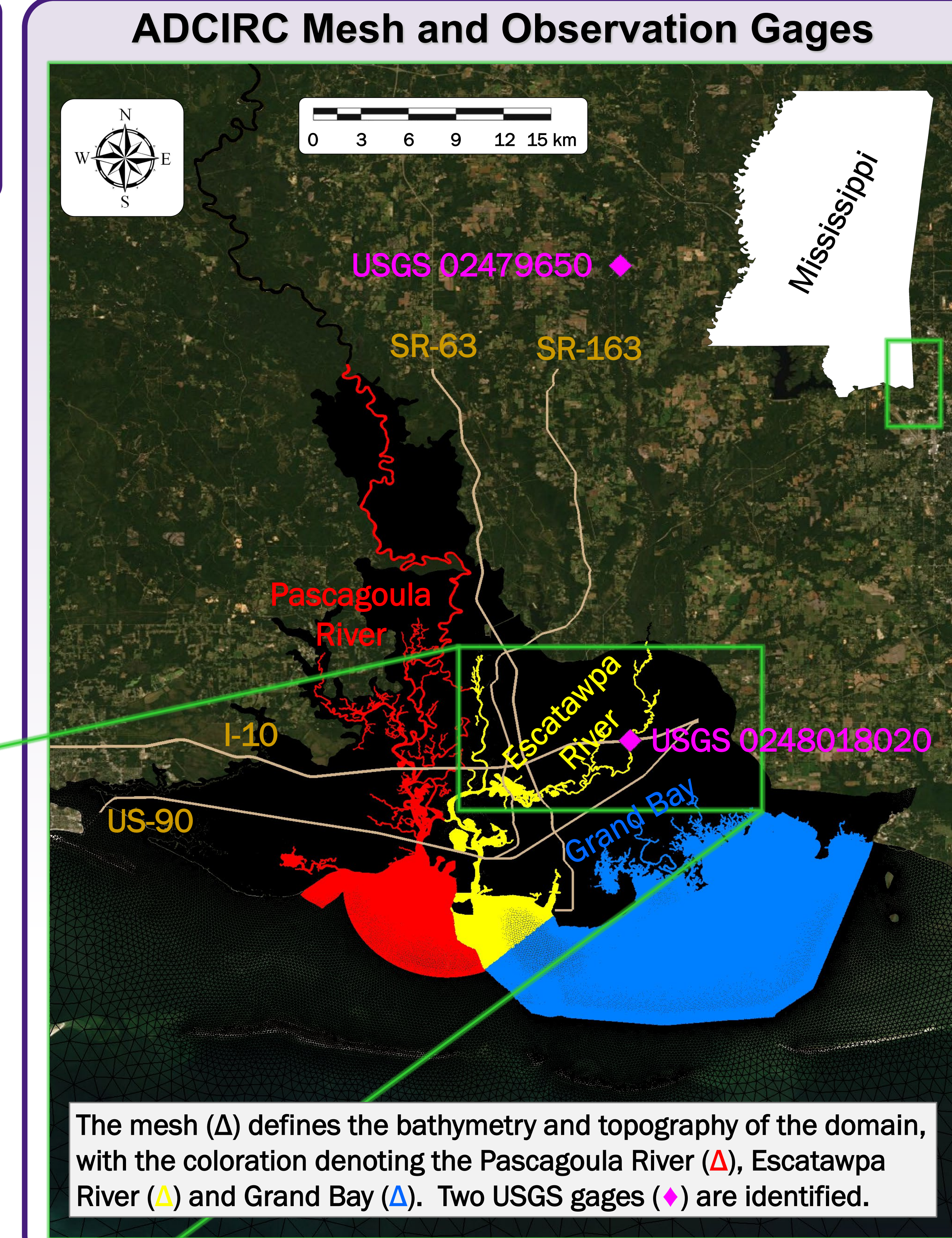
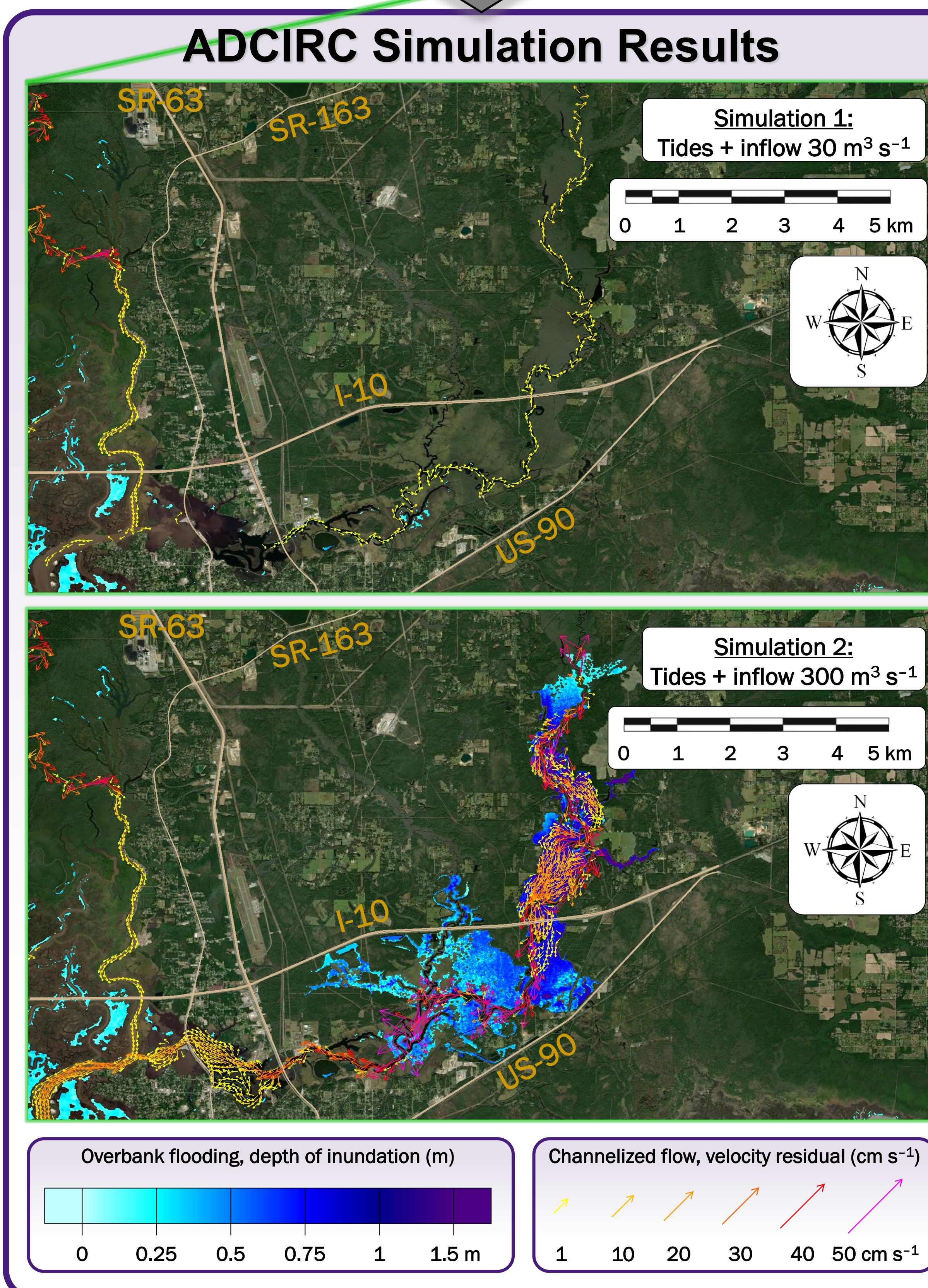
AGU Fall Meeting 2021 Paper # **EP25B-1313** Abstract Reference # **843462** Contact: [pbacopoulos@lsu.edu](mailto:pbacopoulos@lsu.edu)



