University of Wisconsin Antarctica Research Center

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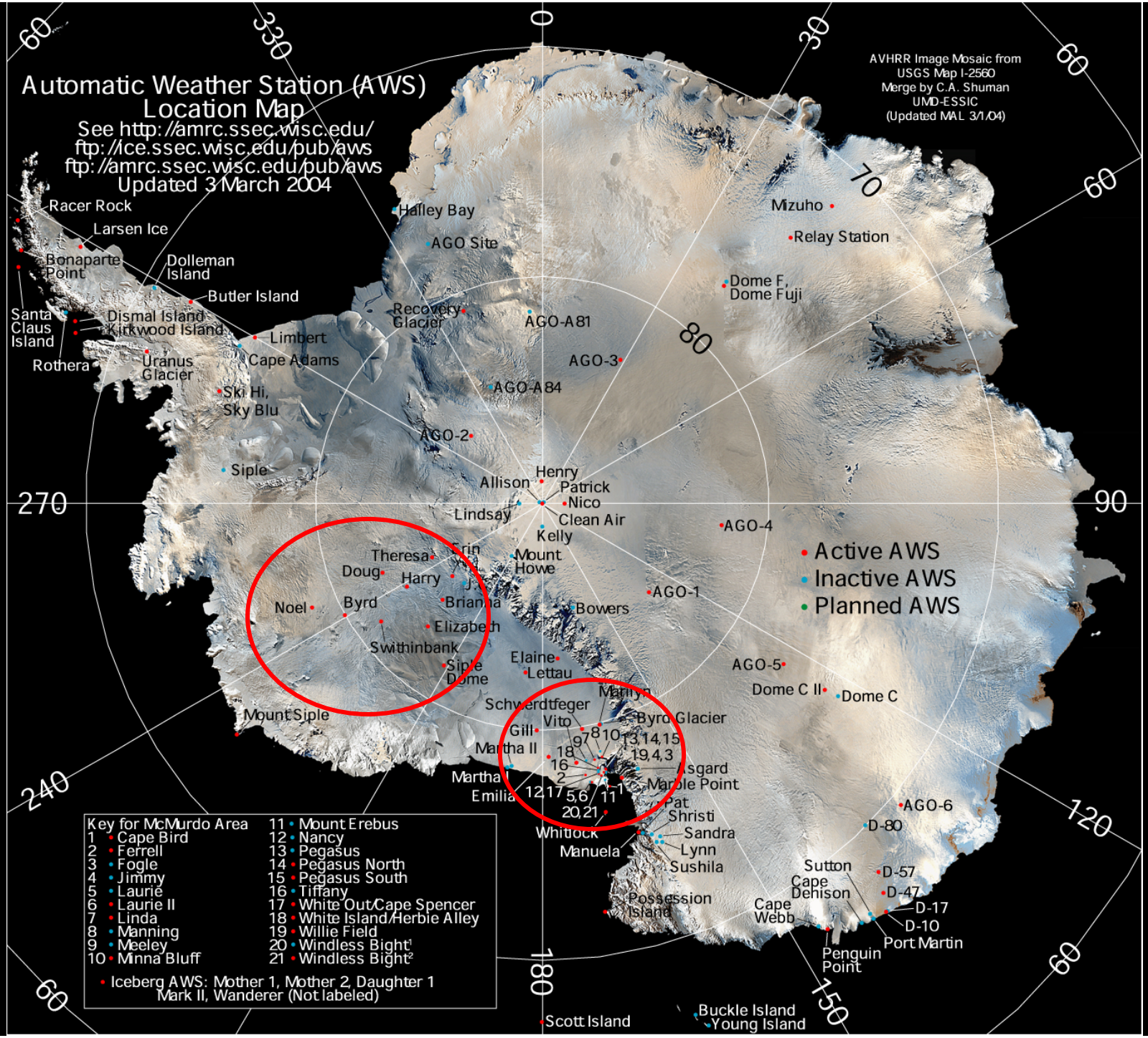
