Coastal Modelling and SWOT Simulation

Zhimin Ma, Guoqi Han

Fisheries and Oceans Canada

Northwest Atlantic Fisheries Centre

Canada

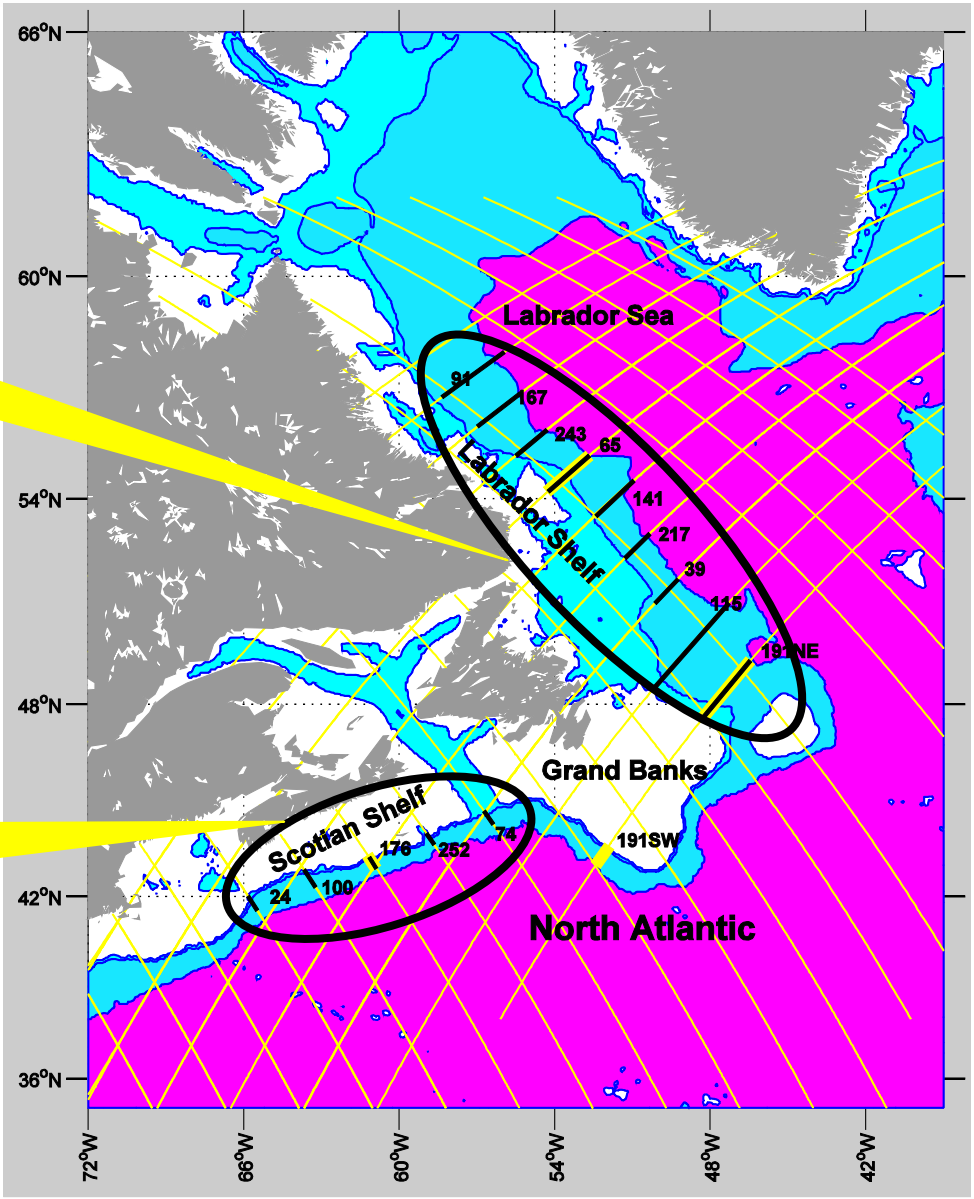
SWOT ST Meeting, June 26-28, 2017

Canada

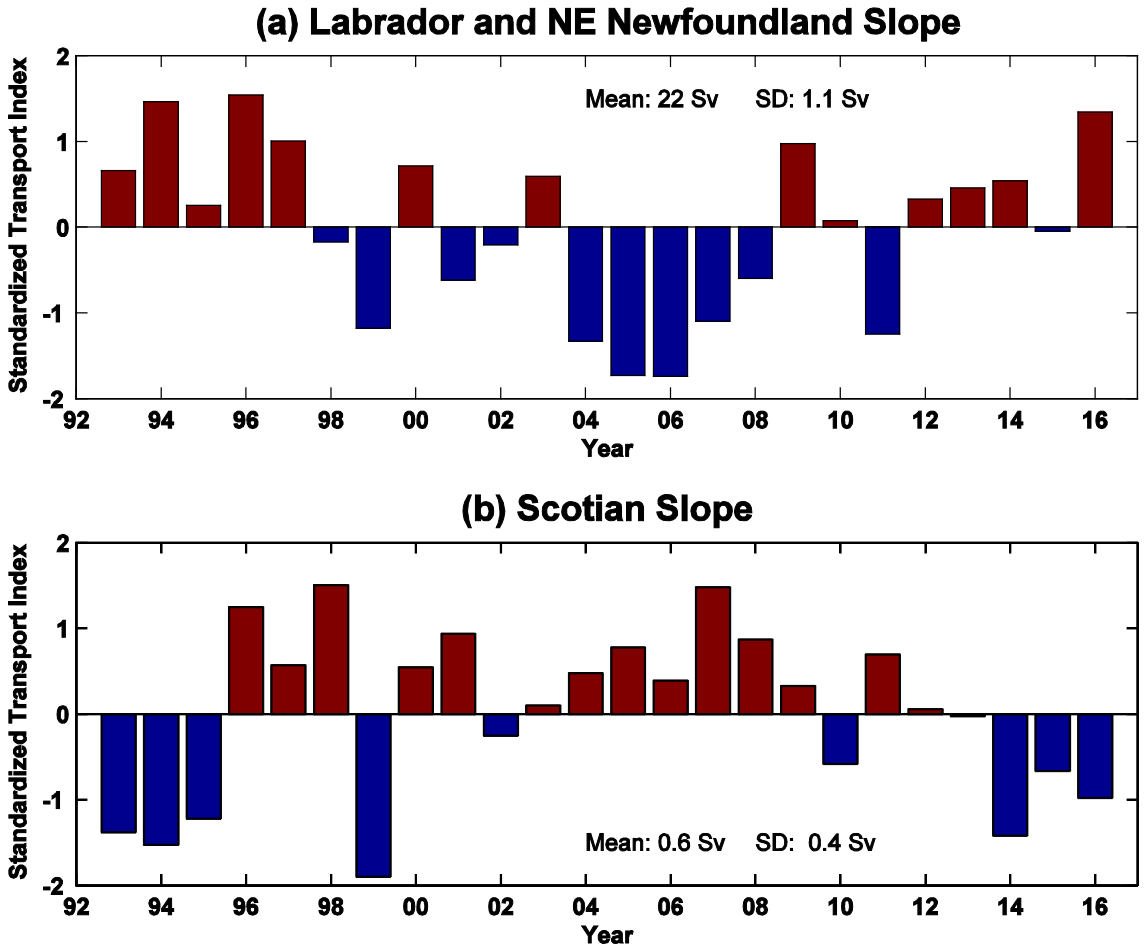

Hudson Strait
GREENLAND
Labrador Sea
Irminger Sea
LABRADOR
