OCEANS PROTECTION PLAN

Development of Six Port-Scale Ocean Forecast Models in Canadian Waters

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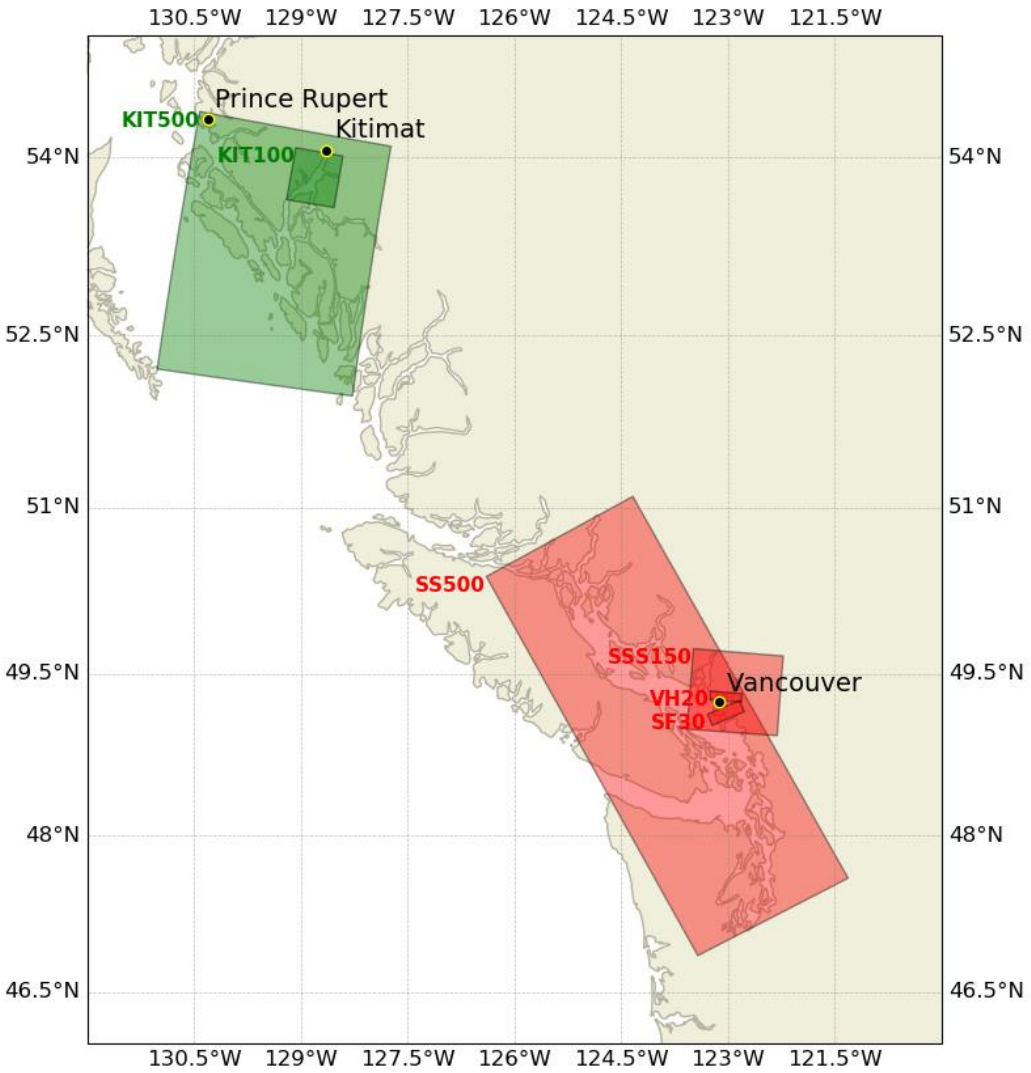
Overview of Project