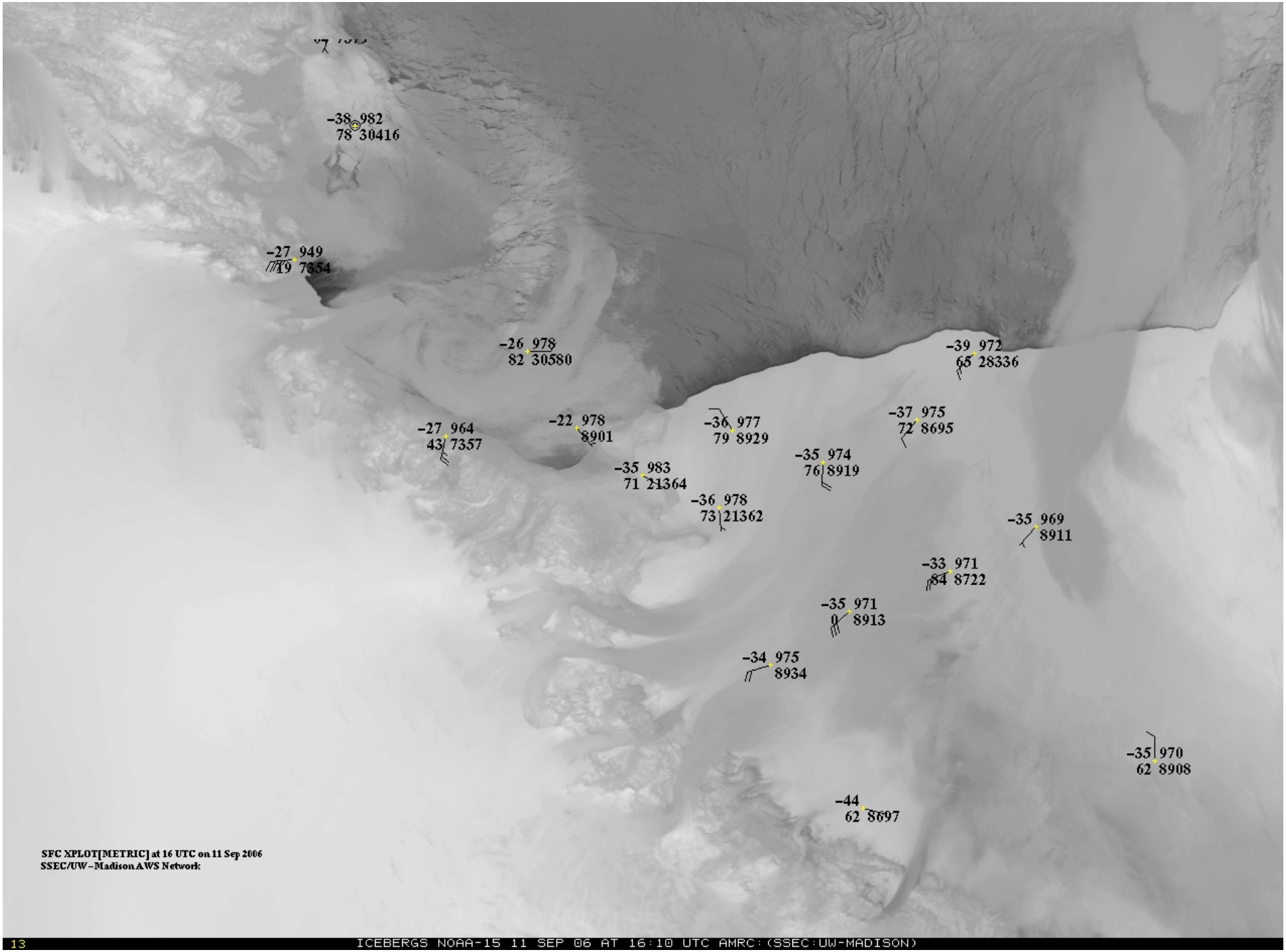
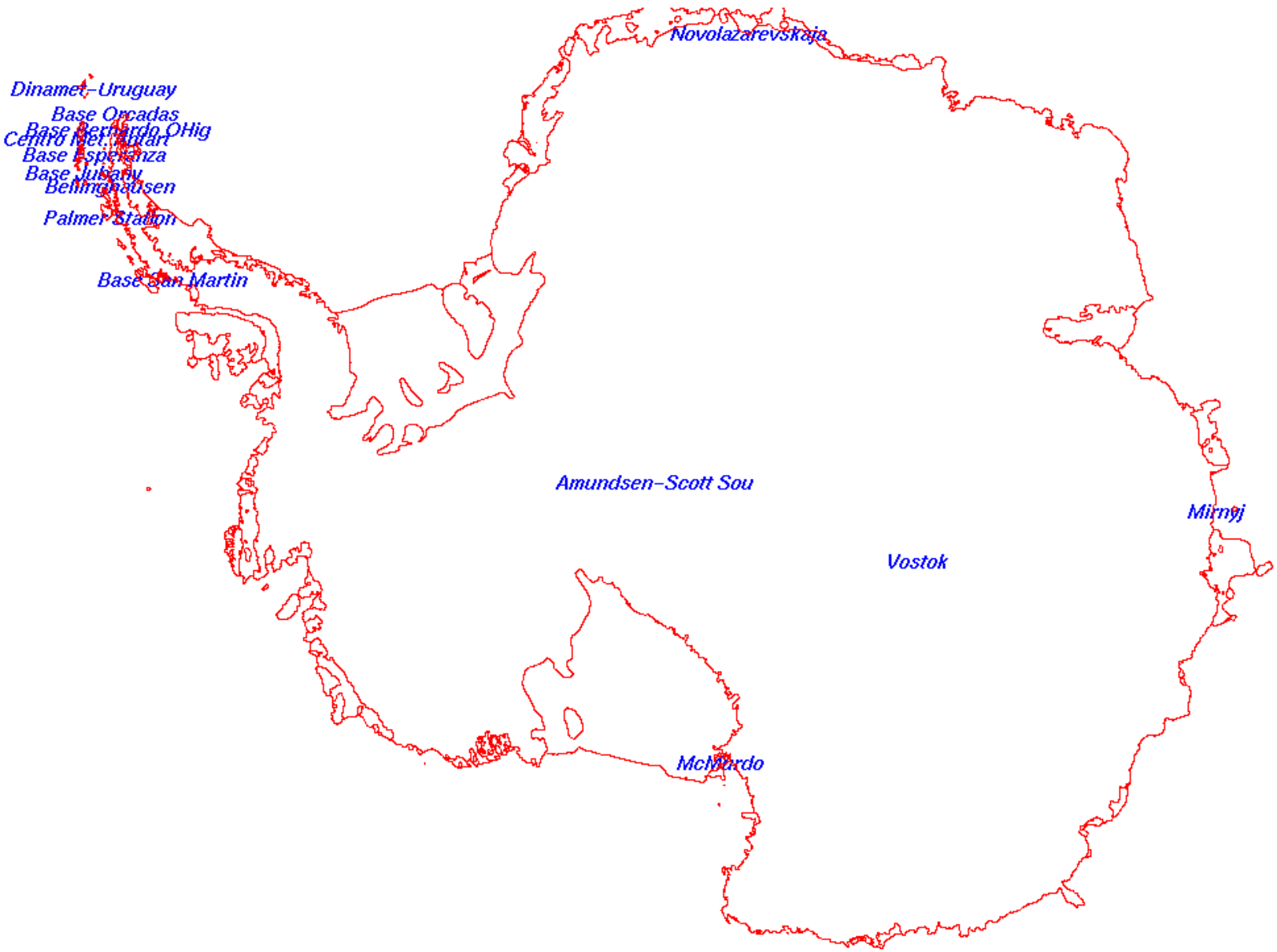
Automatic Weather Stations Project