Northeast Newfoundland Shelf
Grand Banks of Newfoundland
Flemish Cap

Labrador & NE Nfld Slope

Scotian Slope



Canada



- **In 2016 LC transport was above normal by about 1.5 SD over the Lab and NE Nfld Slope and below normal by 1 SD over the Scotian Slope**

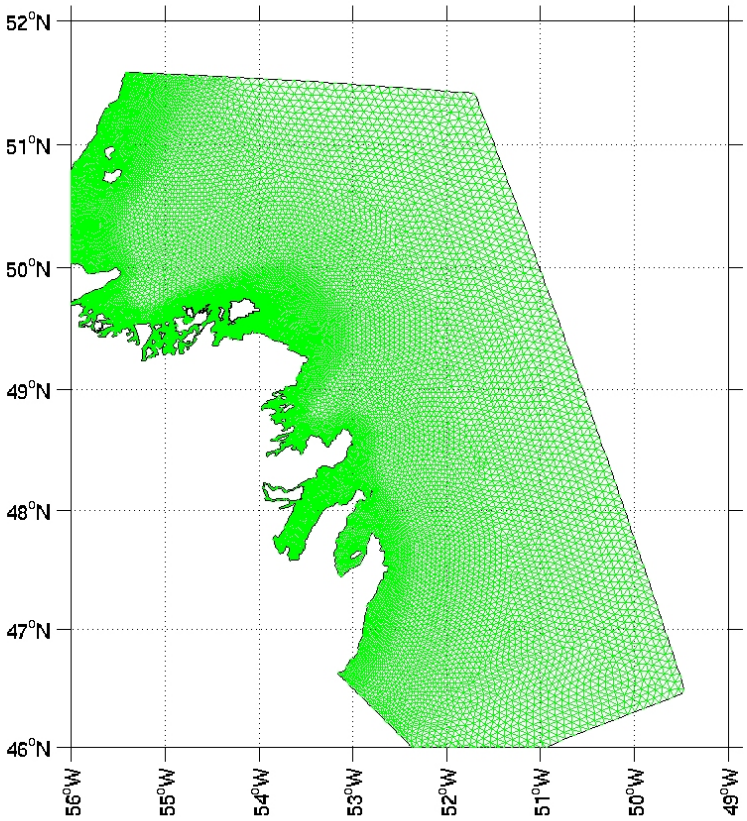
Han et al. (2010; 2014)

