The 2013-2014 Antarctic Automatic Weather Station Network Update: The FreeWave Network Segment

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University of Wisconsin Madison

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University of Colorado-Boulder

Overview

- Field team
- Equipment
- Freewave Network
  - Current usage
  - Future Plans
- Iridium Network
  - Current Usage
  - Future Plans
- Successes and Issues during the field season

The AMRC/AWS Team

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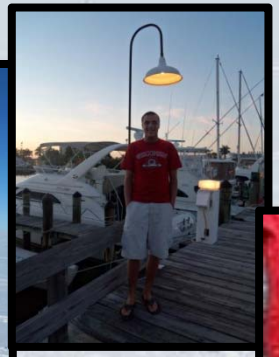
Dr. Melissa Nigro

Dr. John Cassano

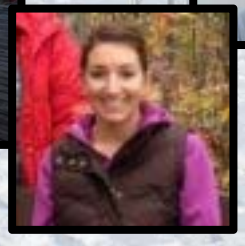
Linda Keller

Carol Costanza

Dr. Masha Tsukernik



Joe Nettesheim



Marian Mateling

Katie Stockwell

Nick Weber

Lee Welhouse

2013-14 Field Team

Dave Mikolajczyk

Dr. John Cassano

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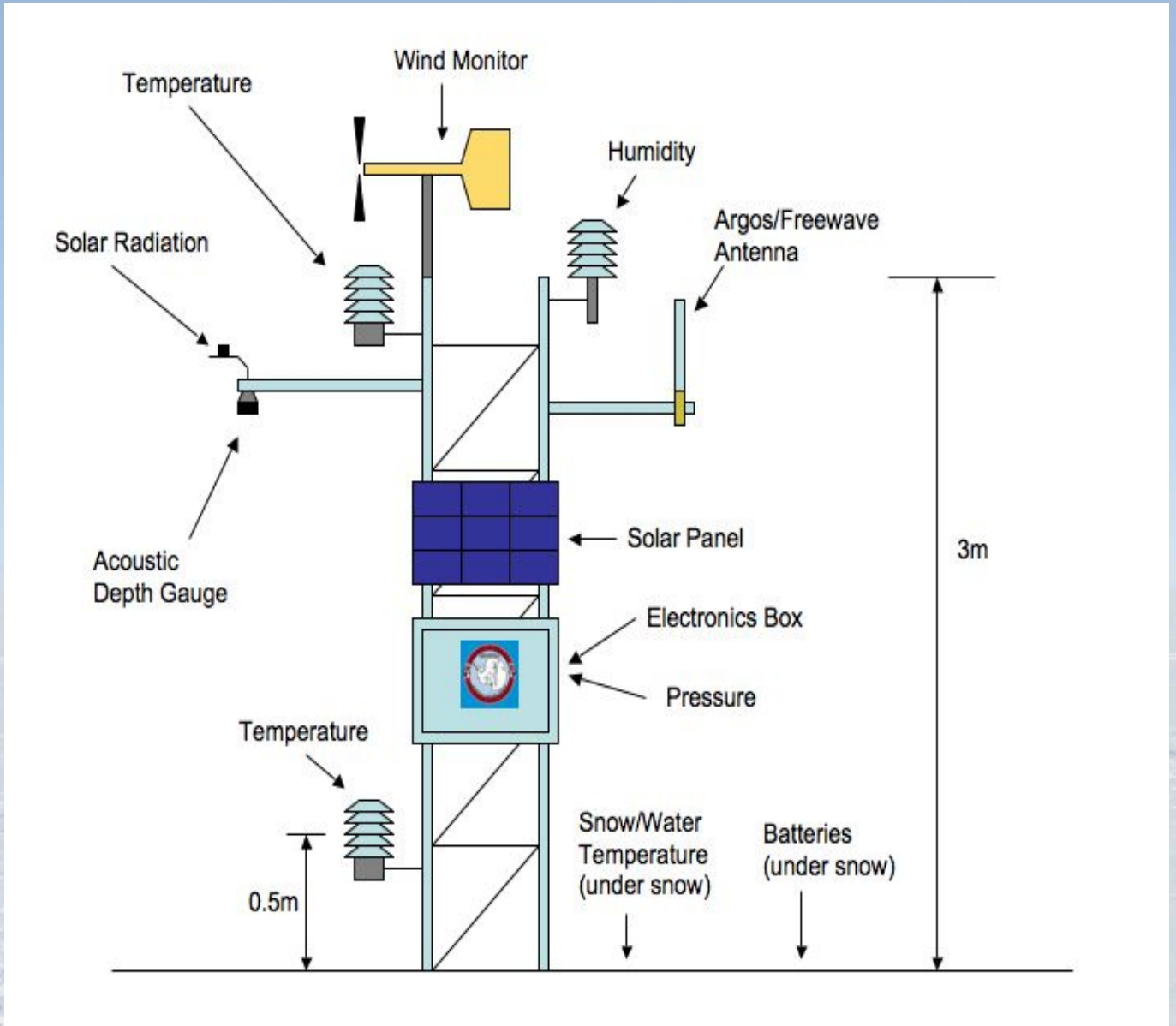
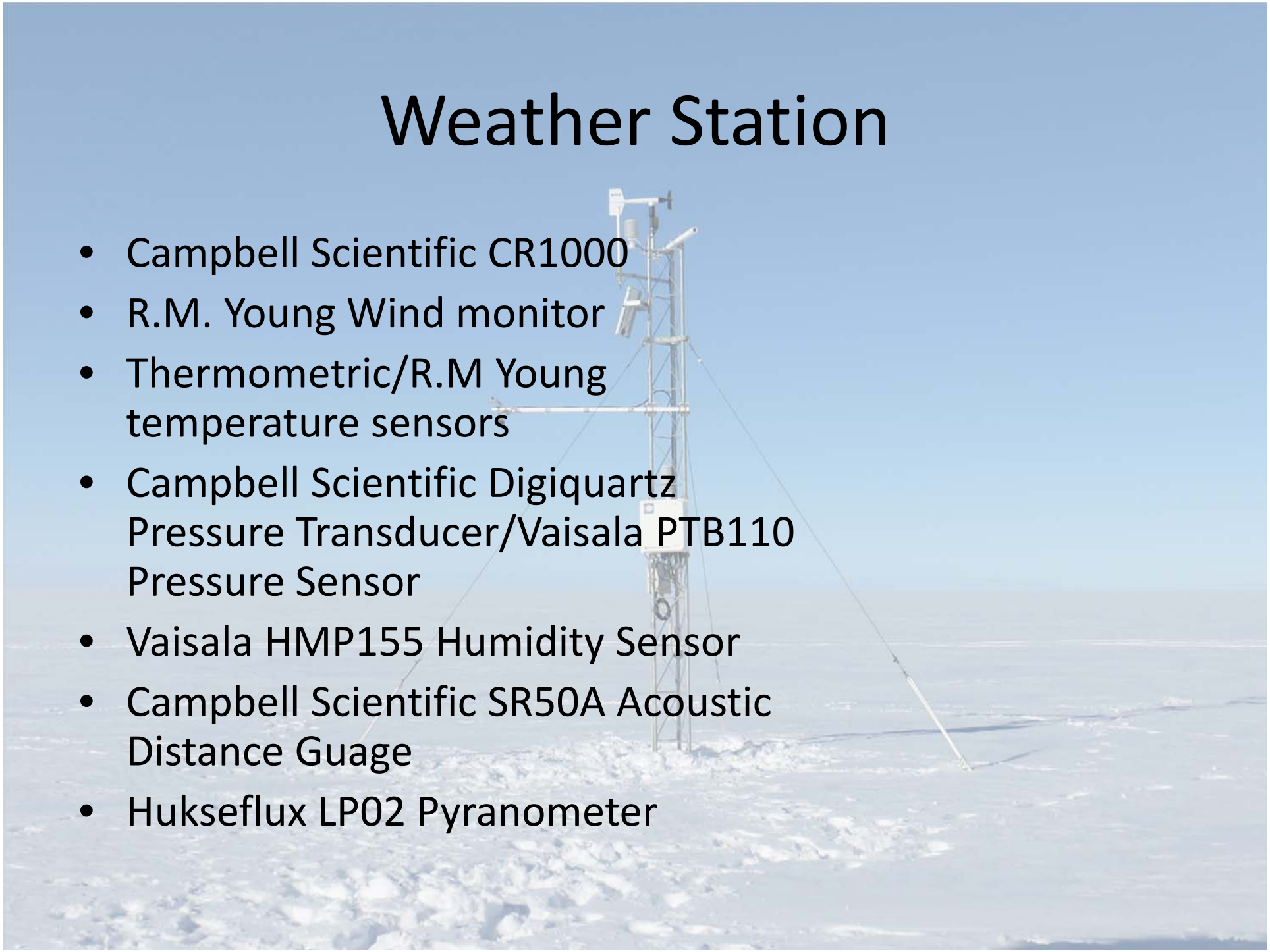
Dr. Melissa Nigro

