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Fundamental Overview and Challenges of the Arctic Marine Program in Canada

NOAA-EC Bi-Lateral Marine Workshop

Ann Arbor, Michigan

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**Prairie & Arctic Storm Prediction Centre,
Meteorological Service of Canada**

May 4, 2016

Contents

- Overview of Canadian Arctic Marine Coverage
- Arctic Clients
- Products Issued
- Challenges
- Future Needs

Page 2 – April 27, 2016



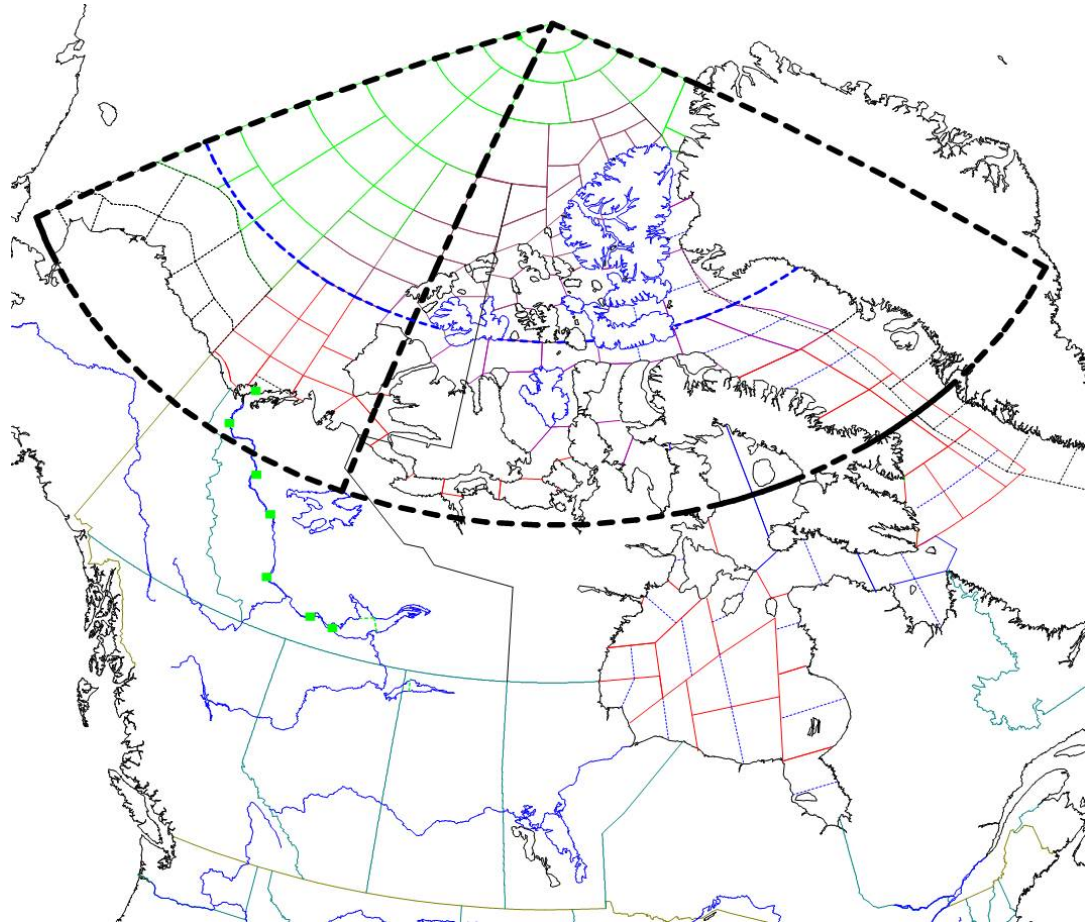
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Canadian Arctic Marine Coverage

