

# Port of Anchorage Deepening and Expansion Hydrodynamic Modeling

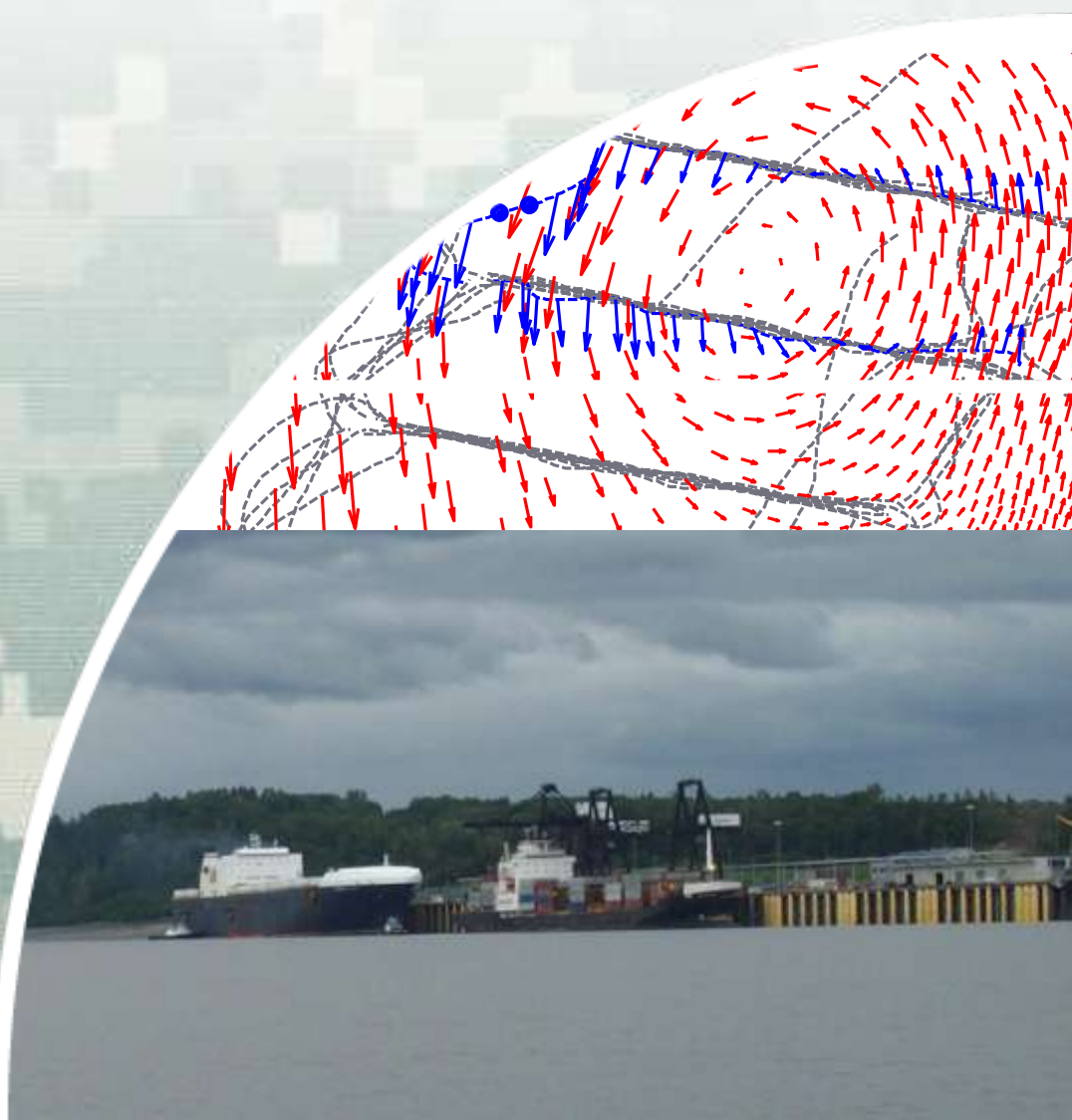


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# Physical Setting at POA

- Tide Range
  - 9 m Mean, 12 m Spring
- Currents
  - Max: ~1 m/s
  - ~0.10-0.20 m/s Eddy
  - 70-80% Flood-directed
- Suspended Sediment
  - ~ 2000 mg/L Summer
  - ~500 mg/L Winter
  - Predominantly Silt

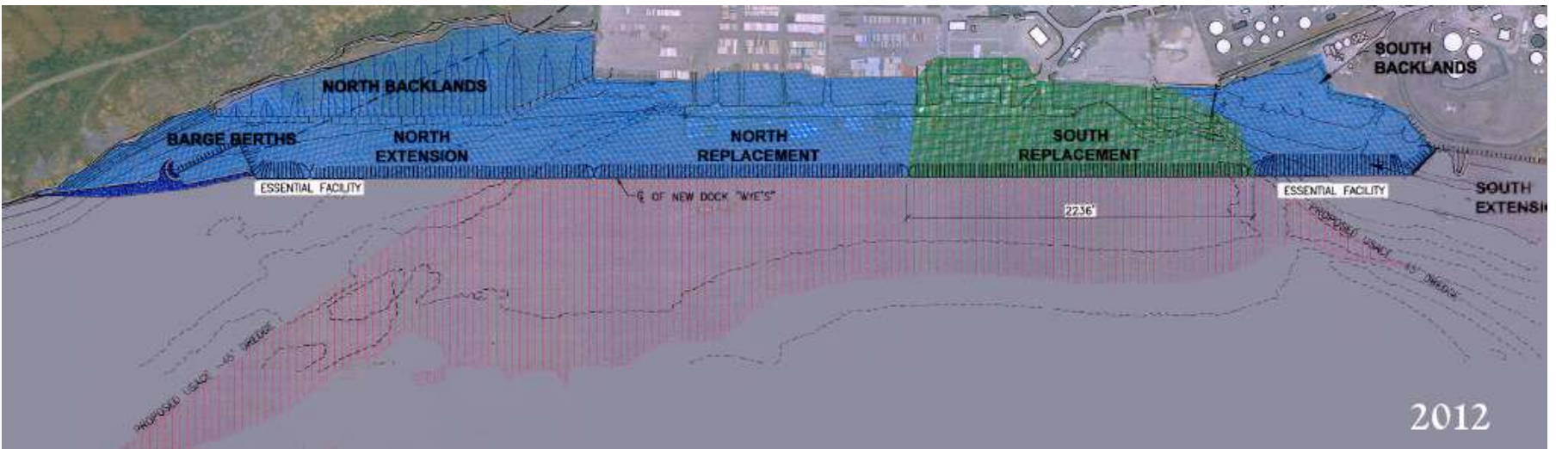
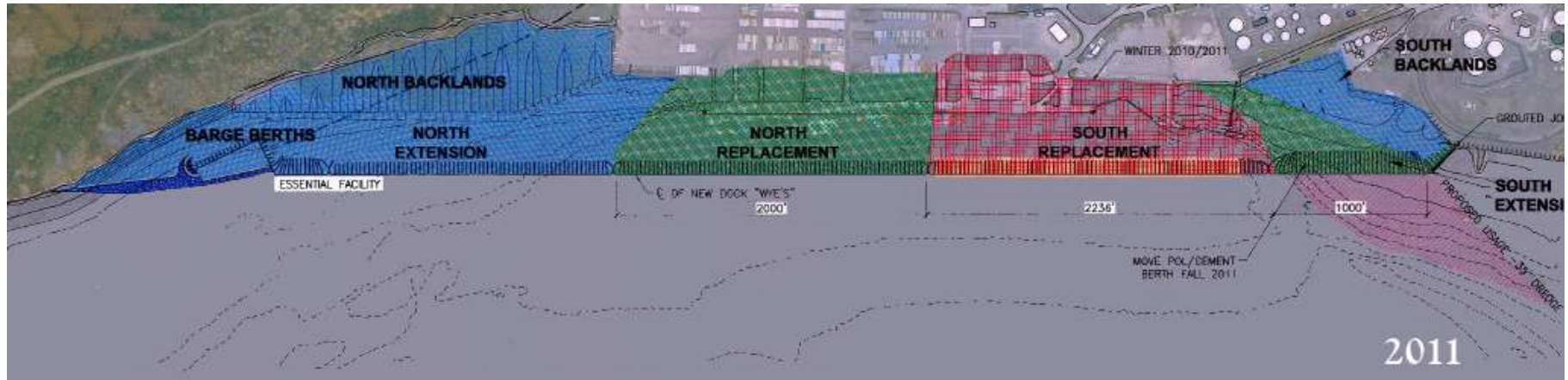