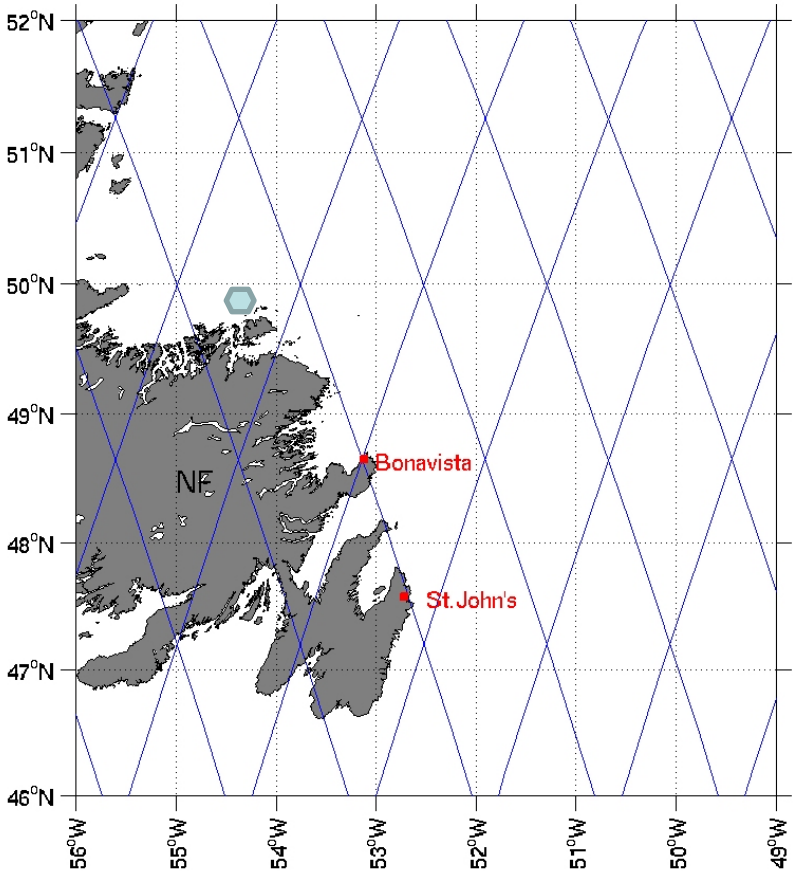
Coastal Ocean Model

- Coastal waters of Newfoundland, Canada
- A Finite-Volume Community Ocean Model (FVCOM, Chen et al., 2003; 2011)
- Horizontal grid size from tens of meters to a few kilometers
- Model running period: May 1, 2016 to June 30, 2016
- Results for the last 21 days are used