- Domestic Marine Program
- International Waters for METAREAs
- Inland Waters



Page 3 – April 27, 2016



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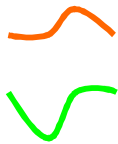
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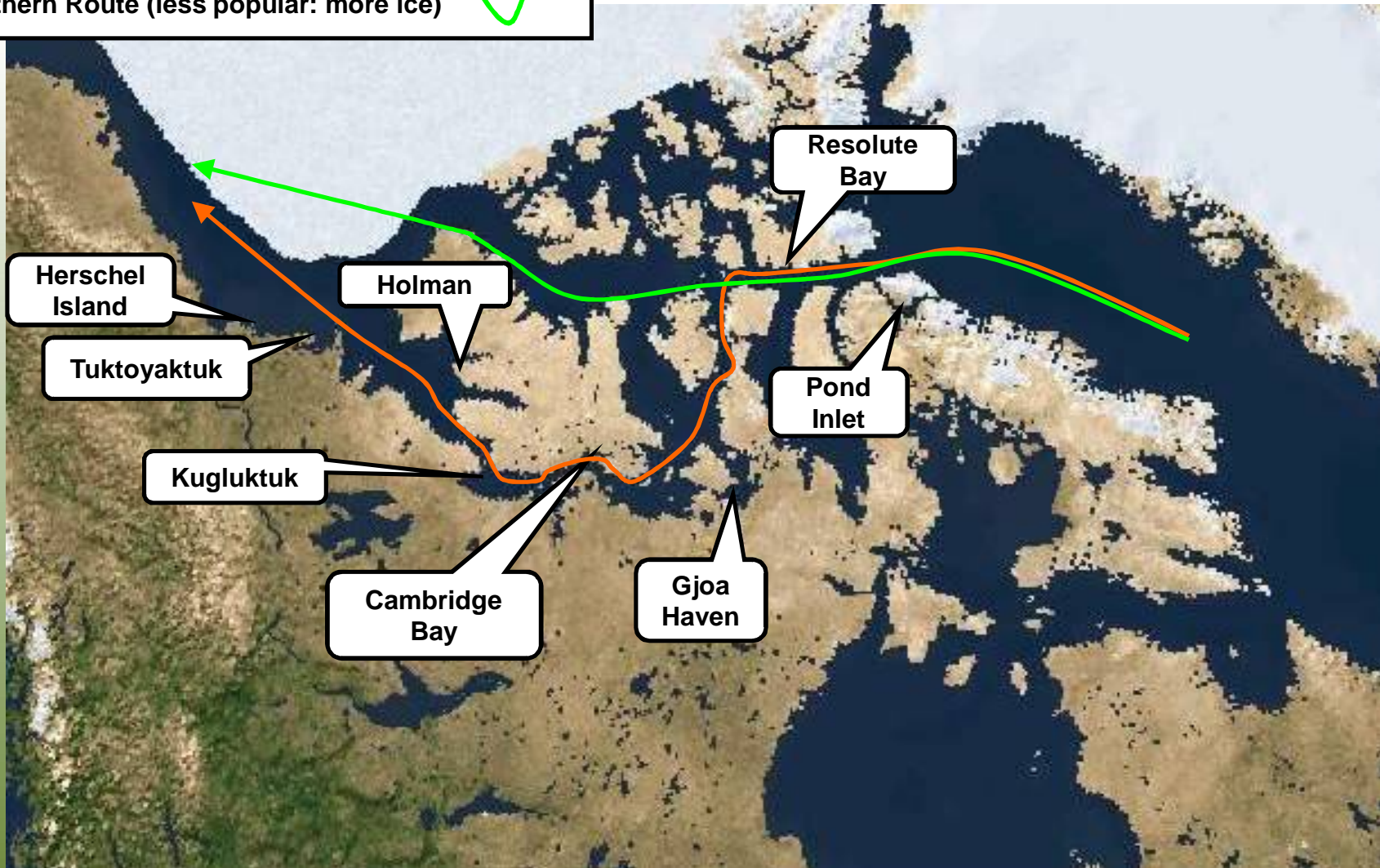
Legend

Southern Route (most popular: less ice)

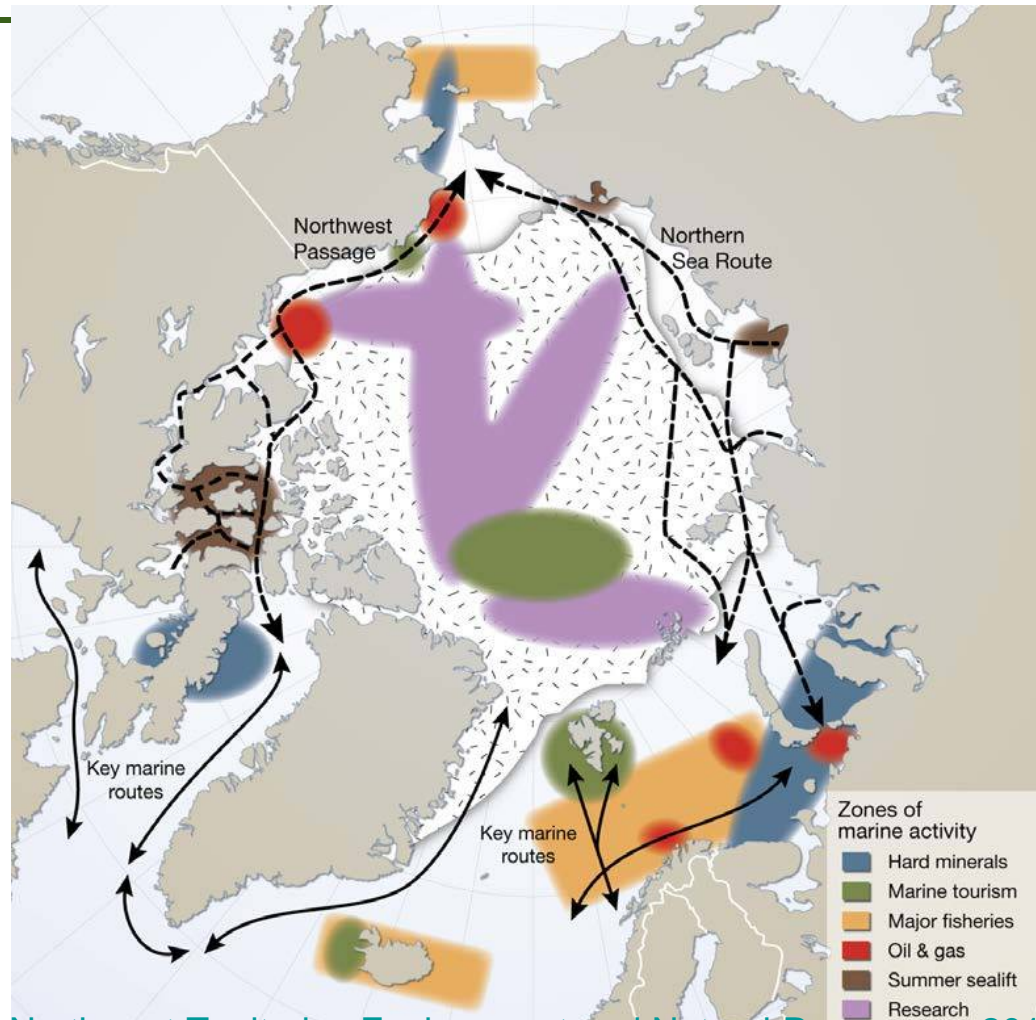
Northern Route (less popular: more ice)