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# Port Expansion and Deepening





# Study Approach

- Field Data
  - Analyze Dominant Physical Processes
- Hydrodynamic Modeling
  - Characterize Hydrodynamic Variability During the Phased Expansion
  - Supports Sediment Transport Modeling, Ship Simulator and Ship Mooring Forces Model



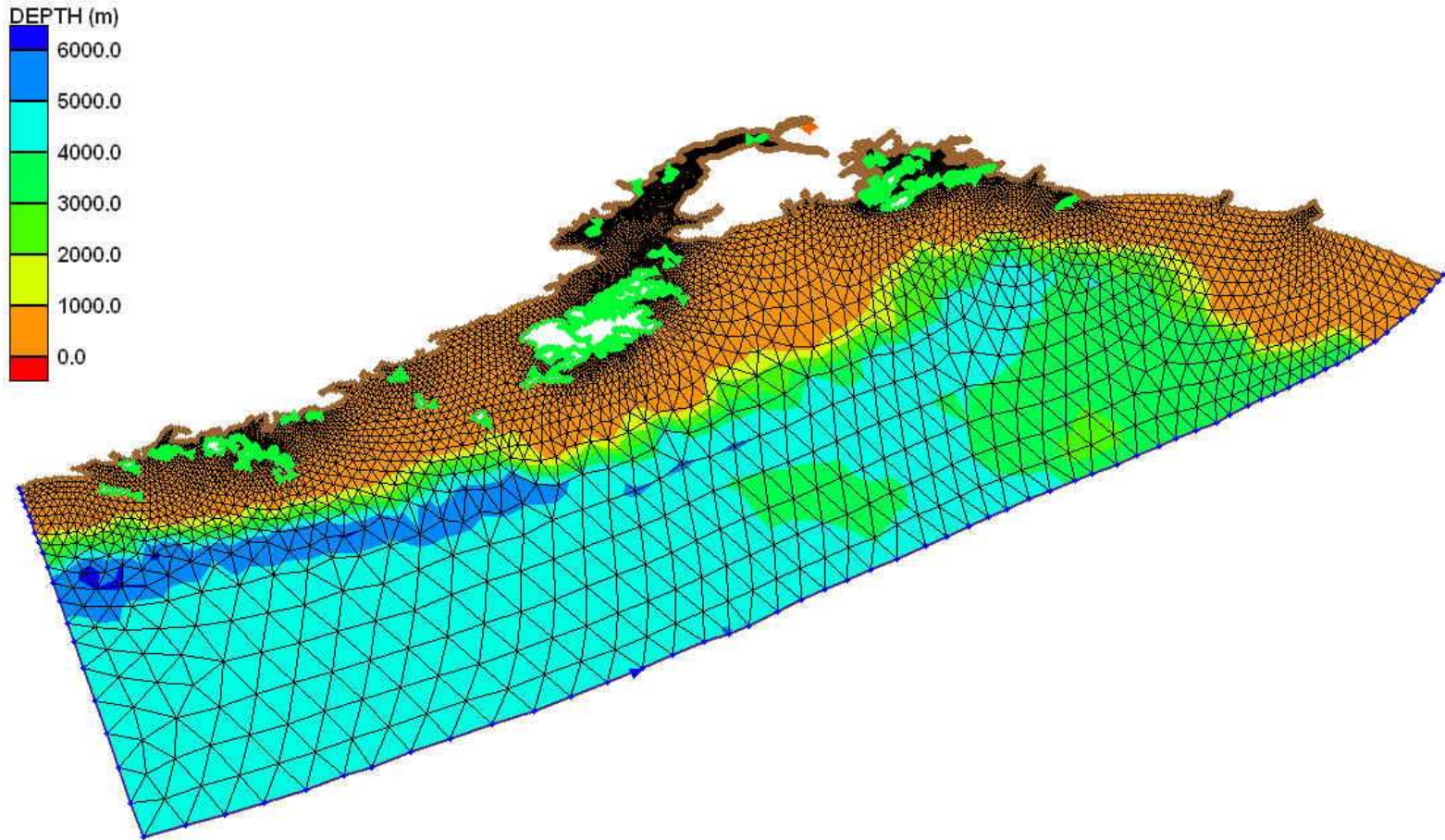
# Hydrodynamic Modeling

## ADCIRC Model and Grid Improvements

- > Smagorinsky Eddy Viscosity Model
- > Extension of Gulf of AK Boundary
- > Improvement of Upper Knik Arm Mudflats

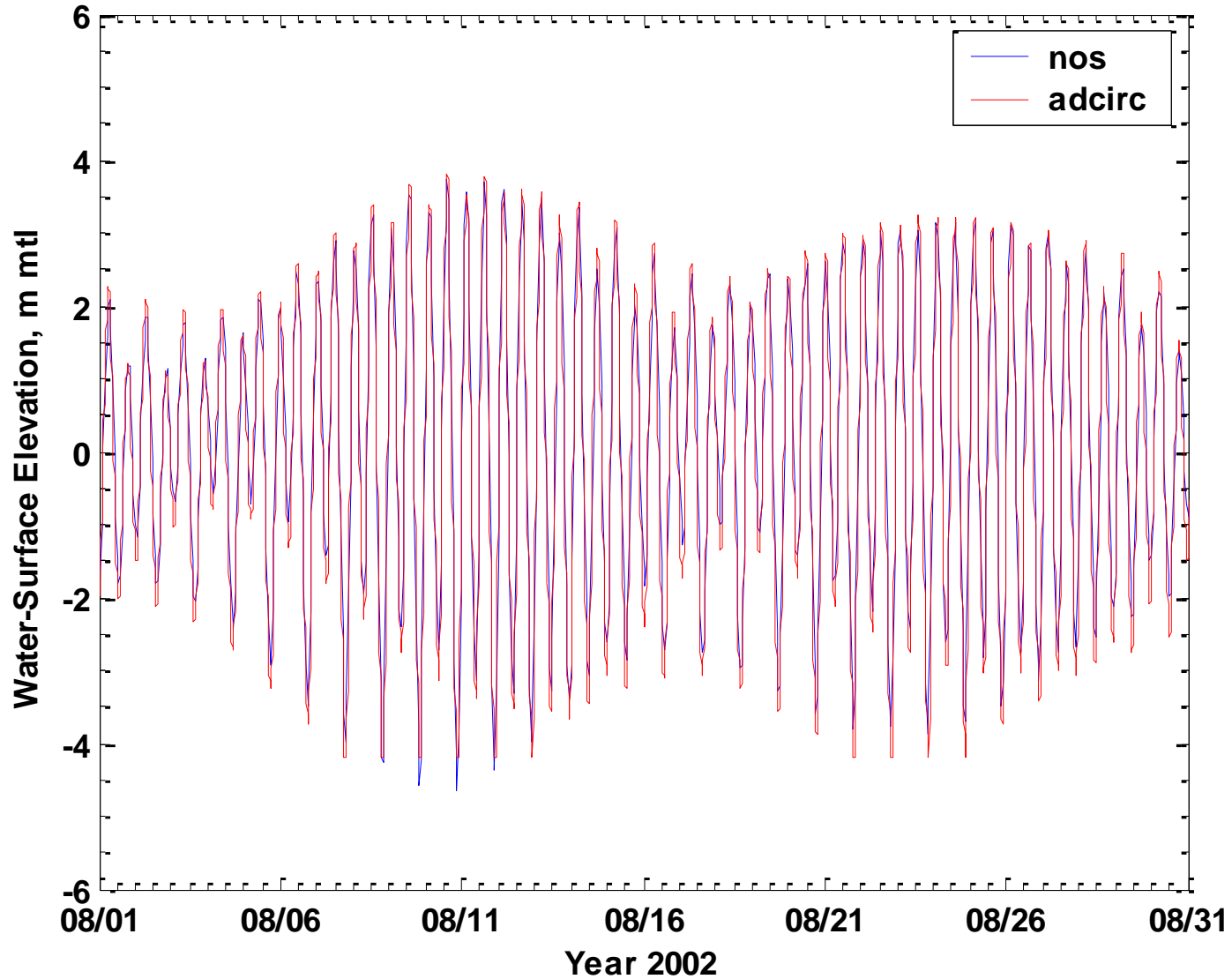
## Calibration and Field Data Comparison