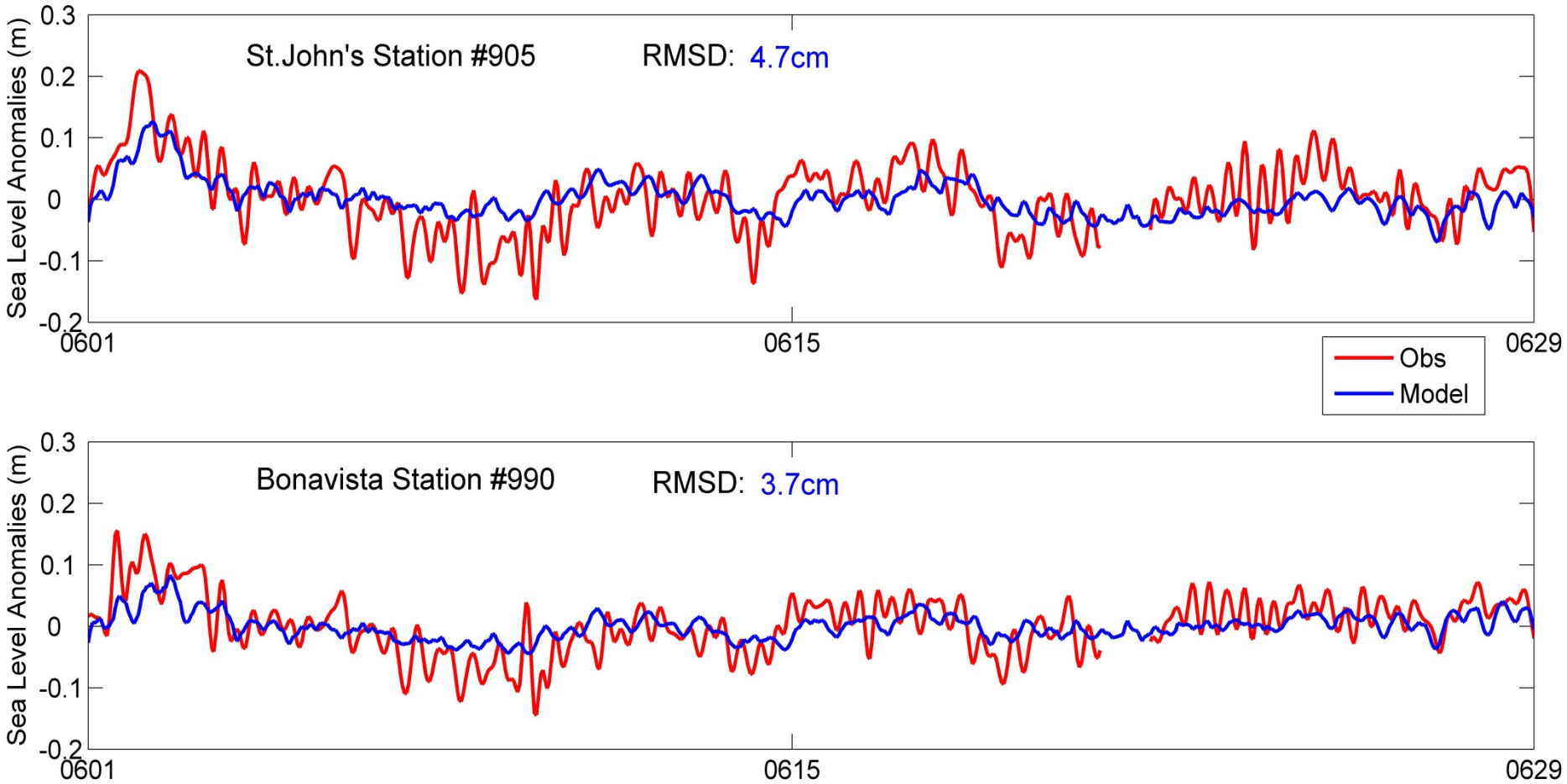
SWOT Simulator

- SWOT simulator (Version 1.1, Gautier et al., 2016)
- Six main errors considered: KaRin noise, roll error, phase error, baseline dilation error, timing error and wet tropospheric correction error
- 21 days (one cycle) data are studied.


