



Laboratoire d'études des littoraux nordiques et arctiques
Northern and Arctic coastal research lab
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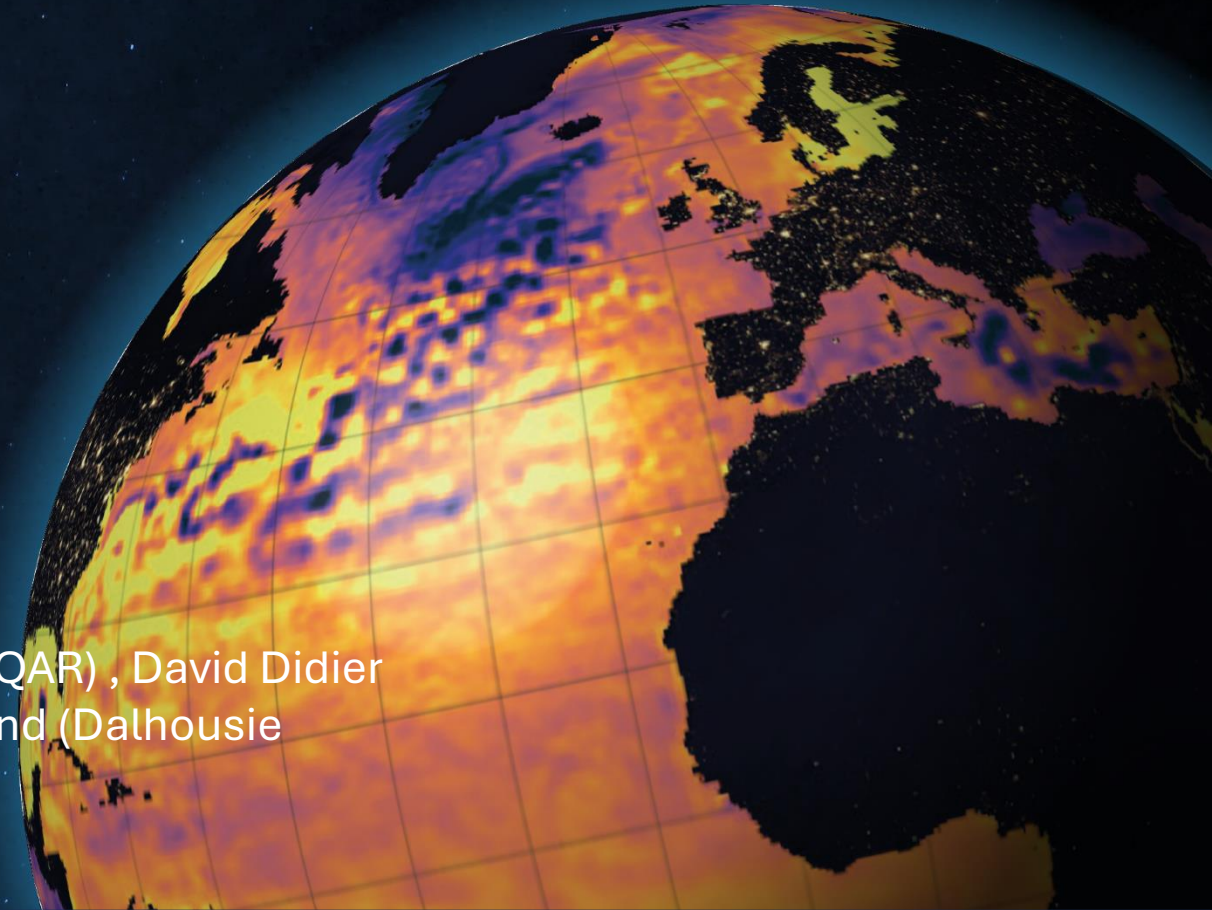
In partnership with



2021 United Nations Decade
2030 of Ocean Science
for Sustainable Development

A coastal hazard prediction system in the Canadian High Arctic to answer community needs

Jérémy Baudry (UQAR-ISMER), Charles Jourdain Bonneau (UQAR), David Didier (UQAR), Terry Noah (Ausuittuq Adventures), Erin Marie Bertrand (Dalhousie University), Dany Dumont (ISMER-UQAR)



IVIQ Hunters and Trappers Organization



Polar Knowledge Canada



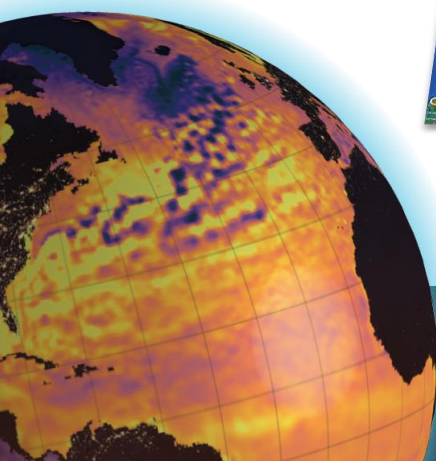
NSERC
CRSNG



Crown-Indigenous Relations and Northern Affairs Canada
Relations Couronne-Autochtones et Affaires du Nord Canada

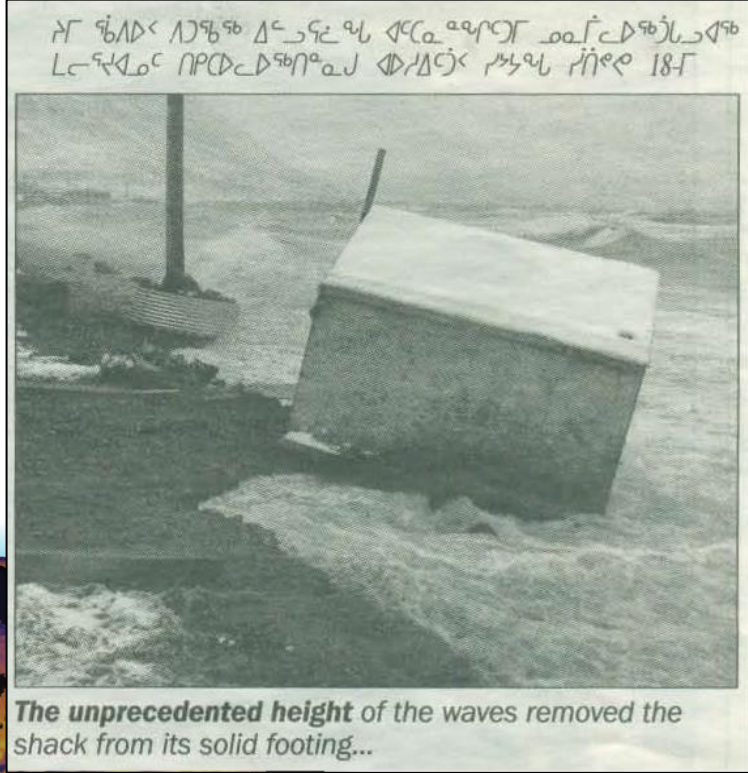
○ Grise Fiord (NU) ^{ᑭᑭ} The place that never thaws

