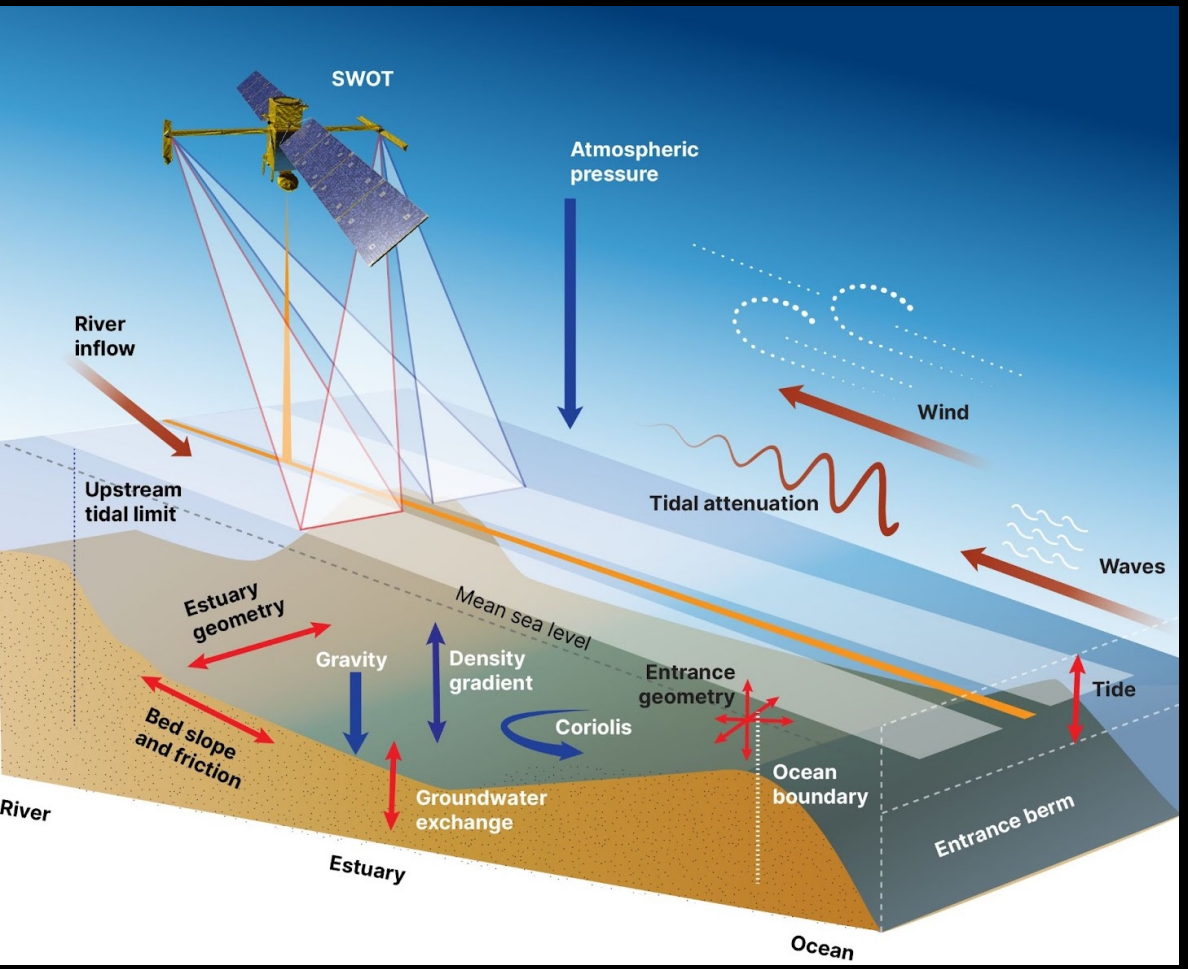
Using SWOT Data to Assess the Impact of Ocean Tides and Sea Level Change on Upstream Rivers and Estuaries