52°N
51°N
50°N
49°N
48°N
47°N
46°N
56°W
55°W
54°W
53°W
52°W
51°W
50°W
49°W

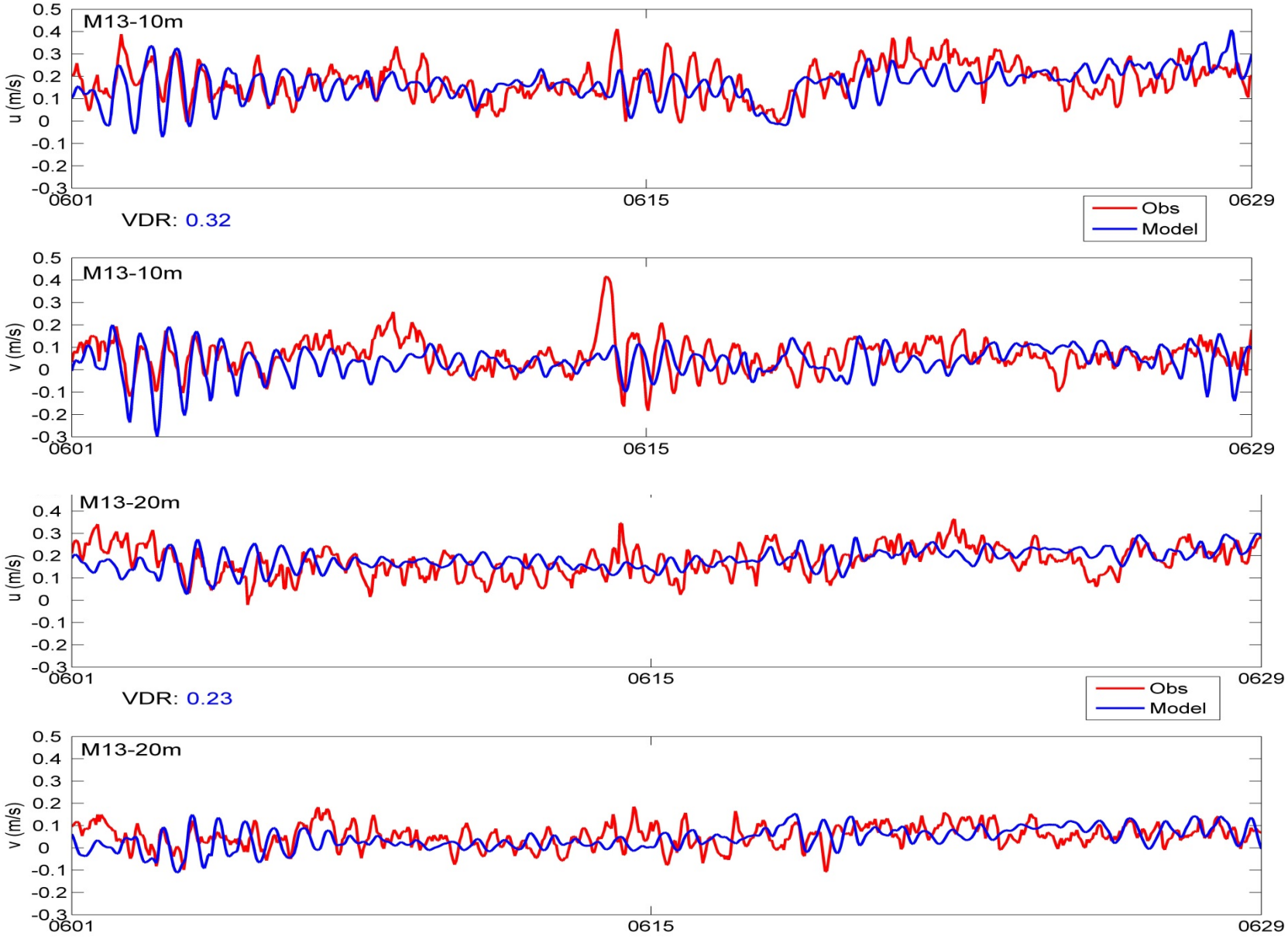

52°N
51°N
50°N
49°N
48°N
47°N
46°N
NF
Bonavista
St. John's
56°W
55°W
54°W
53°W
52°W
51°W
50°W
49°W