..until recently



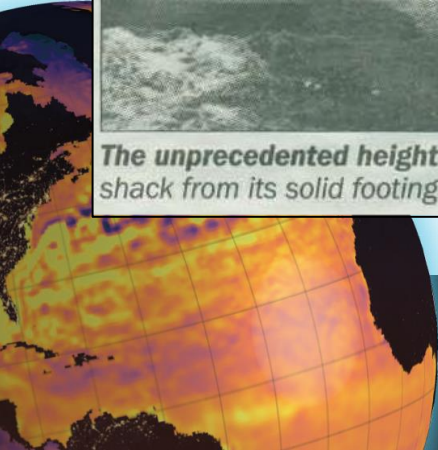
○ Coastal hazards in Grise Fiord

Local observations over the last decade



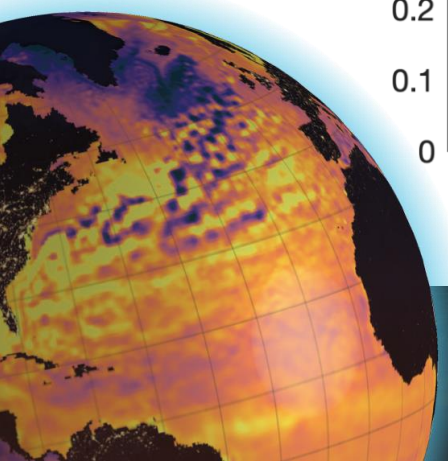
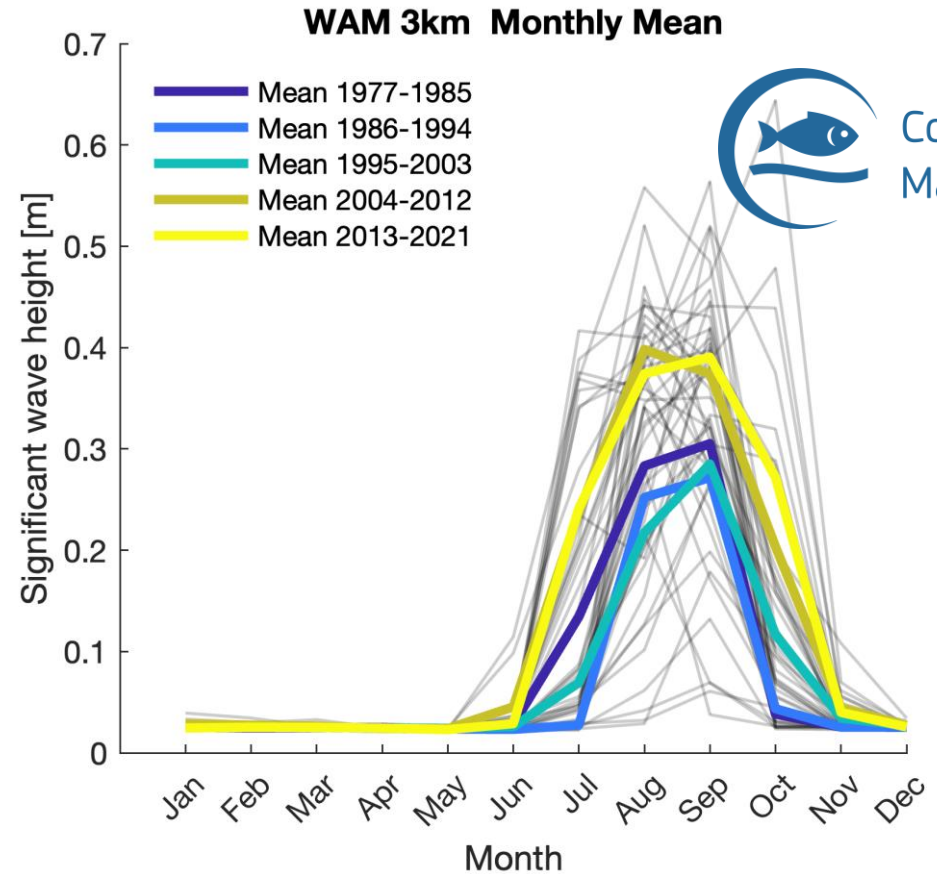
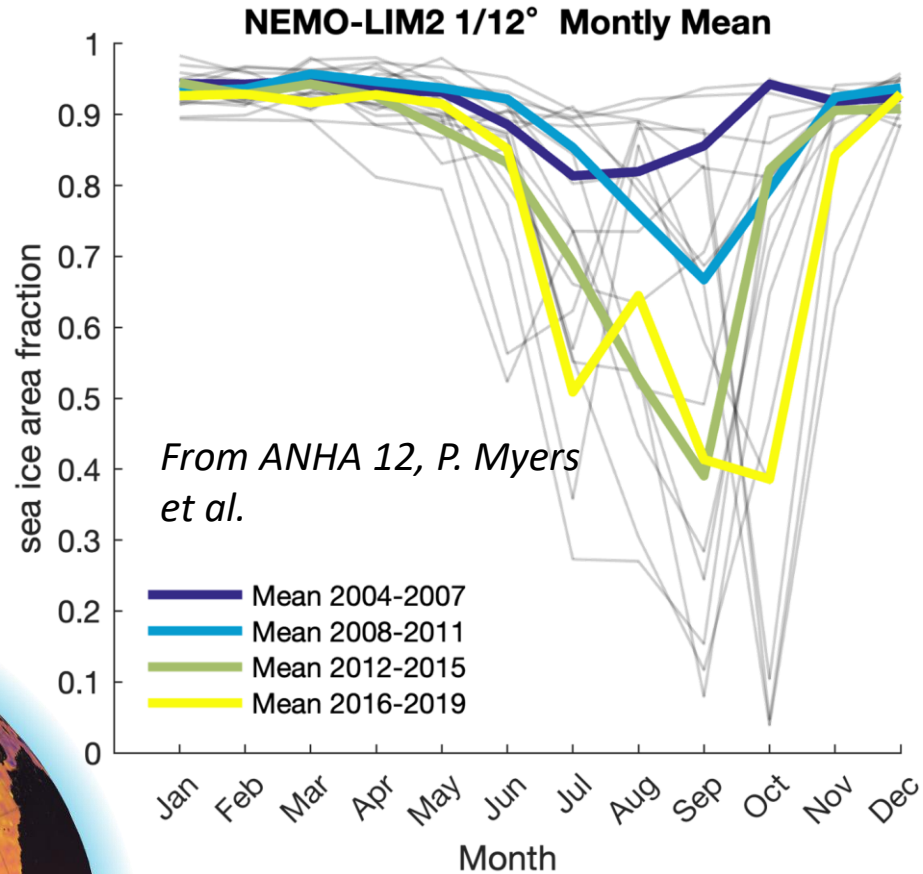
Pictures by Bernard Ungalaaq Maktar in the Nunatsiaq News on August 20 2016. ►