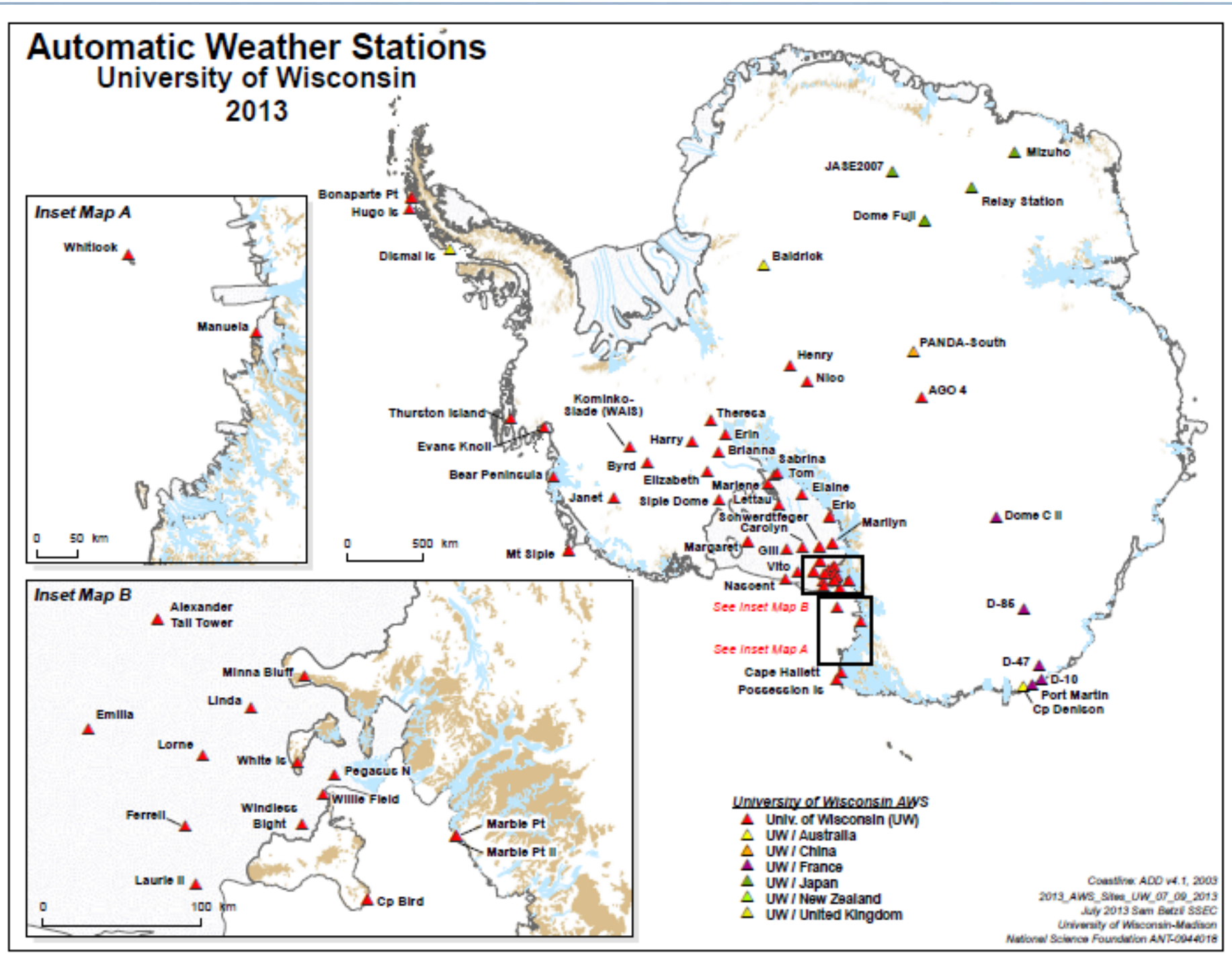
AWS Schematics



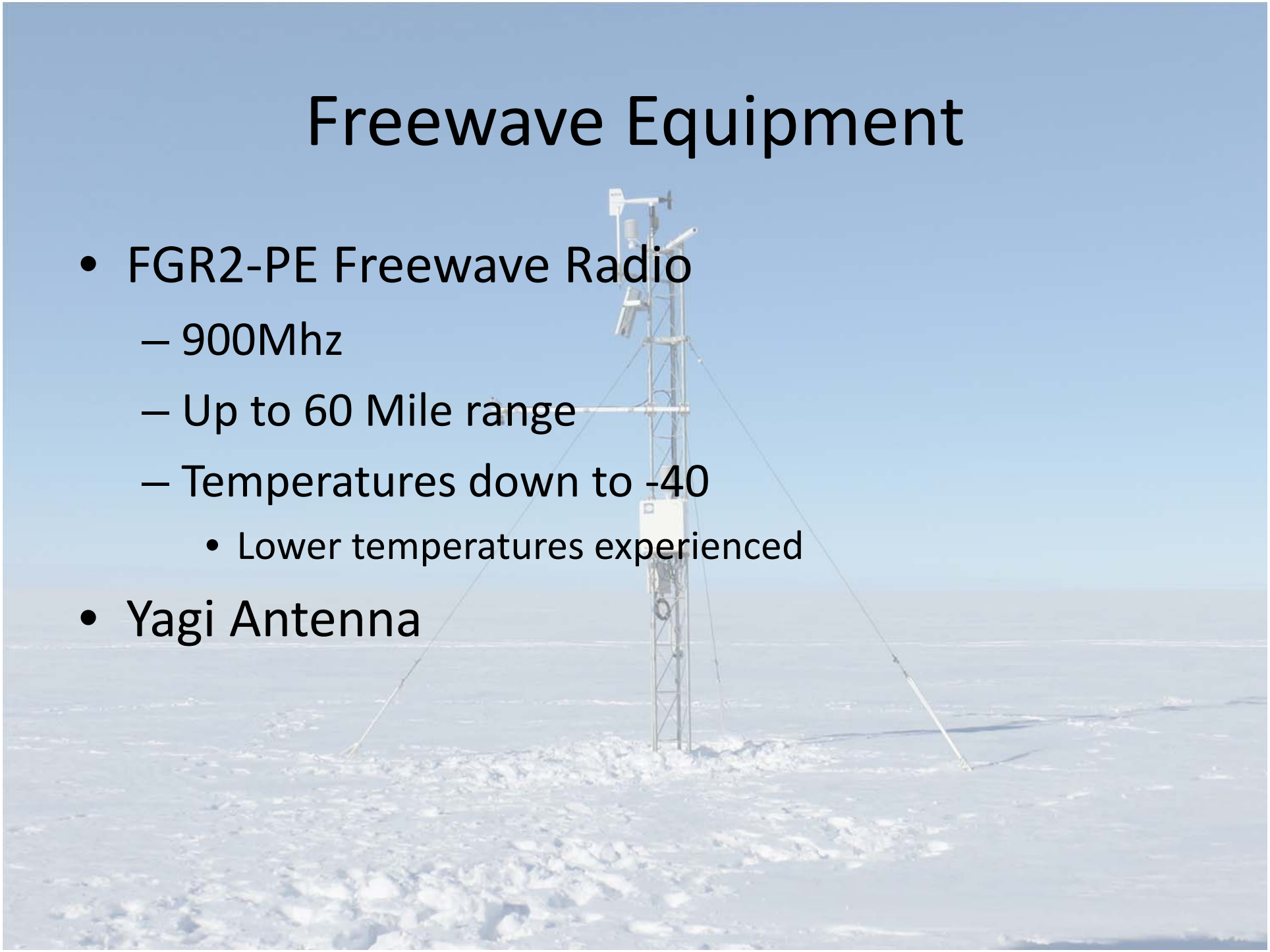
Weather Station



- Campbell Scientific CR1000
- R.M. Young Wind monitor
- Thermometric/R.M Young temperature sensors
- Campbell Scientific Digiquartz Pressure Transducer/Vaisala PTB110 Pressure Sensor
- Vaisala HMP155 Humidity Sensor
- Campbell Scientific SR50A Acoustic Distance Guage
- Hukseflux LP02 Pyranometer


Automatic Weather Stations
University of Wisconsin
2013
Inset Map A
Whitlock
Manuela
0 50 km
Inset Map B
Alexander Tall Tower
Minna Bluff
Linda
Emilia
Lorne
White Ic
Pegasus N
Willie Field
Windless Bight
Ferrell
Marble Pt
Marble Pt II
Laurie II
Cp Bird
0 100 km
Bonaparte Pt
Hugo Ic
Dismal Ic
Thurston Island
Evans Knoll
Bear Peninsula
Janet
Mt Siple
0 500 km
Kominko-Slade (WAIS)
Harry
Byrd
Elizabeth
Siple Dome
Theresa
Erin
Brianna
Sabrina
Tom
Marlene
Lettau
Schwerdtfeger
Carolyn
Margaret
Gill
Vito
Nacoent
Janet
Elaine
Erio
Marilyn
See Inset Map B
See Inset Map A
Cape Hallett
Possession Ic
Baldrick
Dome Fuji
JASE2007
Mizuho
Relay Station
PANDA-South
Henry
Nico
AGO 4
Dome C II
D-85
D-47
D-10
Port Martin
Cp Denison
University of Wisconsin AWS
Univ. of Wisconsin (UW)
UW / Australia
UW / China
UW / France
UW / Japan
UW / New Zealand
UW / United Kingdom
Coastline: ADD v4.1, 2003
2013_AWS_Sites_UW_07_09_2013
July 2013 Sam Betzil SSEC
University of Wisconsin-Madison
National Science Foundation ANT-0944018

