

Storm Studies in the Arctic (STAR)

A CFCAS Network



“To better understand severe Arctic storms and their associated hazardous conditions and to contribute to their better prediction”

1st Annual STAR Workshop

NRC, Ottawa, ON Nov. 17, 2006

<http://www.starnetwork.ca/>

Outline

- Weather in the North & IPY 1 data
- STAR History ... proposal to 2010
- STAR Objectives
- STAR Themes
- STAR Team
- STAR Field Experiment Timing
- Present Status
- Purpose of Workshop
- Structure of Workshop
- Expectations of Workshop

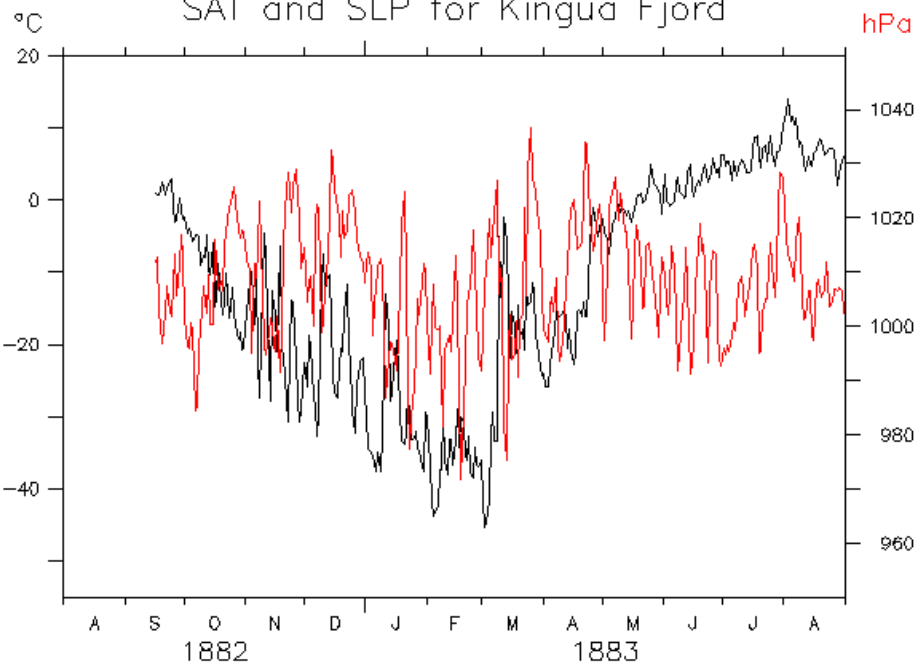


Weather in YFB & IPY 1

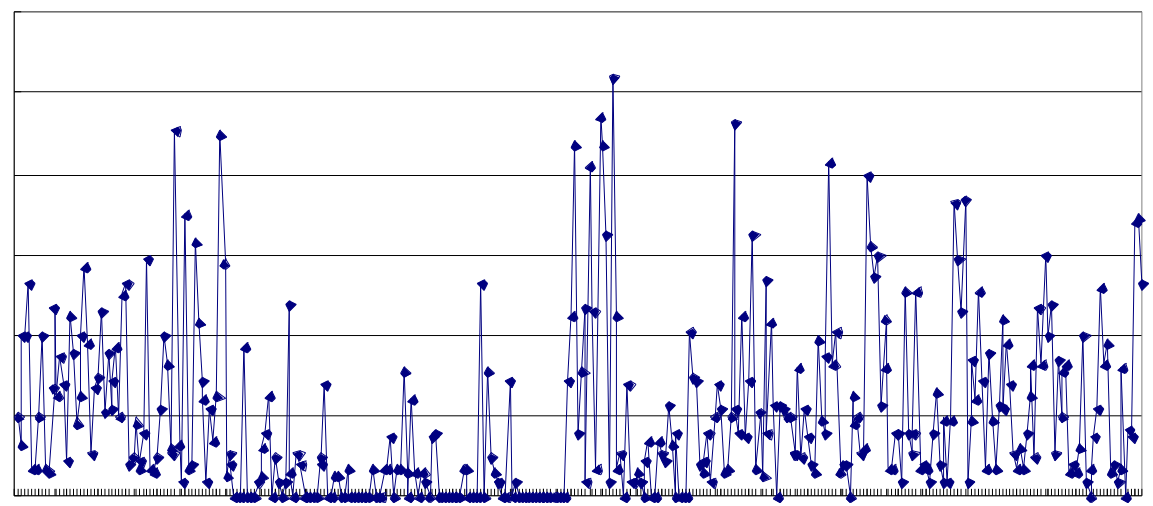
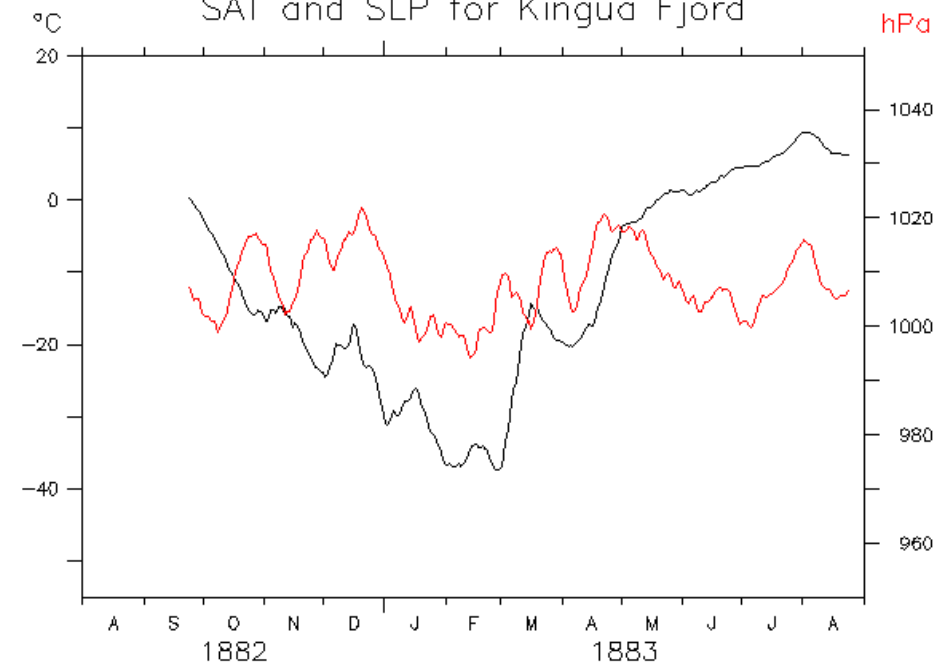
- This Fall's weather & storm activity?
 - Warmer than average thus far (1-2°C) since Sept
 - Scalar wind speeds slightly less than normal
 - SLP strong bi-pole (high over Baffin Bay, low in Hudson Bay) in Sept that has gradually weakened
 - Precipitation near normal to slightly below normal
 - Storm activity most likely less than normal (Ed?)



SAT and SLP for Kingua Fjord



SAT and SLP for Kingua Fjord



TIMELINE OF STAR (history)

2004 Spring Call for new Network LOIs by CFCAS

2004

Jun

Initial LOI submitted to CFCAS

Jly

LOI accepted by CFCAS

2004-05

Aug-Mar

Proposal Development

Apr / 05

Proposal submission

Jun / 05

