

Low level convection over Hudson Strait and associated precipitation in Iqaluit

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STAR 2008 Workshop
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Introduction

- Intensive Observation Period (IOP) 7 for STAR project
 - 19:00 UTC November 9 – 02:00 UTC November 10, 2007
- Low-level convection (LLC) observed in Hudson Strait and Foxe Basin
 - NRC-Convair mission planned to sample phenomena in Hudson Strait
- Unexpected highly rimmed precipitation occurred in Iqaluit



Motivation

- November 9 precipitation event in Iqaluit was small in accumulation but important because it was not forecasted well
 - Climate change forecasts predict a shorter sea-ice season in the future
 - Consequently these types of events, that are in part driven by ocean convection, might become important sources of precipitation in Iqaluit in the future
 - Improved understanding of this phenomena is required



Objective

- Investigate the precipitation event that occurred in Iqaluit on November 9-10, 2007
 - Examine possible contributing factors:
 - LLC in Hudson Strait
 - Onshore flow
 - The passing of a small trough



Preliminary Results

Outline:

- EC Forecast for event
- Surface Analysis
- Precipitation in Iqaluit
- Upper Air Observations
 - Iqaluit and Coral Harbour
- NRC-Convair data
 - Dropsondes
 - Ka-Band Radar
- Ocean Surface Flux measurements (NARR data)



EC Forecast – Iqaluit - Nov 9, 2007

Time issued

- 05:00 EST –
 - Today . . Cloudy with sunny periods and 60% chance of flurries
 - Tonight . . 60% flurries
- 11:00 EST –
 - Today . . . Cloudy with sunny periods and 40% chance of flurries
 - Tonight . . 40% flurries
- 16:00 EST –
 - Snow ending this evening then cloud with 60% chance of flurries. 2-4 cm
 - Saturday (Nov 10) – Cloudy with sunny periods, 60% chance of flurries, clearing late in the day

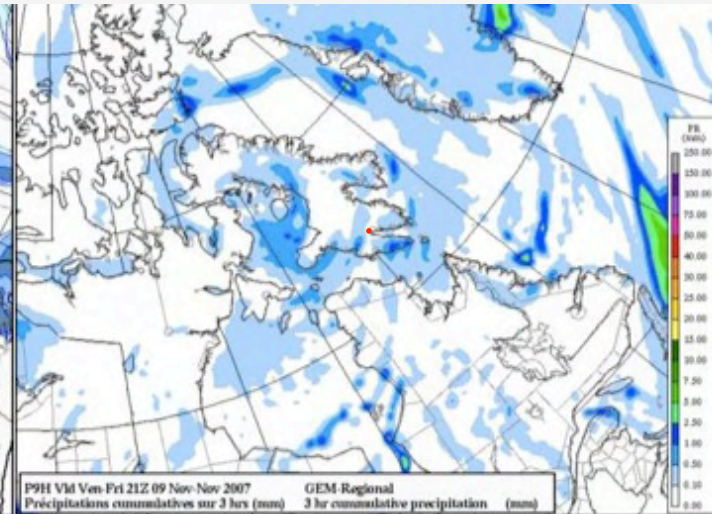
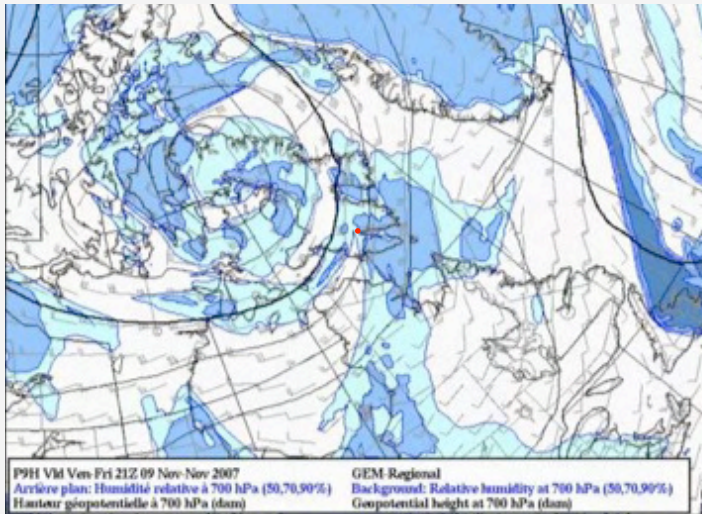