# ADCIRC Cook Inlet-POA Grid



# 2002 Calibration, Nikiski

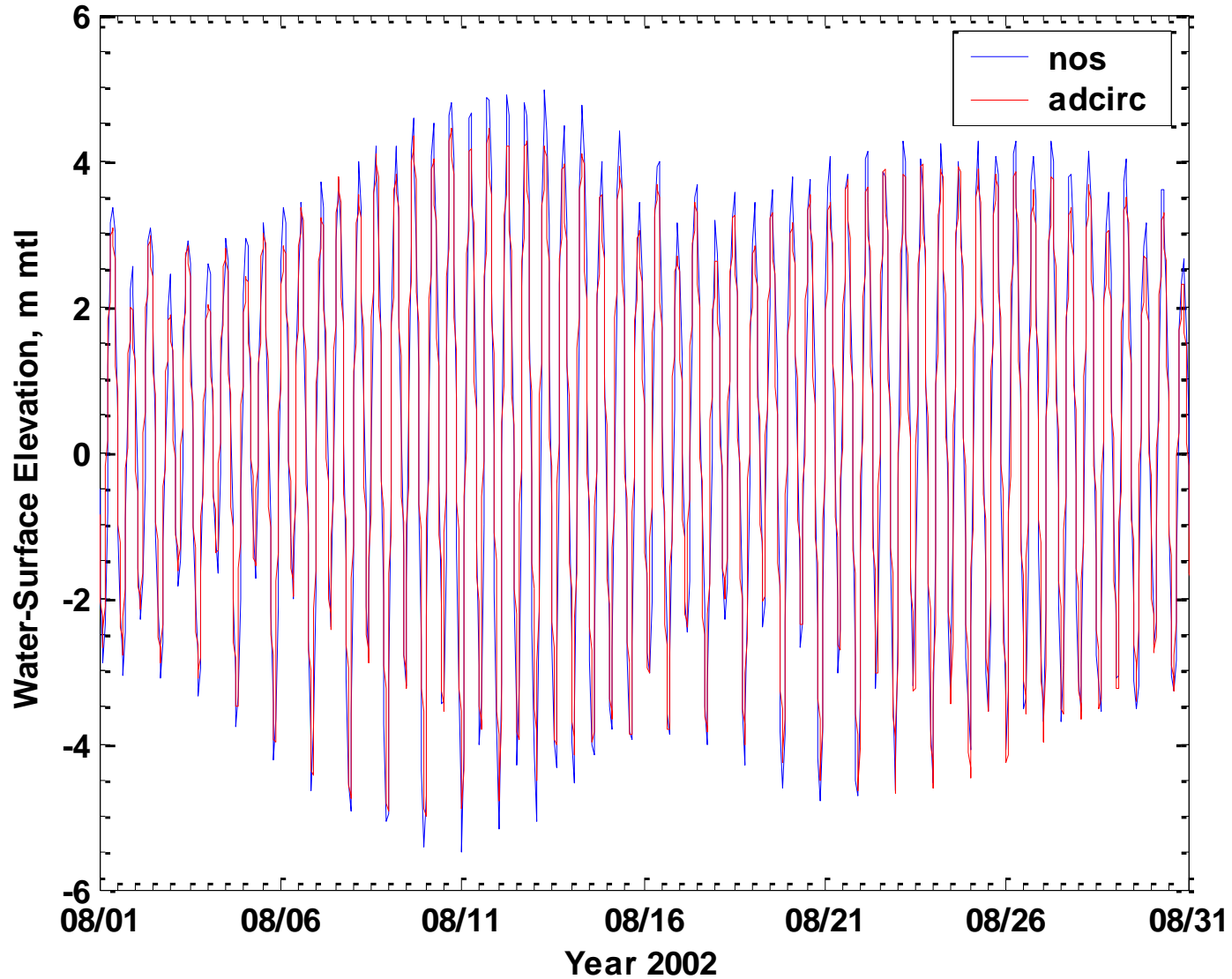
Nikiski, Alaska





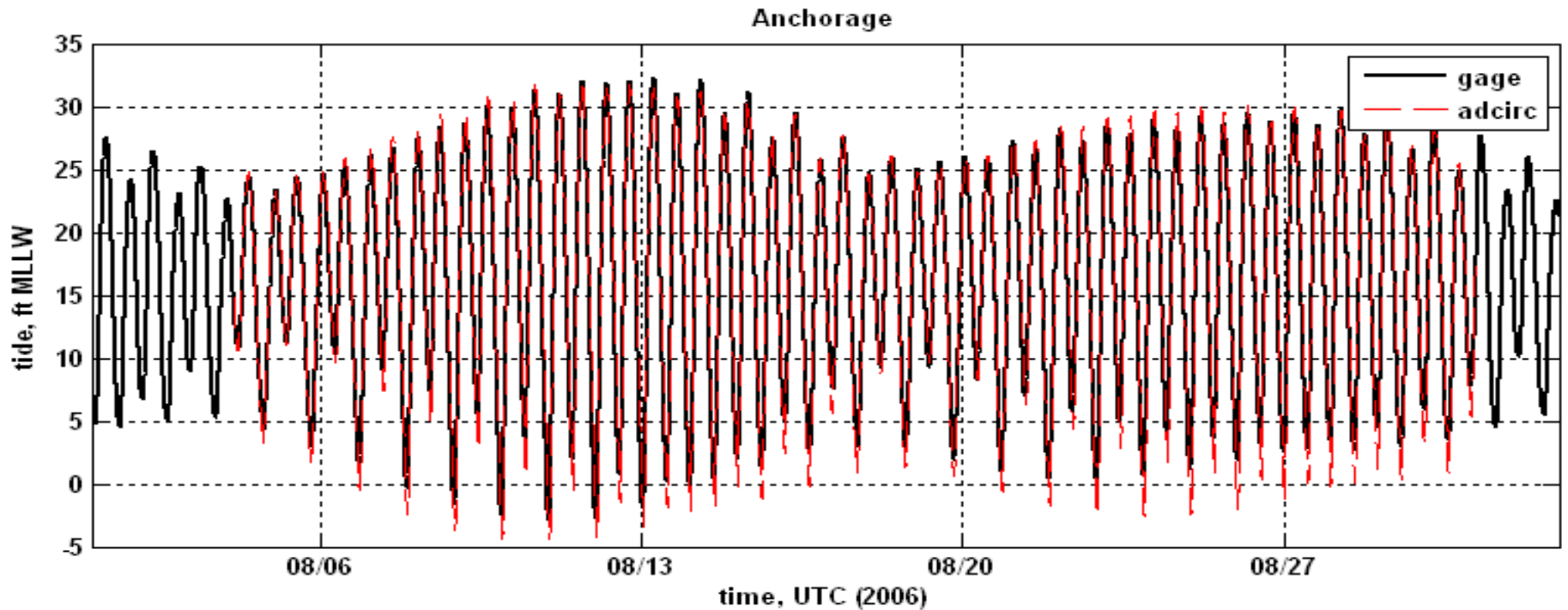
# 2002 Calibration, Anchorage

Anchorage, Alaska

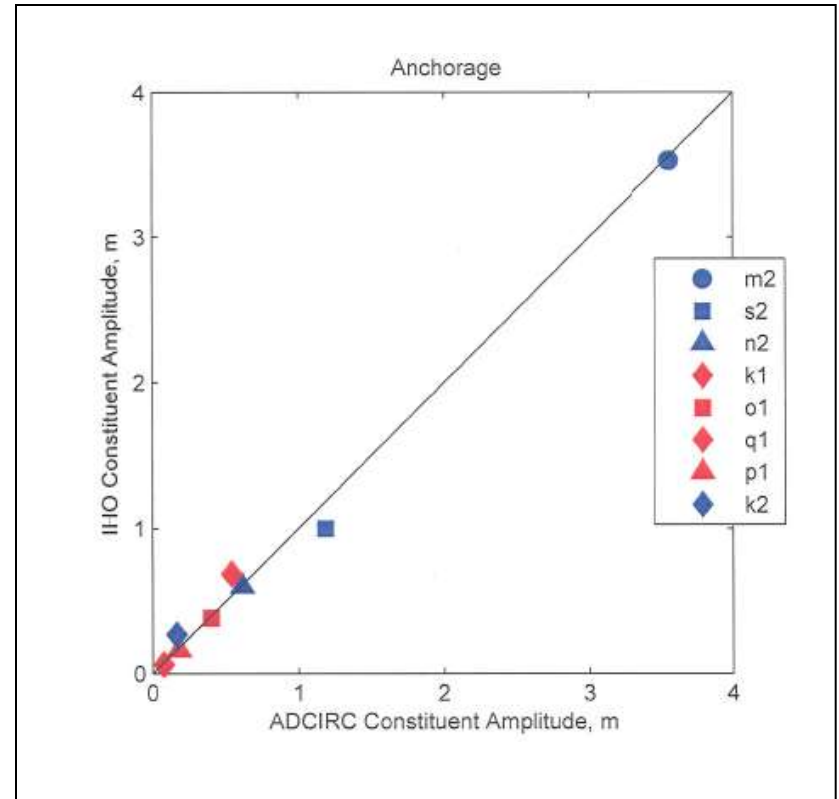
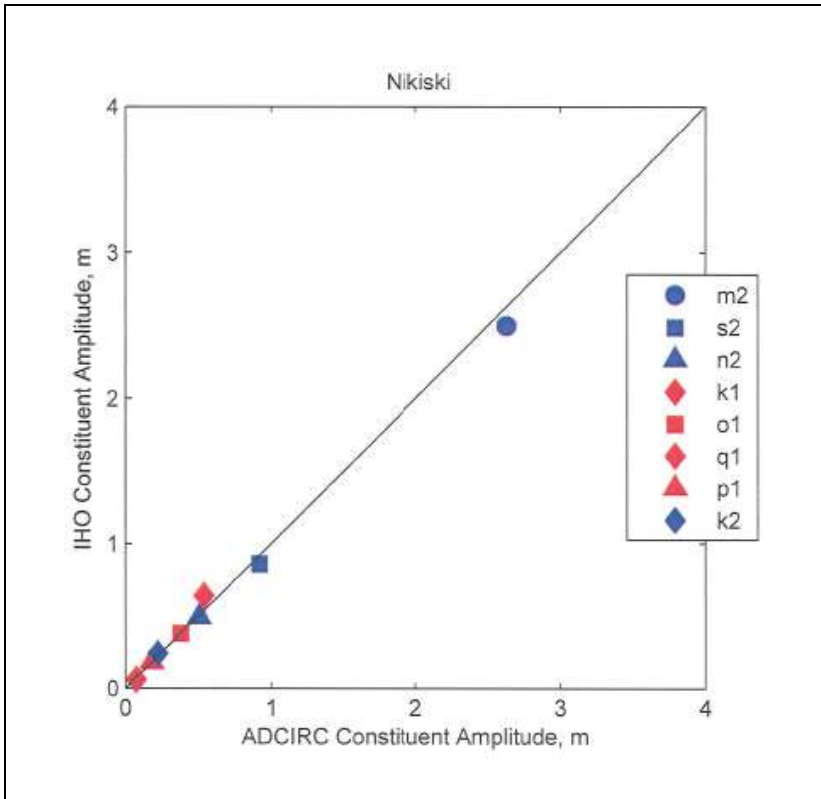