Proposal Defence

Dec / 05

STAR Proposal formally accepted

2006

Apr

STAR officially begins

Nov 17

First STAR workshop



TIMELINE OF STAR (beyond today)

- **2006**

Autumn/Winter Acquisition of equipment and testing
Autumn Annual workshop
John Scott (radar location)

- **2007**

Spring Installation of double-fence and other MSC equip at Iqaluit
Surveys for identifying mesonet locations and begin aircraft operations planning
June/July Begin to install equipment at Iqaluit and surrounding region
Oct 10–Dec 10 Autumn field experiment

- **2008**

Feb 1-Feb 28 Blowing snow field experiment
Summer Annual workshop

- **2009**

Summer Annual workshop

- **2010**

Summer Project completion and final workshop
Special issue for STAR research in a selected peer-reviewed journal



STAR Team

- Co-Leads:
Hanesiak (UM), Stewart (McGill)
- Co-Investigators:
Barber (UM), McBean (UWO), Moore (UT), Taylor (YU)
- Collaborators:
Bilan-Wallace (MSC), Goodson (MSC), Hudak (MSC), Kochtubajda (MSC), Gravel (MSC), Strapp (MSC), Nitu (MSC), Wolde (NRC)



Objective

- To better understand severe Arctic storms and their associated hazardous conditions, and contribute to their better prediction
 - Realized through 4 main themes
 - Blowing snow, strong winds, low visibility & fog, wind chill, precipitation, sea ice