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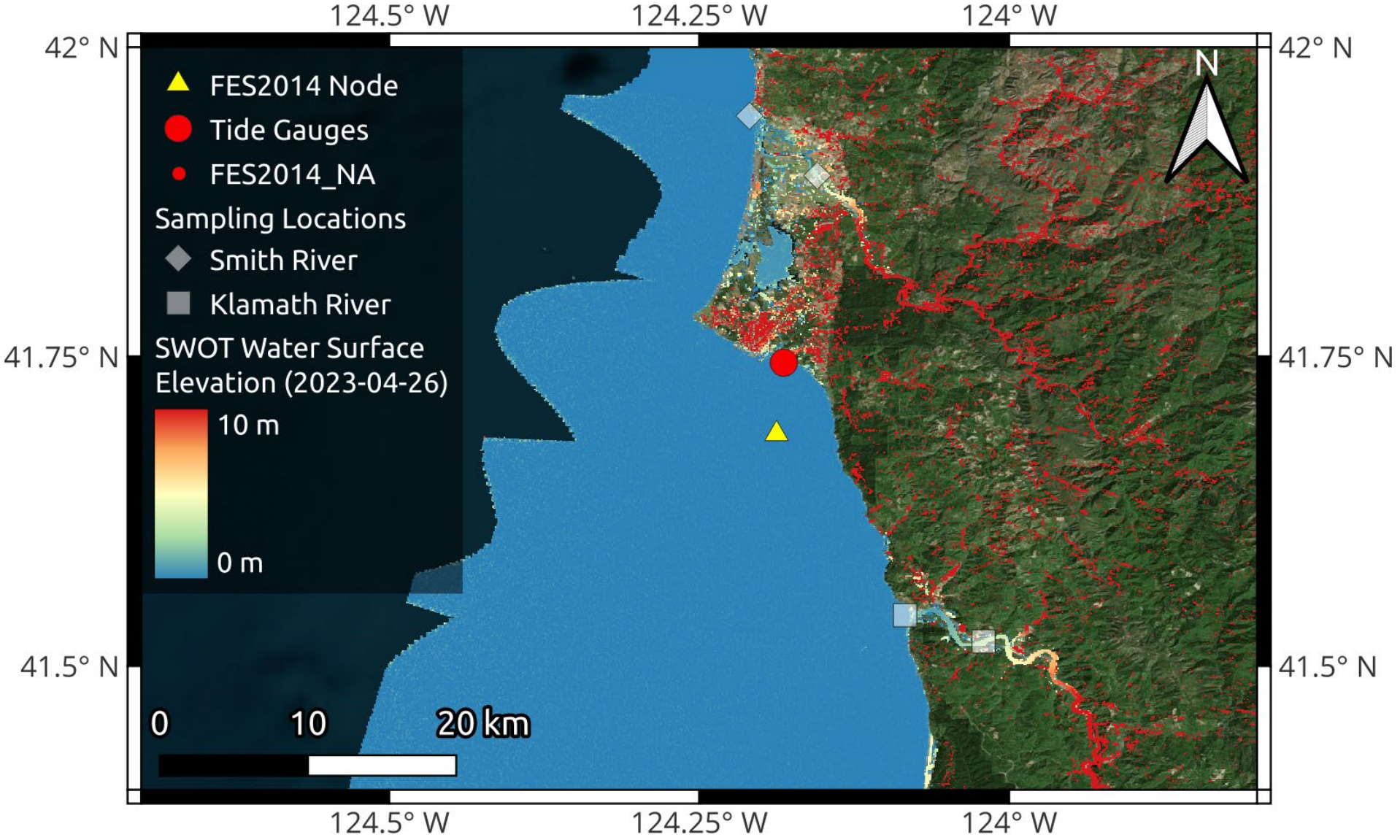