# 2006 Verification, Anchorage



# 2006 Harmonic Constituent Comparison Nikiski and Anchorage





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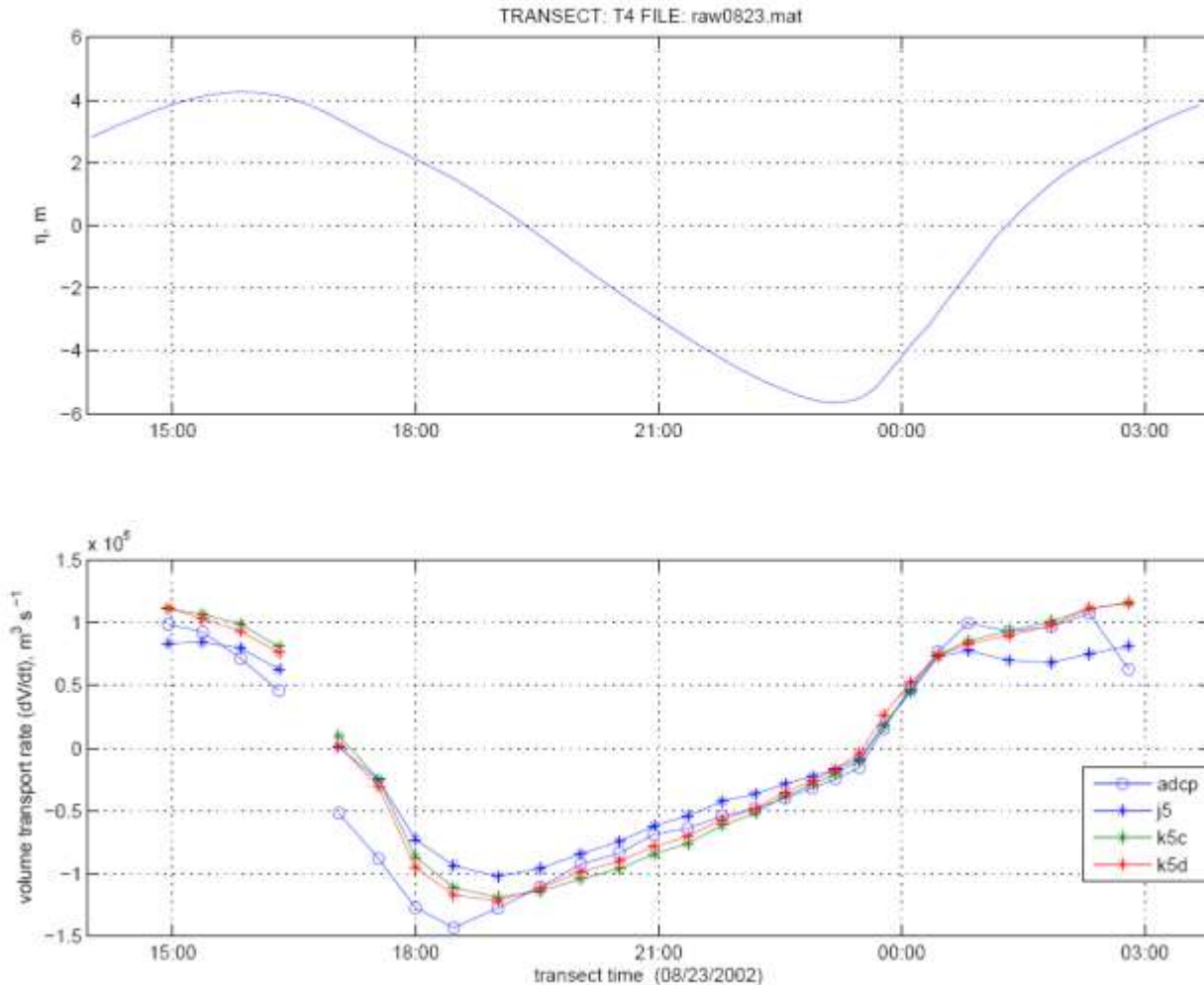
# Improvement of Upper Knik Arm Mudflats



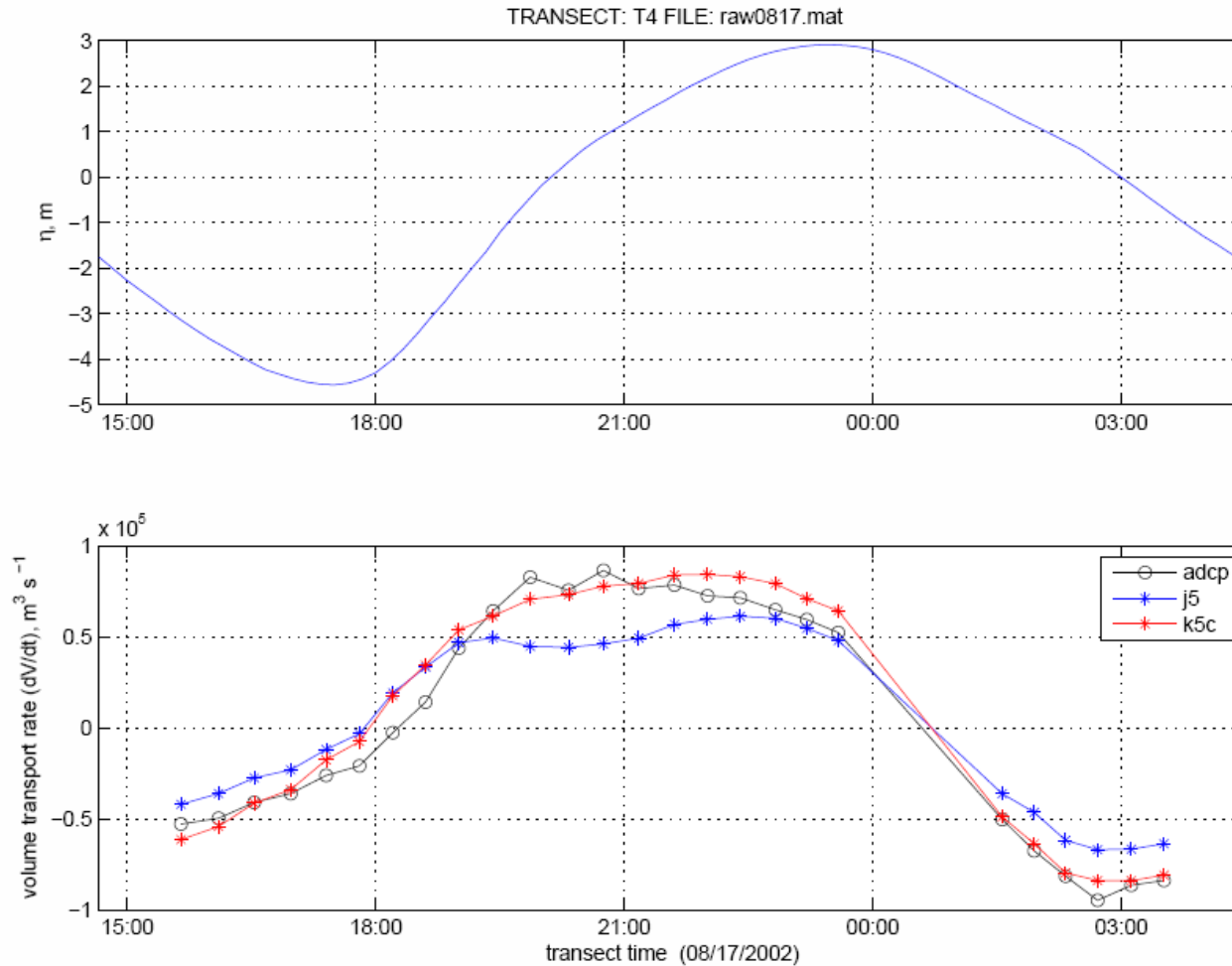
# NOAA 2002 and ERDC 2006 ADCP Transects