GEM-Regional Precipitation Forecast

Relative Humidity at 700 hPa

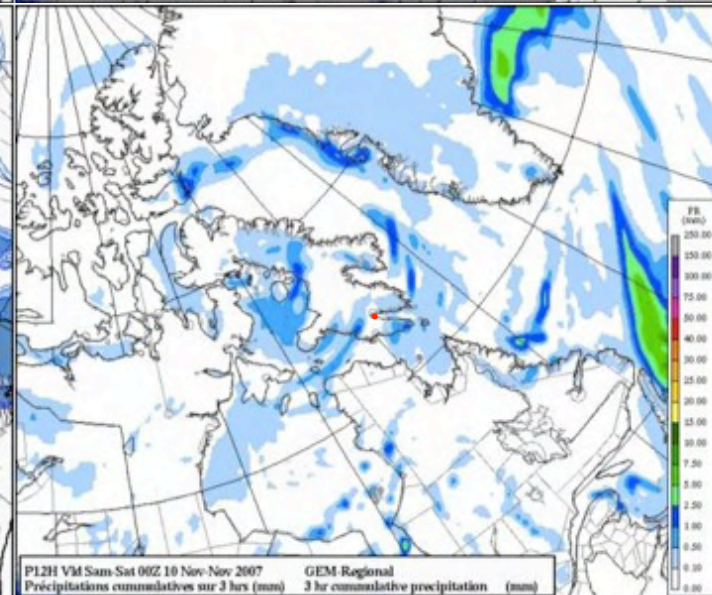
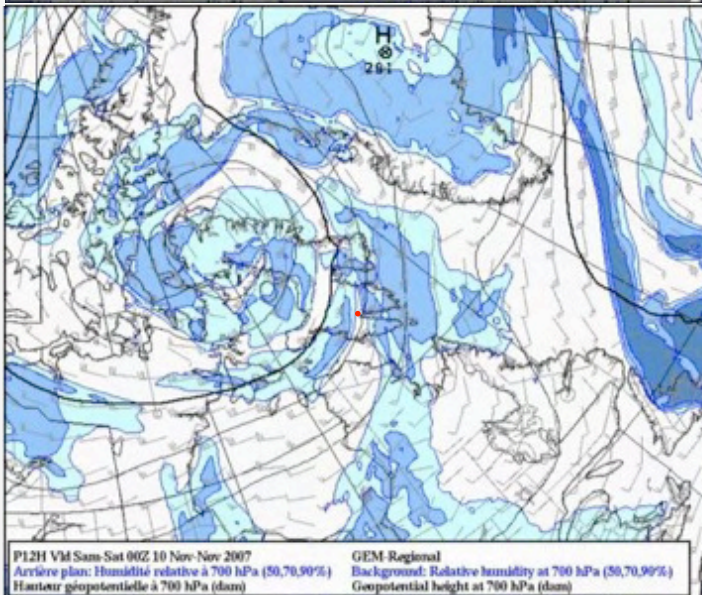
3hr Cumulative Precipitation (mm)