MAP INDICATING THE SOUTHERN AND NORTHERN ROUTES THROUGH THE NORTHWEST PASSAGE



Arctic Marine Activity



Northwest Territories Environment and Natural Resources, 2015.

Page 5 – April 27, 2016



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Arctic Clients



Inuit
Pleasure Craft
Cruise Ships
Research Trips
Fishing
Cargo / Fuel



Arctic Clients - Inuit

- Used marine areas throughout the year for:
 - near shore commercial and traditional harvesting all year long
 - Recreational, reaching cabins and camps
 - Especially in winter means to visit other communities (snowmobile more affordable than boat)
 - Hunting for country food very important



Arctic Clients – Resupply



Desgagnés Transarctik Inc.

Arctic Clients – Resupply



Desgagnés Transarctik Inc.



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Arctic Clients - Resupply

- Tankers provide a fuel supply link to Arctic Coastal Communities
- Off-load fuel using floating pipelines
 - Increased Sensitivity to Wind and Ice



PetroNav vessel offloading fuel using floating pipeline

Photo courtesy Chris King

Page 10 – April 27, 2016



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Arctic Clients - Mining

First Unescorted Commercial Trip through Northwest Passage
Polar Class 4 Icebreaker



Sept 19 2014
MV Nunavik 29 day
journey from
Deception Bay to
Bayuquan, China
-21000 tonnes nickel
concentrate

-40% reduction in
distance & time
compared to
Panama Canal



A map showing the four-day, 1,700 km route through Northwest Passage from Lancaster Sound to the Beaufort Sea. Credit: Fednav/The Northern Miner



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Products Produced

- Text Products
 - Short Range Forecast, Winds, Weather, Waves
 - Marine Advisories
 - Long Range Wind Forecast (Day 3-5)
 - METAREAs
- All products text based – majority of clients accessing information through Radio means
- Some Visualization products used by some clients (using an FTP server)