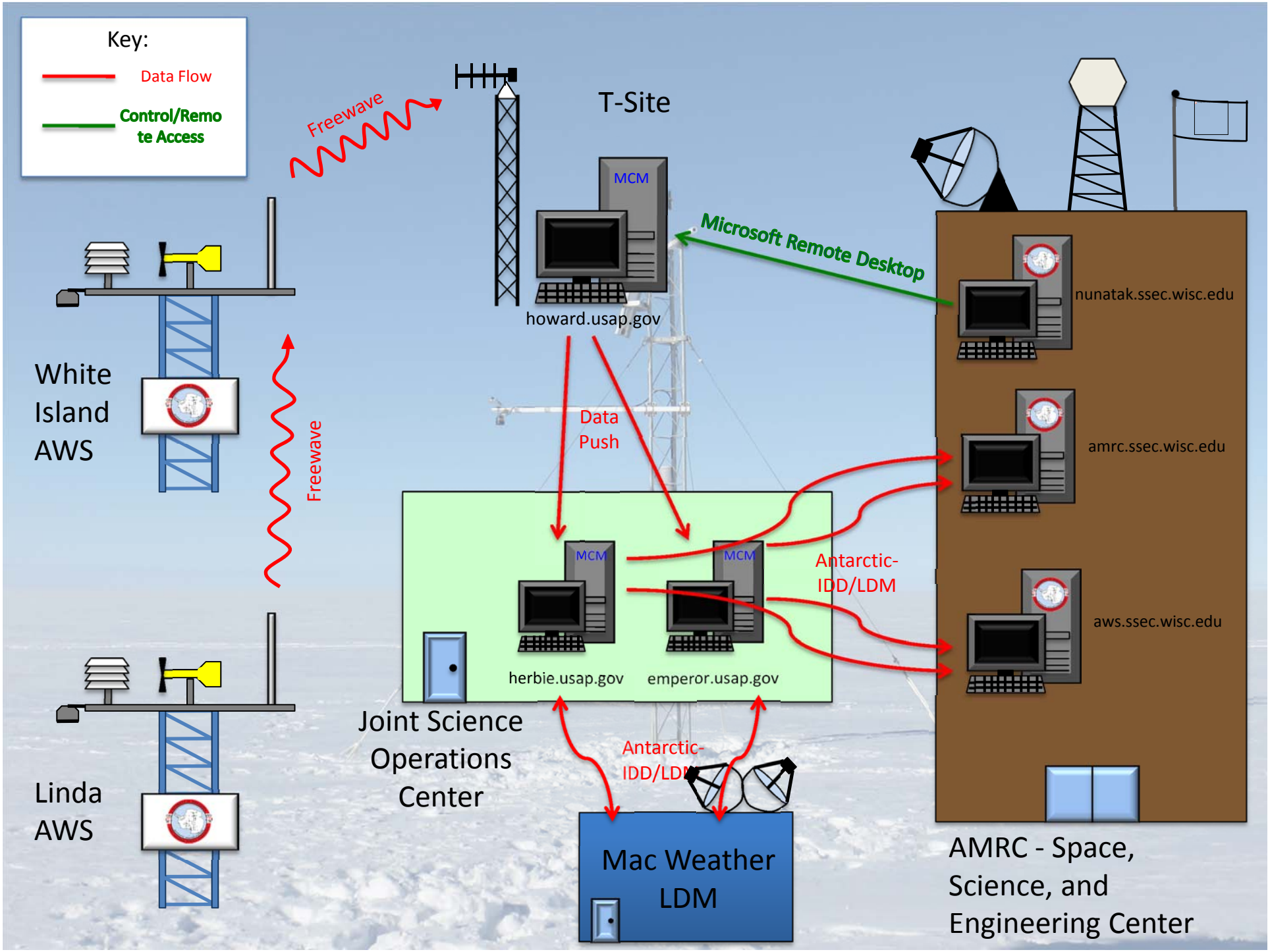
Freewave Equipment



- FGR2-PE Freewave Radio
  - 900Mhz
  - Up to 60 Mile range
  - Temperatures down to -40
    - Lower temperatures experienced
- Yagi Antenna

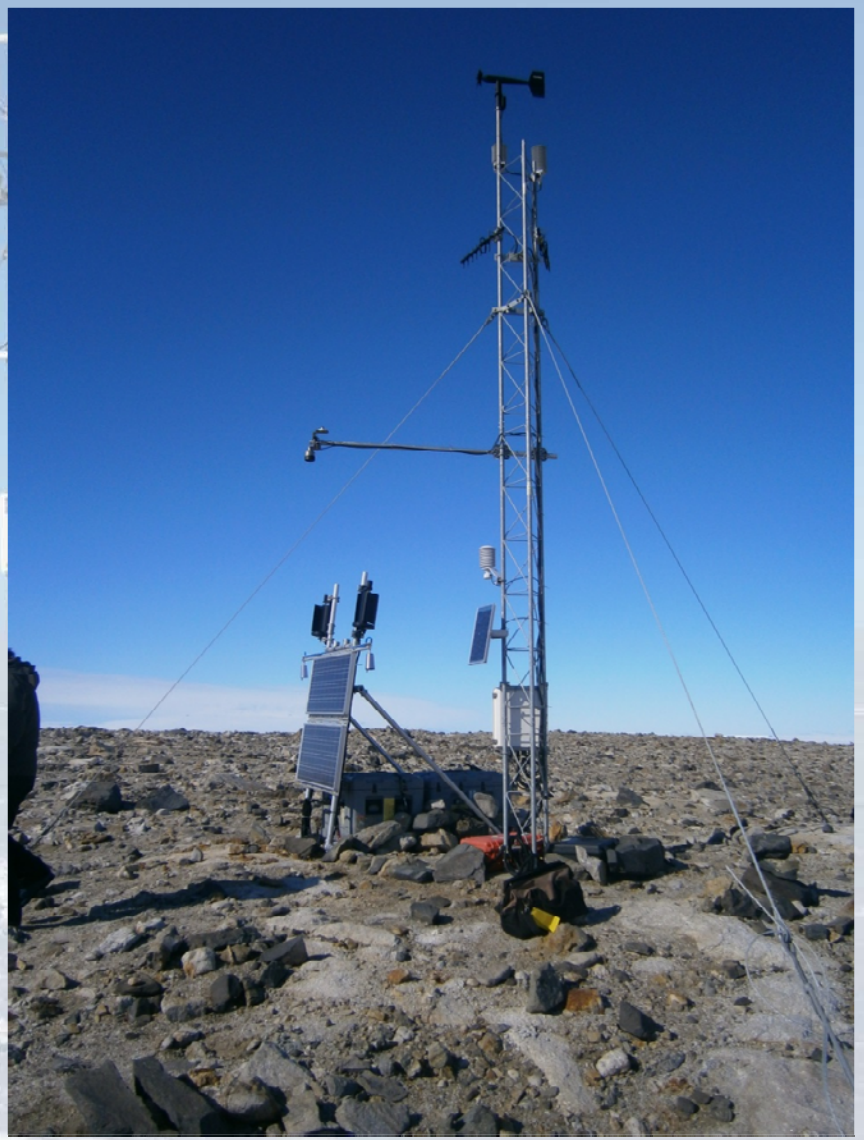
Current Freewave Network

	Distance to repeater/end point
• Ferrell II	• 51.43 Miles to White Island
• Linda	• 28.58 Miles to White Island
• Lorne	• 37.91 Miles to White Island
• Windless Bight	• 24.59 Miles to White Island
• White Island	• 19.36 Miles to McMurdo
• Willie Field	• 4.26 Miles to McMurdo
• Pegasus North	• 7.74 Miles to McMurdo
• Minna Bluff	• 48.91 Miles to McMurdo
• Cape Bird	• 43.67 Miles to Marble Point
• Marble Point	• 51.73 Miles to McMurdo