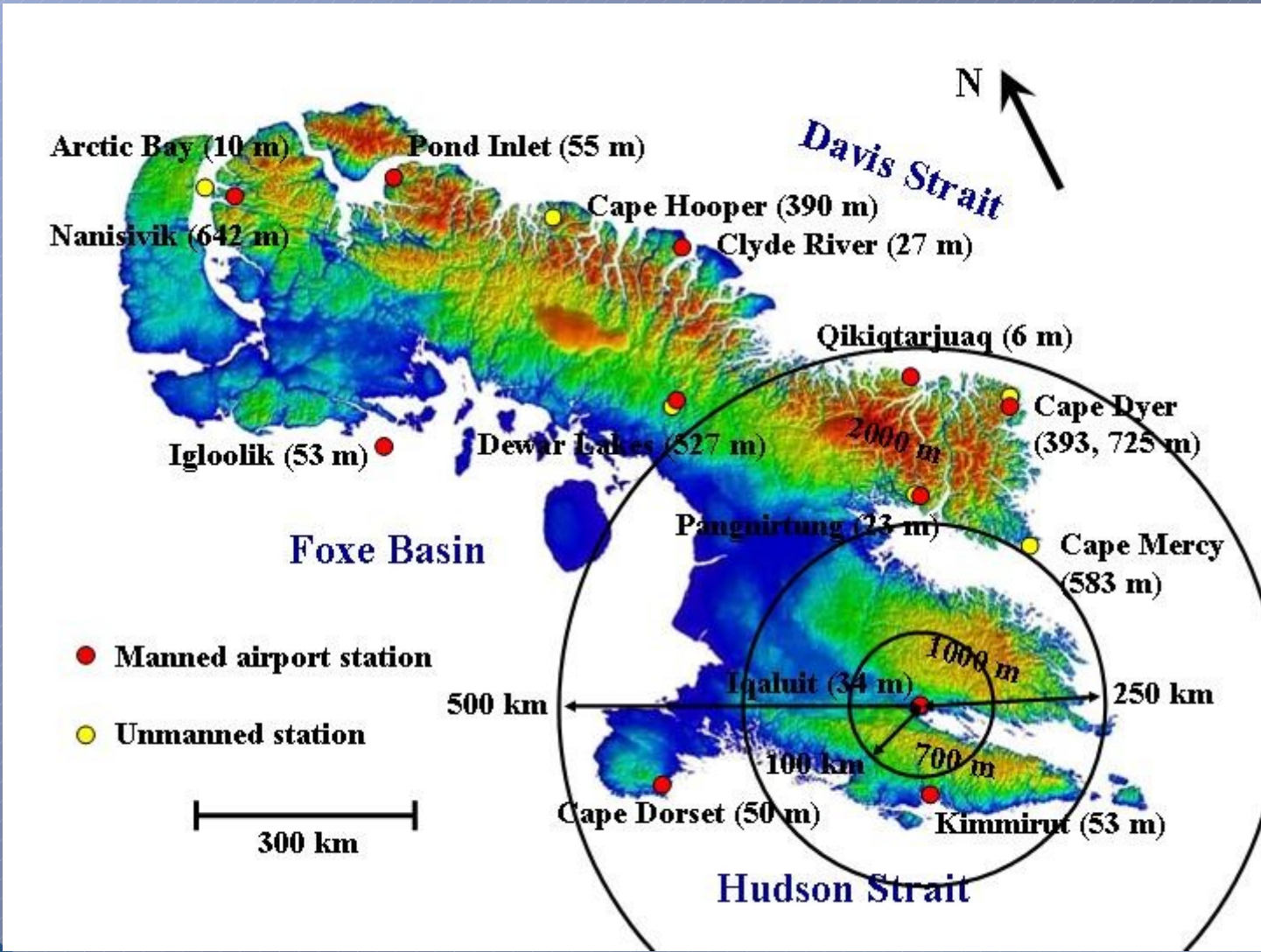


Themes

- Theme 1 (Ron):
 - Hazardous weather in the Iqaluit area
 - Cloudsat validation
 - **Project 1:** strong winds, shear & local impacts
(John, Peter, Kent, Ron)
 - **Project 2:** precipitation, cloud & associated features
(Ron, John, Peter, Kent, Dave H, Mengistu, Walter, Rodica)
- Theme 2 (Kent & Dave B):
 - Regional hazardous weather and sea ice impacts
 - **Project 1:** interactions of fronts & cyclones with topography
(Kent, John, Ron, Peter, Dave B, Bob, Ron G, Dave H, Mengistu)
 - **Project 2:** Sea ice coupling to storms
(Dave B, John, Kent, Ron, Peter)
- Theme 3 (John):
 - Weather prediction capabilities and improvements
(John, Ron G, Bob K, Sylvie, Dave B, Kent, Ron, Peter)
- Theme 4 (Gordon & Bob K):
 - User community interactions (gov & northern comm.)
(all STAR academics and MSC)