◀ Photo by Jimmie Qaapik in the NNSL media, September 18 2011



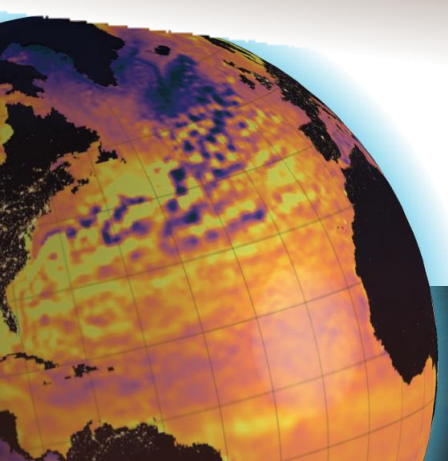
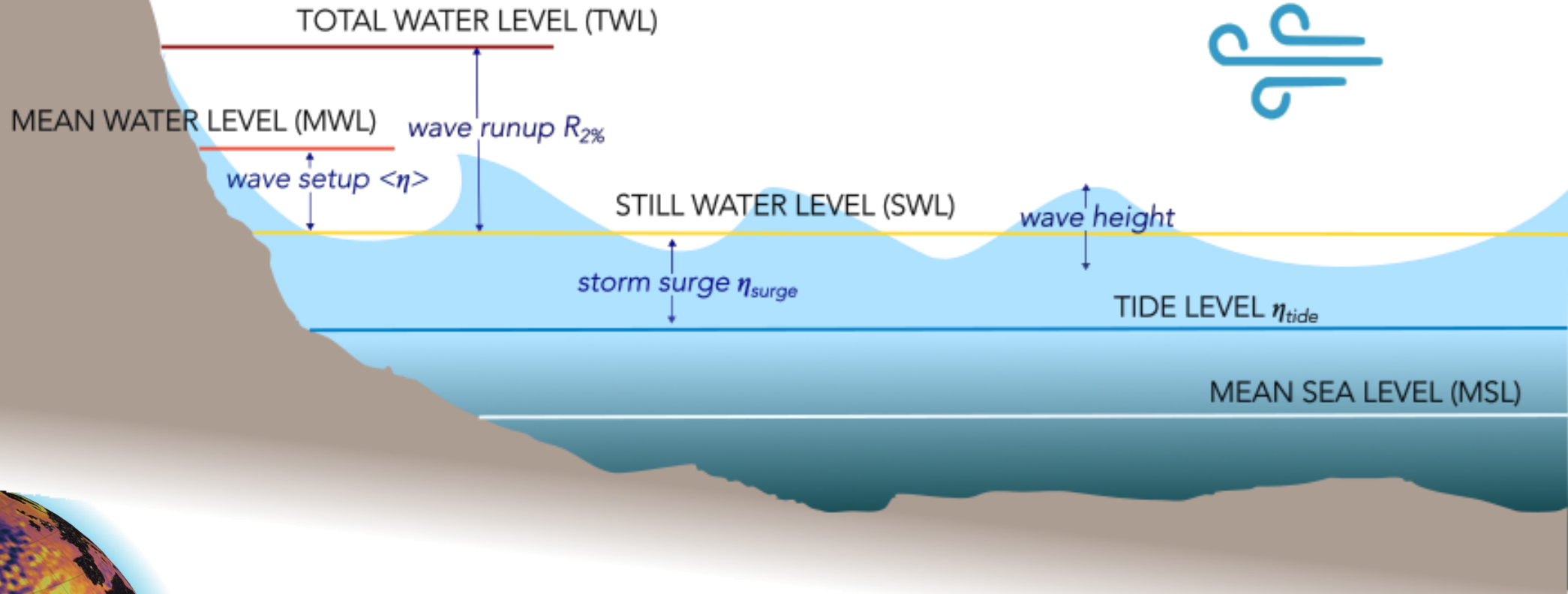
○ Coastal hazards in Grise Fiord

Increased vulnerability due to climate change

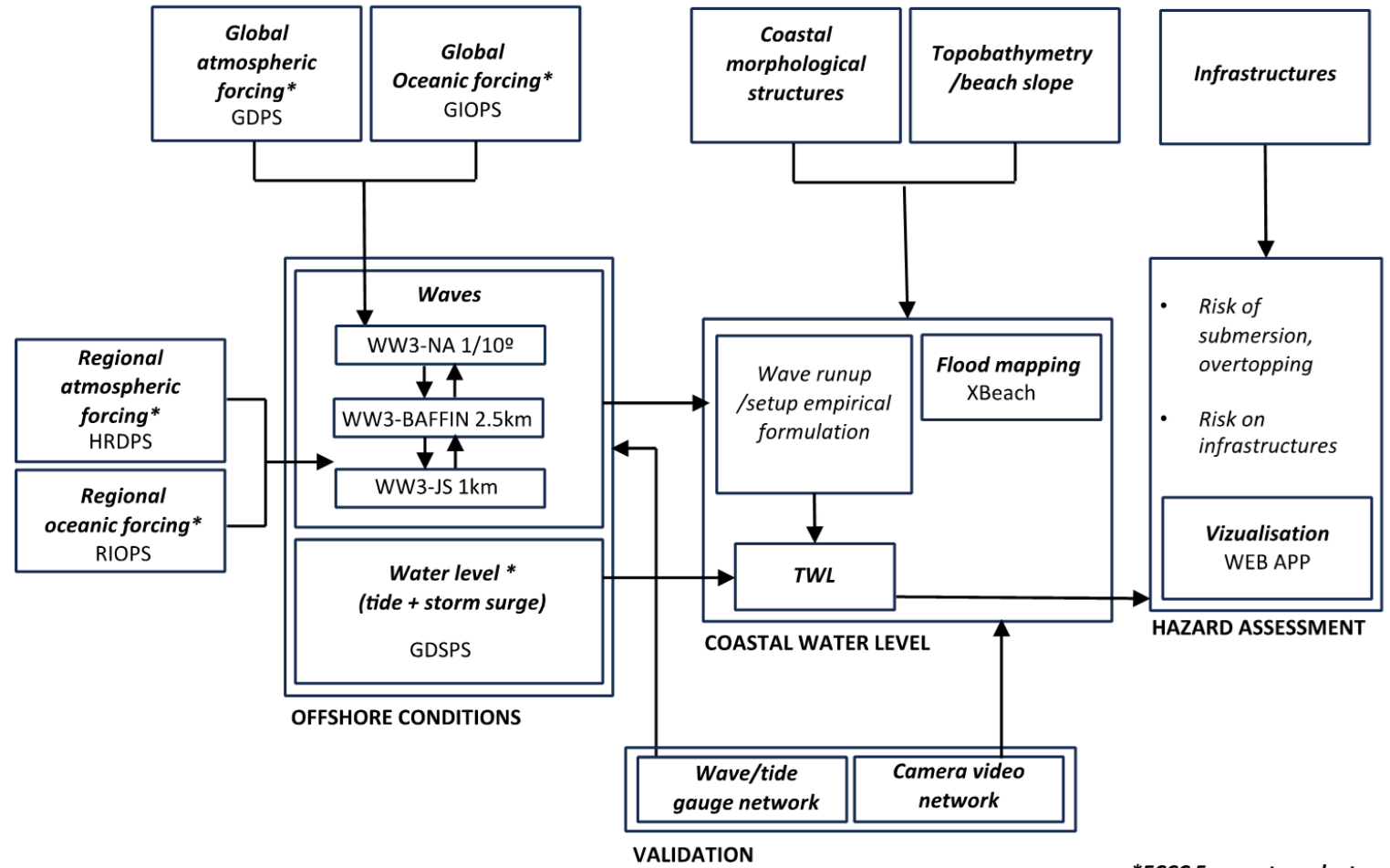
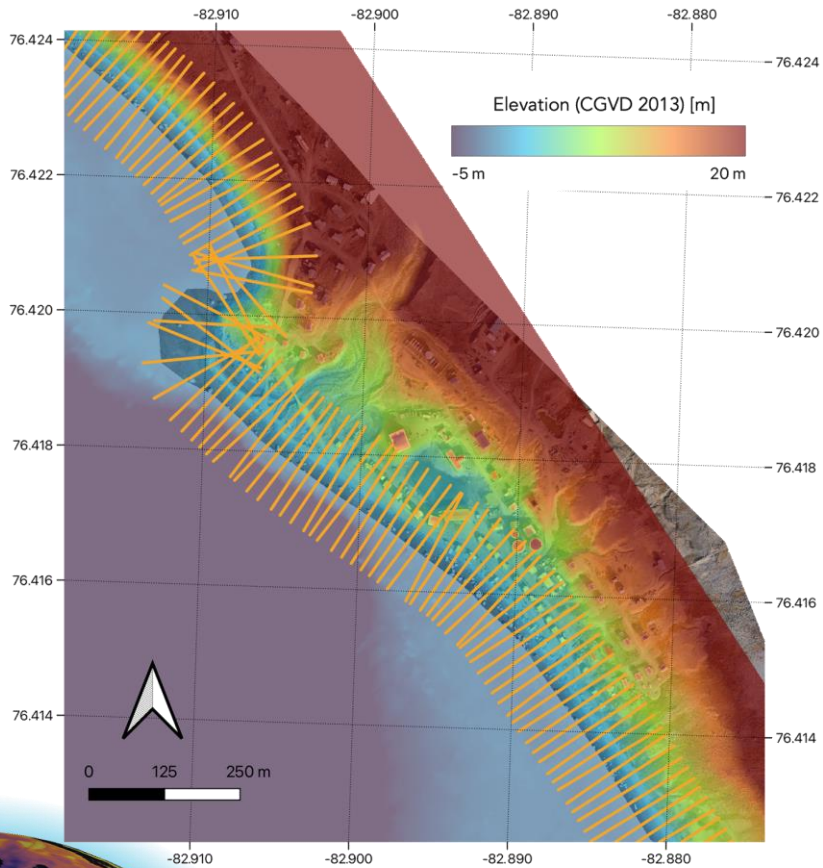