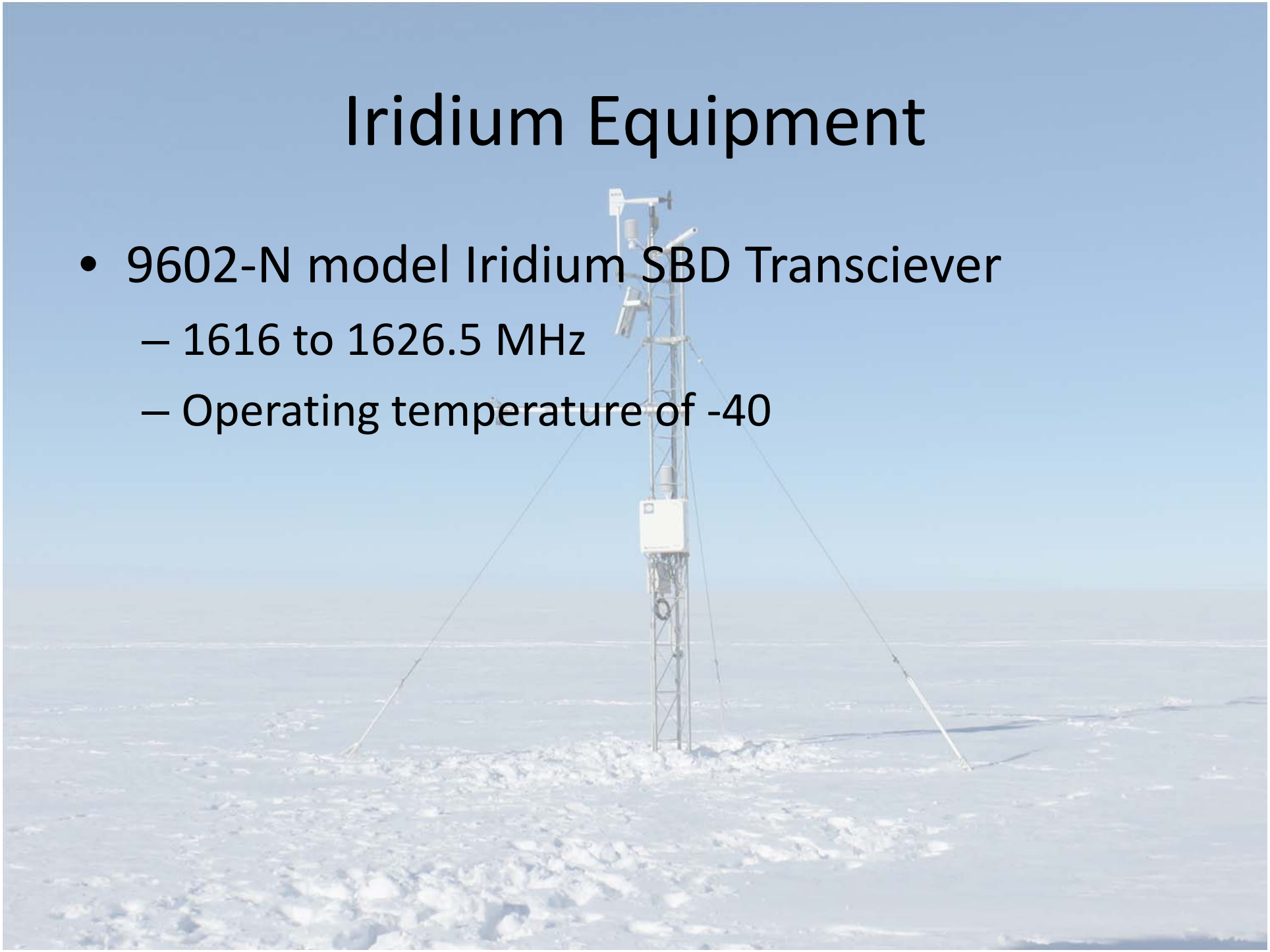

Key:
Data Flow
Control/Remote Access
Freewave
T-Site
MCM
howard.usap.gov
Microsoft Remote Desktop
nunatak.ssec.wisc.edu
amrc.ssec.wisc.edu
aws.ssec.wisc.edu
White Island AWS
Freewave
Data Push
Antarctic-IDD/LDM
MCM
MCM
herbie.usap.gov
emperor.usap.gov
Joint Science Operations Center
Antarctic-IDD/LDM
Linda AWS
Mac Weather LDM
AMRC - Space, Science, and Engineering Center

Future Plans Freewave

- Potentially increase network
  - Determine the possibility of multiple hops
- Improve stability
- Add redundancy at repeater sites
- Remove single points of failure