De-tided Hourly Sea Level Anomalies

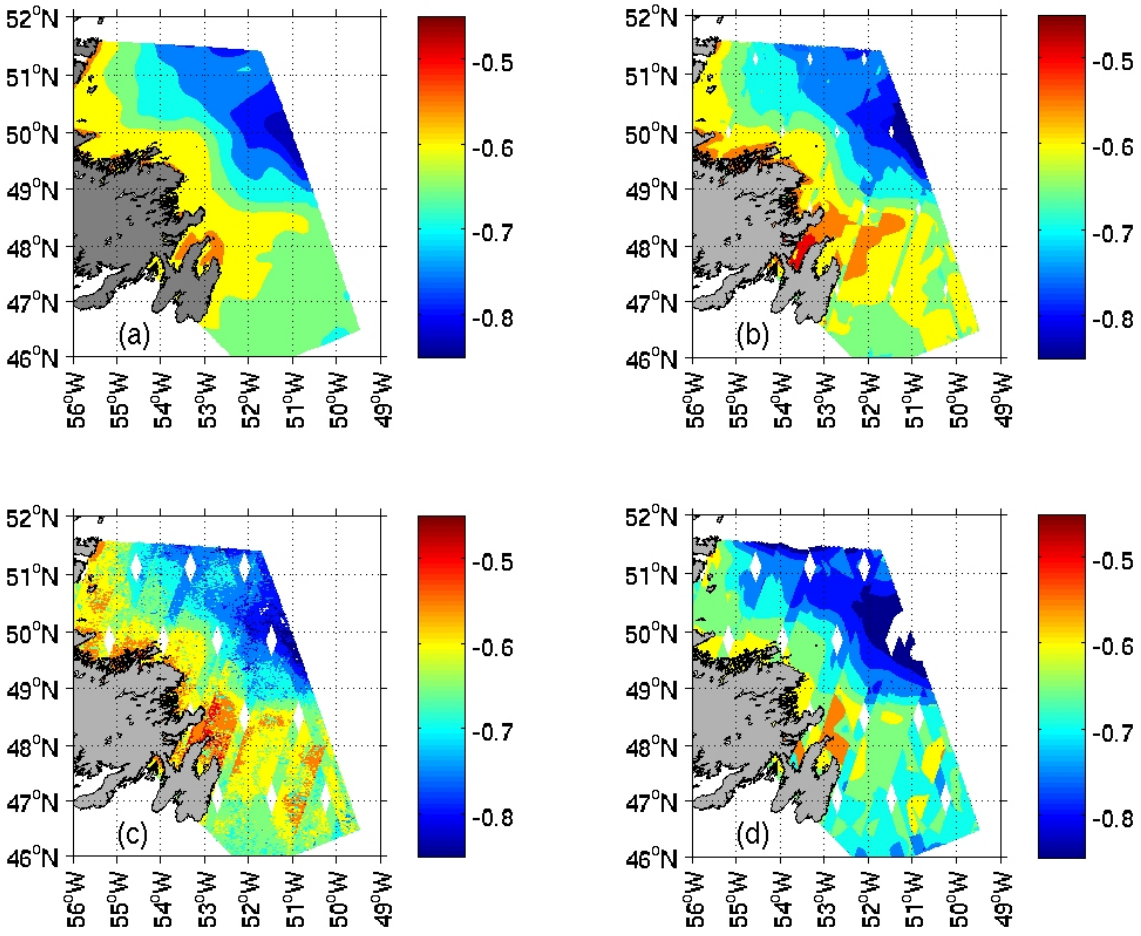


Fisheries and Oceans Canada | Pêches et Océans Canada

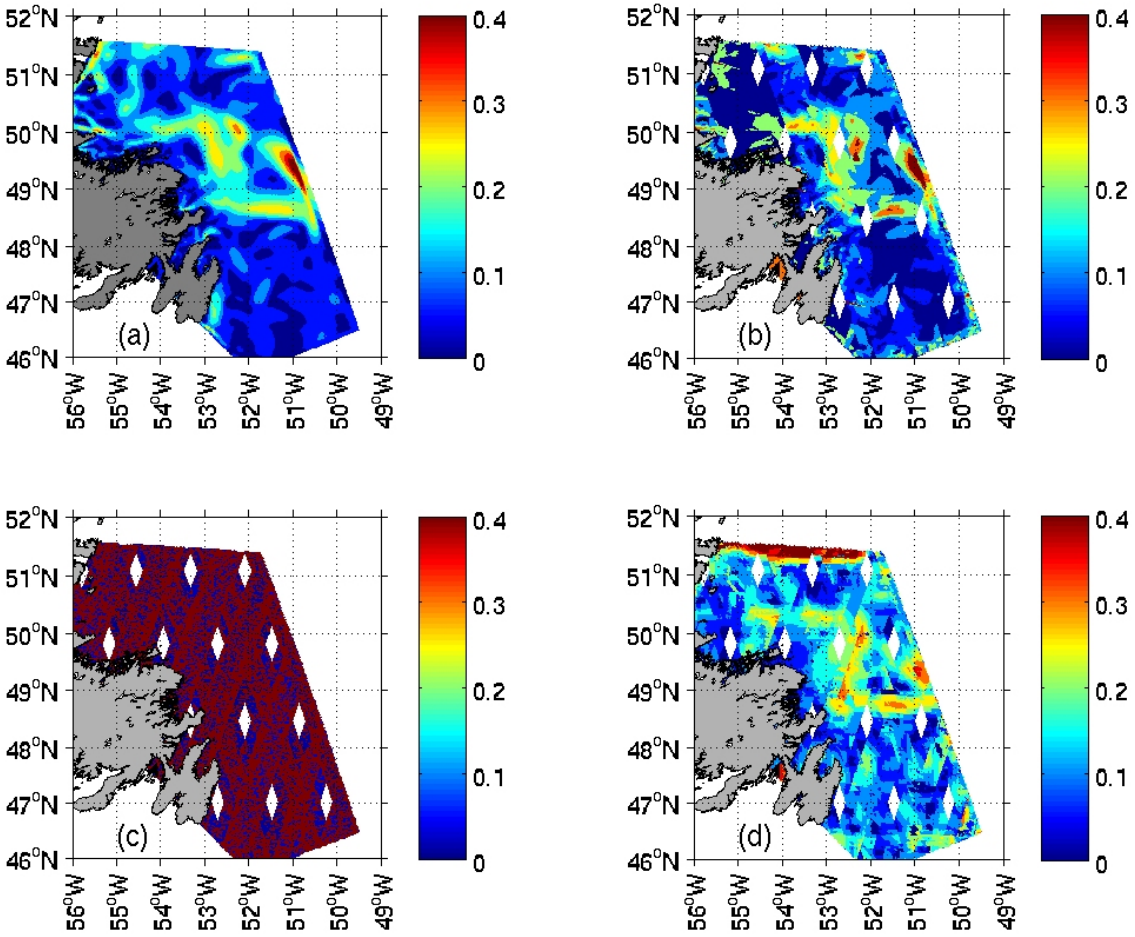
Non-tidal Currents



SSH (m)


52°N
51°N
50°N
49°N
48°N
47°N
46°N
56°W
55°W
54°W
53°W
52°W
51°W
50°W
49°W
-0.5