○ Predicting coastal Total Water Level

$$TWL = \overbrace{\eta_{tide} + \eta_{residual}}^{SWL} + R_{2\%}$$

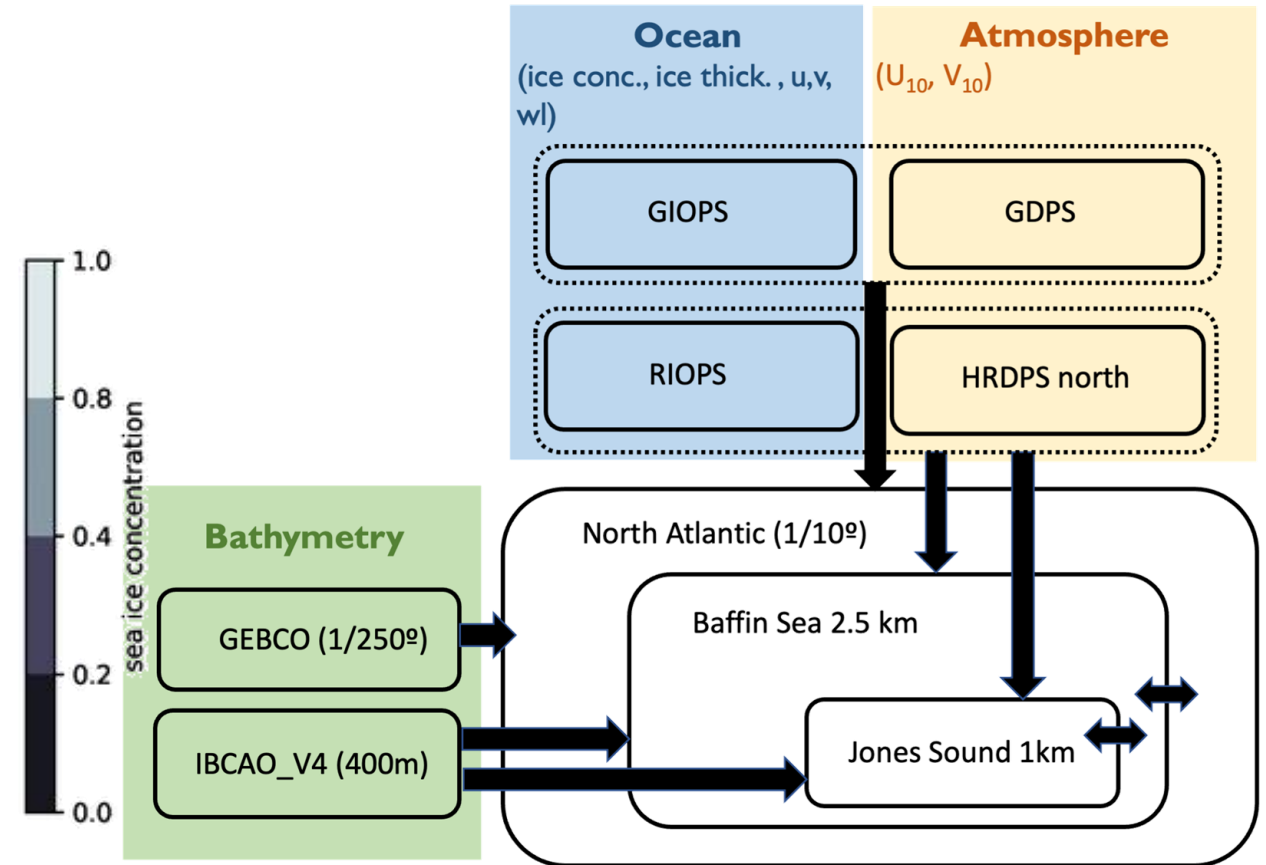
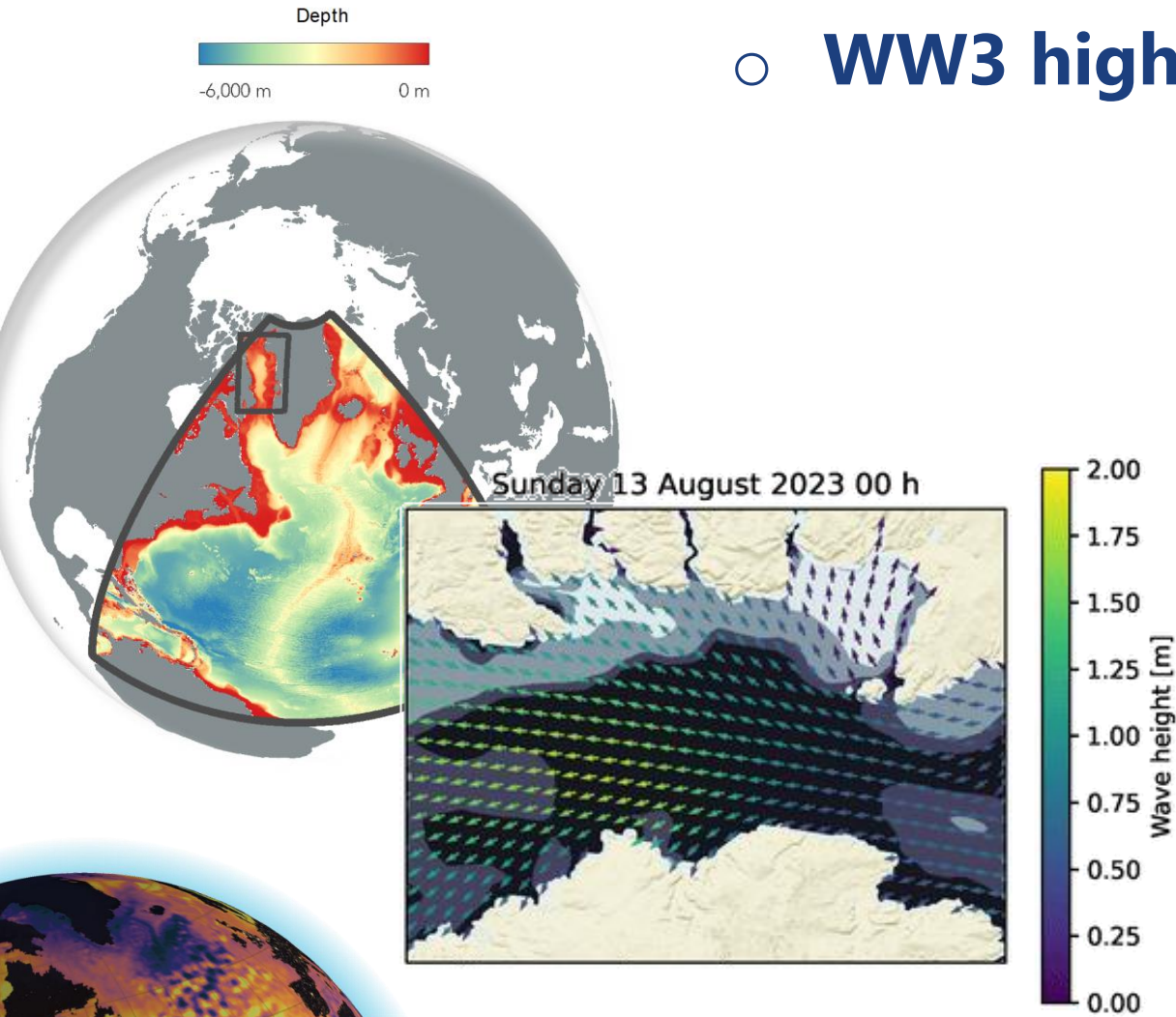