21:00 UTC Nov 9

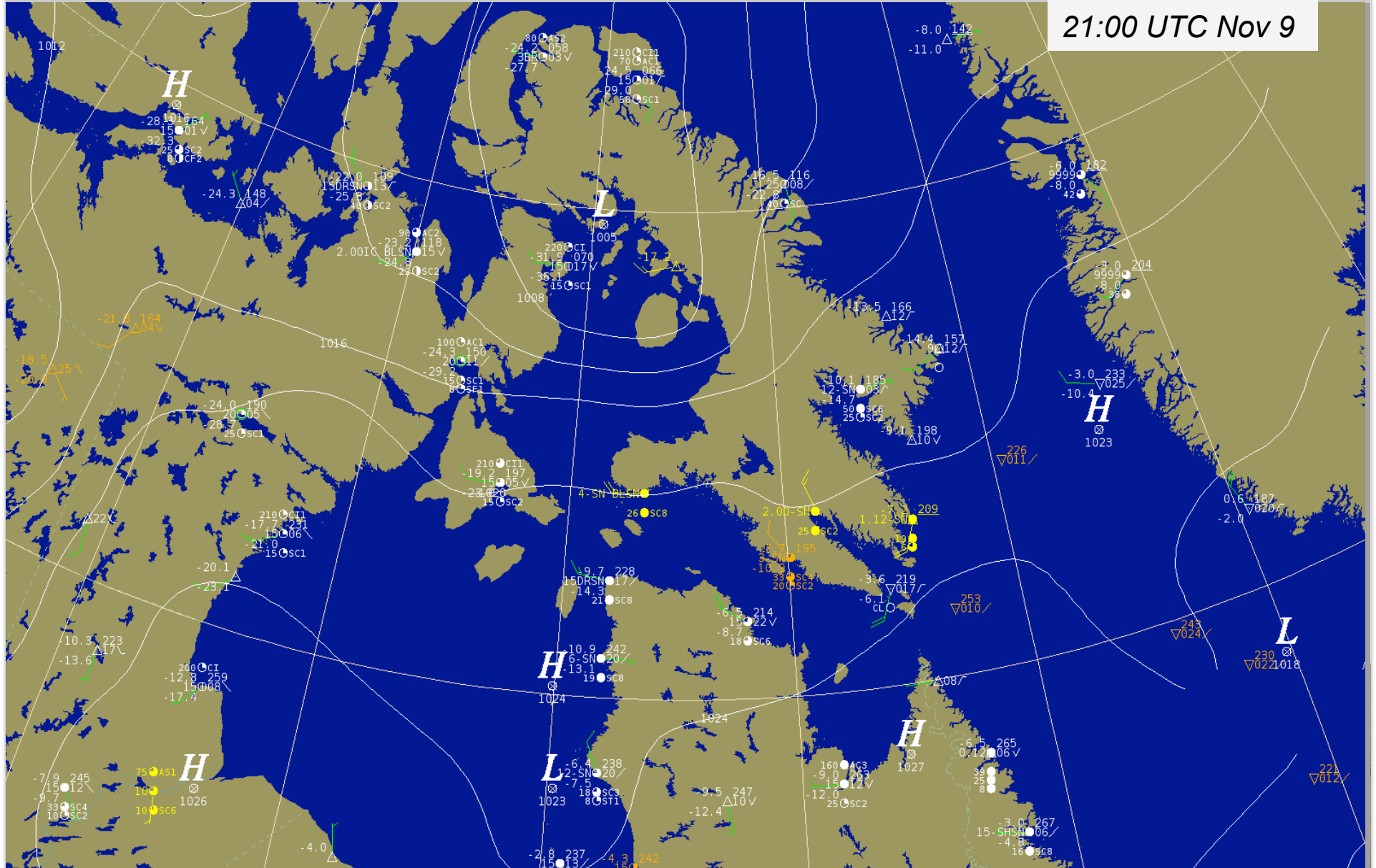


● Iqaluit

00:00 UTC Nov 10

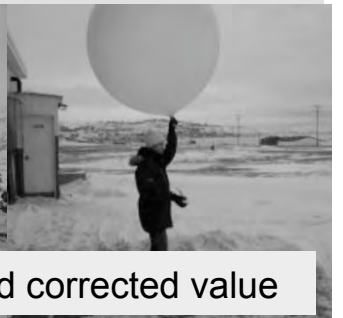
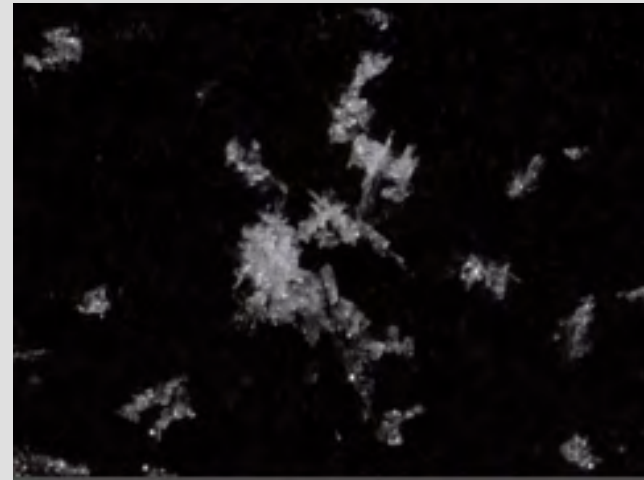
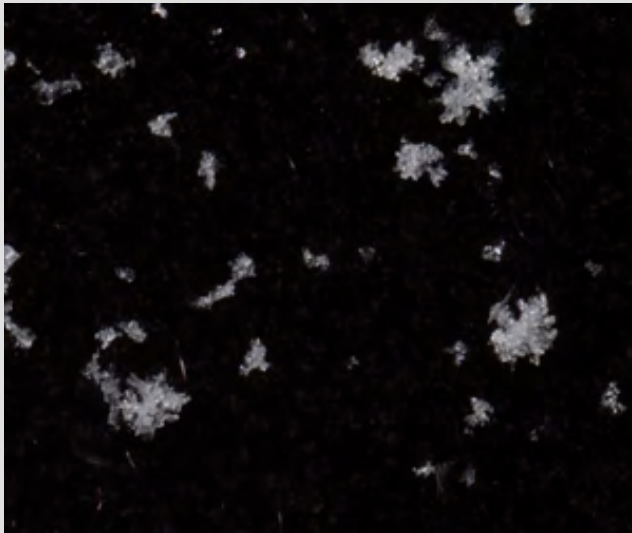


Sfc observations



Precipitation in Iqaluit

- YFB station- precipitation measurements:
 - 2.2* mm from Geonor with double fence enclosure
- Snowflake Microphotography at 19:30 UTC