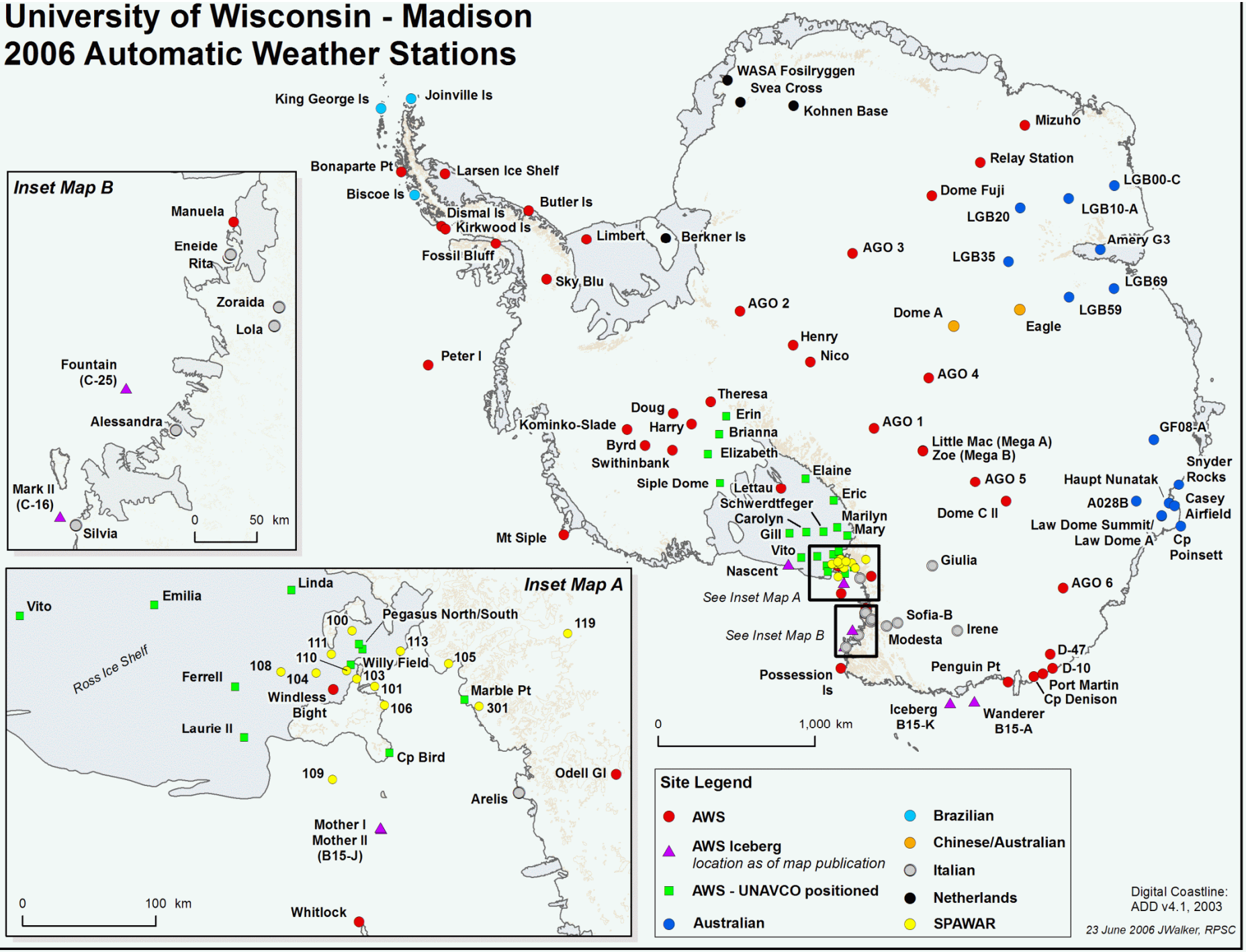

Automatic Weather Station (AWS)
Location Map
See http://amrc.ssec.wisc.edu/
ftp://ice.ssec.wisc.edu/pub/aws
ftp://amrc.ssec.wisc.edu/pub/aws
Updated 3 March 2004
AVHRR Image Mosaic from
USGS Map I-2560
Merge by C.A. Shuman
UMD-ESSIC
(Updated MAL 3/1/04)
Active AWS
Inactive AWS
Planned AWS
Racer Rock
Larsen Ice
Bonaparte Point
Dolleman Island
Butler Island
Santa Claus Island
Dismal Island
Kirkwood Island
Limbert
Rothera
Uranus Glacier
Cape Adams
Ski Hi, Sky Blu
Siple
Halley Bay
AGO Site
Recovery Glacier
AGO-A81
AGO-3
AGO-A84
AGO-2
Mizuho
Relay Station
Dome F, Dome Fuji
AGO-4
AGO-1
AGO-5
Dome C II
Dome C
AGO-6
D-80
D-57
D-47
D-17
D-10
Port Martin
Penguin Point
Sutton
Cape Dehison
Cape Webb
Possession Island
Sandra
Lynn
Sushila
Manuela
Whitlock
Pat
Shristi
Asgard
Marble Point
Byrd Glacier
Schwerdtfeger
Vito
Gill
Martha II
Martha I
Emilia
Marilyn
Henry
Patrick
Nico
Clean Air
Allison
Lindsay
Kelly
Mount Howe
Bowers
Elaine
Lettau
Theresa
Doug
Harry
Erin
Briana
Elizabeth
Noel
Byrd
Swithinbank
Siple Dome
Mount Siple
Scott Island
Buckle Island
Young Island
Key for McMurdo Area
1 Cape Bird
2 Ferrell
3 Fogle
4 Jimmy
5 Laurie
6 Laurie II
7 Linda
8 Manning
9 Meeley
10 Minna Bluff
11 Mount Erebus
12 Nancy
13 Pegasus
14 Pegasus North
15 Pegasus South
16 Tiffany
17 White Out/Cape Spencer
18 White Island/Herbie Alley
19 Willie Field
20 Windless Bight1
21 Windless Bight2
Iceberg AWS: Mother 1, Mother 2, Daughter 1
Mark II, Wanderer (Not labeled)