# 2002 Measured and Predicted Ebb Volume Flux: Mudflat Bathymetry Improvement



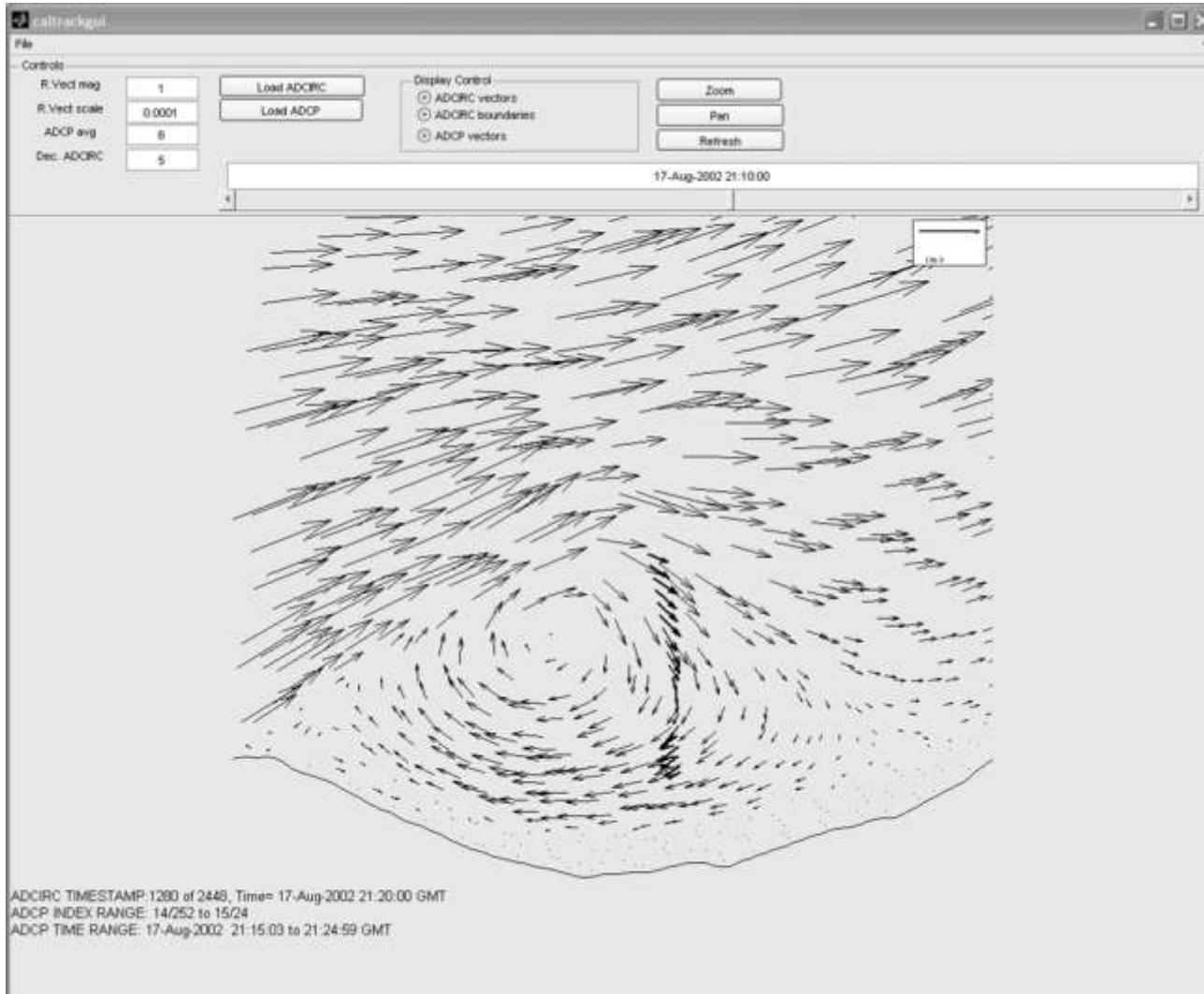
# 2002 Measured and Predicted Flood Volume Flux: Mudflat Bathymetry Improvement



