




Apr 27th, 4:00 PM - 4:30 PM

Tidal Influence on the Fraser River Plume

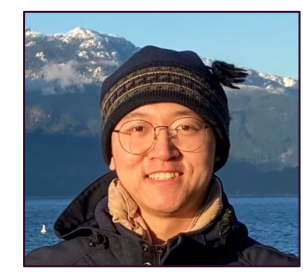
Shumin Li
Ubc

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PRESENTER
Shumin Li



Tidal Influence on the Fraser River Plume

Shumin Li, Rich Pawlowicz
University of British Columbia

Main Findings:
The Fraser river plume area is negatively correlated to the tidal elevation in the Strait of Georgia, varying up to 20% in a tidal cycle.

INTRODUCTION

The Fraser River plume is the biggest source of freshwater and particulate matter to the Strait of Georgia. Earlier studies characterized the wind and river flow influence on the Fraser River plume, but its dependence of tide is still not known. This study aims to provide insights of role of tide in the Fraser River plume variation.

METHOD

11, 258 satellite images (MODIS) of the southern Strait of Georgia area from 2003 to 2019 are visually inspected.

2466 good images are selected and individually processed to calculate the plume areas.

Temporal biases are resolved, and normalized plume areas are averaged over a tidal cycle.

RESULTS

The Fraser River plume area is negatively correlated to the tidal elevation with a phase lag at about one hour.

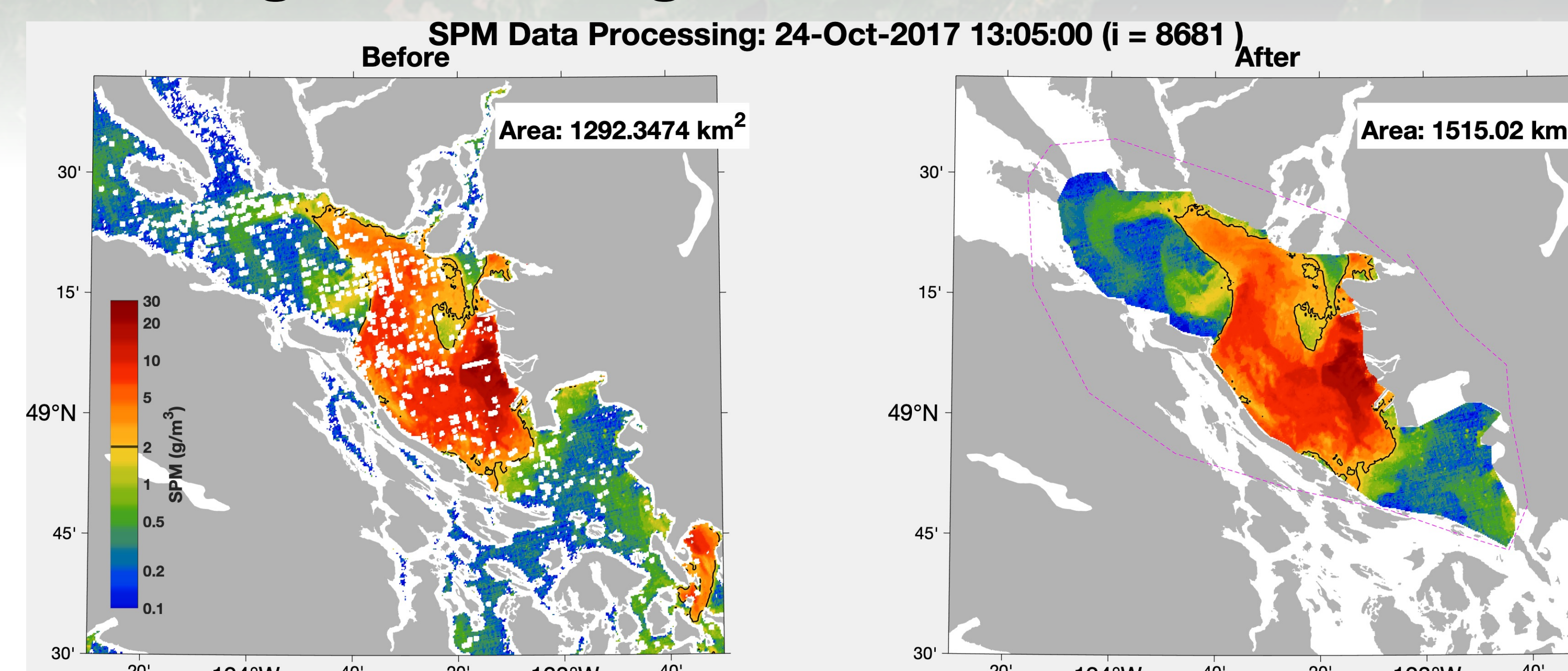
The plume area routinely increases/decreases by about 20% during the ebb/flood tides but varies very little when the river discharge is high.