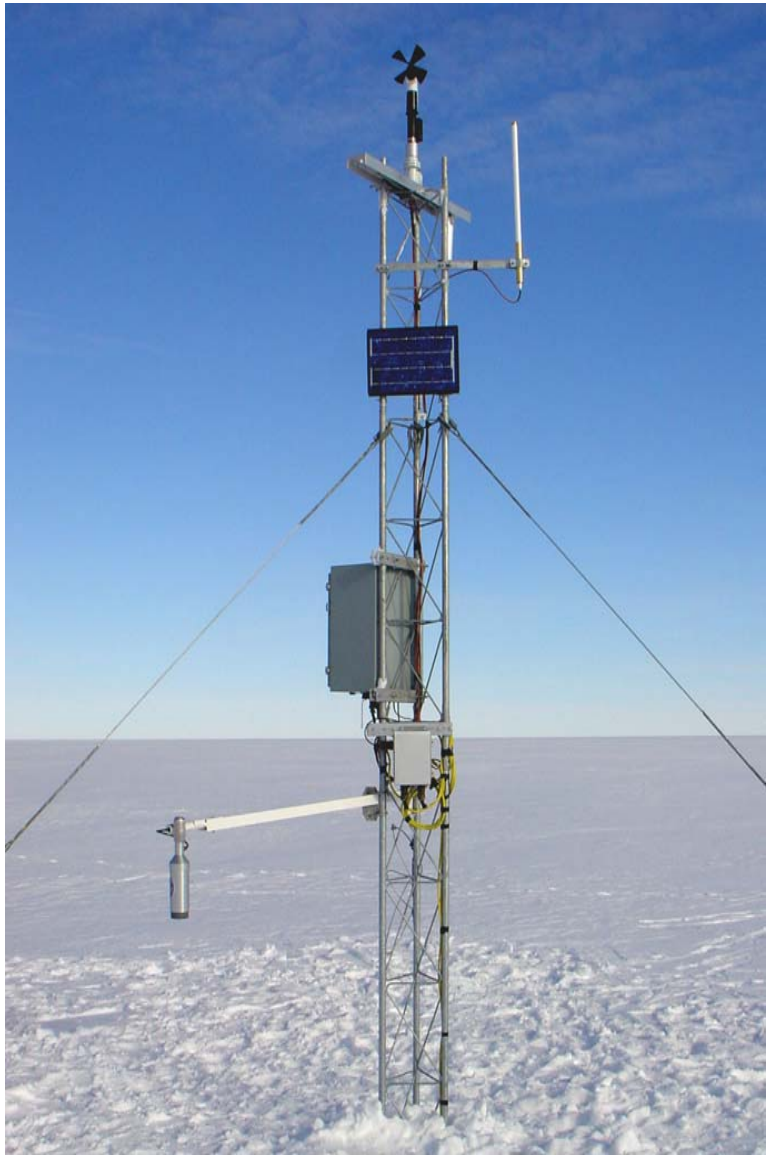
13 ICEBERGS NOAA-15 11 SEP 06 AT 16:10 UTC AMRC:(SSEC:UW-MADISON)

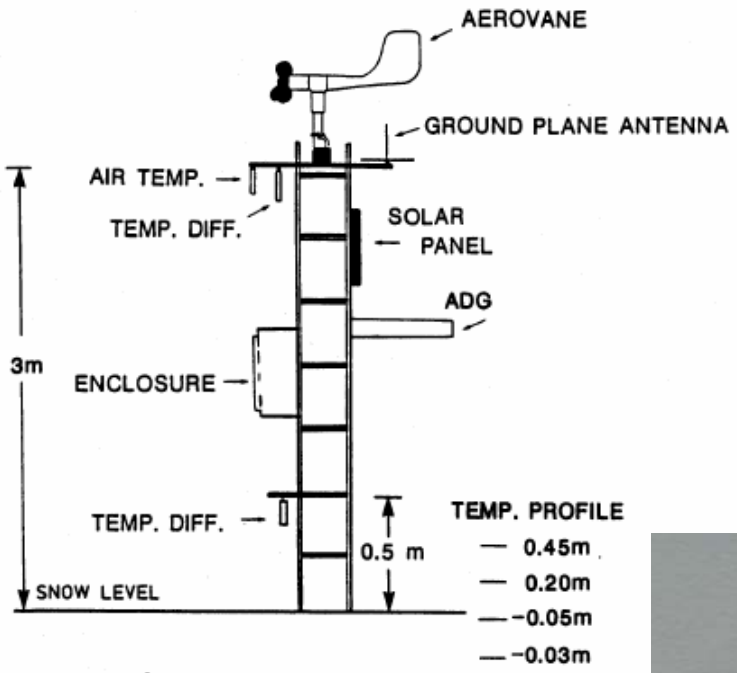

Novolazarevskaja
Dinamet-Uruguay
Base Orcadas
Base Bernardo OHig
Centro Met. Antar
Base Esperanza
Base Jubany
Bellingnausen
Palmer Station
Base San Martin
Amundsen-Scott Sou
Mirnyj
Vostok
McMurdo