-0.6
-0.7
-0.8
(a)
(b)
(c)
(d)

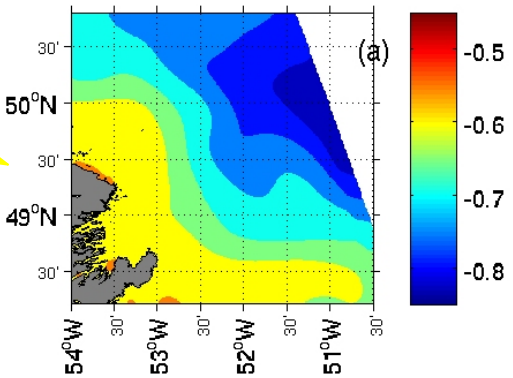
Surface Geostrophic Currents (m/s)

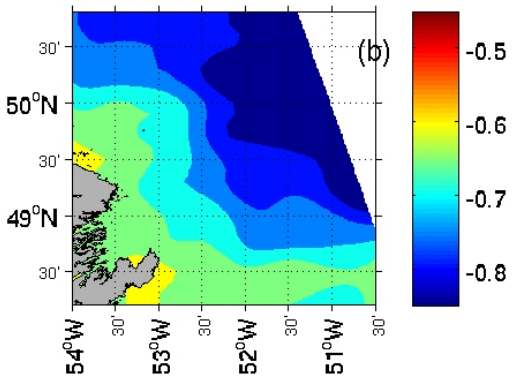


Truth

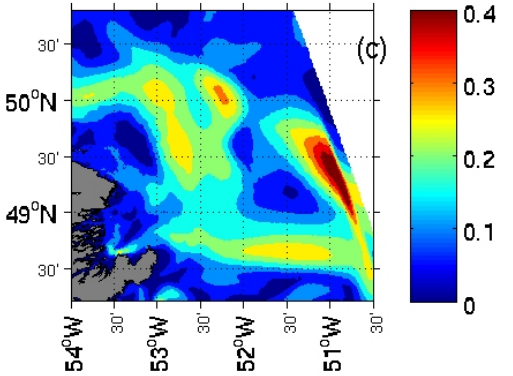
Mapped

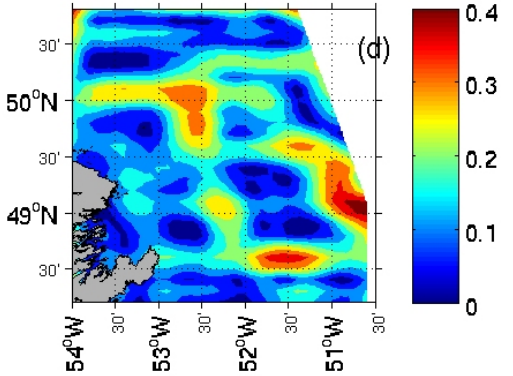
SSH (m)





Geostrophic Currents (m/s)