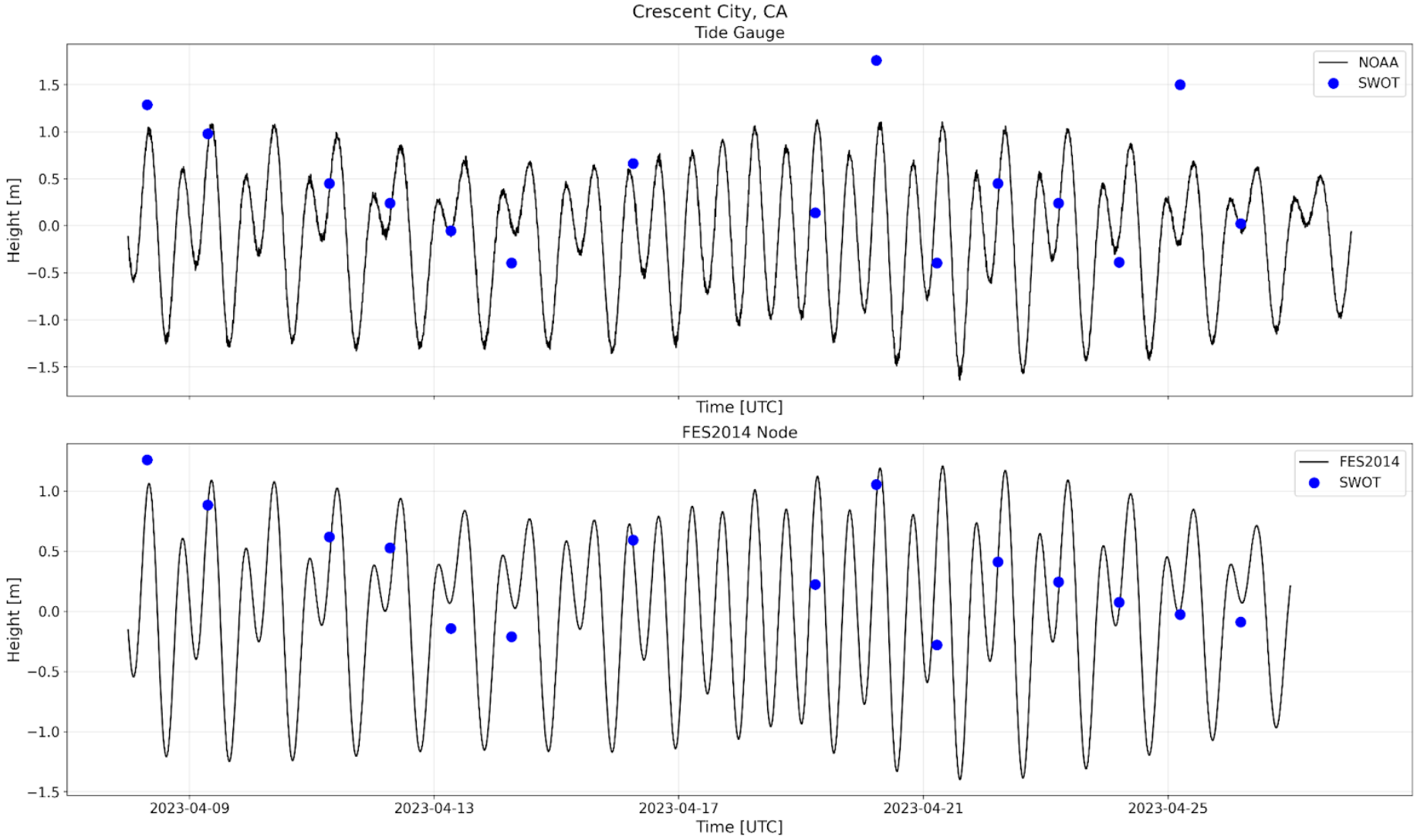
Investigation Objectives