University of Wisconsin - Madison
2006 Automatic Weather Stations



Instrumentation





- AWS
  - Low power consumption
  - Basic meteorological measurements
  - Project in operation since 1980
- ADG
  - SR50
  - ARGOS
  - 8 sites

a) B-15A, Oct. 2003

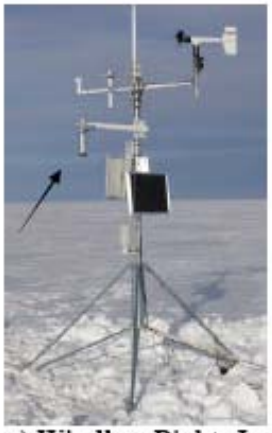
b) Nascent, Oct. 2004

c) B-15K, Oct. 2004

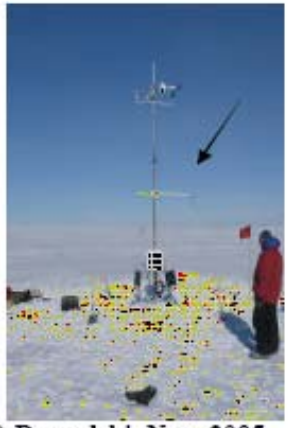
d) Mary, Jan. 2005

e) Williams Field, Feb. 2005

f) Ferrell, Feb. 2005



g) Windless Bight, Jan. 2006



h) Drygalski, Nov. 2005

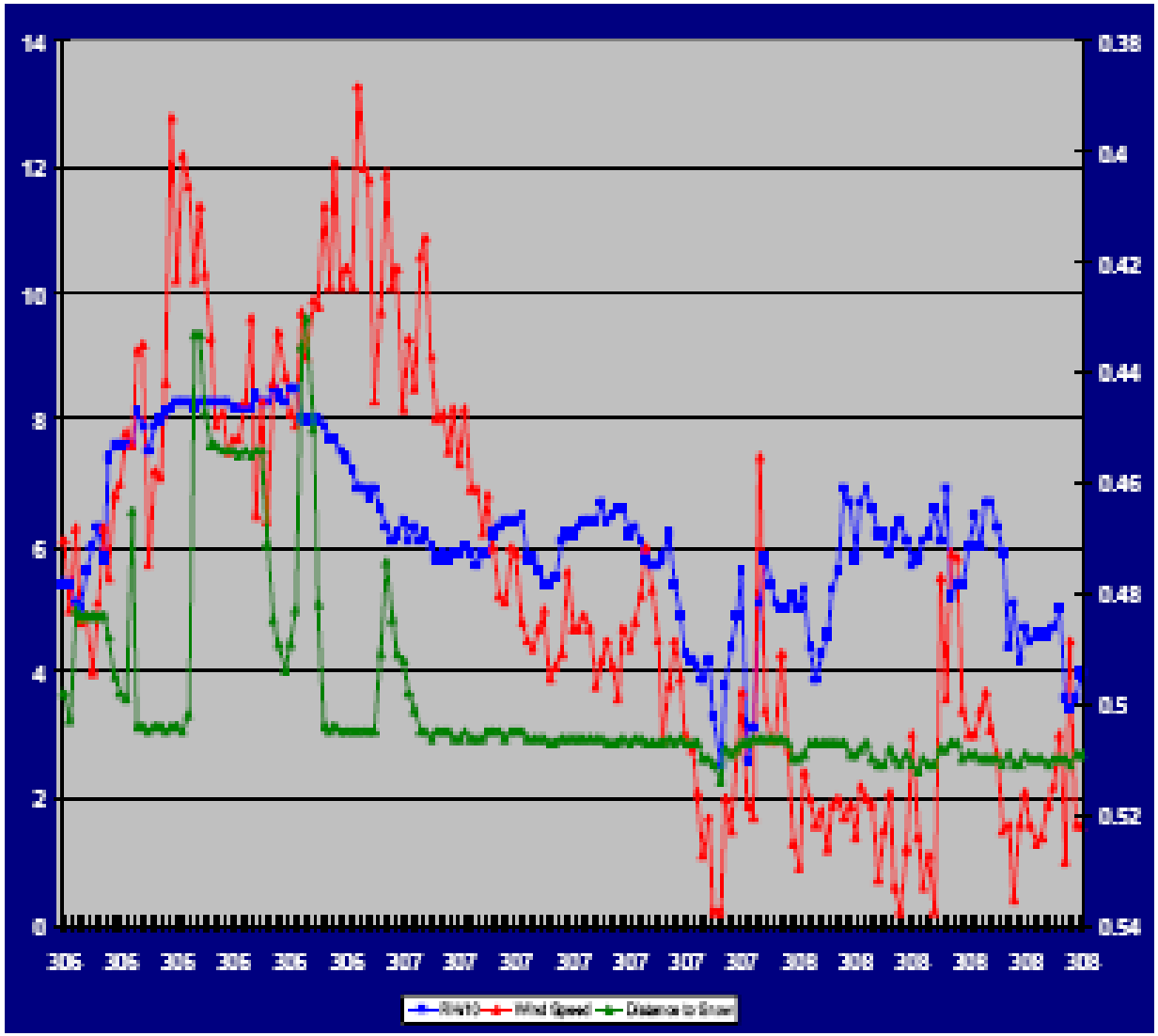
Precipitation Measurement Project

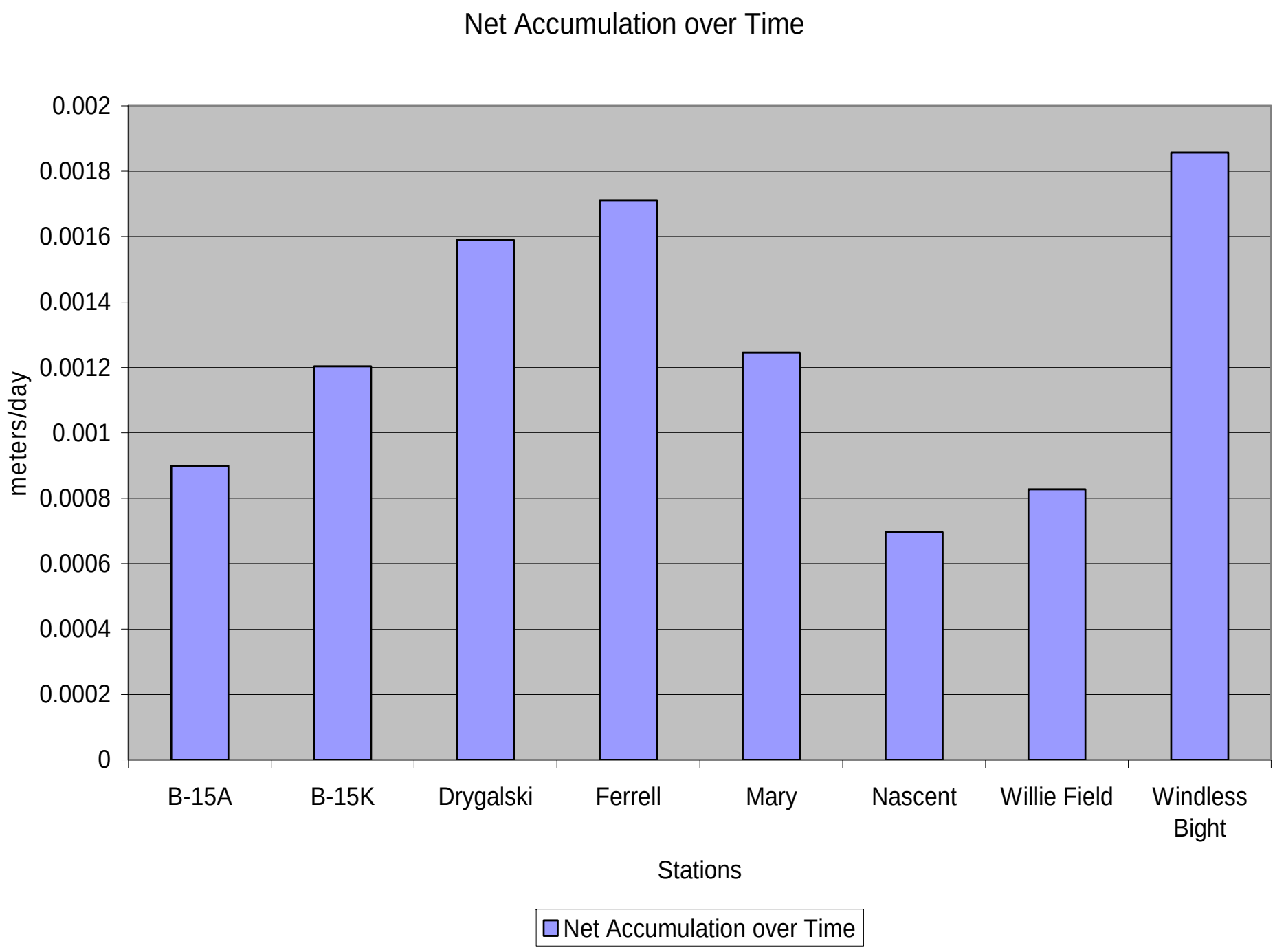
- Strategic placement of ADGs
- 8 ADG sites so far
- Snow density measurements
- Visual stratigraphy
- Comparison to AWS data