*Wind corrected value

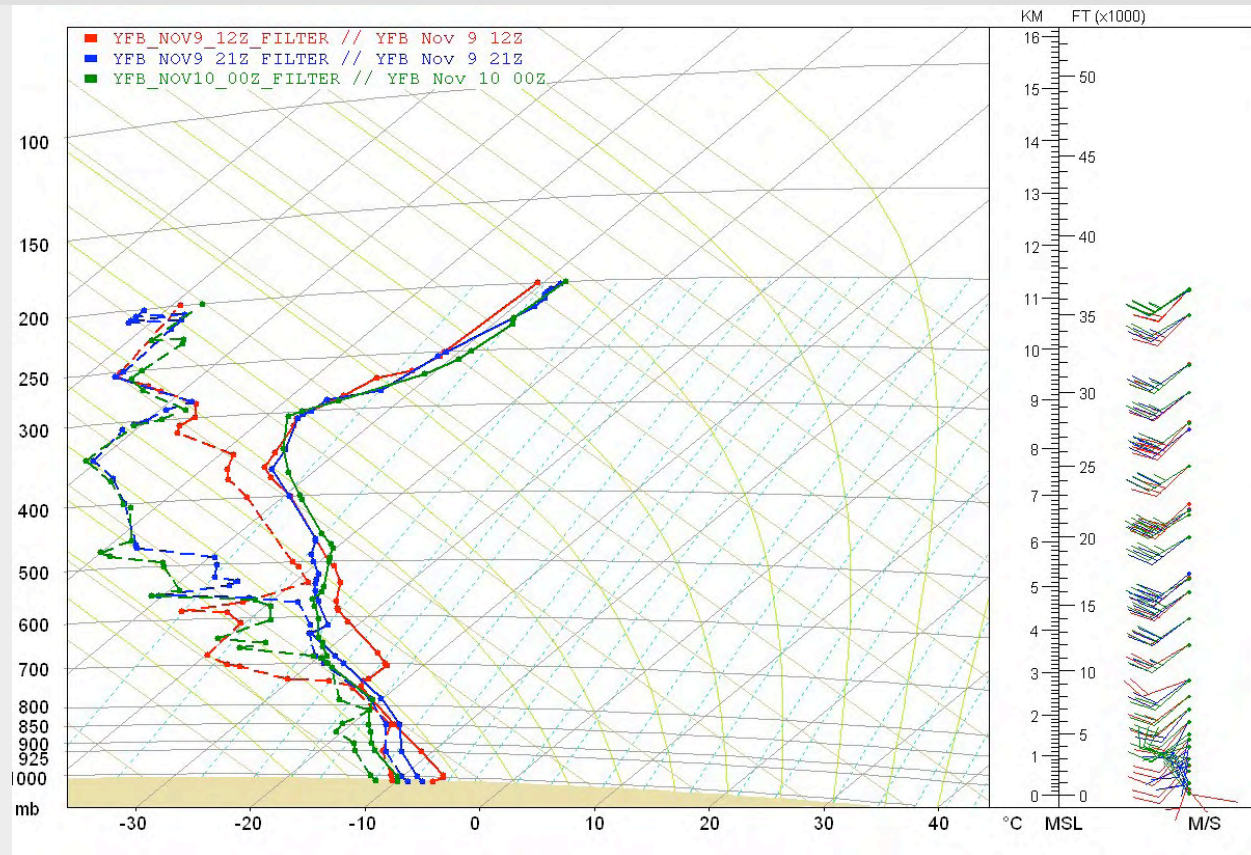
Upper Air Observations – Iqaluit

12:00 UTC Nov 9 – 00:00 UTC Nov 10

R: 12:00 UTC
Nov 9