- Developed six port models:
  - Pacific coast: Vancouver Harbour, Fraser River, and Kitimat
  - Atlantic coast: St. Lawrence estuary, Saint John NB, and Canso
  - Just reached end of five-year national project
- Models designed to provide data for drift prediction and for e-navigation products
- Common tools and approaches used across the six ports
- All use the CONCEPTS NEMO 3.6 codebase and ECCC systems for forcing data
  - Ocean OBC: CIOPS-E/W (~2.5 km)
  - Atmosphere: HRDPS (~2.5 km)
  - Rivers: Gauge database
- Use one-way nesting to move from coastal to port scale (~500m - ~20 m)
- All ports have a 5-6 year hindcast, as well as 2 months of forecasts

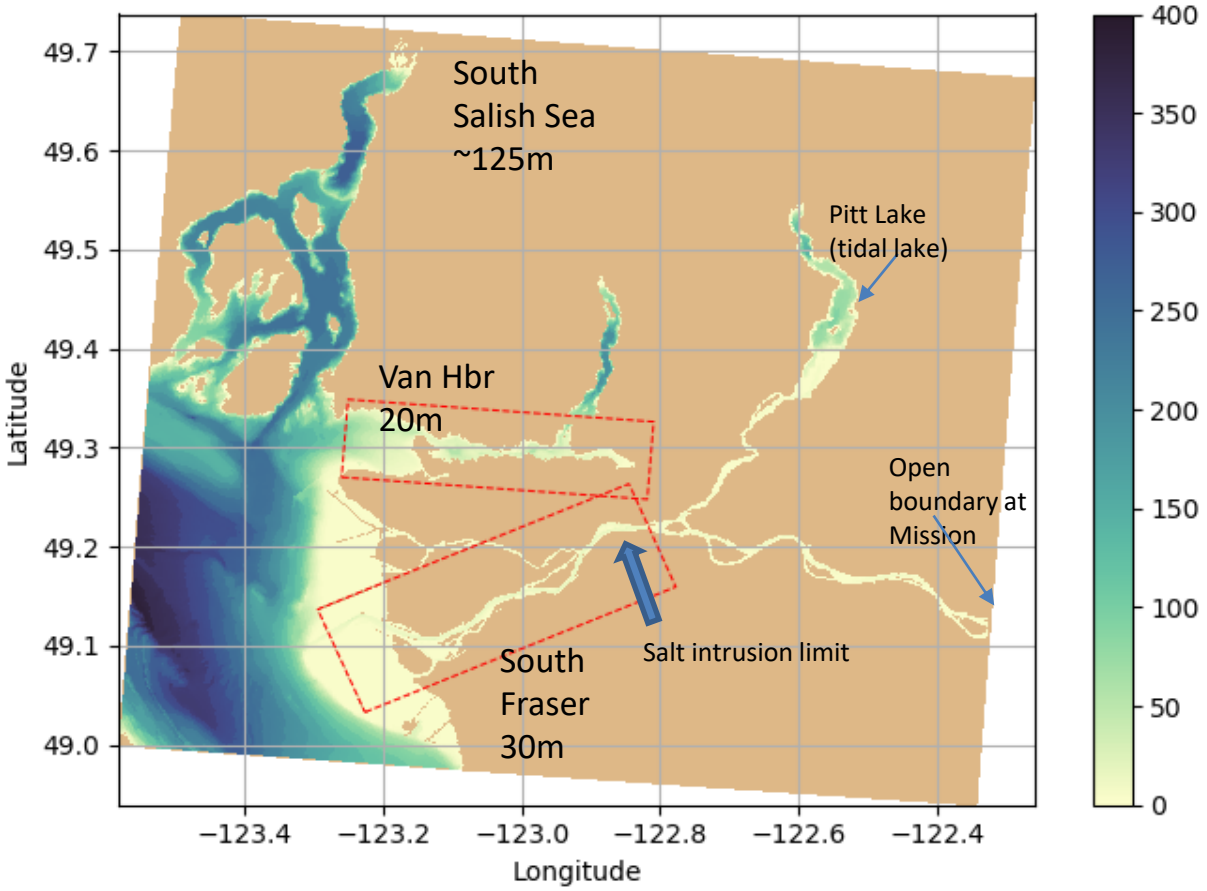
Pacific: Vancouver, Fraser, Kitimat

- Vancouver 20m:
  - Fine features, mixed tides, two narrows, runoff
- Fraser 30m:
  - River-tide interactions, mixed tides, runoff
- Kitimat 500m / 100m:
  - Extensive fjord system, complex water masses, runoff