- Understand potential errors in the SWOT data and calibrations and develop strategies to mitigate or correct those errors in our analyses. Two potential sources of error identified include cross-swath roll error, and the wet troposphere delay estimation error as SWOT transitions from sea (measured with on-board radiometer) to land (calculated using land ECMWF model).
- Use SWOT data to estimate for current conditions:
  - The mean water surface elevations and spatial distribution in estuaries and rivers.
  - The tidal range (low- to high-tide range) distributed spatially as tides propagate up estuaries and rivers and influence inland water surface elevations.
  - The upstream spatial extent of tidal influence.
- Utilize SWOT data, combined with sea-level rise projections from the open ocean, to estimate:
  - Future mean water surface elevations and spatial distribution in estuaries and rivers.
  - Future projections of tidal range, distributed spatially.
  - Future upstream spatial extent of tidal influence.
- Develop a simplified model, combining SWOT data with an open-ocean tidal model and sea-level rise projections, that could be applied anywhere in the world to determine potential inland sea-level rise impacts, particularly for those regions presently lacking these projections.

SWOT L2 HR image of water surface elevations near Crescent City, CA on April 26, 2023

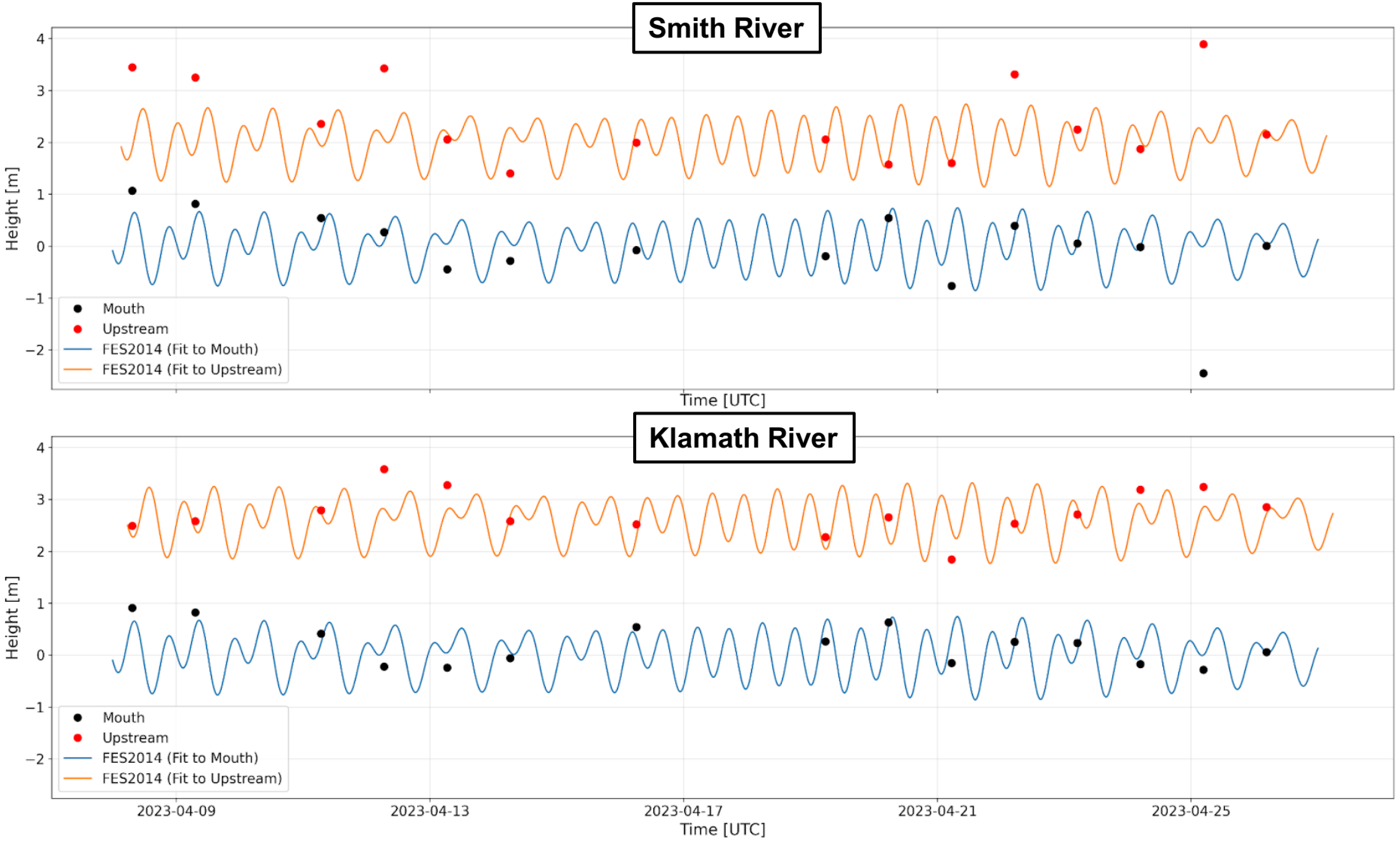


SWOT Comparisons



Comparison of SWOT water surface elevations from the 1-day repeat orbit to the NOAA tide gauge in Crescent City (top) as well as to the FES2014 ocean tide model (bottom) (April 8-26, 2023).