Predicting coastal Total Water Level



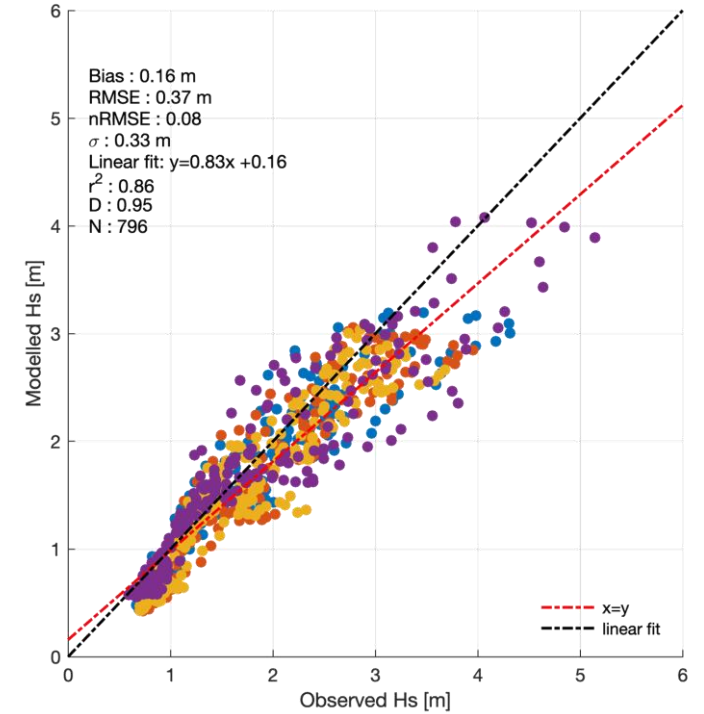
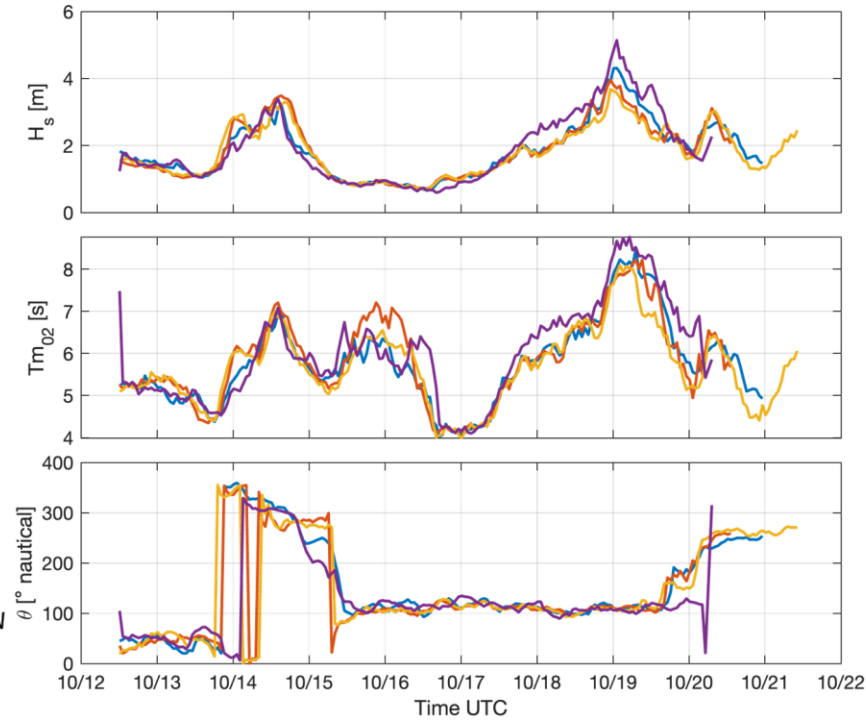
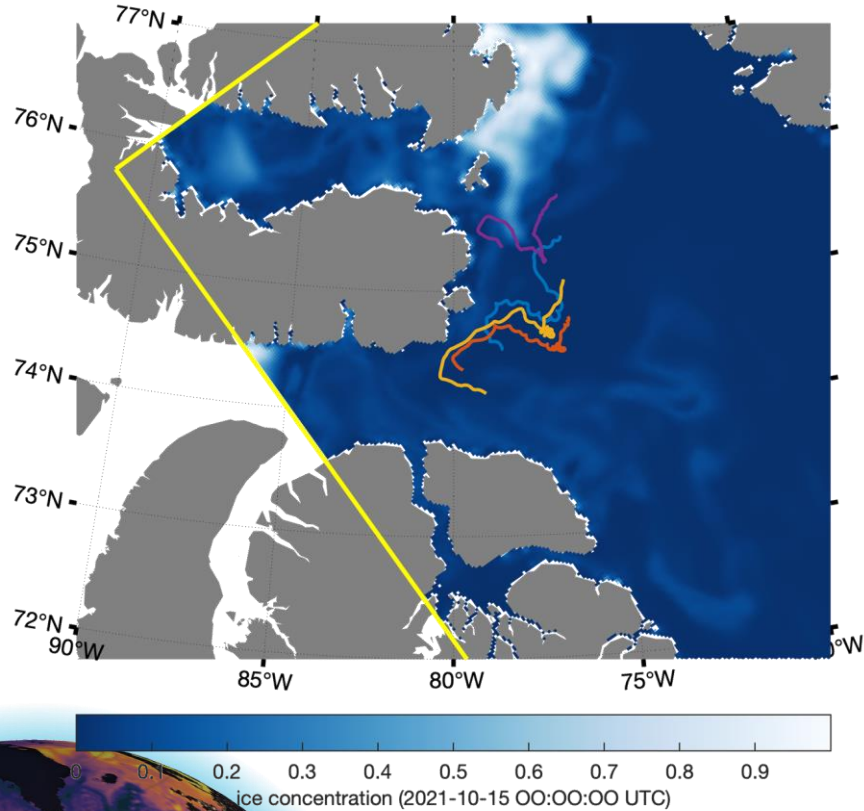
*ECCC Forecast products