Geography



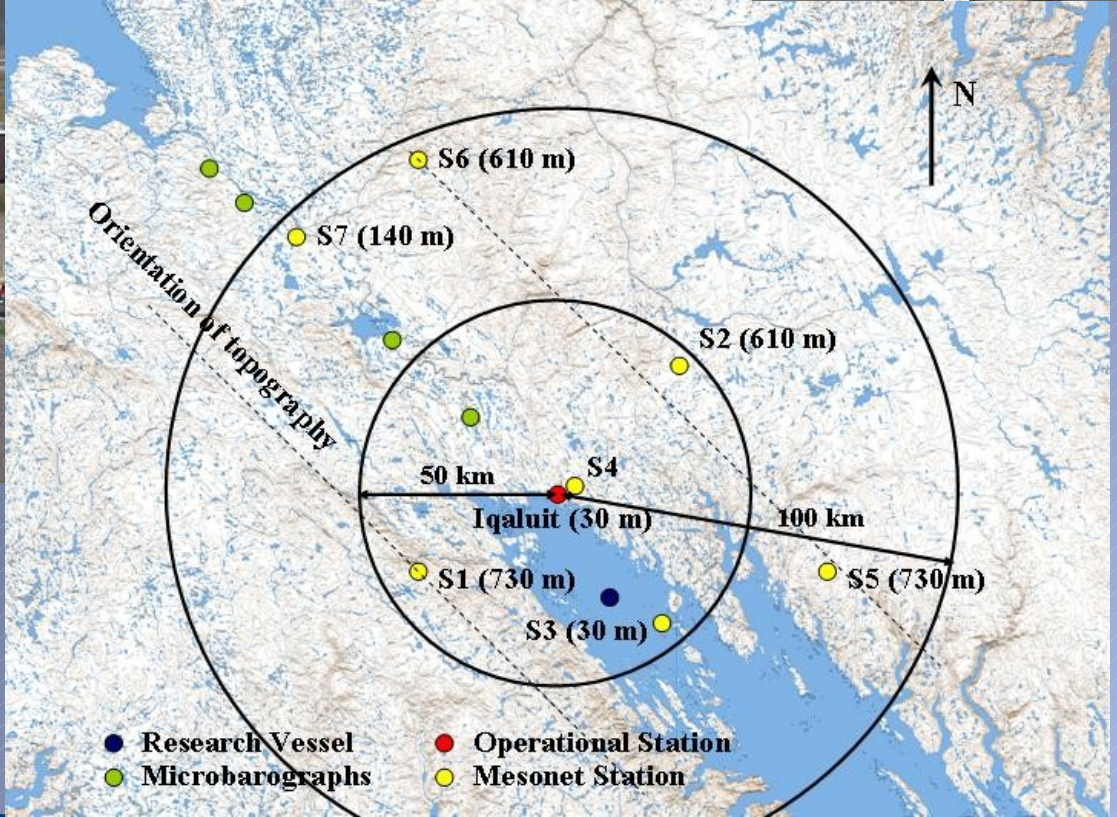
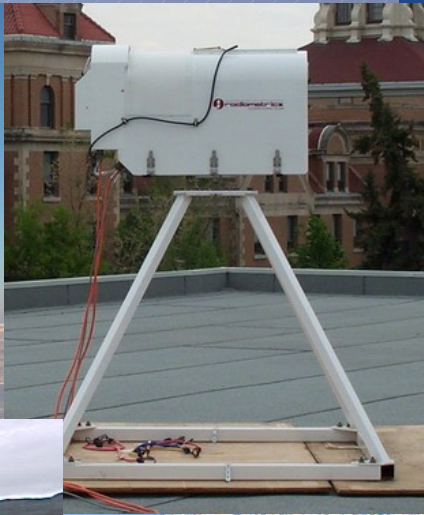
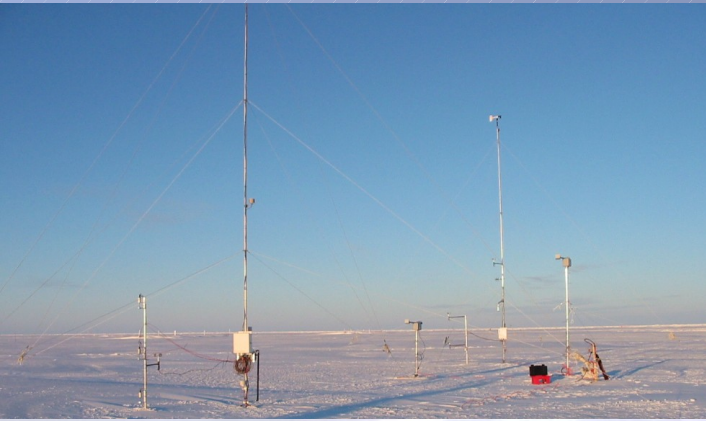
Geography