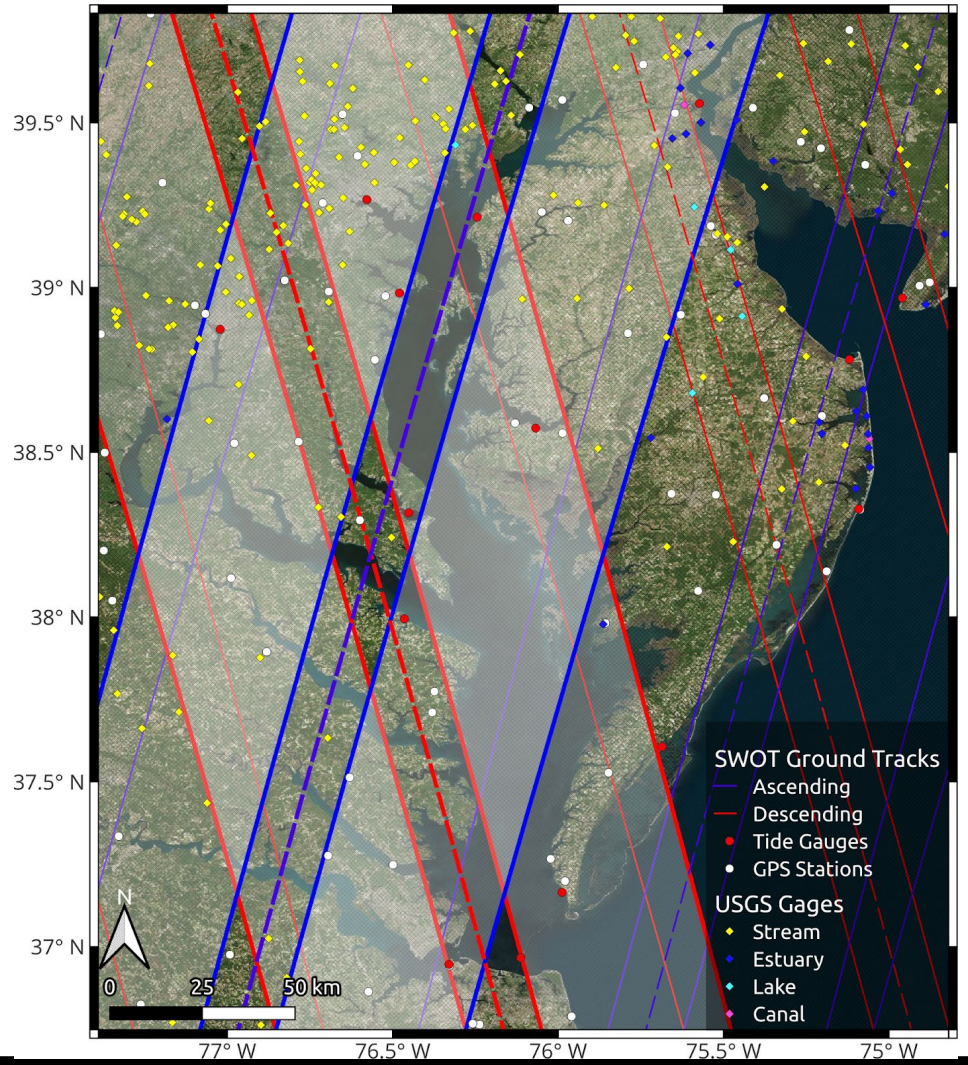
SWOT Comparisons



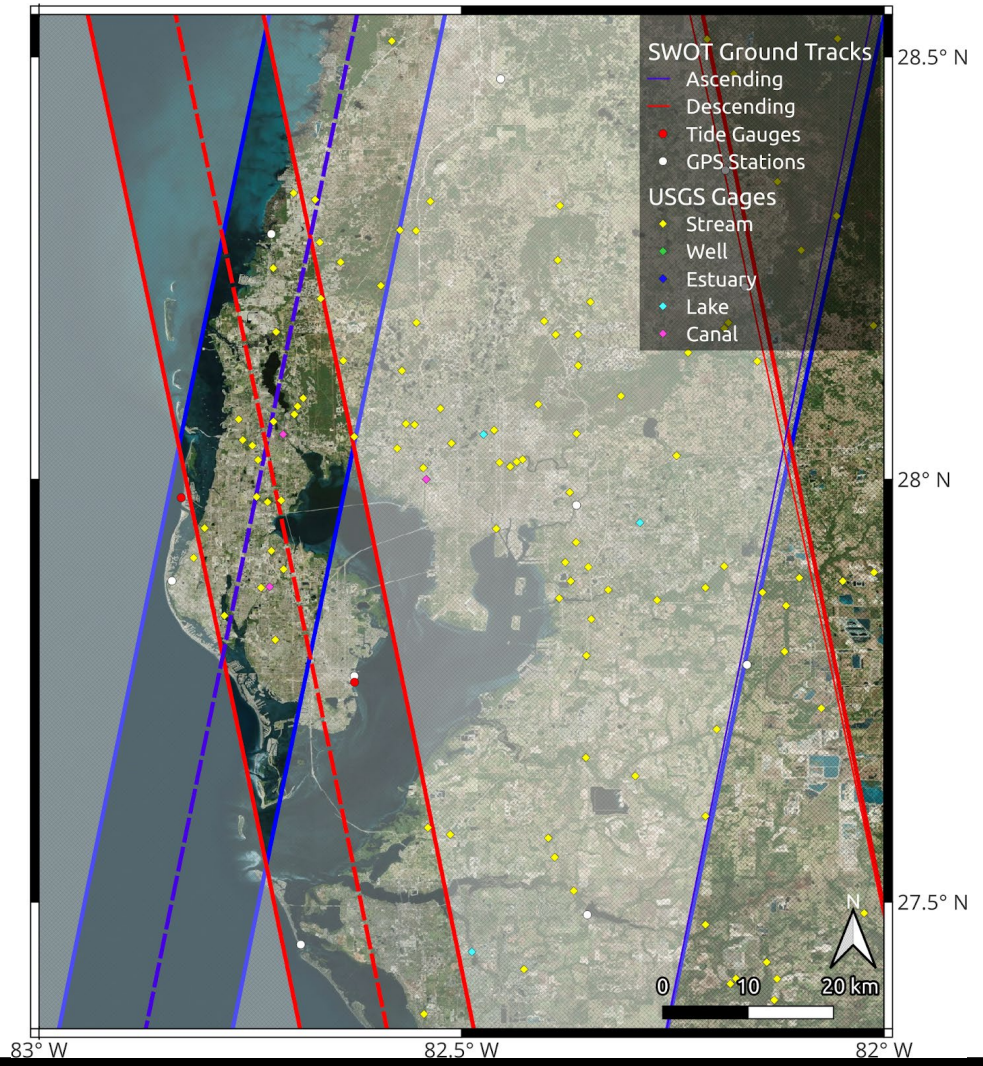
Comparison of SWOT water surface elevations from the 1-day repeat orbit to scaled FES2014 ocean tide model estimates (April 8-26, 2023).

Proposed Study Areas

Chesapeake and Delaware Bays



Tampa Bay



Proposed Study Areas