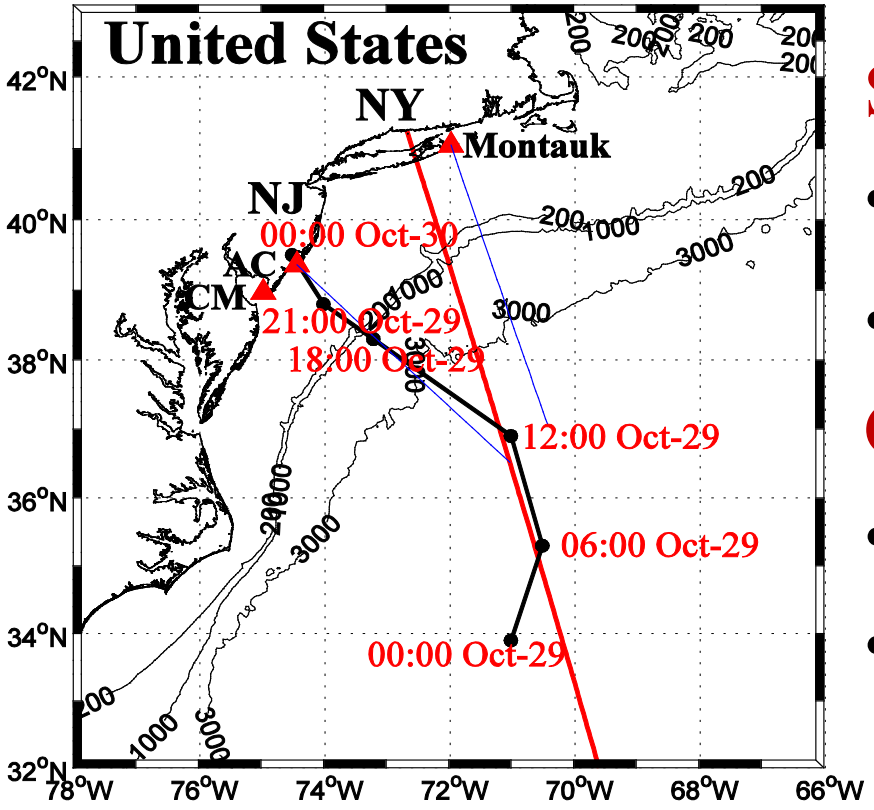


Canada

Summary

- The inshore Labrador Current is captured fairly (better) by spatial filtering of SWOT-like data within each swath (by mapping).
- We will work on assimilating SWOT-like data into the FVCOM model.

Hurricane Sandy by HY-2A



Surge magnitude at the coast:

- Tide gauge: 1.73 m
- Altimetry: 1.83 ± 0.04 m

Cross-shelf decay scale:

- Tide gauge: 75 km
- Altimetry: 68 ± 5 km

Chen et al., 2014

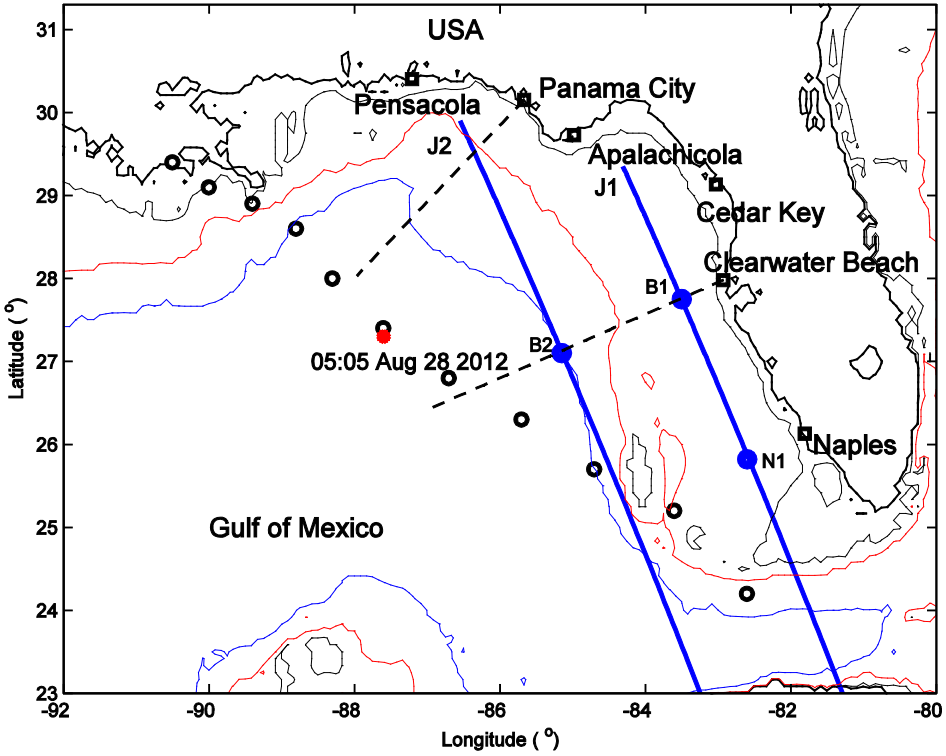
Hurricane Isaac by Jason-1 and Jason-2

Surge magnitude at the coast:

- Tide gauge: 0.58 m
- Altimetry: 0.60 m

Cross-shelf decay scale:

- Tide gauge: 190 km
- Altimetry: 190-220 km



Han et al., 2017