○ WW3 high-resolution wave configuration

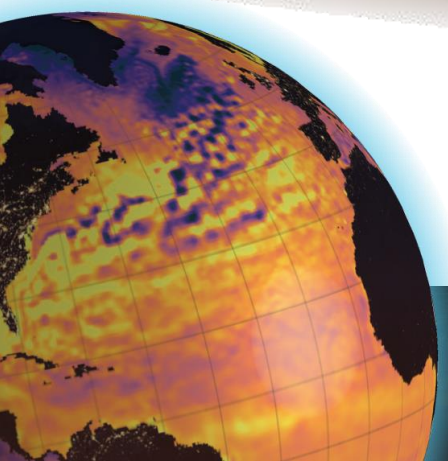
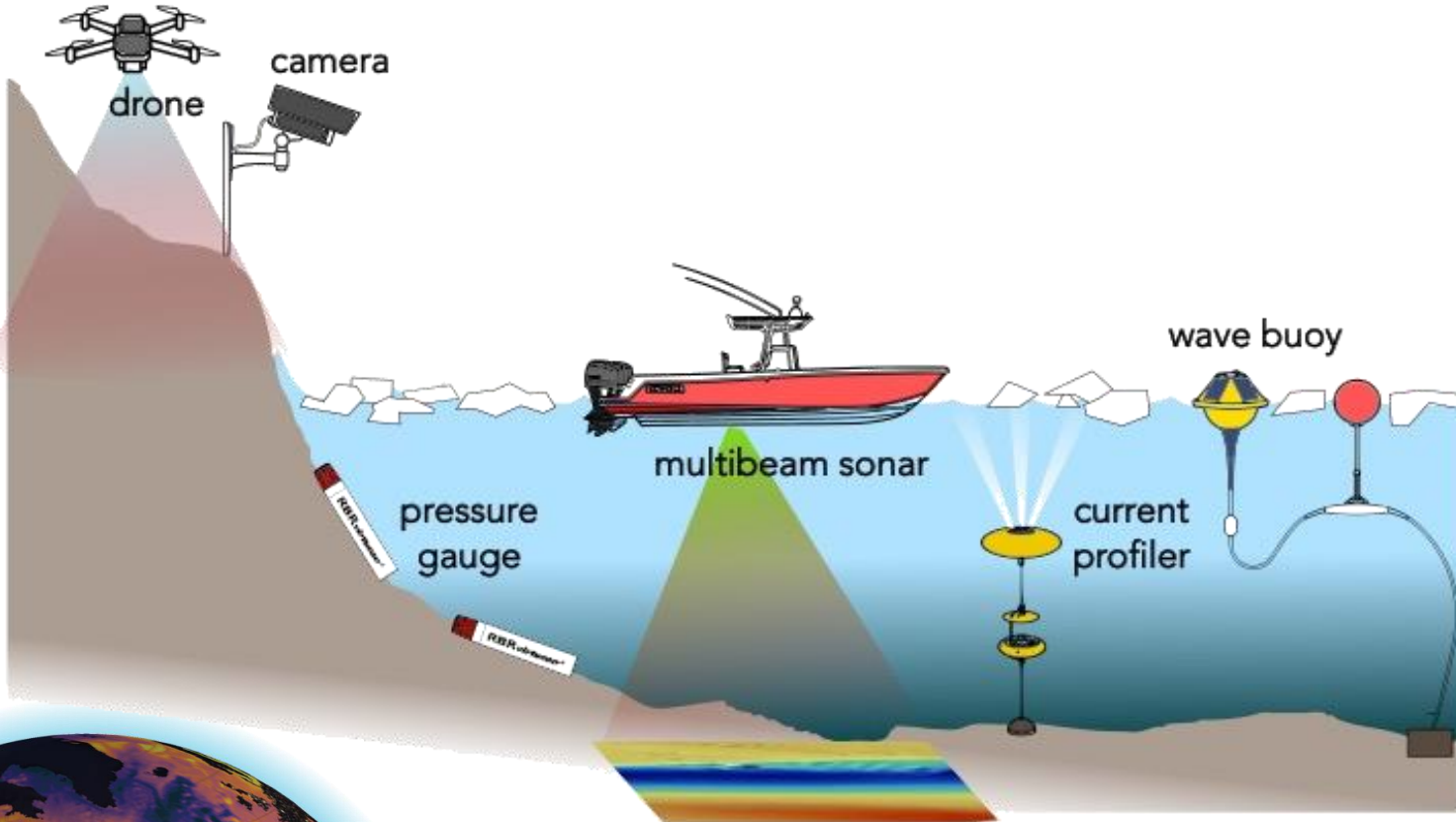


Wave model evaluation

CCGS Amundsen Dark Edge mission (2021)