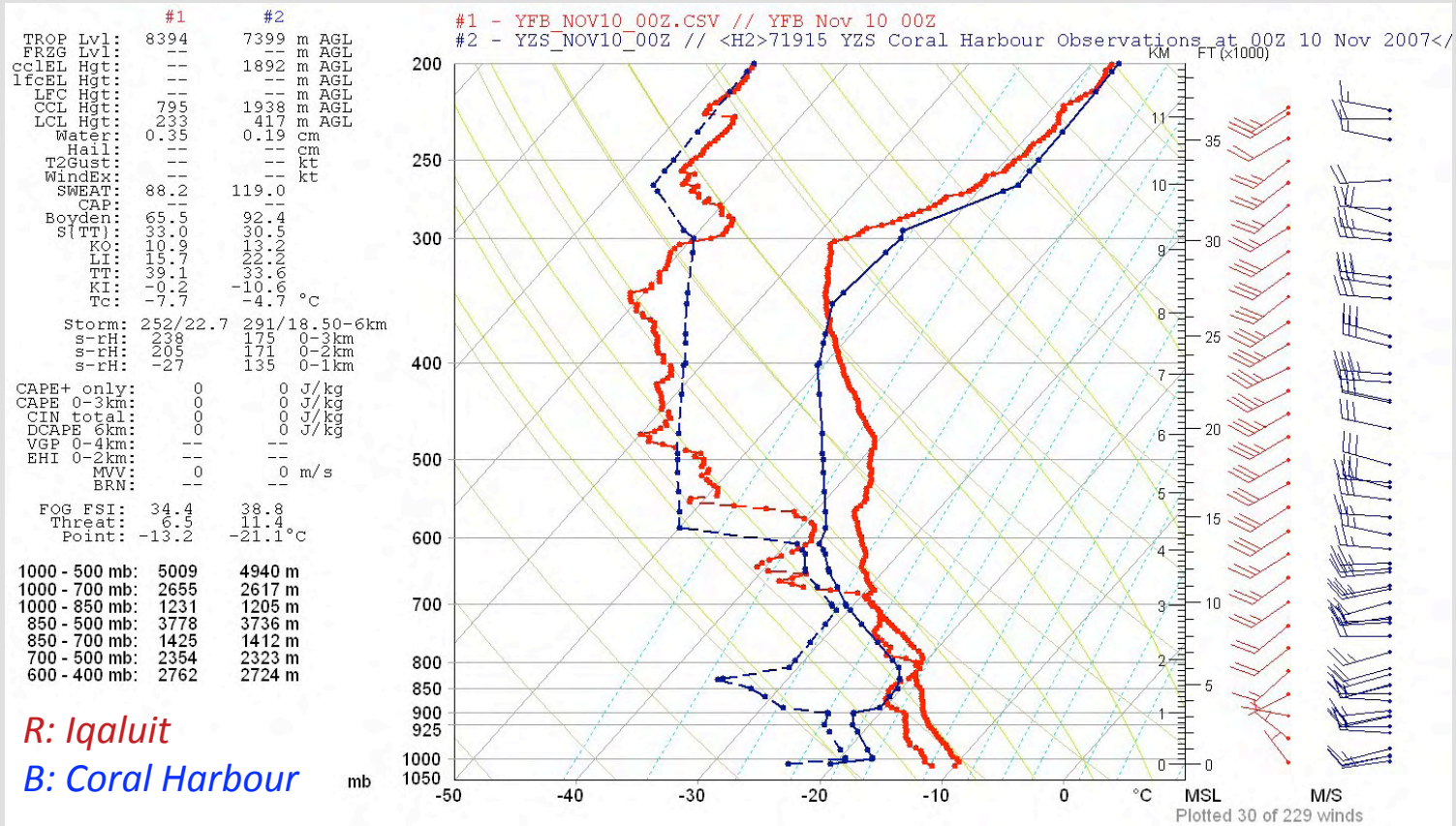
B: 21:00 UTC
Nov 9

G: 00:00 UTC
Nov 10

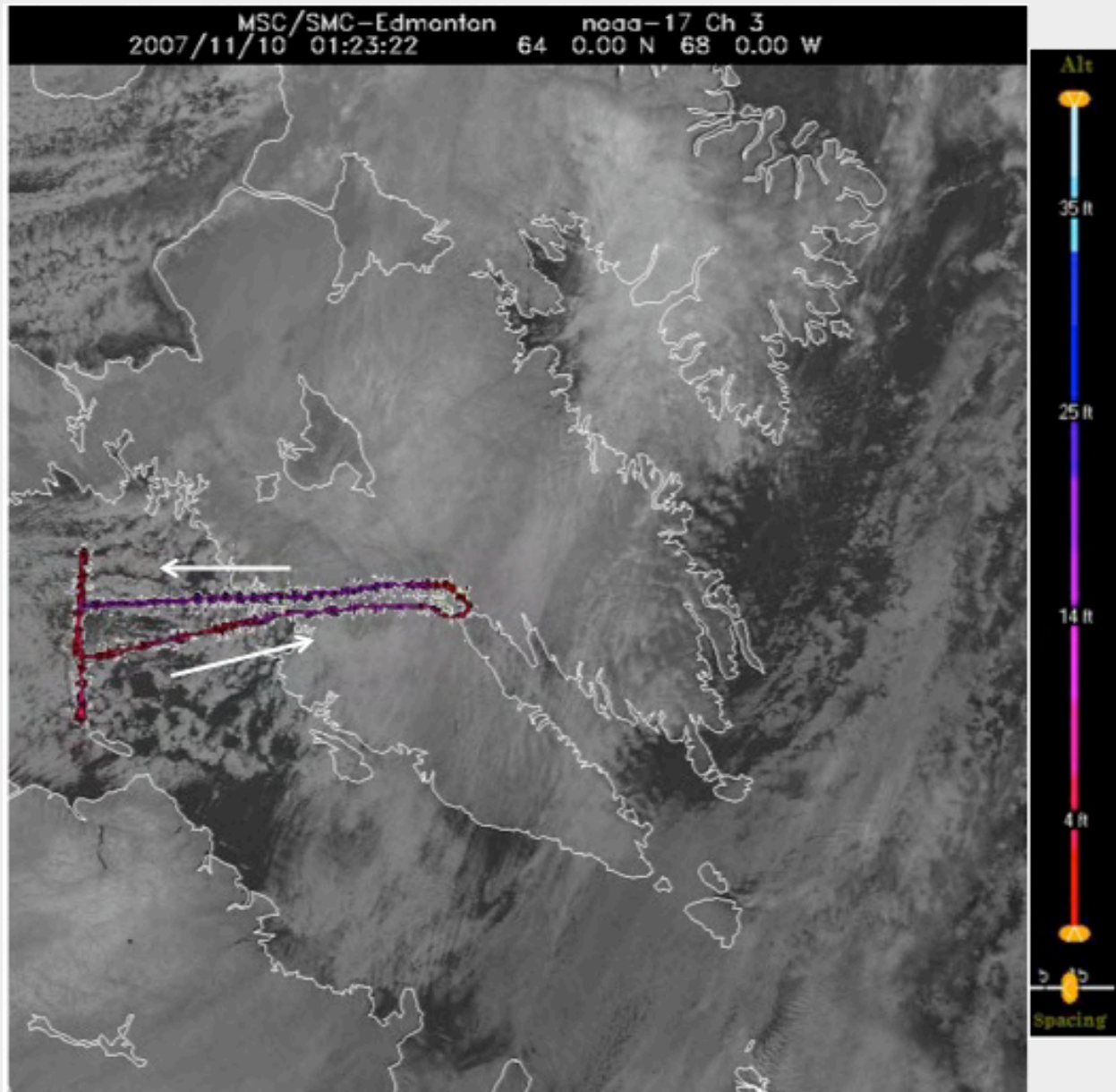


Upper Air Observations – Iqaluit and Coral Harbour

