

What Do Data Snapshots Miss?

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What is a data snapshot?

Data snapshots are any data collection that occurs at a single snapshot in time. These data include sediment samples, bathymetric maps, transect measurements, etc. and can provide excellent spatial mapping of the sediment bed and chemistry. **Currently, data snapshots are the most commonly collected data type at contaminated sediment sites.**

However, data snapshots can be sensitive to the time of data collection. For example, data collected after a storm vs before a storm or at peak vs flood tide can result in very different site characterization (Figure 2).

Bathymetric change maps (Figure 2) are often used to estimate the rates of sedimentation or erosion at contaminated sediment sites using the difference between two bathymetric surveys.

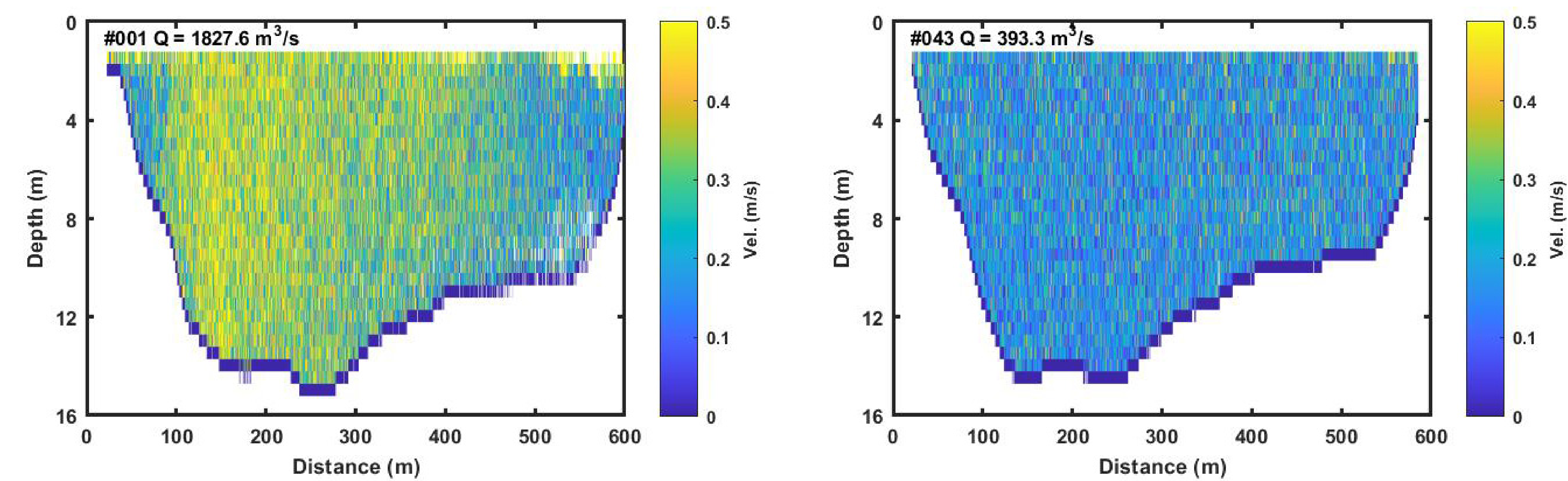


Figure 1: Water Column Current Transect Measurements, One Month Apart

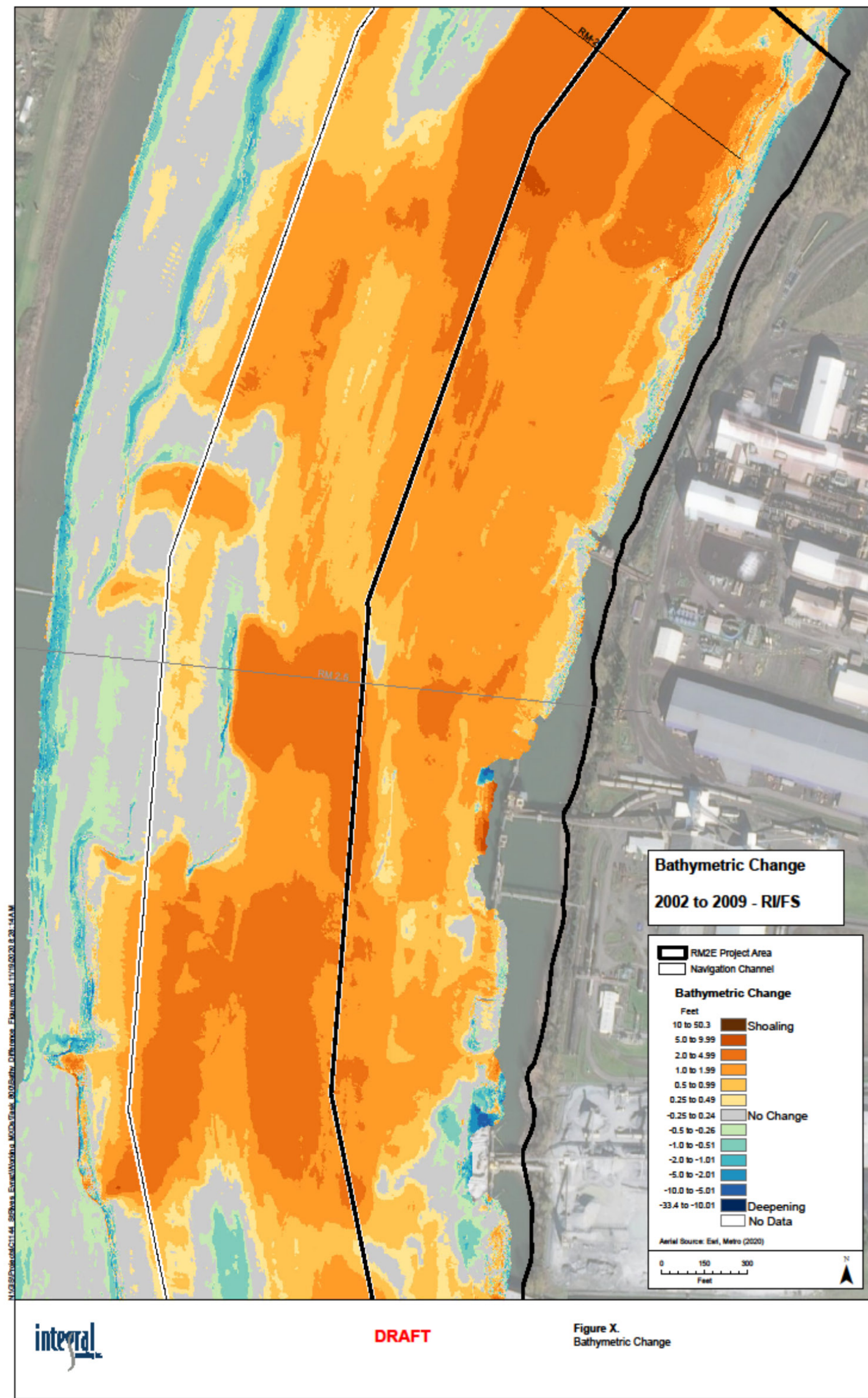


Figure 2: Bathymetric Change Map

A wide range of time-varying physical processes affect sediment sites.

Case Study: Portland Harbor Processes

Annual forcing conditions (Figure 3) on Portland Harbor are associated with distinct time scales:

Event	Time Scale
Storm events and flooding from the Willamette River	Daily–monthly; Annually
Seasonal snowmelt on the Columbia River	Seasonally
Tidal variability from the ocean	Hourly