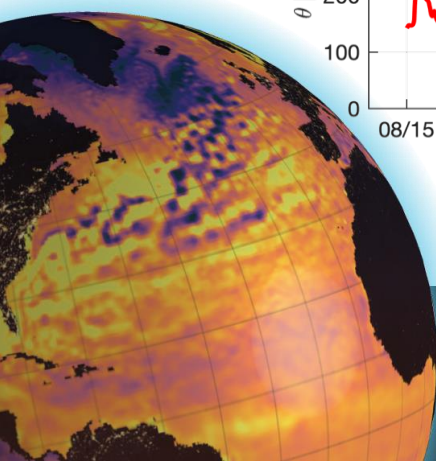
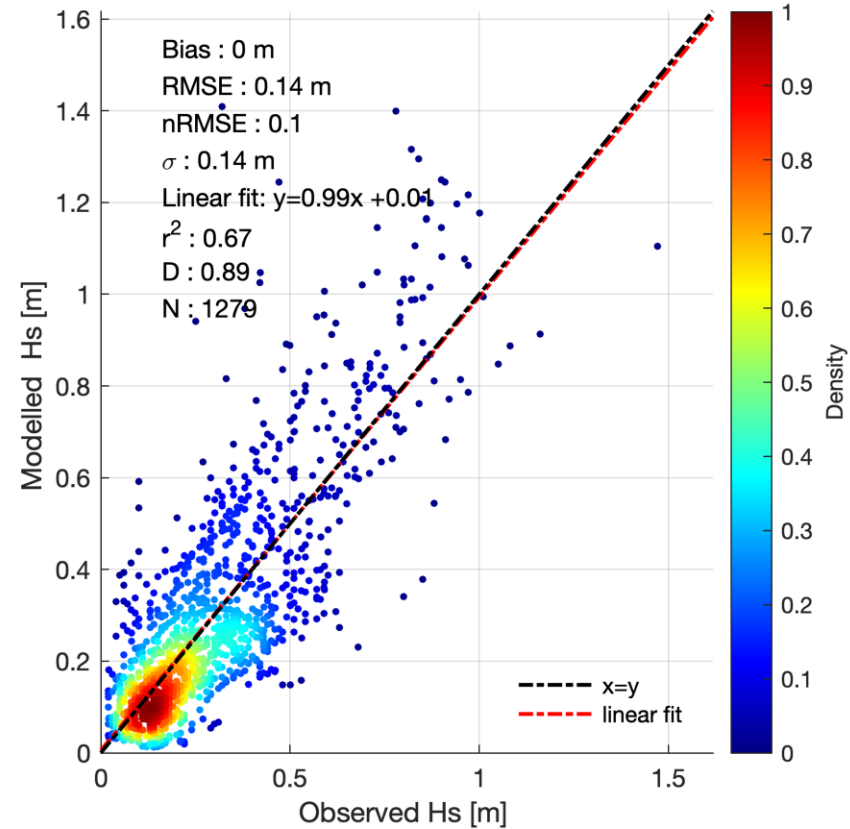
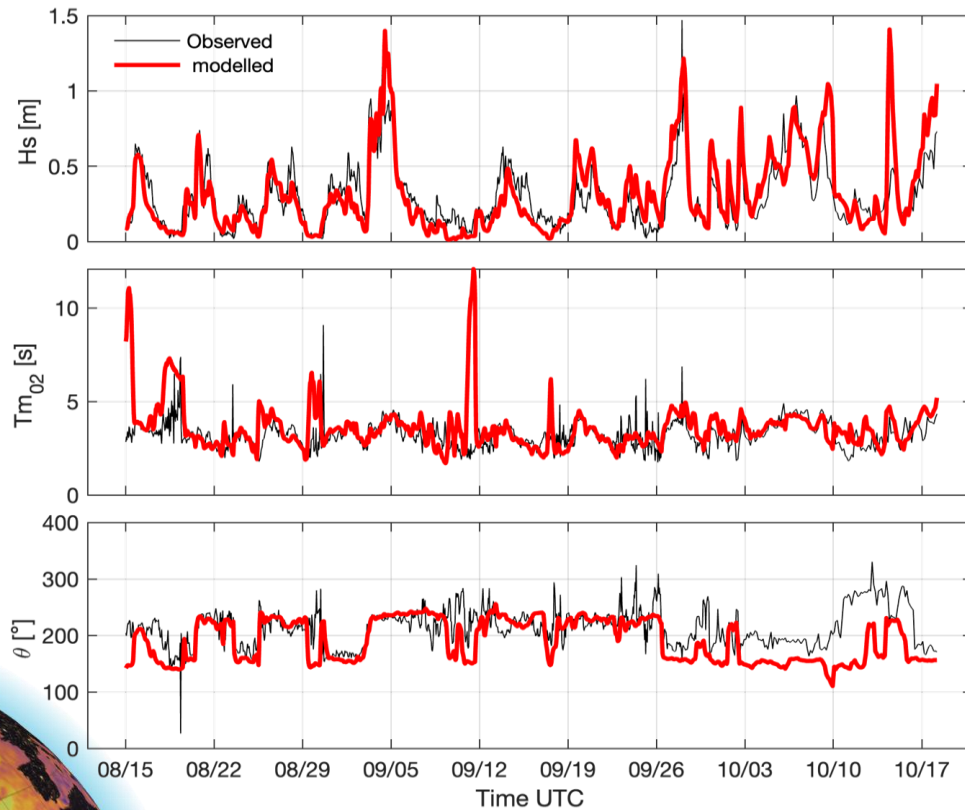


- **Community based project**
An observatory for coastal dynamics in Grise fiord



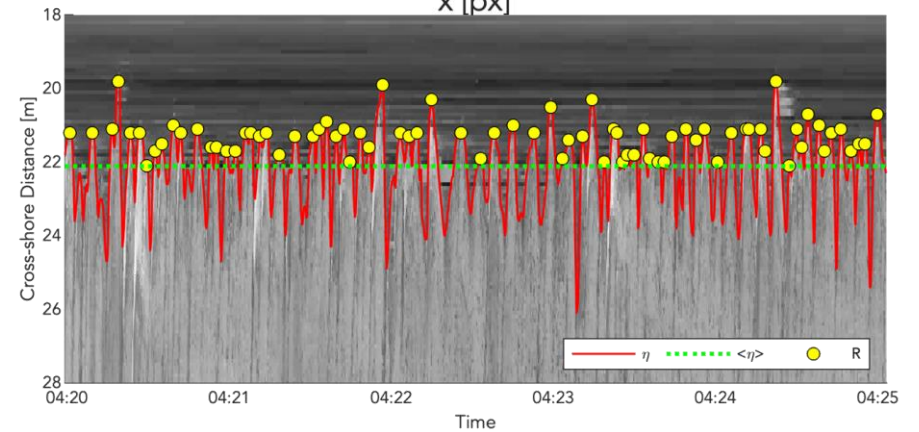
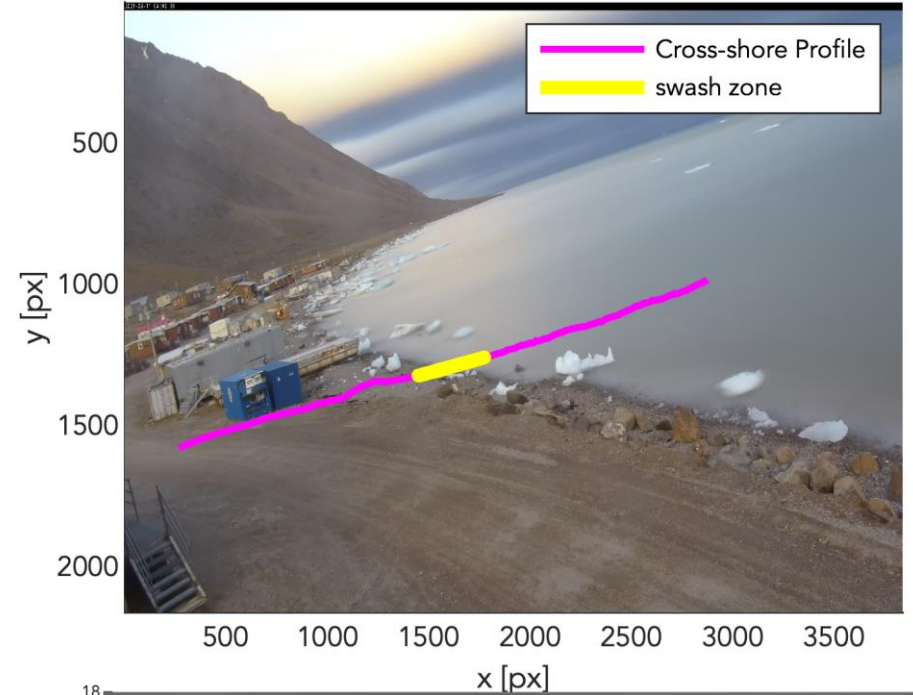
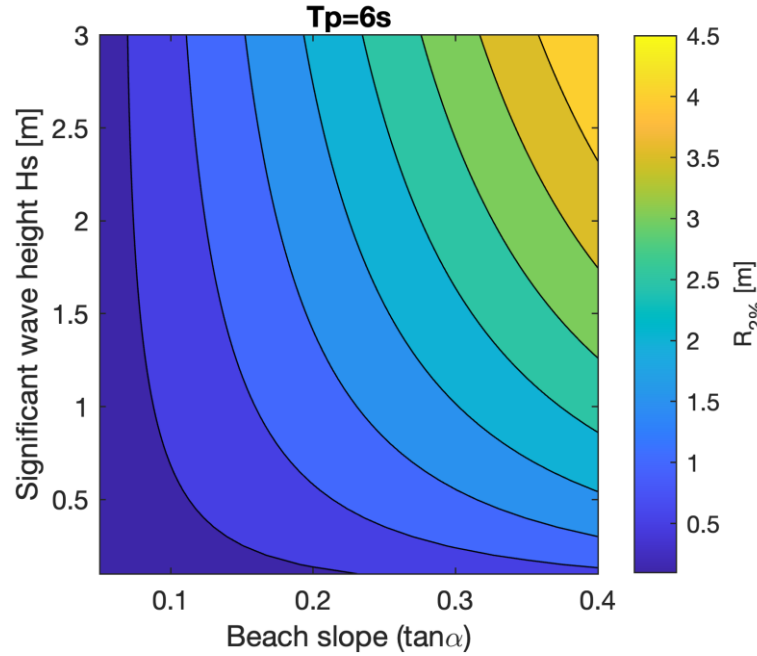
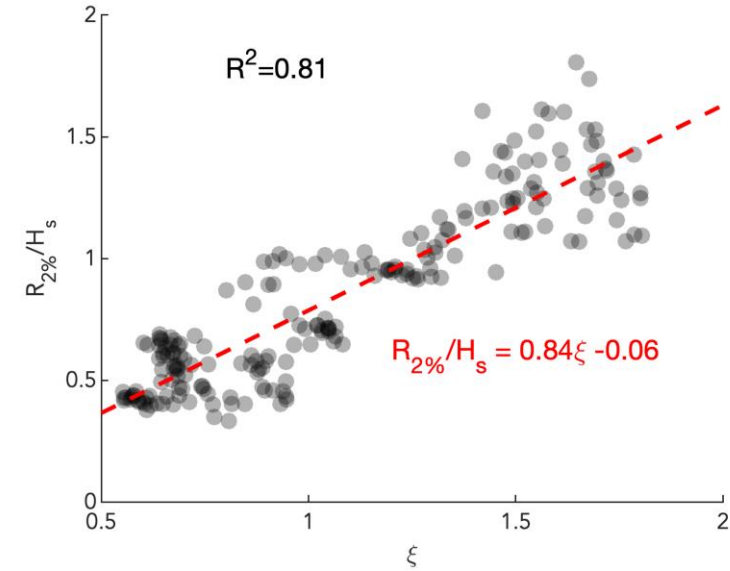
○ Wave model evaluation