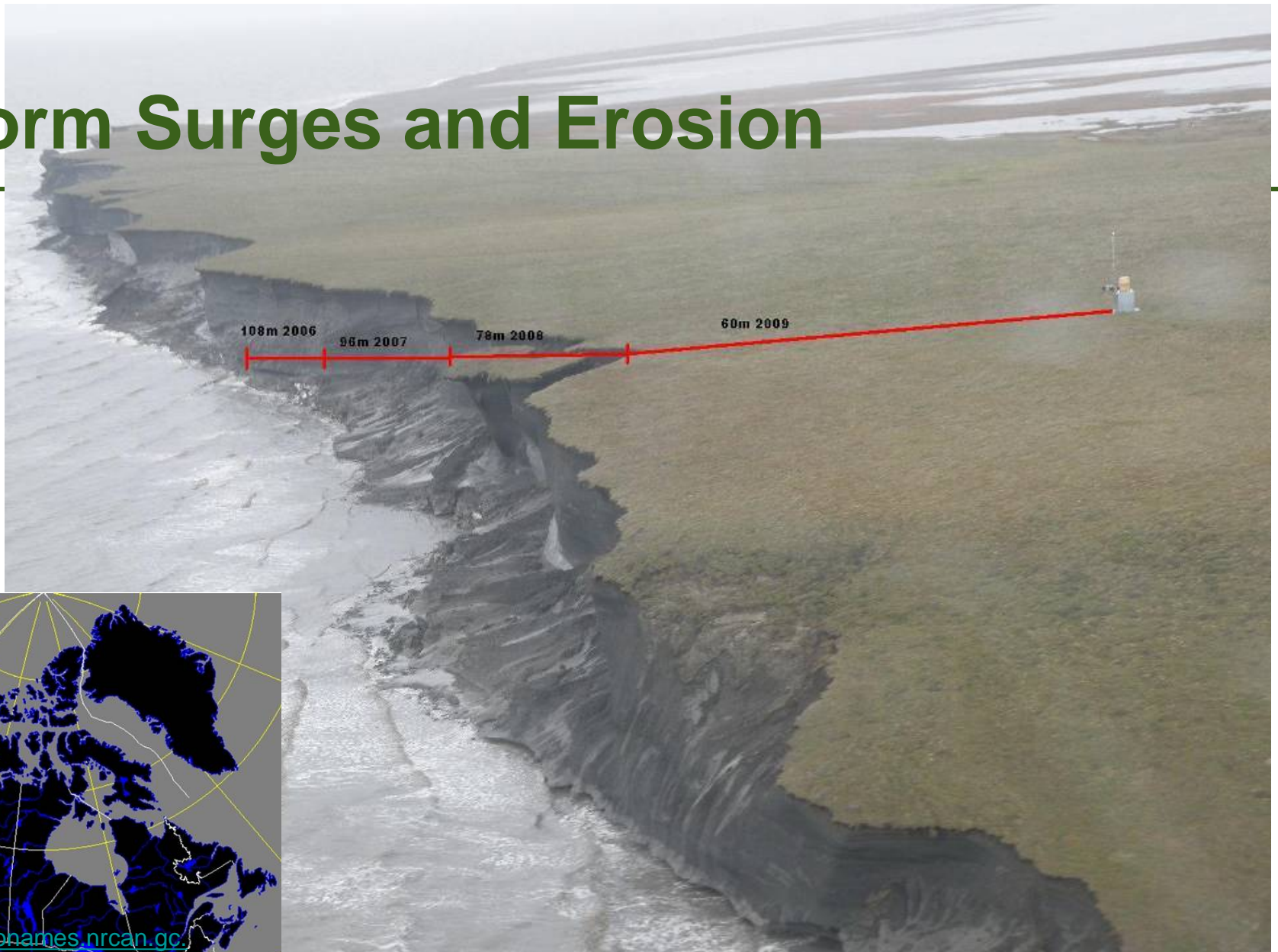


Challenges Faced

- Severity of Weather
- Mandate – with the devolution of the NWT
- Local Effects
- Data Availability
- Climate Change – increasing season length



Storm Surges and Erosion



Page 14 – April 27, 2016



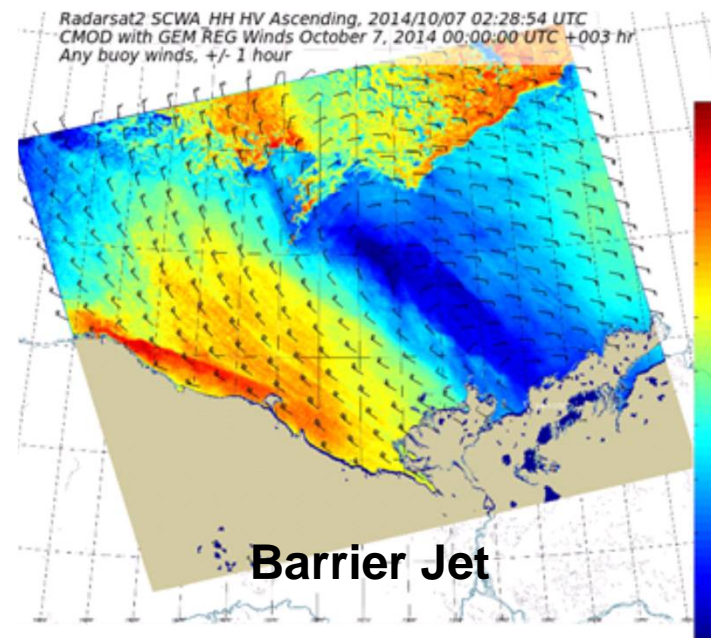
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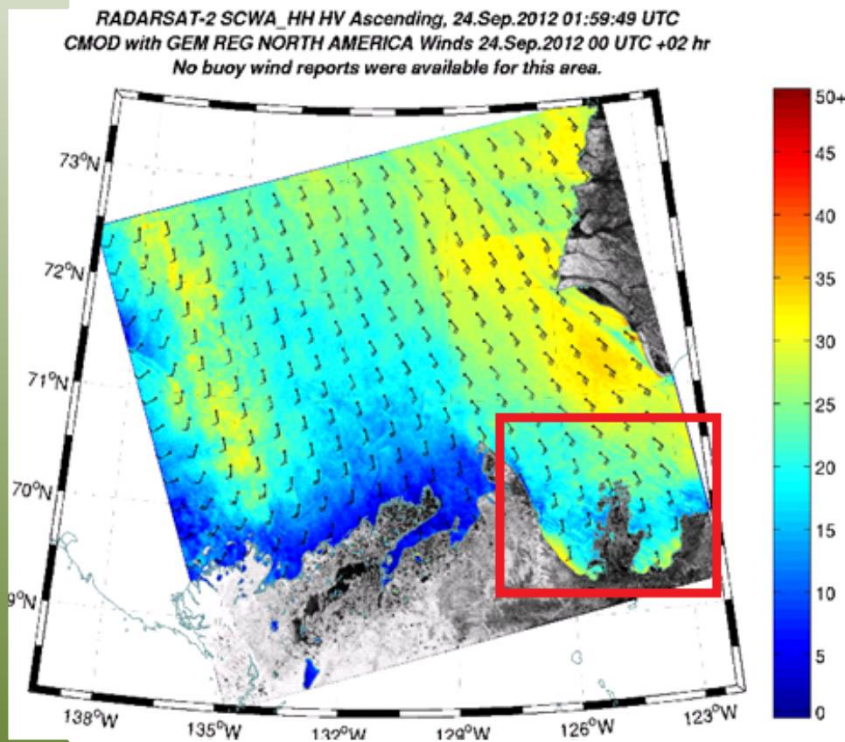
Local Effects