Iridium Equipment

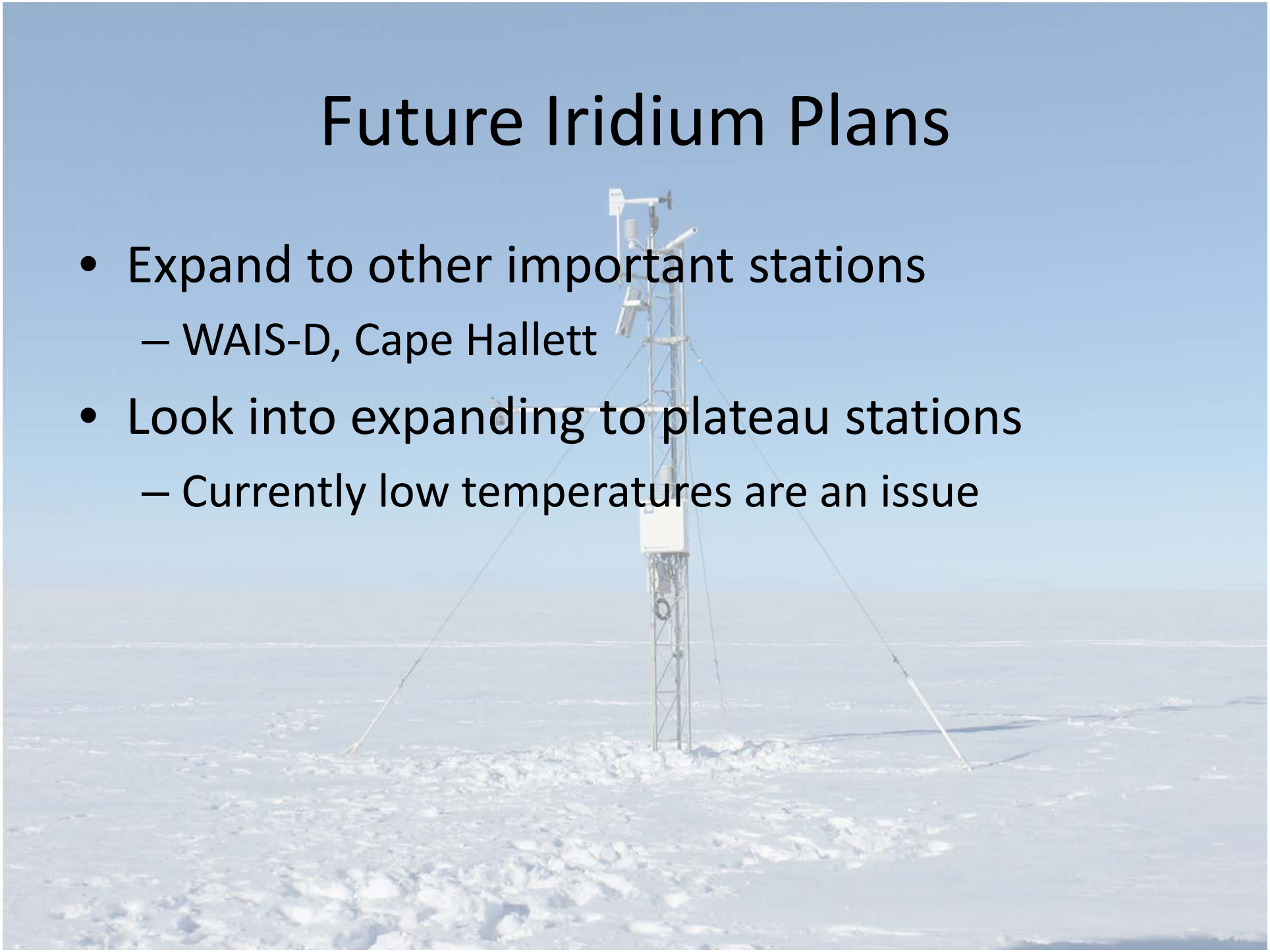


- 9602-N model Iridium SBD Transciever
  - 1616 to 1626.5 MHz
  - Operating temperature of -40

Iridium Network

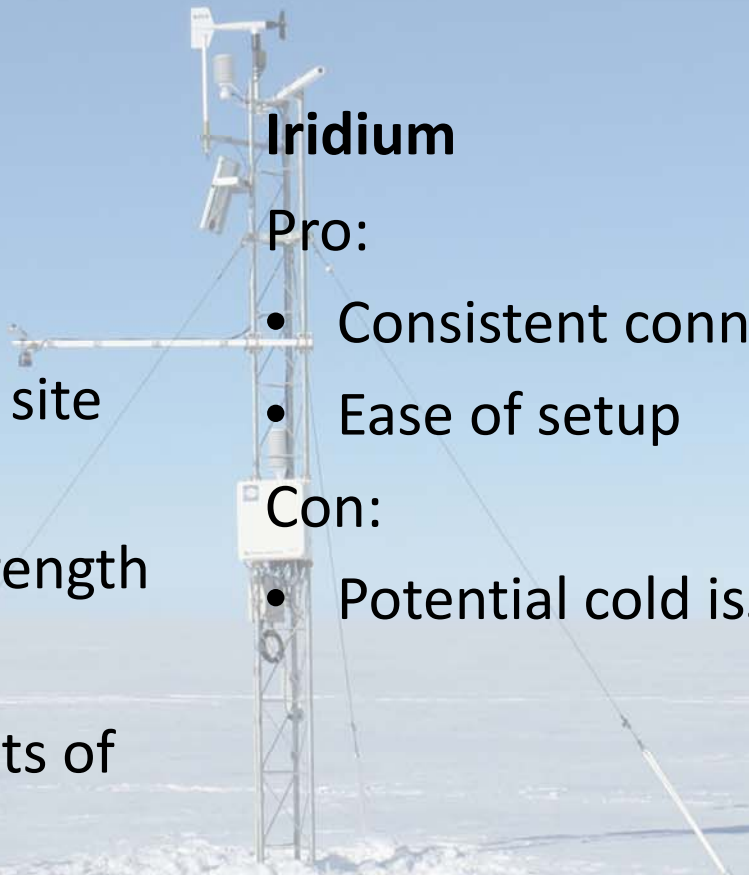
- Currently only one station
  - Alexander Tall Tower
- Using iridium due to large amount of data