# 2002 Point Woronzof Flood Gyre Location

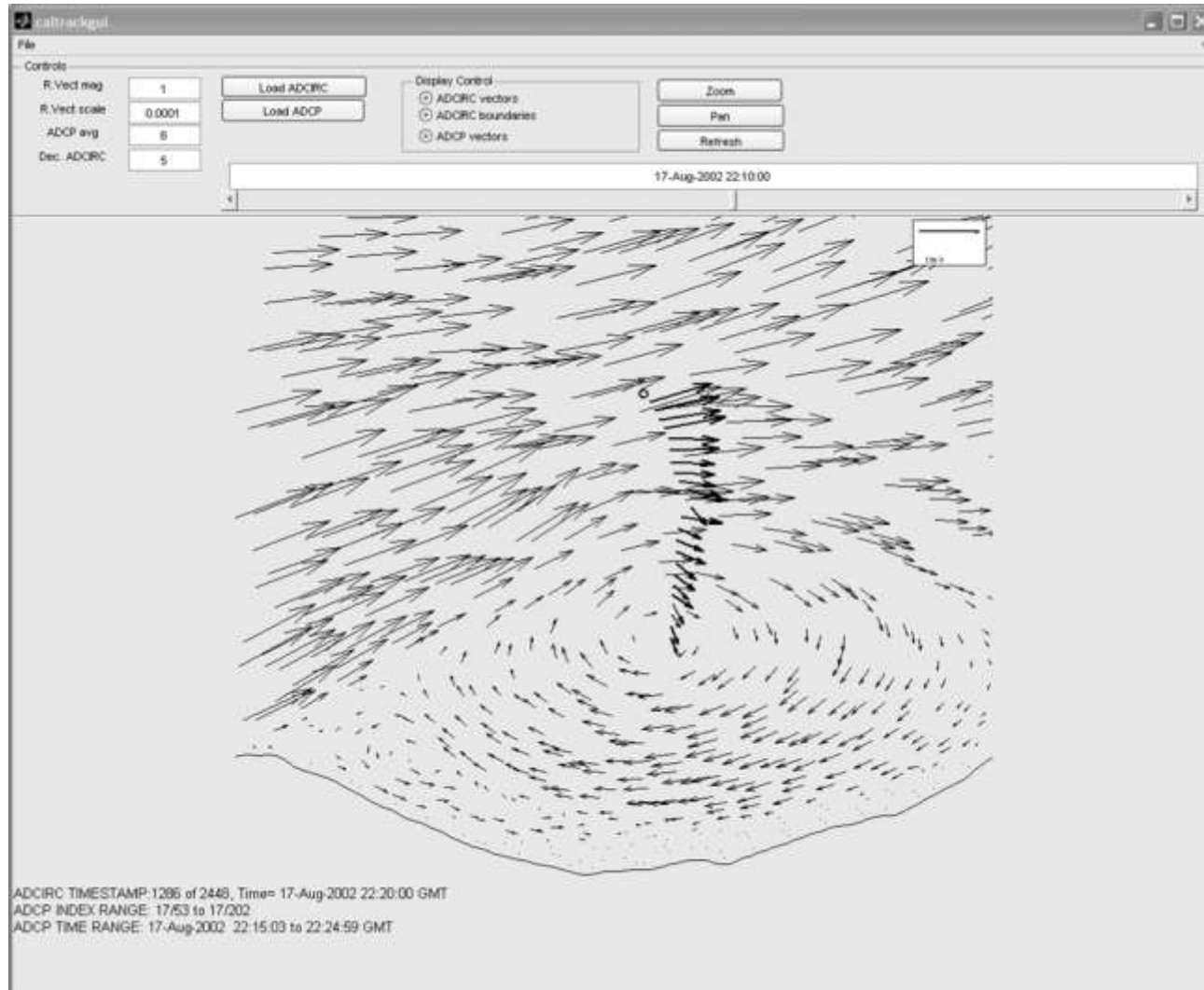


# Model- NOAA 2002 Data Comparison of the Point Woronzof Gyre





# Model - NOAA 2002 Data Comparison of the Point Woronzof Gyre +1 Hr.

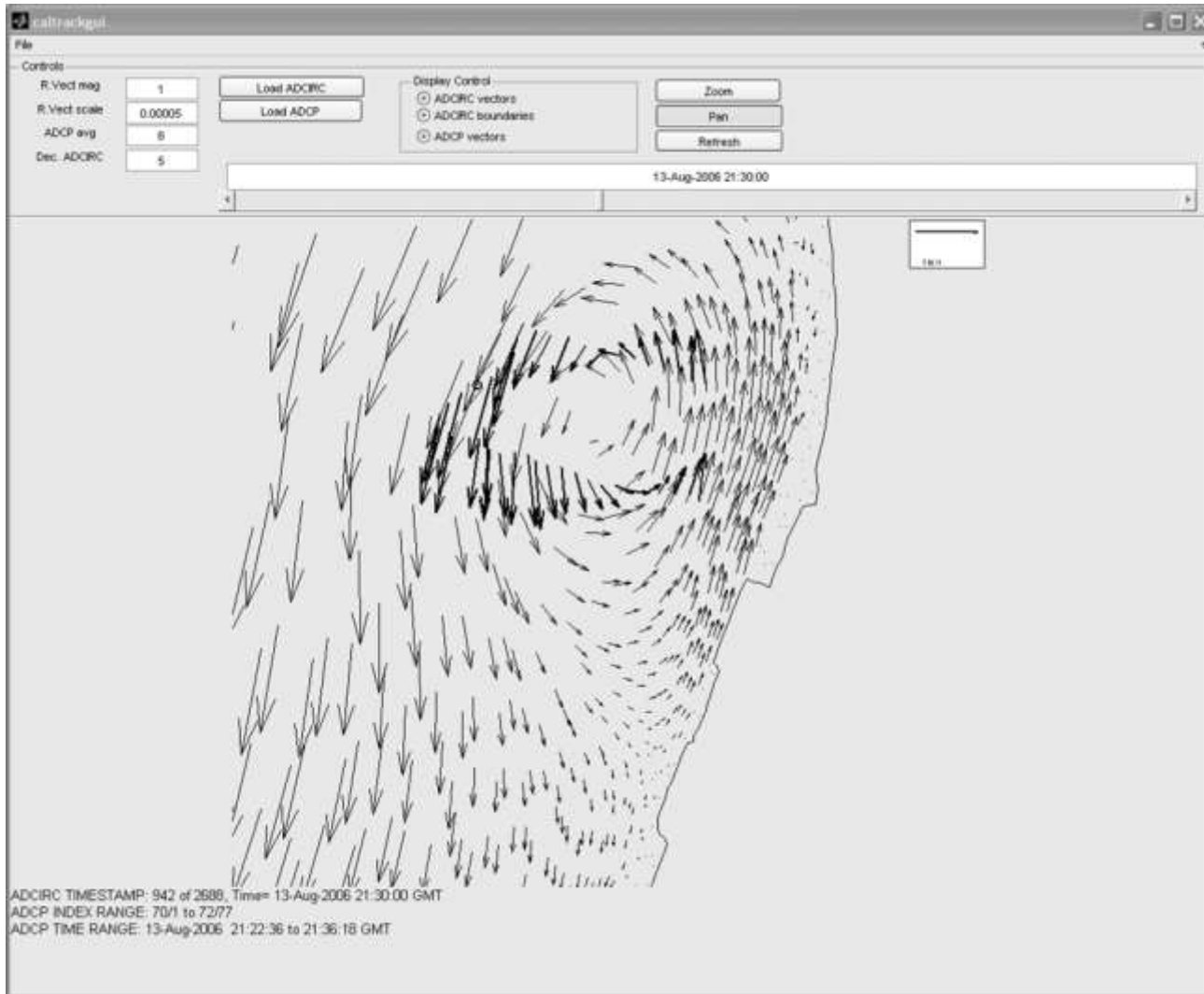