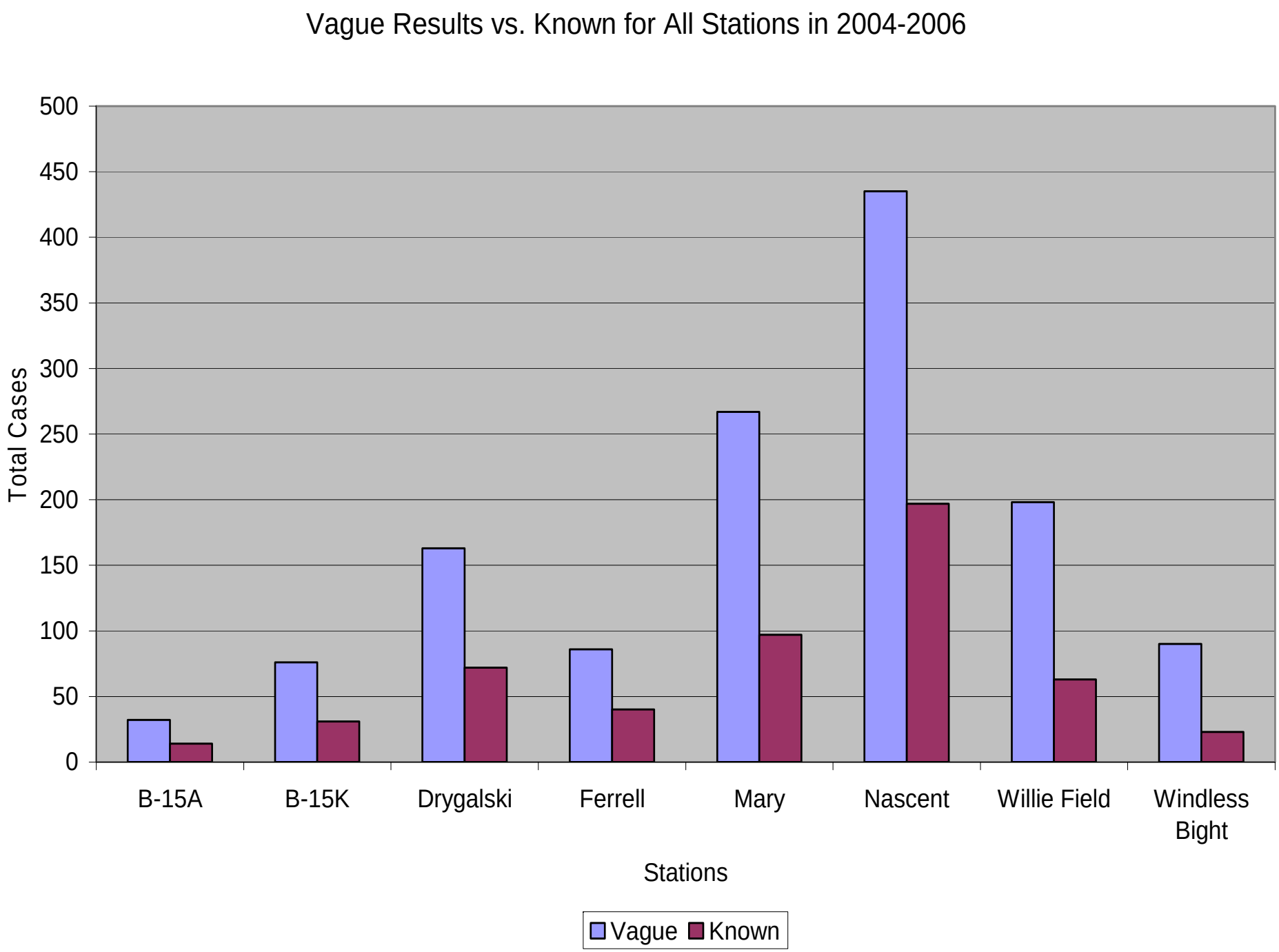
ADG Data Analysis

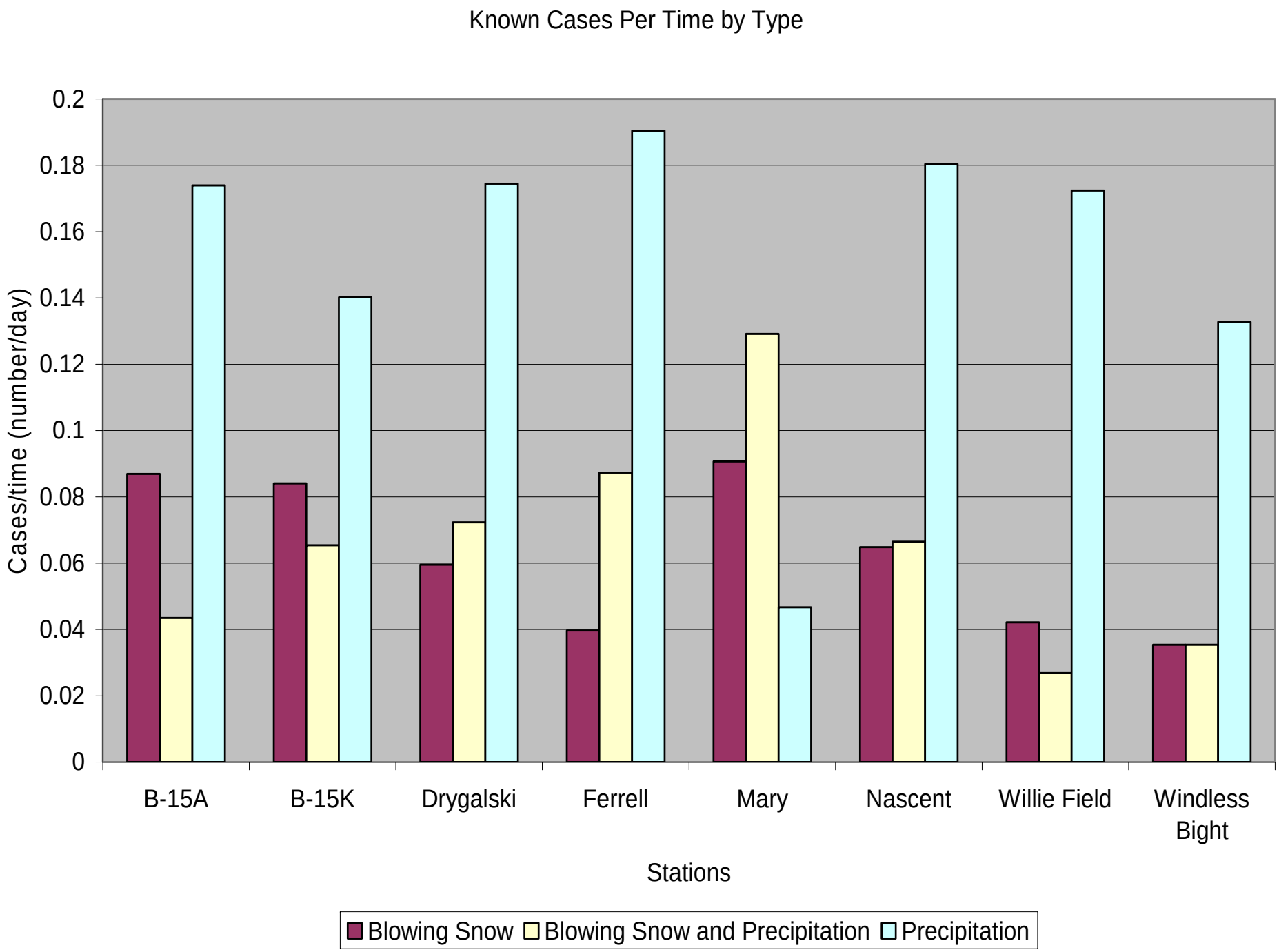
- Data from 2004-2006
- Depth change events identified (750 in all)
- Five categories
  - Undetermined
  - Unexpected
  - Blowing snow
  - Precipitation
  - Combined (Blowing snow and precipitation)
- Blowing snow threshold
- Constant relative humidity
- Further analysis for each station for each case