Future Iridium Plans



- Expand to other important stations
  - WAIS-D, Cape Hallett
- Look into expanding to plateau stations
  - Currently low temperatures are an issue

Field Season Experiences



Freewave

Pro:

- Easy confirmation of connection back to T site
- More information on connection/signal strength

Con:

- Too many single points of failure
- Intermittent connections are an issue

Iridium

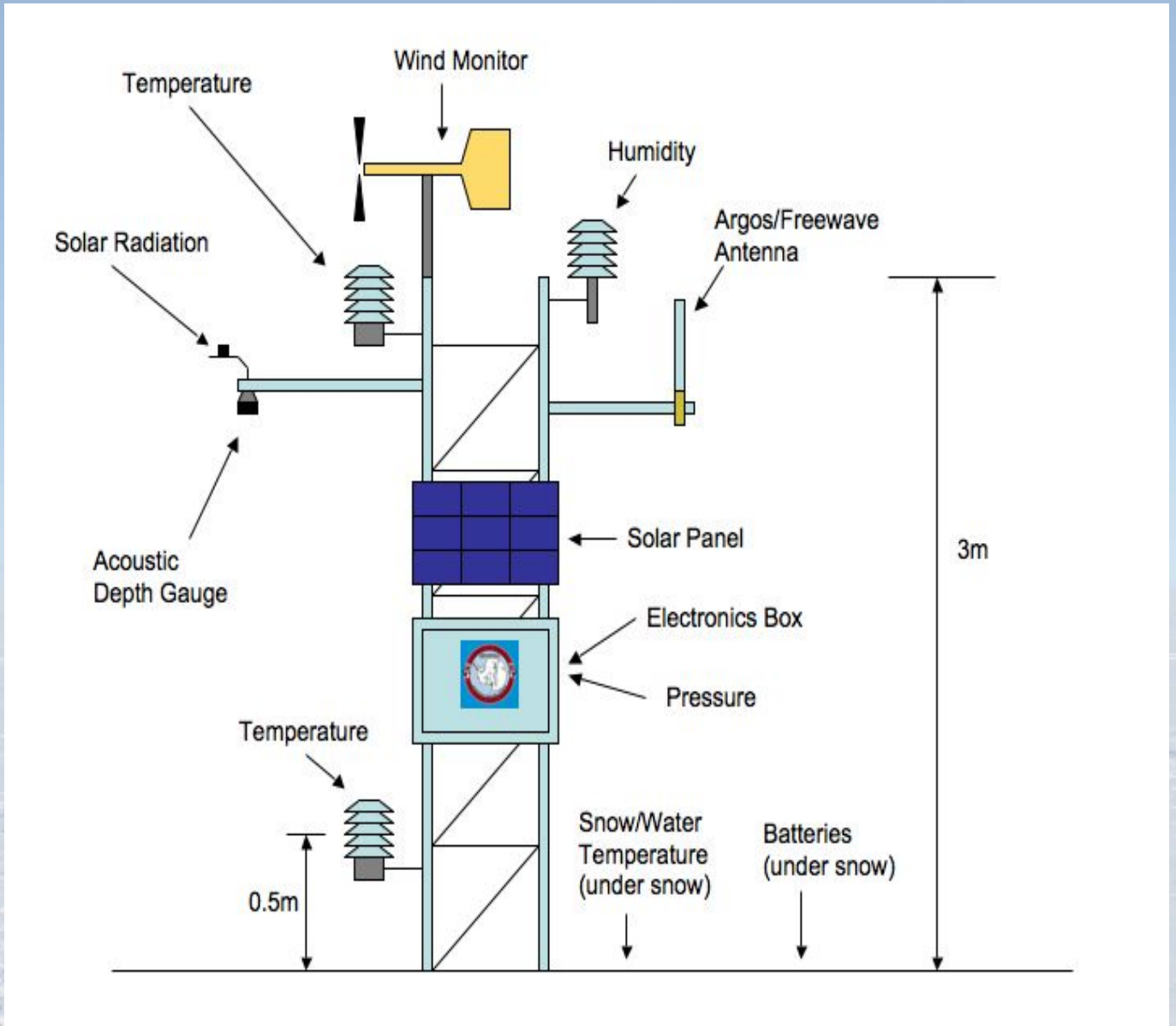
Pro:

- Consistent connection
- Ease of setup

Con:

- Potential cold issues

Thank You and Questions



Acknowledgements

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