# 2006 Cairn Point Ebb Gyre Location





# Model - NOAA 2006 Data Comparison of the Cairn Point Gyre

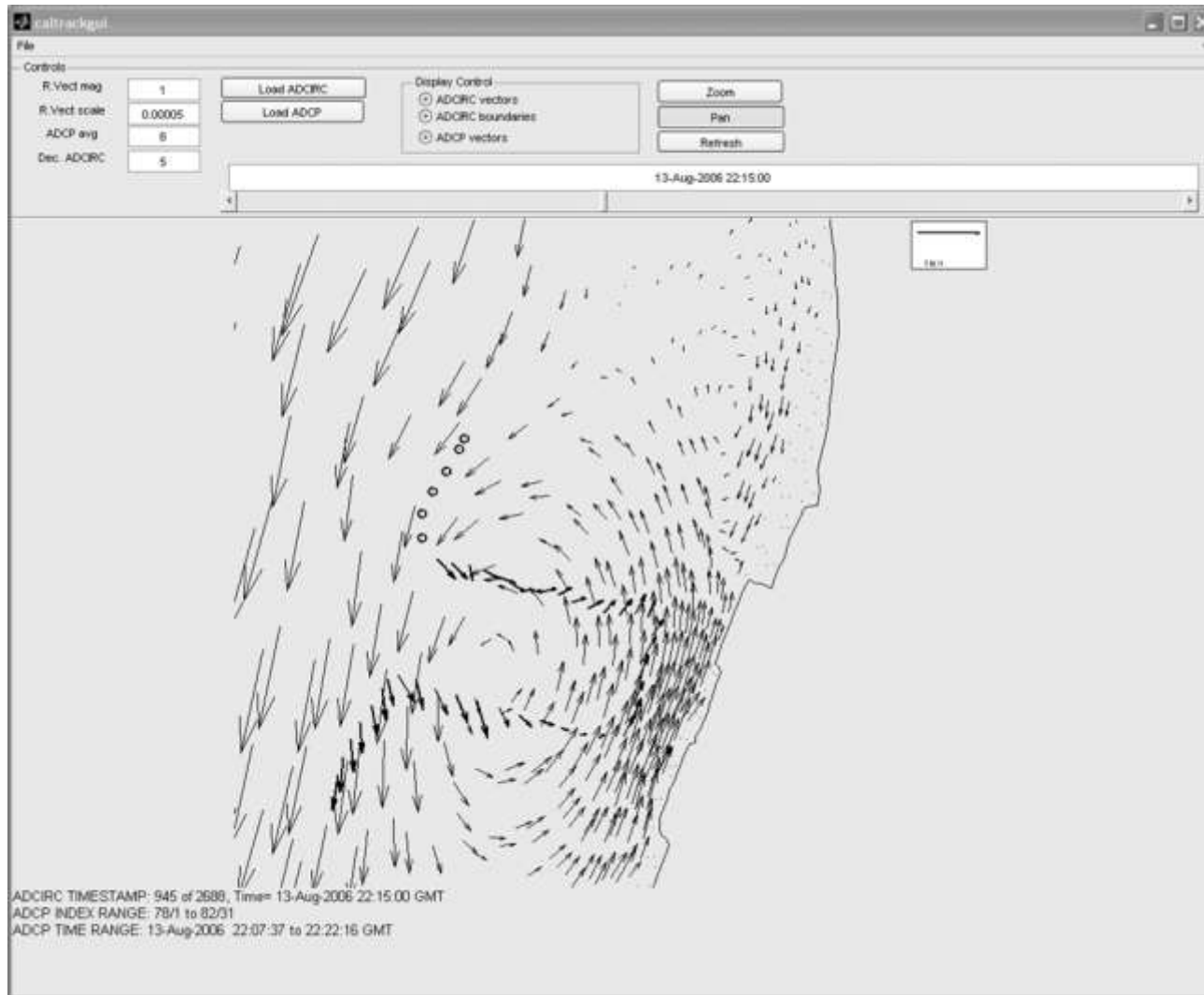




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# Model - NOAA 2006 Data Comparison of the Cairn Point Gyre + 1Hr