DISCUSSION

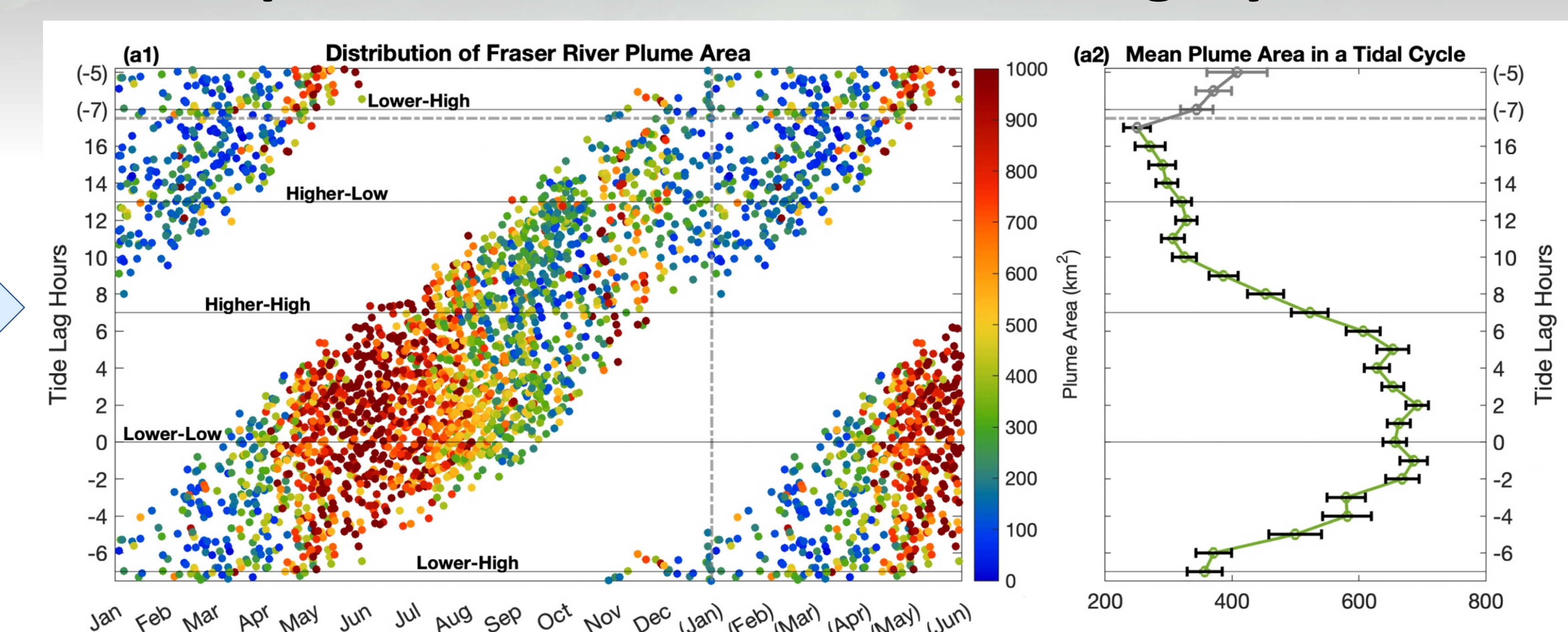
Care must be taken when analyzing tidal variabilities using aliased sampling schemes.

Active exchange of salt, nutrient, and sediments between river water and ocean water in tidal time scales.