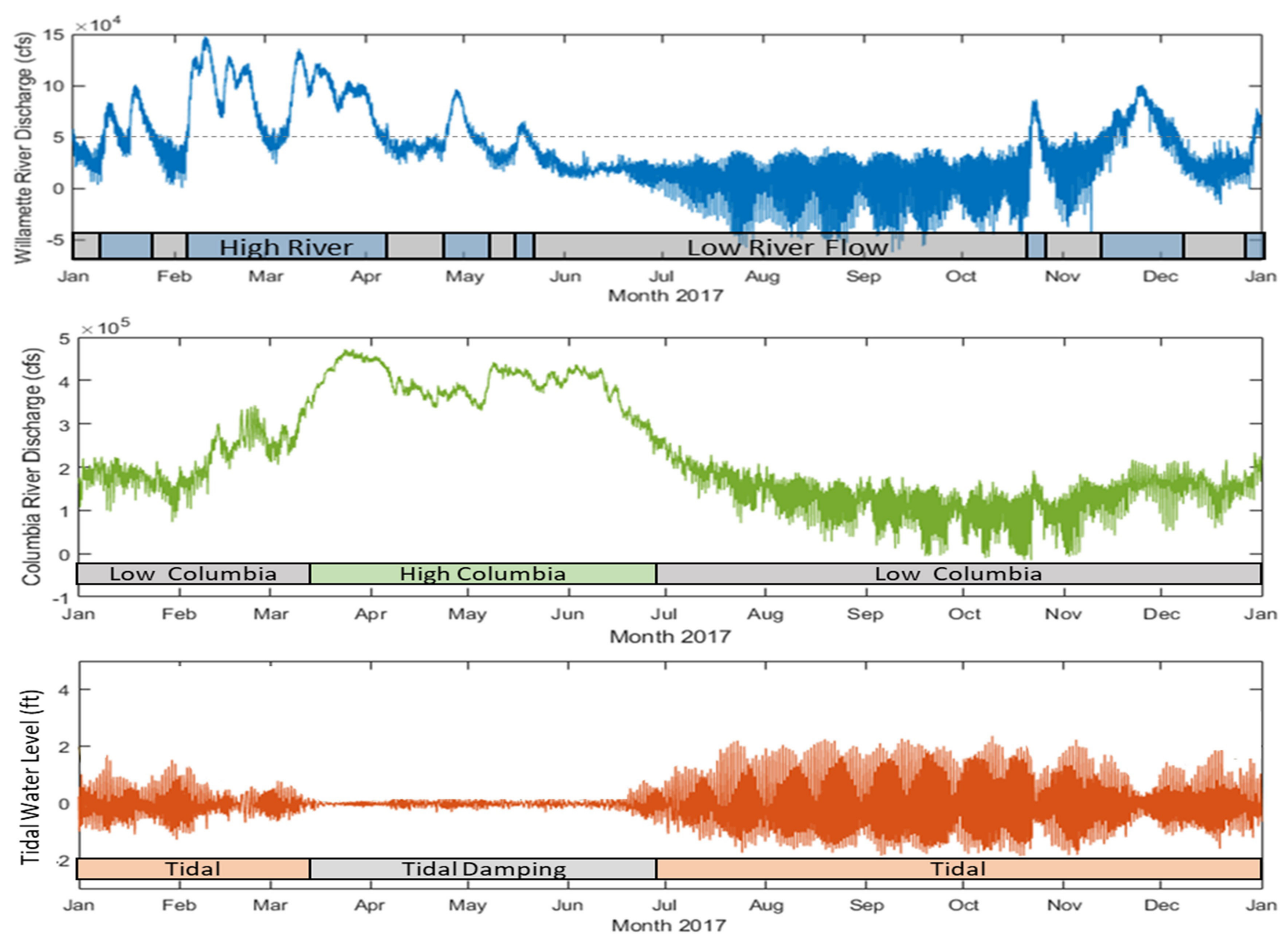


Figure 3: Annual Forcing Conditions at Portland Harbor

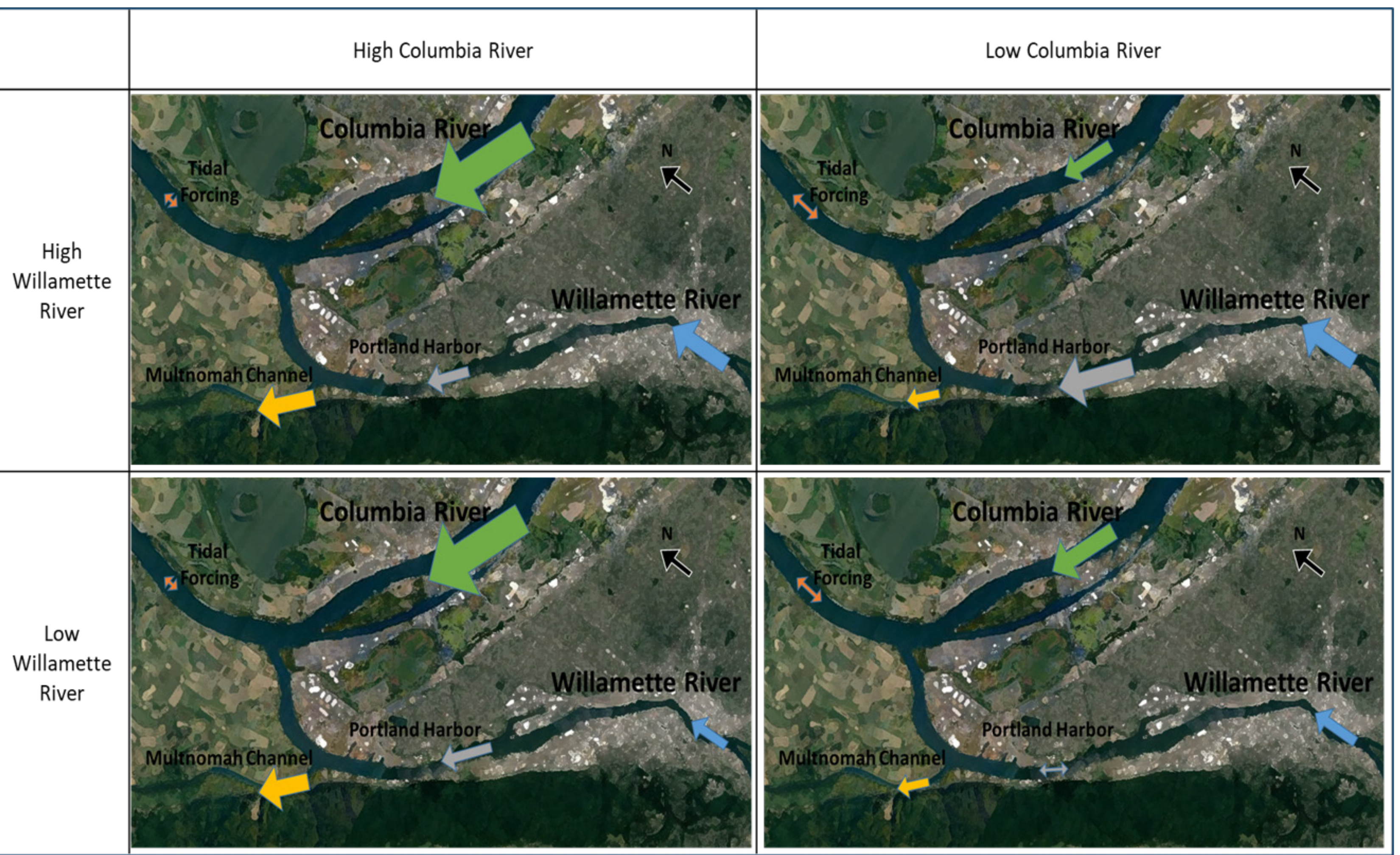


Figure 4: Time-Varying Dynamics in Portland Harbor

Complex interactions of processes result in time- and spatial-varying currents and dynamics (Figure 4). Larger arrows denote larger currents.

Data snapshots fail to capture time-varying dynamics at a site that may be critical to site dynamics.

We should use **time series data** for a more robust site understanding.