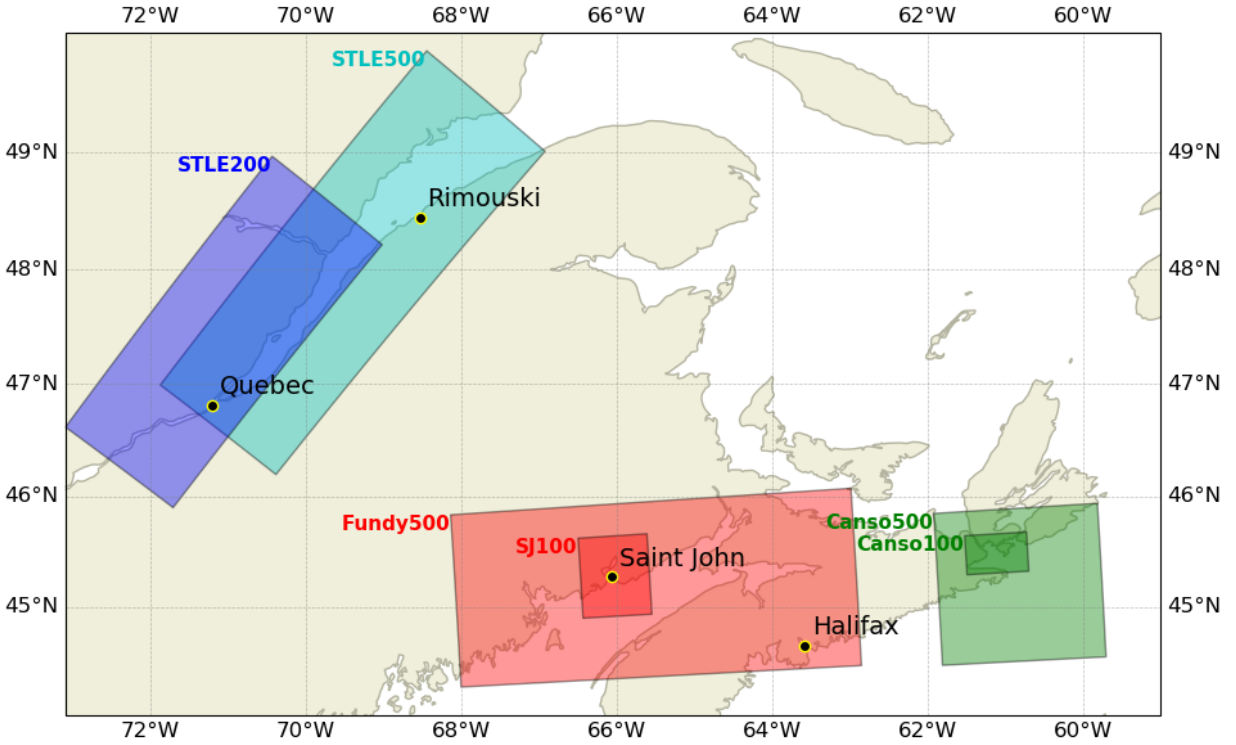
Pacific: Vancouver, Fraser, Kitimat

- South Salish Sea 150m:
- Vancouver 20m:
  - Fine features, two narrows, runoff
- Fraser 30m:
  - River-tide interactions, runoff
- Kitimat 500m / 100m:
  - Extensive fjord system, complex water masses, runoff