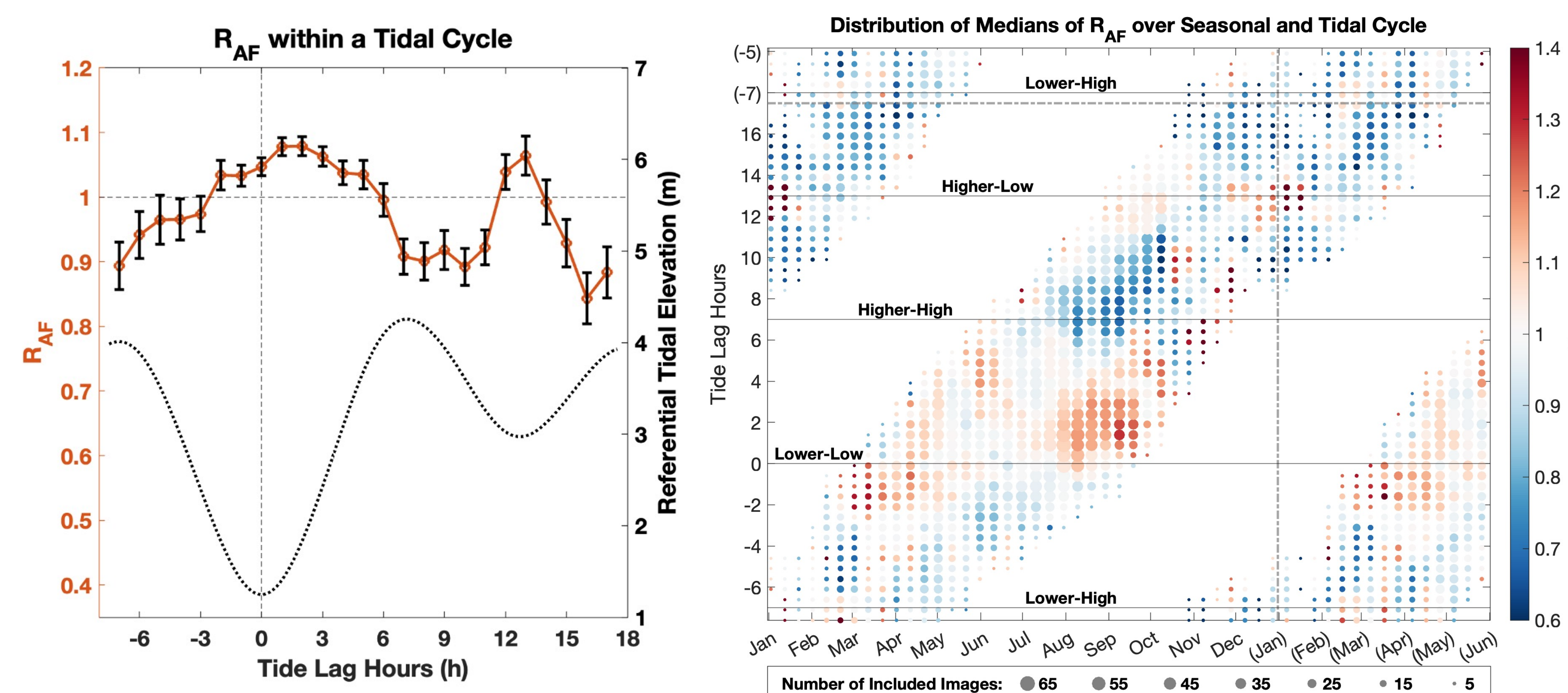
1. Image Processing



2. Temporal Bias in the Satellite Imagery



4. Tidal Variation over a tidal Cycle



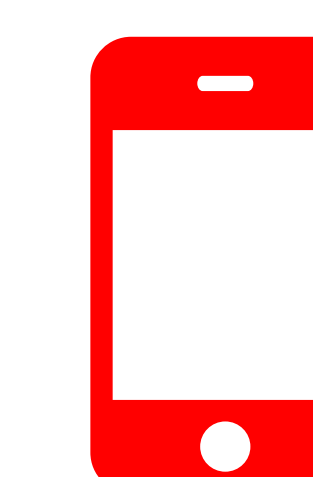
3. Remove Temporal Bias

The plume area is near linear correlated to the river flowrate:

$$\bar{A} \approx 0.136 Q$$

To remove seasonal variation, we defined a normalized plume area:

$$R_{AF} = \frac{A}{\bar{A}} = \frac{A}{0.136 Q}$$



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