Tools



Surface-based Measurements



NRC Convair-580

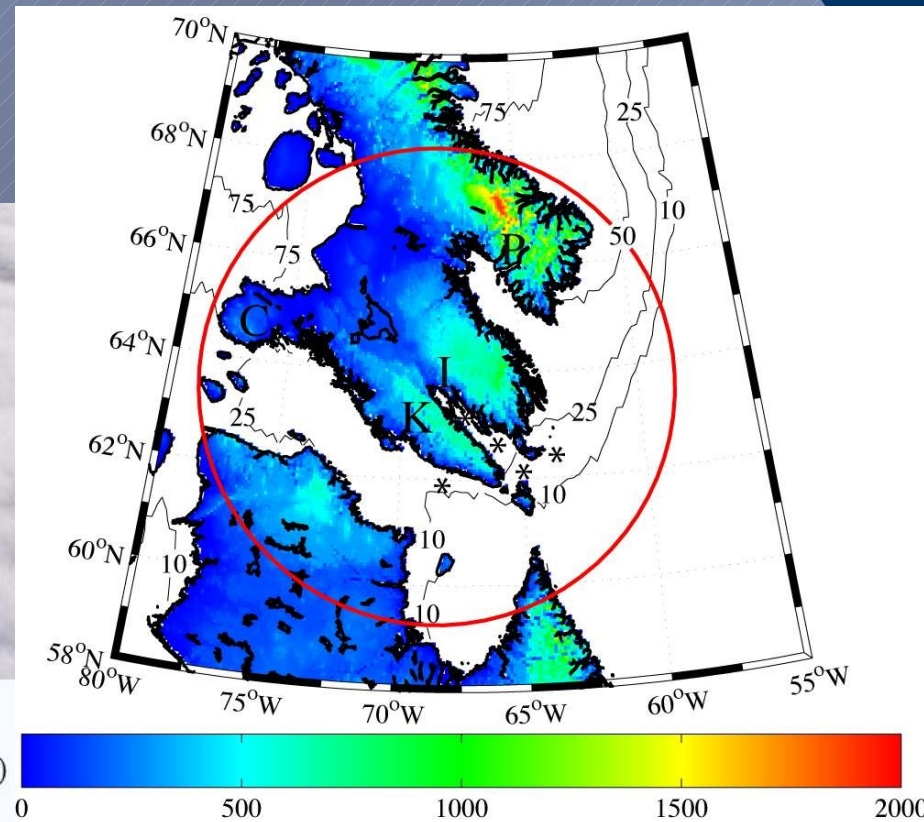
- 3 W band, 3 X band, 2 K band and 2 lidars
- W bands aft, port (dual-pol) and down (other angles with mirror)
- X band up, down (dual-pol) and port side ... all Doppler
- K band and lidars up and down
- dropsondes