- Local effects captured by Observations
- Radar Sat Imagery since 2010 helped to determine effect of expected local effects and identify new features

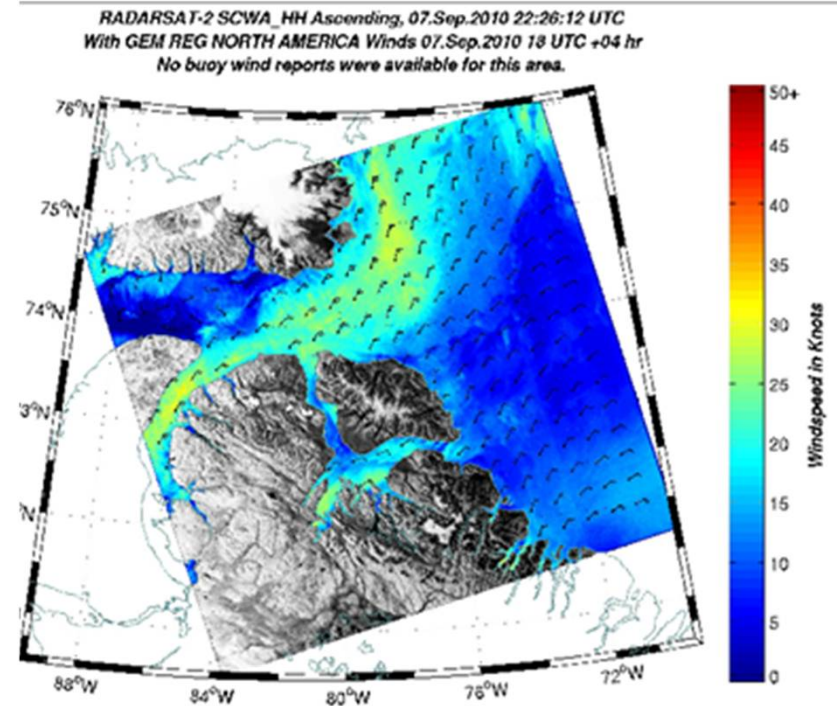


Local Effects

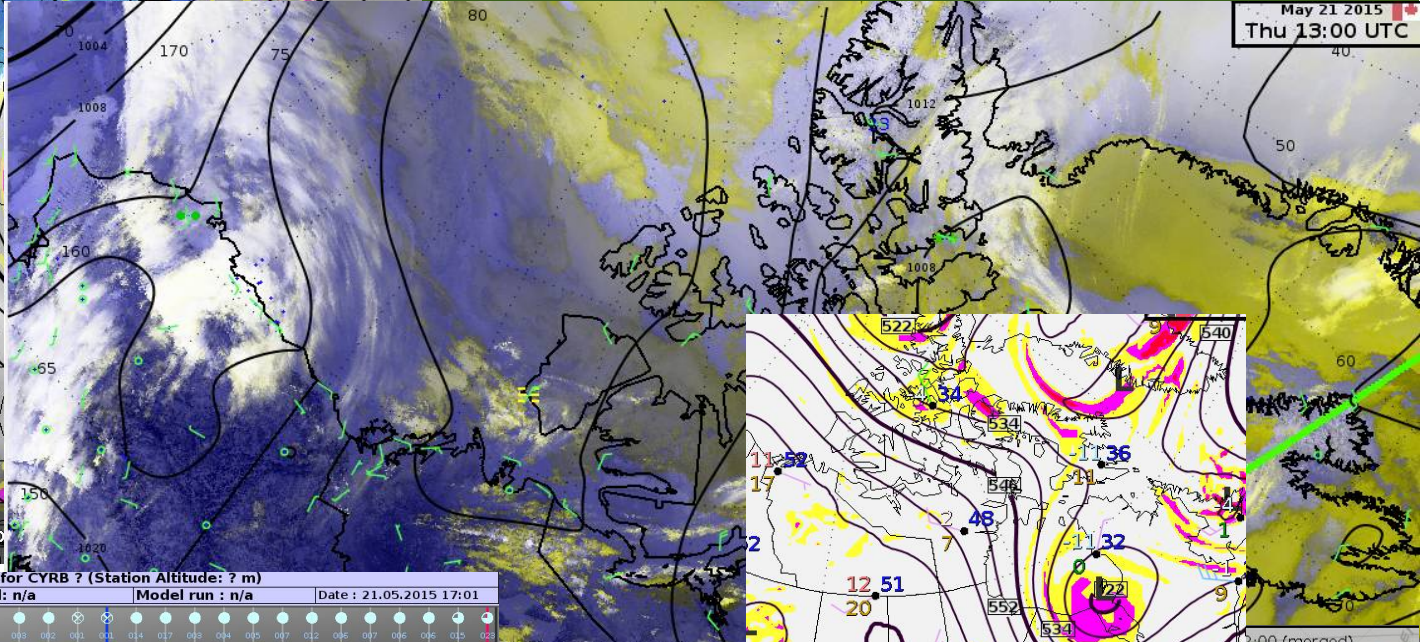
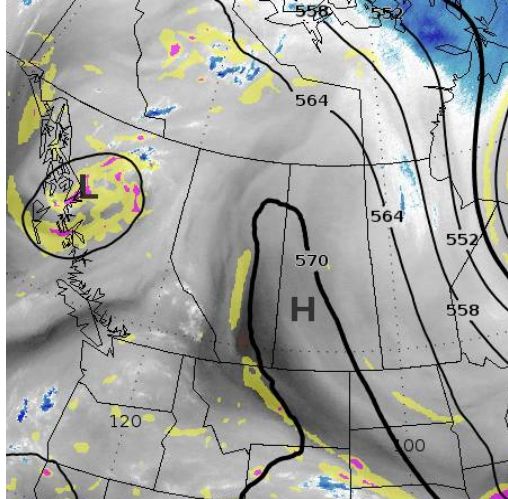
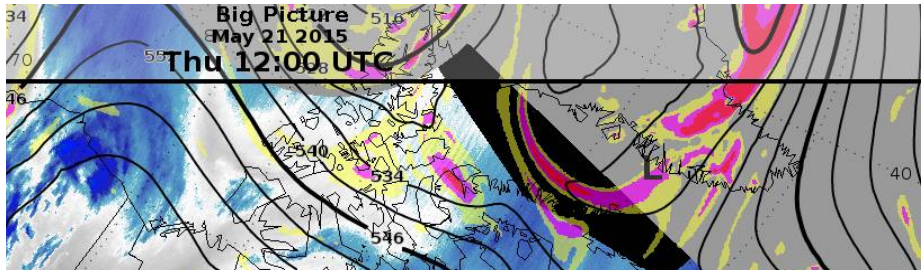
Downslope Winds