Portland Harbor: Water Column Measurements Capture Time-Varying Dynamics

- Time series data collection with *in situ* instrumentation can be relatively low cost and can provide valuable insight in time-varying dynamics at a site (Figures 5 and 6).
- Models should rely on data with appropriate resolution of relevant processes. These data can be used to verify current magnitude during flood events, flow reversals or recirculation from tides, and diversion of flow in Multnomah Channel.

Conclusion

In situ time series data can be used with standard data snapshot techniques and models to better characterize and understand complex sediment sites. At a relatively low cost, this robust understanding will support and better inform all phases at a contaminated sediment site.

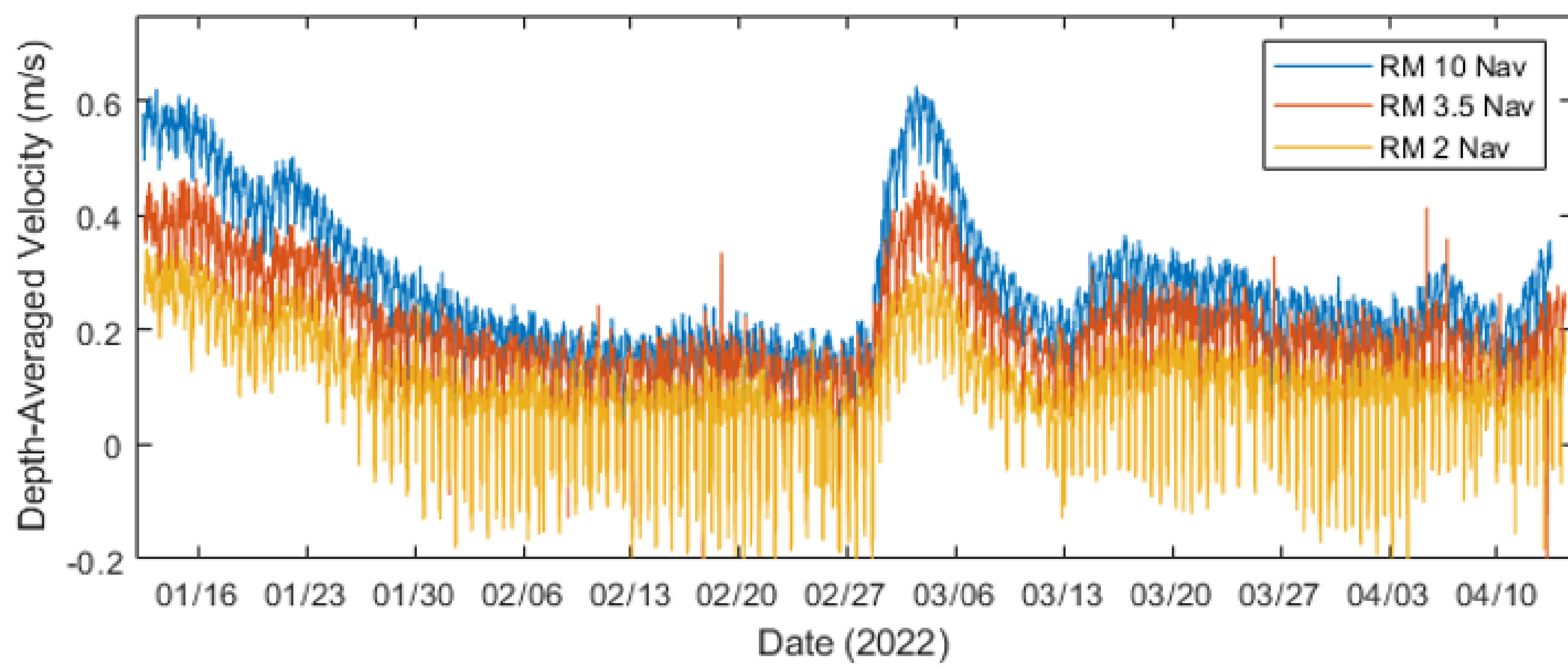


Figure 5: Water Column Currents Measured Every 15 Minutes at Three Monitoring Locations in Portland Harbor