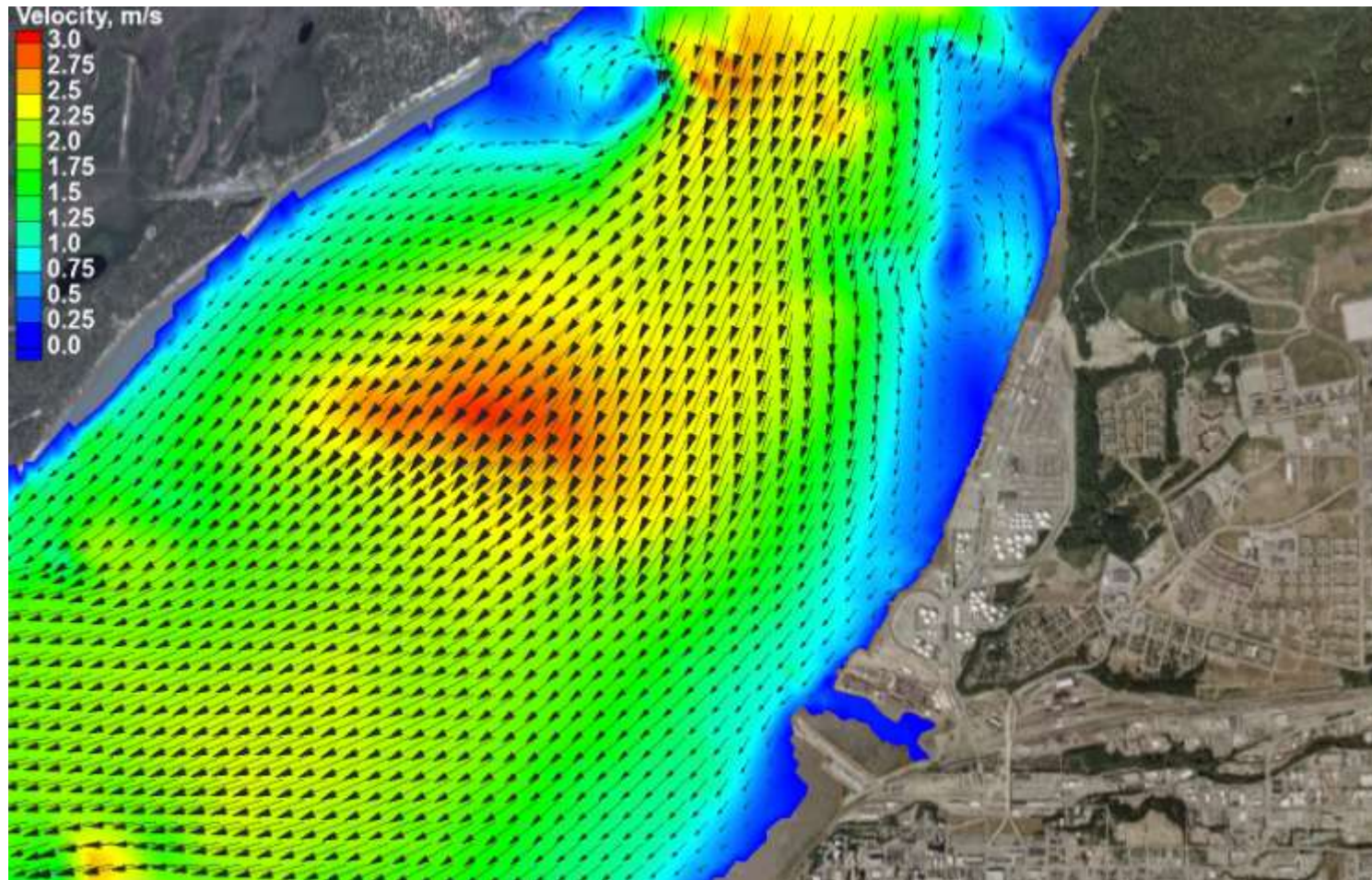




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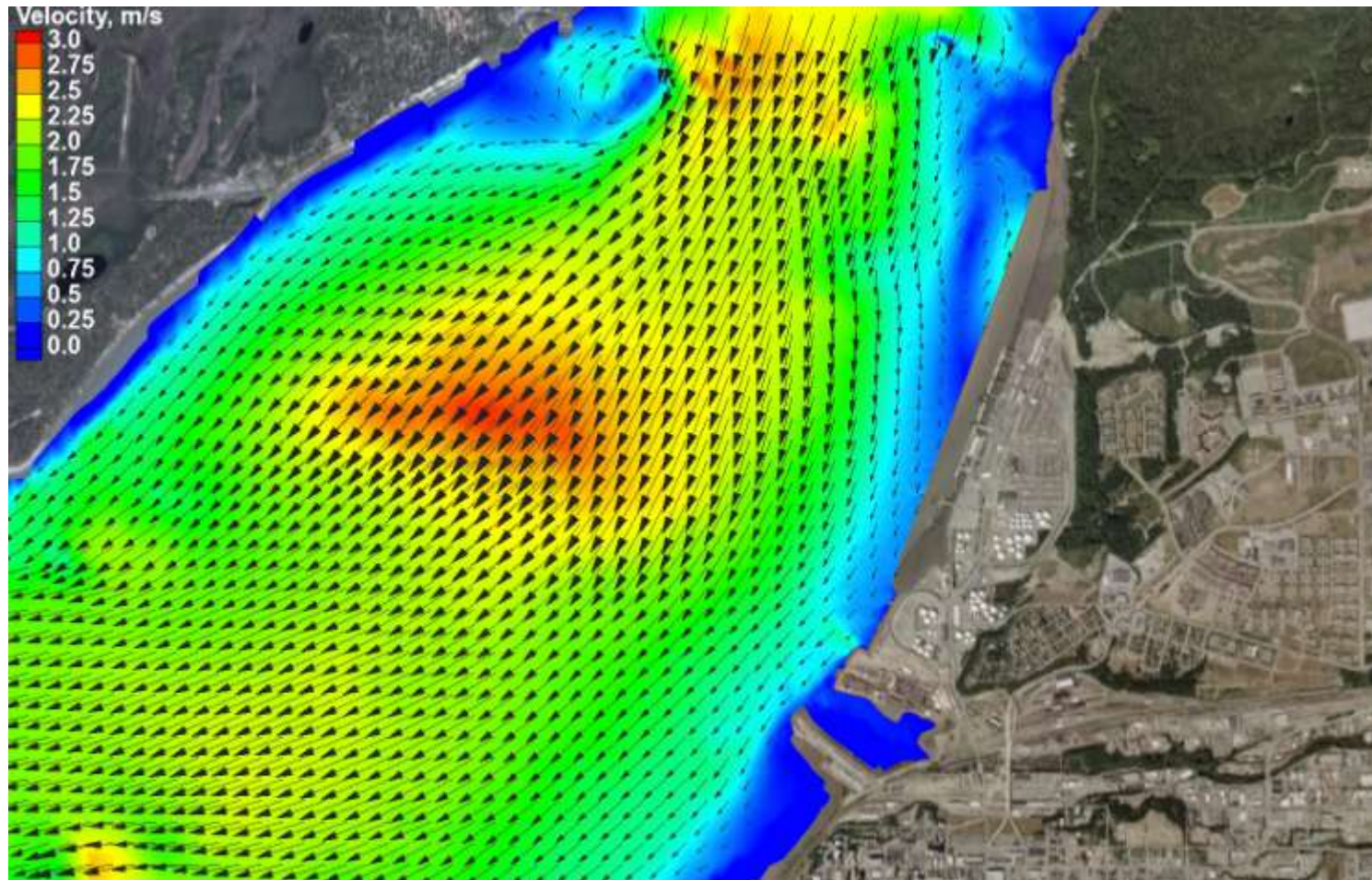
# Maximum Ebb Existing Port Configuration





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# Maximum Ebb 2012 Port Configuration





# Summary

- Calibrated 2D Hydrodynamic Model of Cook Inlet, Knik Arm and the POA
- Model and Grid Updates to Improve Predictions of Port Expansion Hydrodynamic Alteration
- Supplied Boundary and Field Input for the Ship Simulator, a 3D Mooring Forces Model and a 3D Sediment Transport Model

## Questions?