Channeling & Barrier Jet



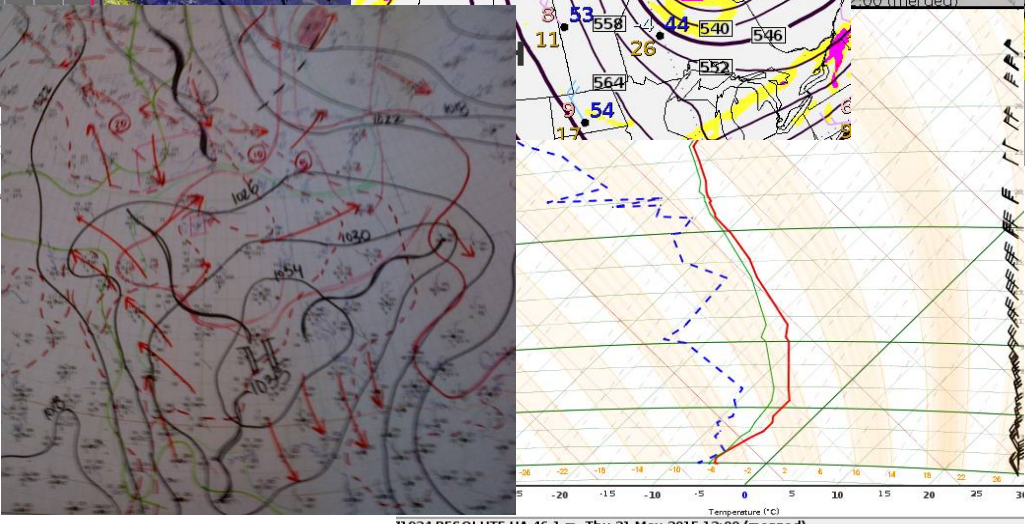
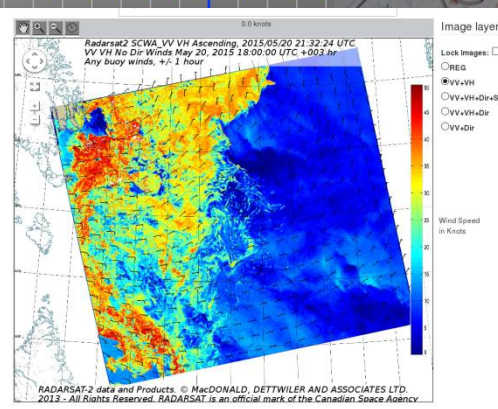
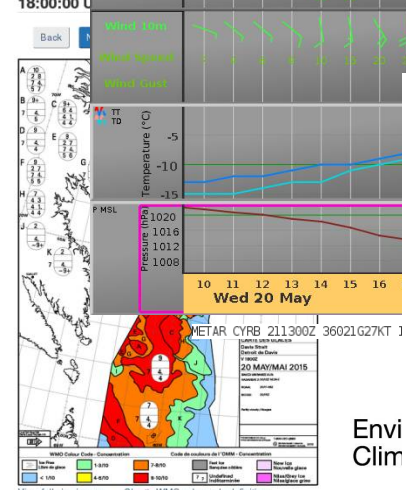
Data - Analysis