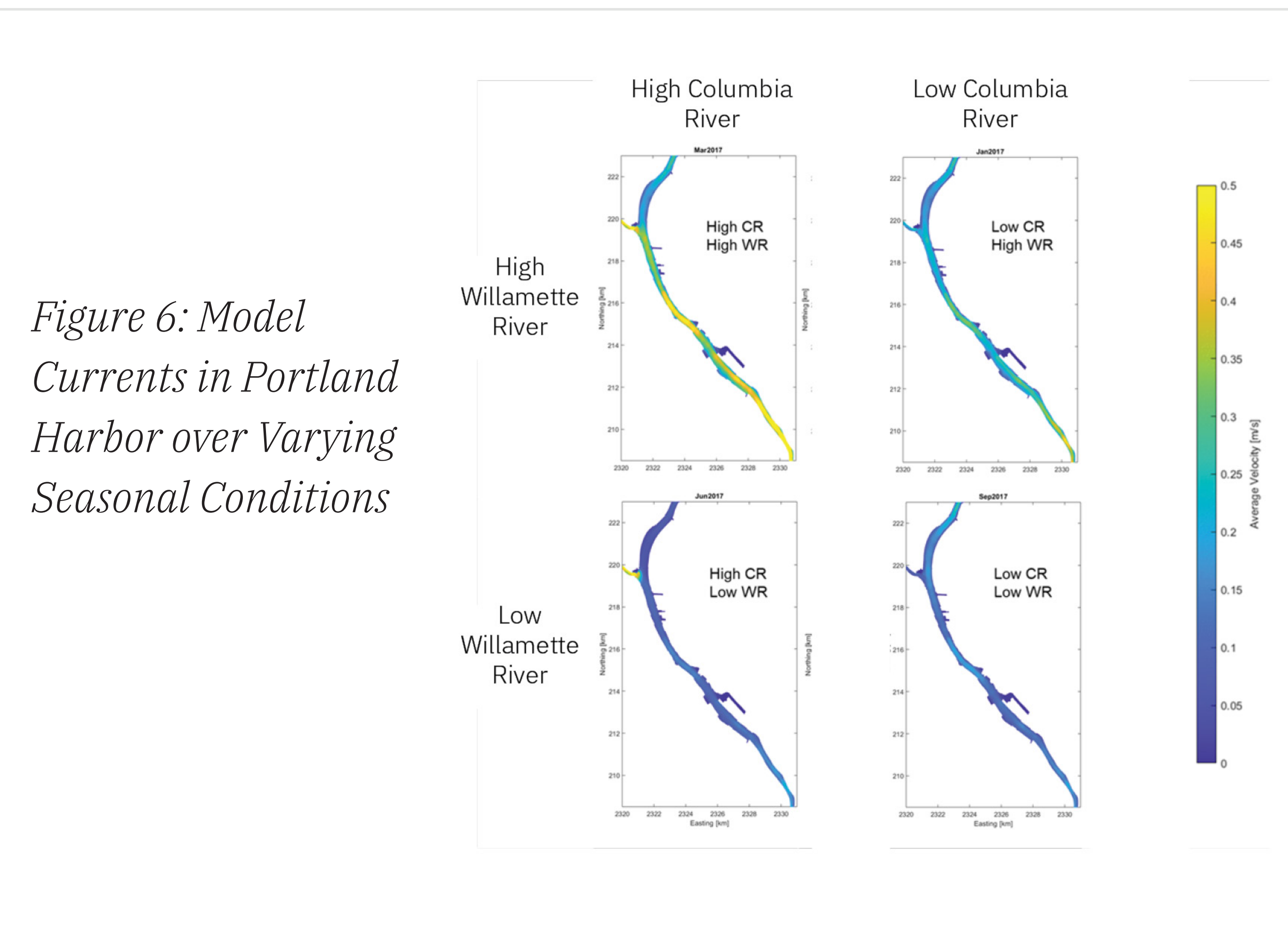


Figure 6: Model Currents in Portland Harbor over Varying Seasonal Conditions

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