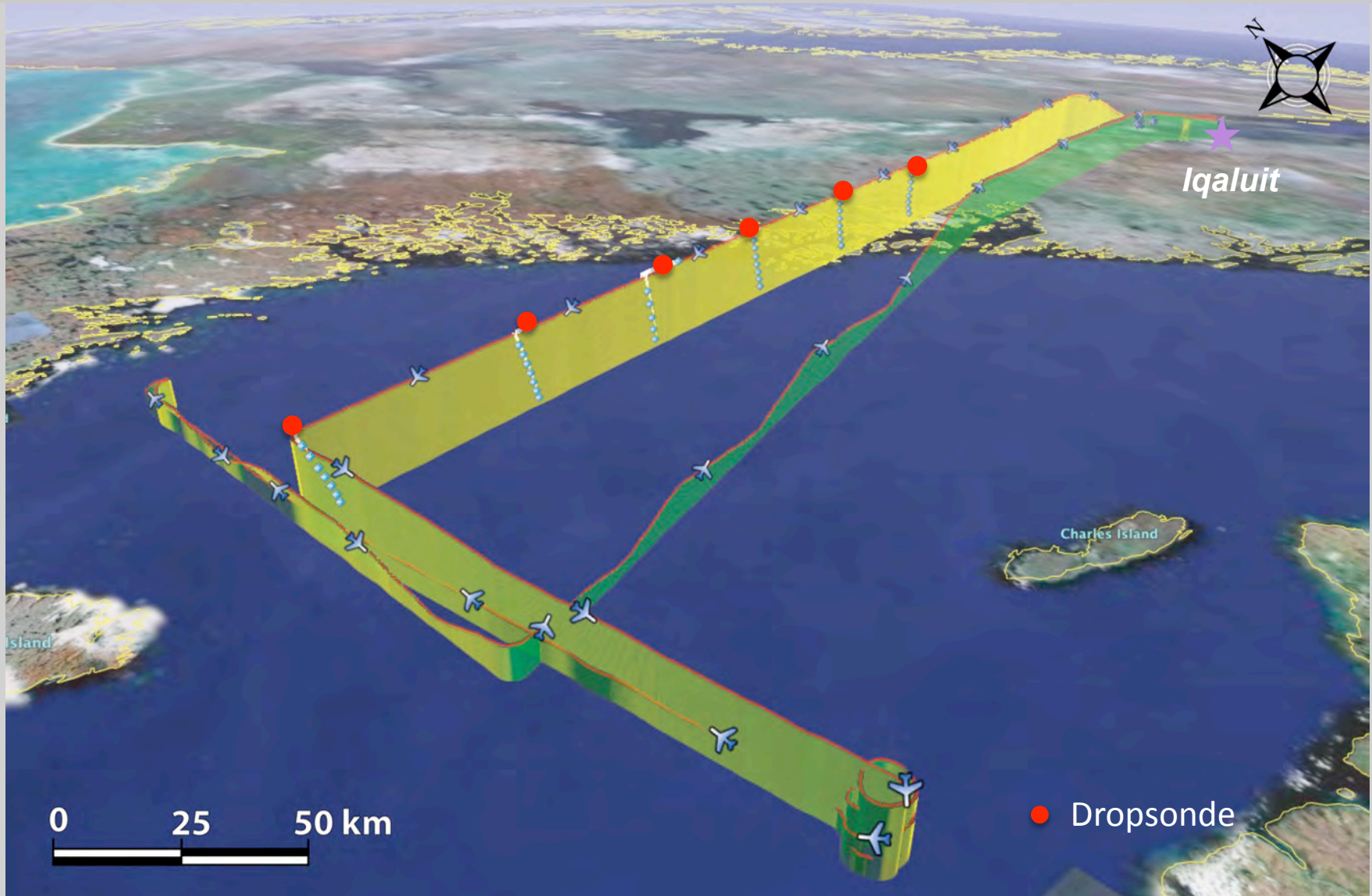
00:00 UTC Nov 10



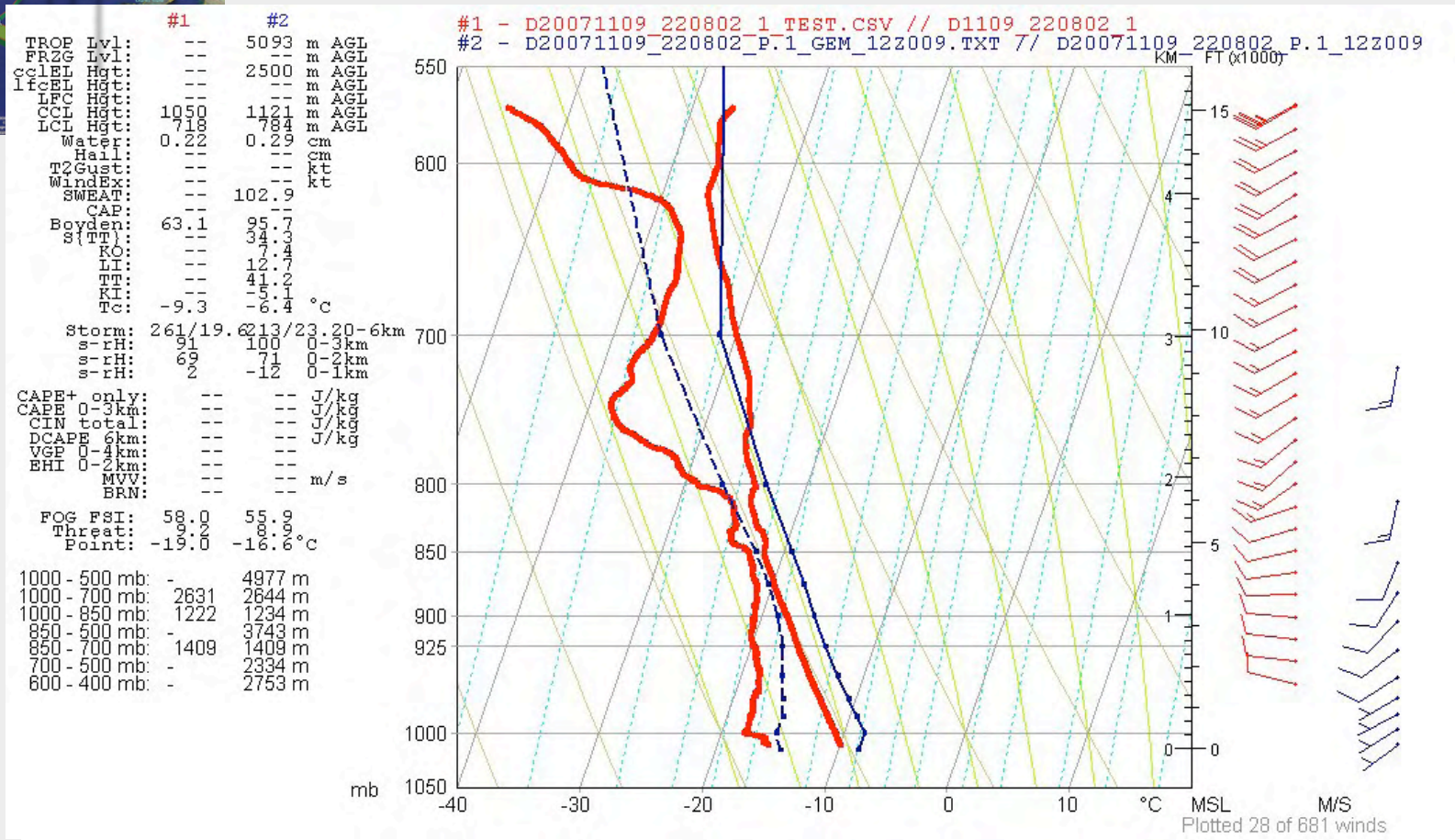
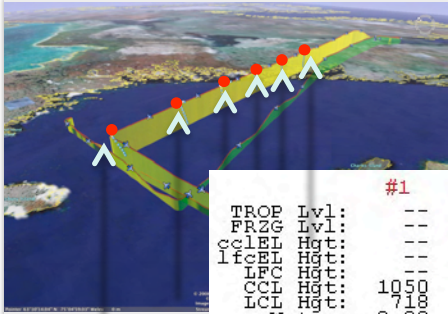
Satellite Image of LLC – Flight Track Overlay