2:00 UTC HGT 500 [isobaric level] RDPS+000h
 2:00 UTC ABSV, 10E-5 1/s, 500 [isobaric level] RD
 2:00 UTC GOES-W - IR 6.7 Water Vapour

Observation Meteorogram for CYRB ? (Station Altitude: ? m)

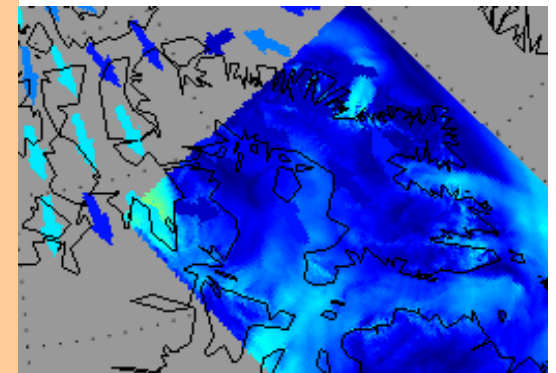
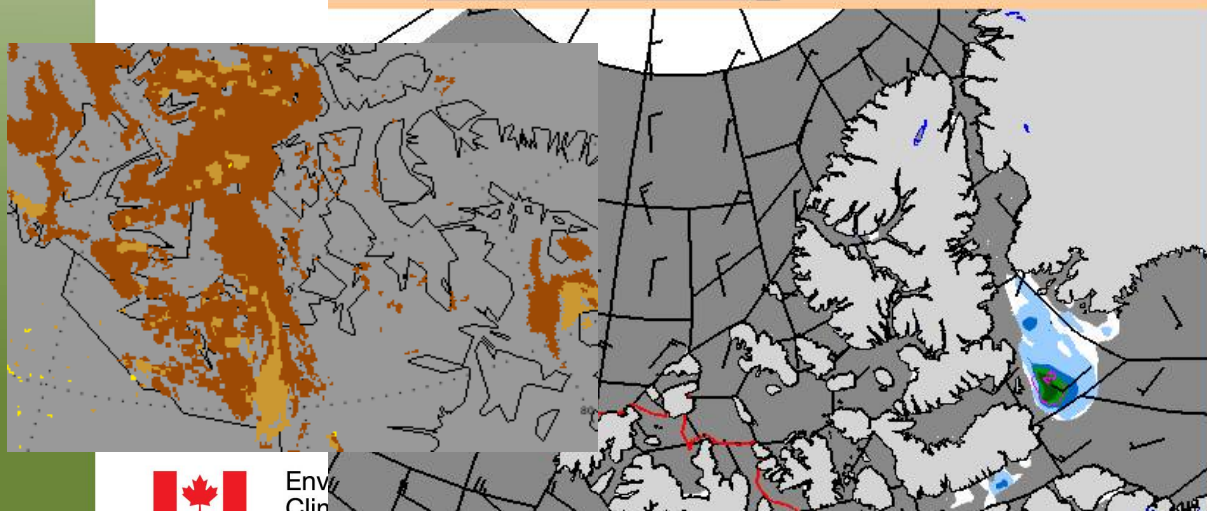
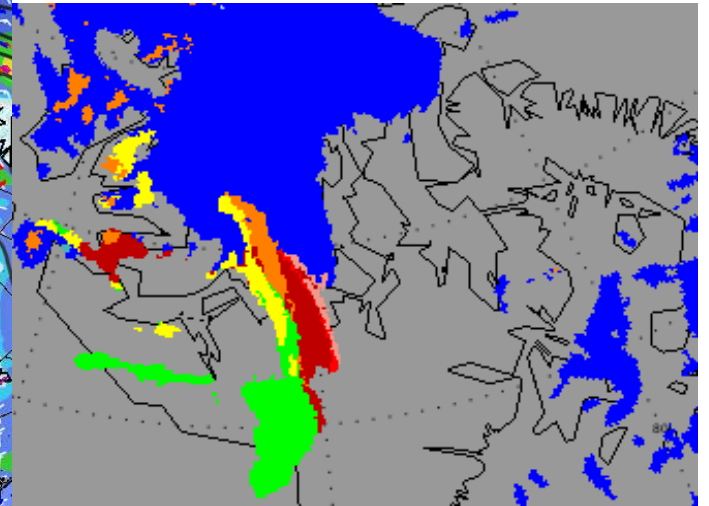
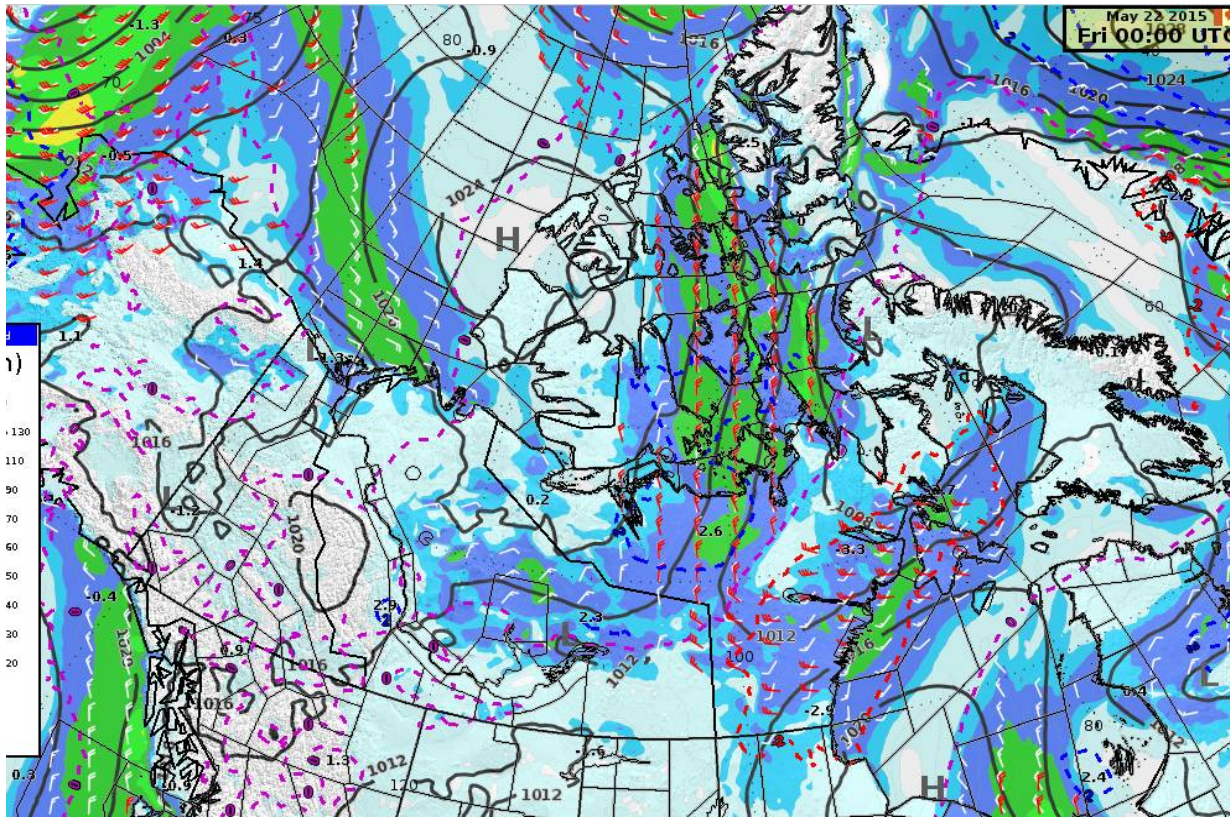
Start	End	Model	Model run	Date
20.05.2015 09:17	21.05.2015 13:18	n/a	n/a	21.05.2015 17:01