Nearshore wave observations in Grise Fiord (2021)

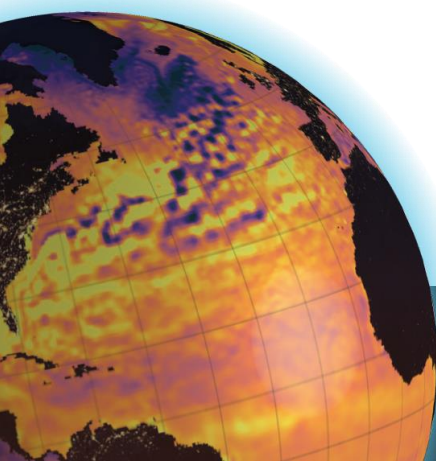


Observations of wave run-up

Calibration of empirical formulations

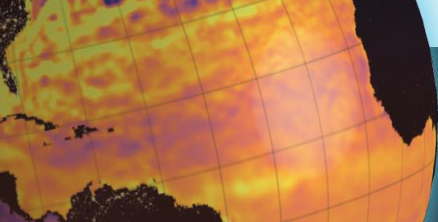


$$R_{2\%}/H_s = 0.84\xi - 0.06 \quad \xi = \frac{\tan \alpha}{\sqrt{H_s L_0}}$$



○ Community based project

Foster relationship with end-users



○ Key challenges

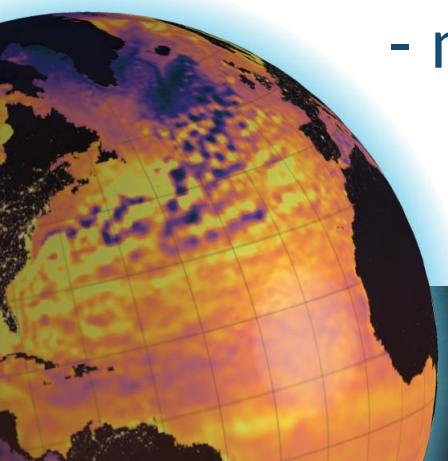
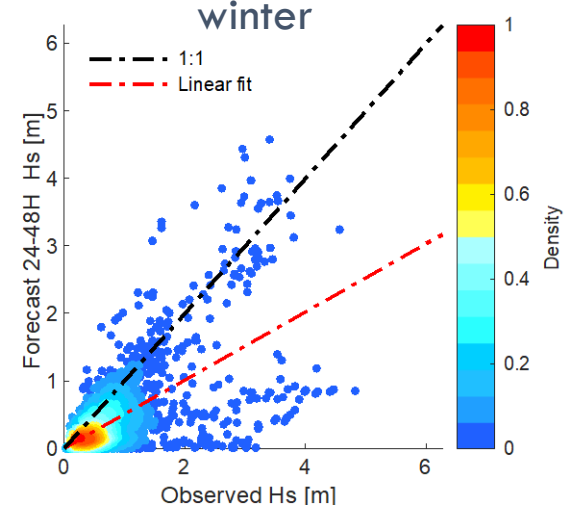
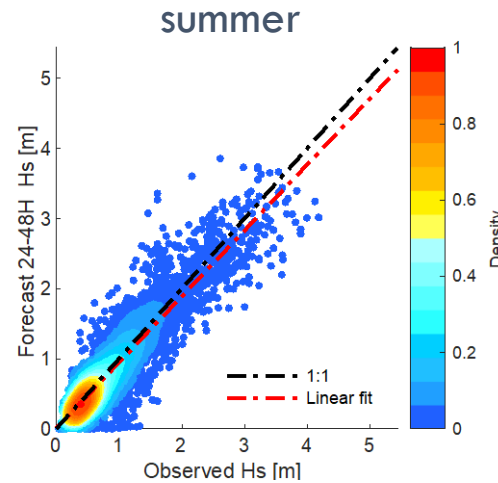
- Representing the marginal ice zone (MIZ) dynamics

- wave radiative stress
- rheology
- fragmentation

- morphodynamic

- Applicability over the entire Canadian arctic?

- Need for high resolution reliable ice forecast for the Canadian arctic
- maintaining relationship with end-users



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OP' 24

ADVANCING OCEAN PREDICTION
SCIENCE FOR SOCIETAL BENEFITS

Thank you!