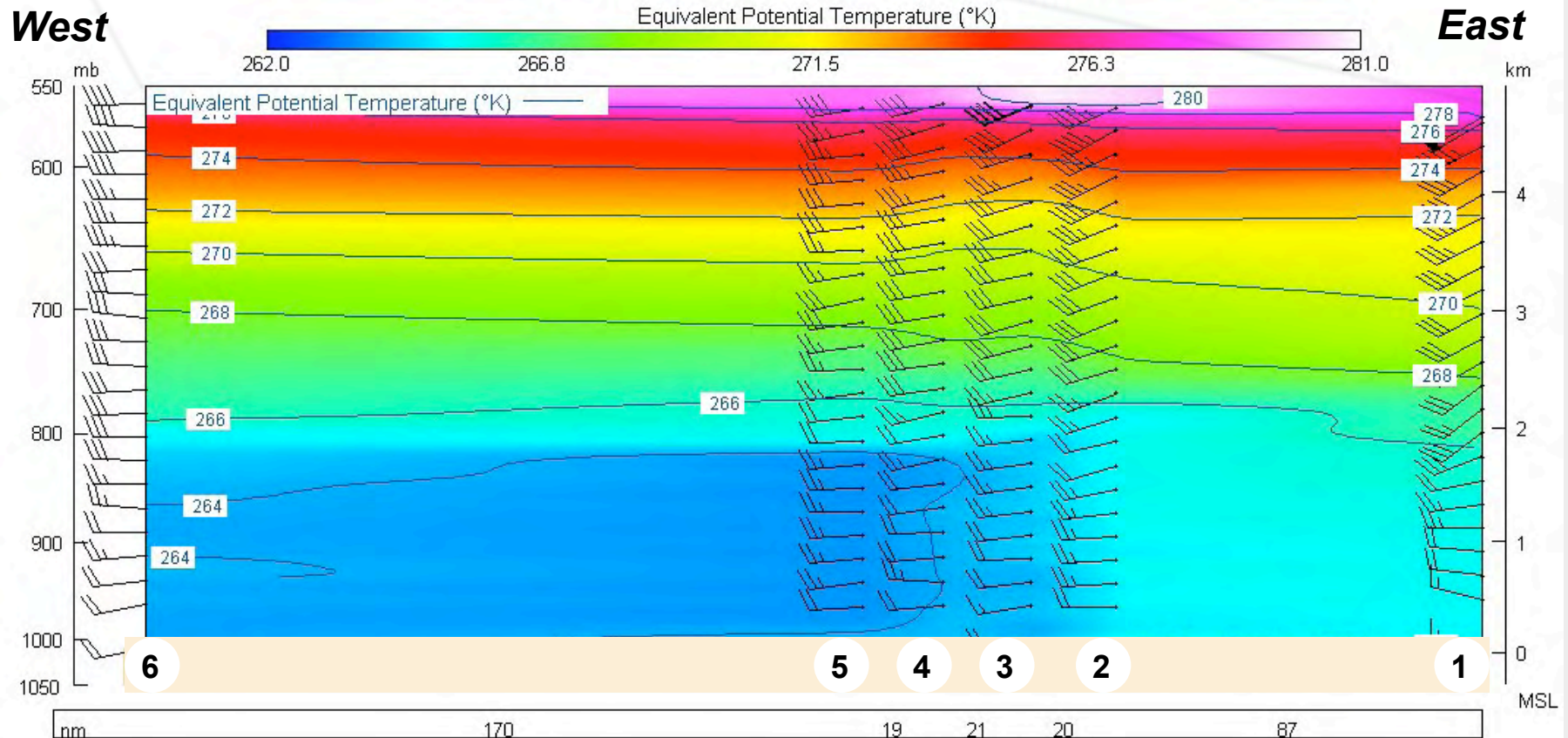
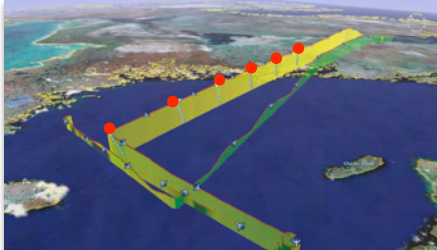
Flight Track



Dropsonde Profiles compared to GEM-LAM

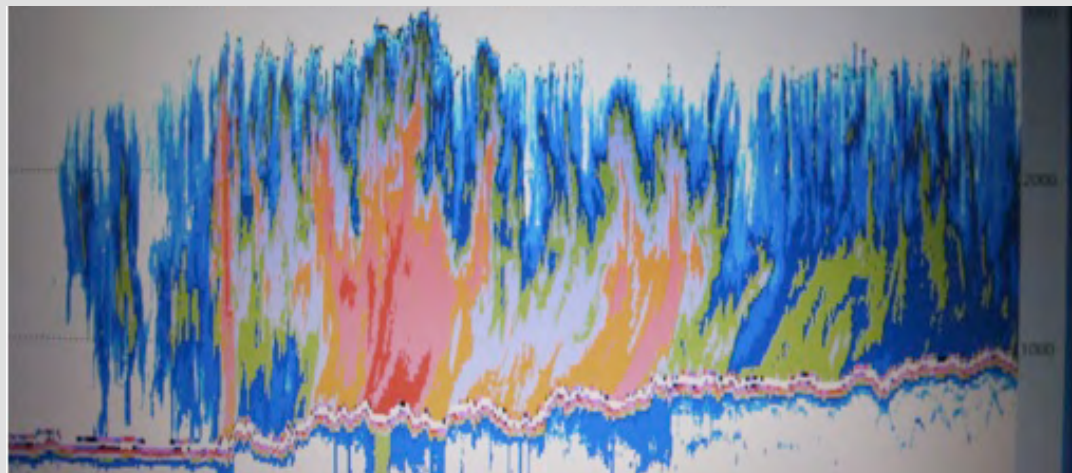
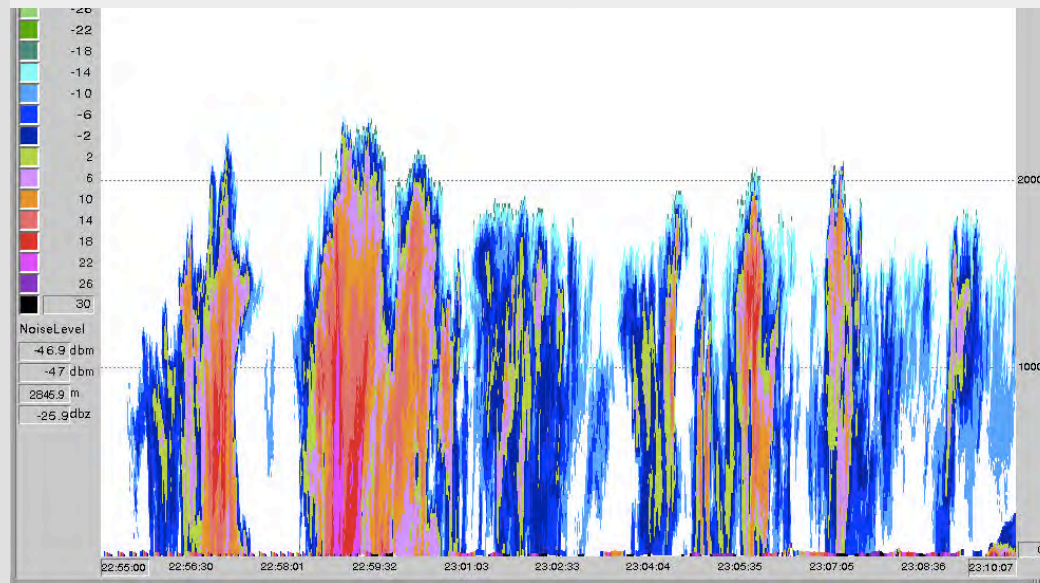