• NRC W/X band radar



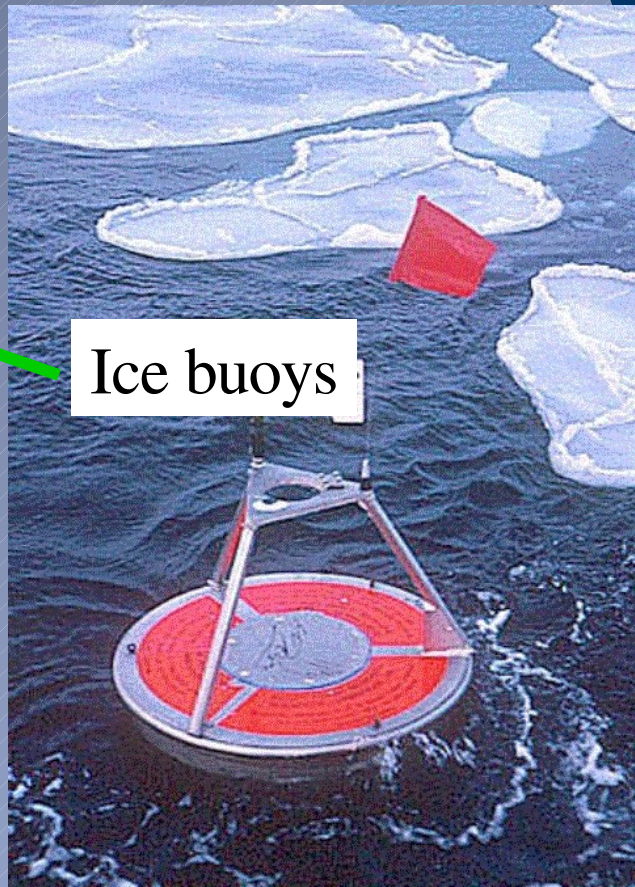
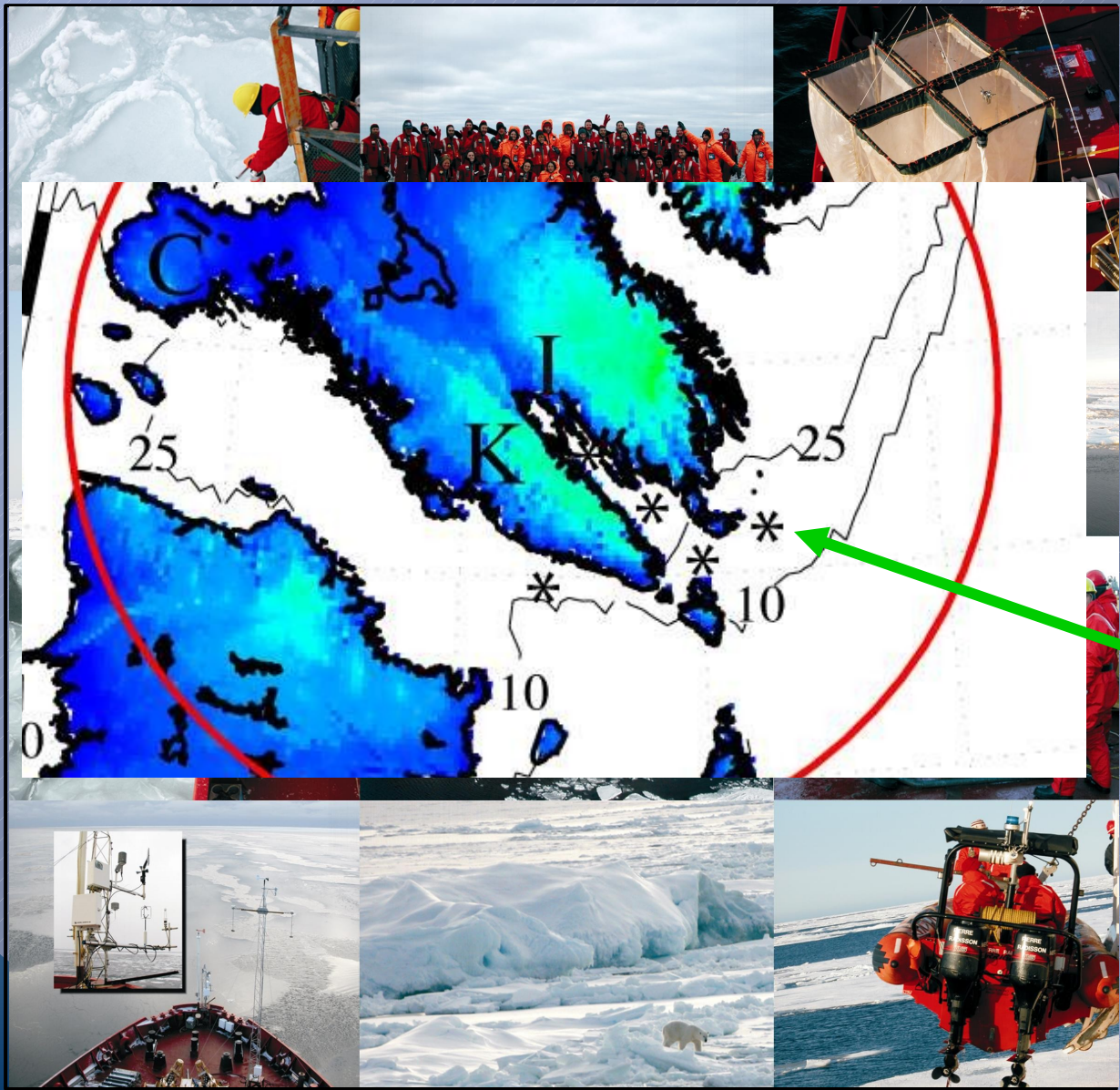
X - X-band antennas (18-25")
W - W-band antennas (12")
R - Motorized reflector plate