**Background and Motivation:** The Escatawpa River flowed into Grand Bay historically, and it has been a topic of conversation with restoration efforts in Mississippi, USA. However, more knowledge is needed to better understand the hydrodynamics of the system regarding freshwater inflows. Following is a configuration of the ADCIRC (ADvanced CIRCulation) model for the Escatawpa River, with two points of emphasis: (1) an analysis of freshwater inflows based on the historical record of discharge on the upper Escatawpa River; and (2) a thorough validation of the model against observed data of stage and discharge inside the Escatawpa River at I-10.



- ### Numerical Modeling (ADCIRC)
- Simulate astronomical tides with steady inflow for (1) year 2015 and (2) first half of year 2002
  - Simulation 1: Tides + steady inflow 30 m³ s⁻¹
  - Simulation 2: Tides + steady inflow 300 m³ s⁻¹



- ### Summary of Findings
- 46-year data record of discharge was statistically and harmonically analyzed for the Upper Escatawpa River
    - {Low, medium, high} flow  $\approx$  {5, 15, 60} m³ s⁻¹
    - Average (steady) flow  $\approx$  30 m³ s⁻¹
    - Seasonal signal  $\approx$  20 m³ s⁻¹
  - ADCIRC performed well in a simulation of astronomical tides plus steady inflow
    - Tidal levels (year 2015) were replicated with  $R^2 = 83\%$
    - Tidal discharge (first half of year 2002) were replicated with  $R^2 = 67\%$
  - ADCIRC simulation results exhibit a hydrodynamic impact of freshwater inflows, in the form of varied overbank flooding (inundation) and channelized flow (velocity residuals)

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