Dropsonde Cross-section



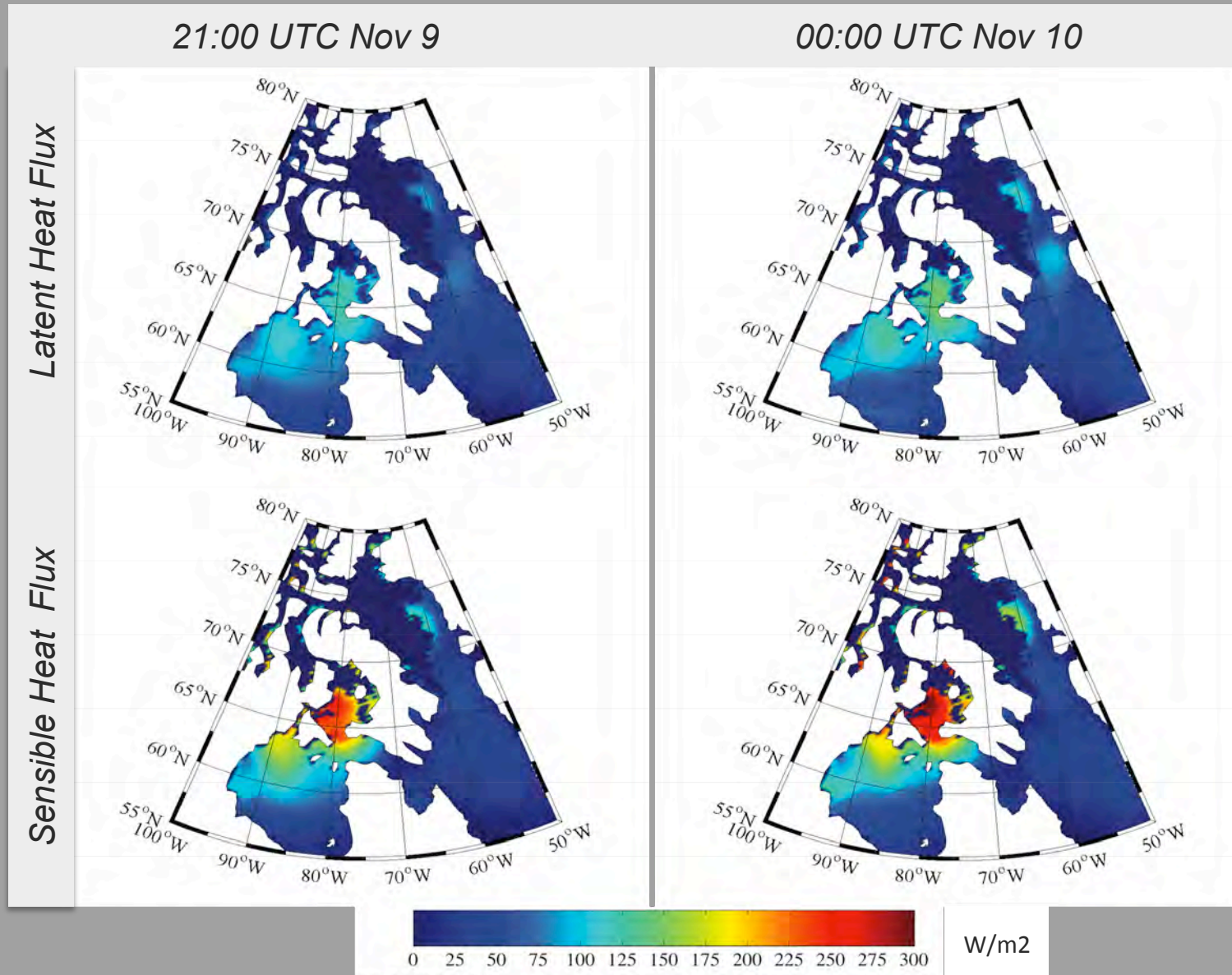
NRC-Convair Ka-Band Radar returns

Convective Towers



Upslope Precipitation

Latent and Sensible Heat Fluxes



Conclusions

- Appears that the November 9 Iqaluit precipitation event was in part caused by:
 - LLC Hudson Strait
 - The passage of a small trough between 18:00-21:00 UTC
 - Onshore flow
- Continued and more detailed analysis is required . . .



Future work

- Use NRC-Convair data to investigate microphysical characteristics of the LLC
- Investigate GEM and GEM-Regional output in more detail for event
- Use YFB special surface observation data, including RADAR, laser precipitation sensor to further investigate Iqaluit precipitation



Thank you



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