NRC Airborne W and X bands (NAWX) Radar System



CCGS Amundsen

- Ceilometer
- All-sky camera
- Rawinsondes
- Manned obs
- Ice buoys



Ice buoys

Collaboration & Users*

- Direct
 - ArcticNet
 - IPY (2007-08)
 - NAC, NRI
 - MSC (many divisions)
 - NRC
- MSC (prediction and warnings)
- Emergency / medical response
- DND
- Coast guard
- CIS for ice impacts from storms
- Town of Iqaluit
- Northern communities



Other Polar Initiatives (collaboration?)

Complementary IPY related high latitude projects

- **Extreme winds in the Arctic region** (Svalbard region) (lead Erik Kolstad - Norway, UK, IARC)
 - Use special and existing surface & UA obs
- **GFDex (Greenland Flow Distortion Experiment)** (Ian Renfrew and Alan Thorpe - UK)
 - Aircraft obs, ship obs, mainly east of Greenland
- **Greenland Jets** (Fall 2007) (Andreas Dörnbrack, Germany)
 - Airborne Doppler Lidar, surface/UA obs, 3-D flows east of Greenland
- Others: Naires Strait (Preben Gudmandsen), Gravity Wave Study (mesoscales) (Stephen Mobbs, UK), South Pole boundary layer study (Jorge Carrasco, Chile)



Deliverables & Integration of Themes*

Theme 1 & 2:

- Collective dataset on the characteristics of storms and associated features in Iqaluit and surrounding region
- Better understanding the processes leading to hazardous weather conditions in Iqaluit and surrounding region
- Assessment of CloudSat and related products and demonstrated use of such products

Theme 3:

- Document how well current models simulate storms & their features
- Highlight specific areas that require improvement as well as providing data assimilation results

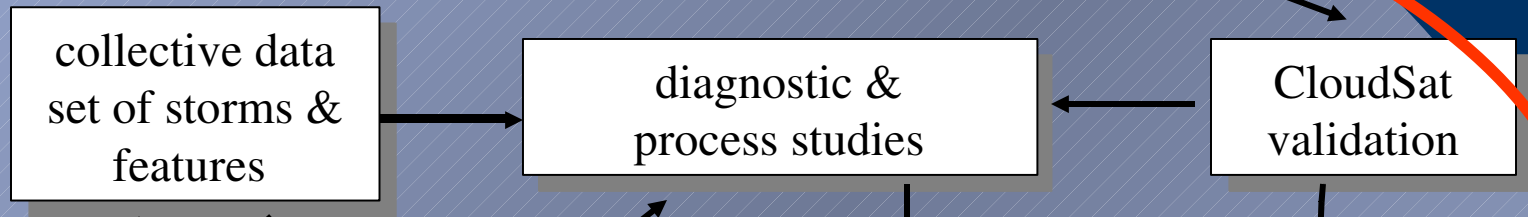
Theme 4:

- identify the impacts of hazardous weather and how communities/government can play a role in reducing the impacts
- Community outreach activities (information on the STAR and MSC websites that provide information on storms, in an accessible and useful manner)
- Hazard mitigation recommendations including weather forecasts better tailored to local community needs to reduce risks and impact