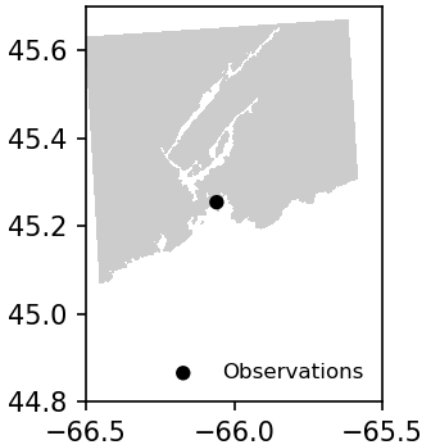
Atlantic: STLE, Saint John, Canso

- STLE 500m / 200m:
  - 1D river model, hydraulic slope, large tides, ice
- Saint John 500m / 100m:
  - Very large tides, strong tidal currents, river outflow
- Canso 500m / 100m:
  - Exposed to open ocean, narrow channels between islands



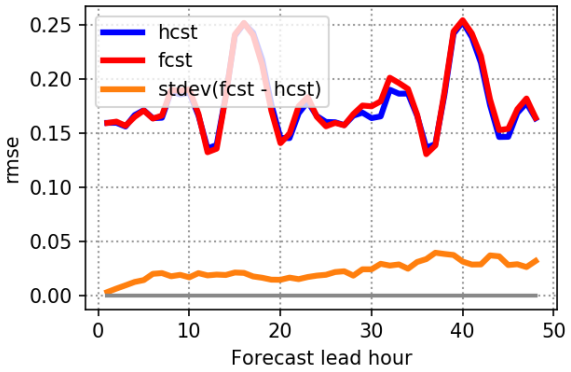
Forecasting

- Forecasts are 48 h long, run up to 4x daily
- Evaluation period is Dec 1 2021 – Jan 31 2022
- Evaluating total water level, surge, SST, and eventually currents
- RMSE calculated between model and tide gauge observations
- RMSE ranges from ~0.15 – 0.25 m over the 48 h

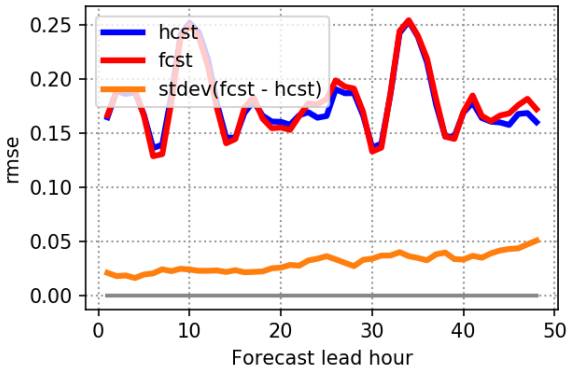


Total WL RMSE vs Forecast Lead Hour for Saint John, NB

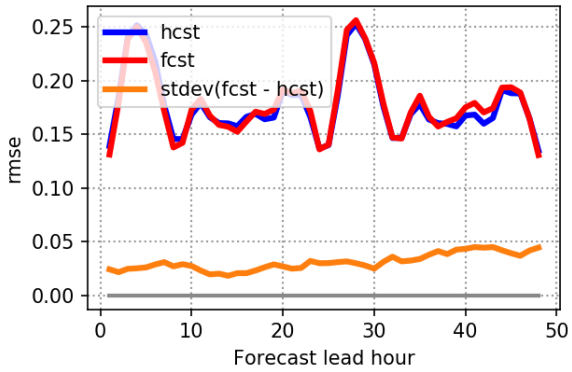
00Z Forecast



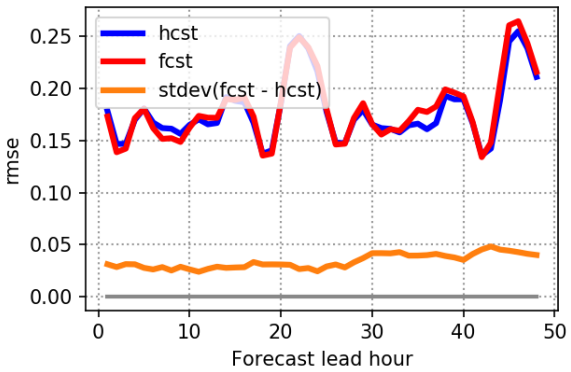
06Z Forecast



12Z Forecast



18Z Forecast



Thank you!

Interested in our models?

Please email me at stephanne.taylor@dfo-mpo.gc.ca

or my colleagues