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71924 RESOLUTE UA 46.1 m, Thu 21 May 2015 12:00 (merged)

Data - Prognosis



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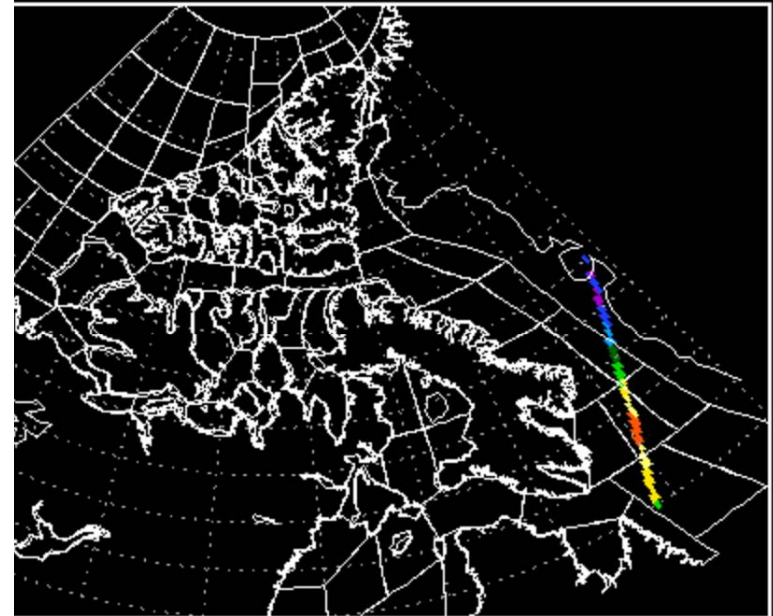
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Future Needs

- Wave Forecasts for Shallow Waters
- Storm Surge Models
- Remote Sensing
- Moving beyond Text Forecasts

Saral SWH 20151010 003908



Significant Wave Height [meters]



Questions

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Page 20 – April 27, 2016



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