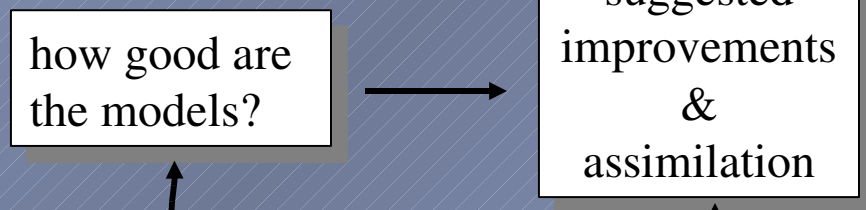


Deliverables & Integration of Themes*

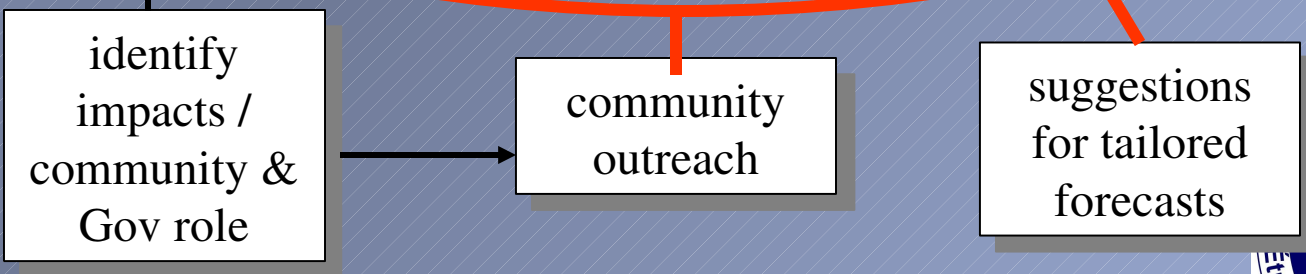
Themes 1 & 2



Theme 3



Theme 4



Long-Term Goals

- To better understand and predict weather and weather-related extremes in the Arctic; and
- To contribute to better assessments of whether the intensity and frequency of such extremes will change in the future with climate



At the end of STAR we expect to say that:

- “We have greatly increased our understanding of Arctic storms through a major field experiment, modeling studies and data analysis focusing on southern Baffin Island and we have applied this to improved prediction.”
- “We have left a legacy of comprehensive datasets, improved observational and modelling techniques, a new generation of Arctic scientists, and have provided northern communities better information about these storms.”
- At the end of each STAR workshop, we will produce a short statement that summarizes our collective status in relation to our final ones.



MANAGEMENT

Accountability and Delivery

- Board of Directors:
Peter Johnson (Chair), Gary Burke, Jamal Shirley, Erik Kolstad, John Hanesiak, Tim Aston (ex-officio), Ron Stewart (advisory)
- Scientific Committee:
John Hanesiak - Ron Stewart (Co-Chairs), Dave Barber, Gordon McBean, Kent Moore, Peter Taylor
- Secretariat:
Lisa LeBlanc, George Liu, Tracy Machonacie



Data Management

- Critical for Network
- It will:
 - enhance our research,
 - promote the Network,
 - allow for more interactions,
 - serve as one legacy of our efforts
- Facilitated by Network/Information managers (Lisa LeBlanc & George Liu)
- Data Policy?
- How will we manage our data?



Present Status & Things to Discuss

- Network and Information Manager
- Funds in place
- Students / PDFs / assistants
- Equipment purchases
 - Mesonets, laser precip sensor, sondes, flux station, ice buoys
- PASPC YFB office during STAR
- Radar siting
- Aircraft (costs, hangar, timing)
- Ship issues
- Licensing
- Community interactions
- IPY - TAWEPI
-



WORKSHOP OBJECTIVES

In general, the objective of this workshop is to: *start the network.*

Specific sub-objectives include:

- Review our network objectives
- Create a logistics plan & raise field issues
- Create action items from logistics plan & other issues



Workshop Outcomes

- Collective appreciation of our network goals
 - individual activities
 - issues and challenges
 - logistical plan improvement
- Specific next actions for moving forward
- Summary of our collective status
- Updated timeline
- BoD meeting



Organization of Workshop

Now	Coffee Break
10:30 - Noon	Specific Research & Logistics Issues
12:00 - 1:00	Lunch break and tour of Convair
1:00 - 2:00	Summary and discussion of outstanding issues
2:00 - 3:00	Sessions <ul style="list-style-type: none">I. Aircraft issuesII. Other issues
3:00 - 3:30	Summary discussion & future activities
4:00 - 6:00	STAR Board of Directors' meeting