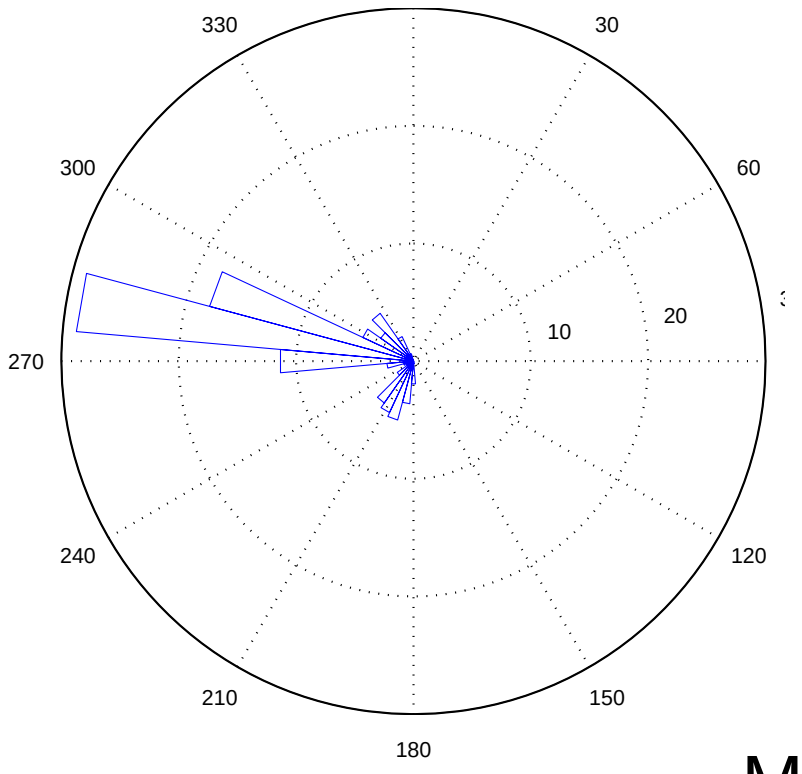
Wind speed – red Humidity – blue Snow depth - green

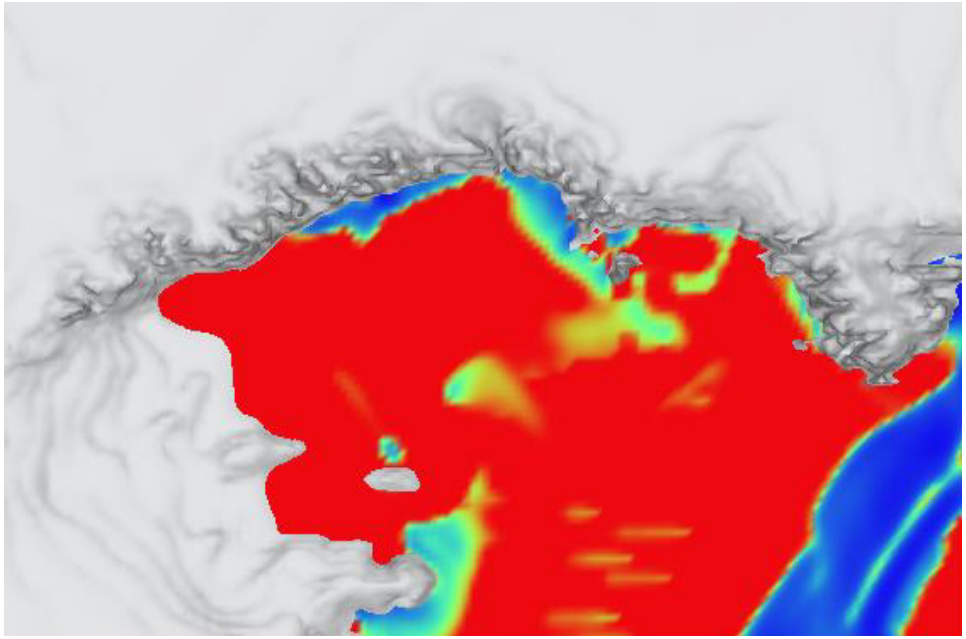



Net Accumulation over Time
0.002
0.0018
0.0016
0.0014
0.0012
0.001
0.0008
0.0006
0.0004
0.0002
0
meters/day
B-15A
B-15K
Drygalski
Ferrell
Mary
Nascent
Willie Field
Windless Bight
Stations
Net Accumulation over Time


Vague Results vs. Known for All Stations in 2004-2006
Total Cases
500
450
400
350
300
250
200
150
100
50
0
B-15A
B-15K
Drygalski
Ferrell
Mary
Nascent
Willie Field
Windless Bight
Stations
Vague
Known

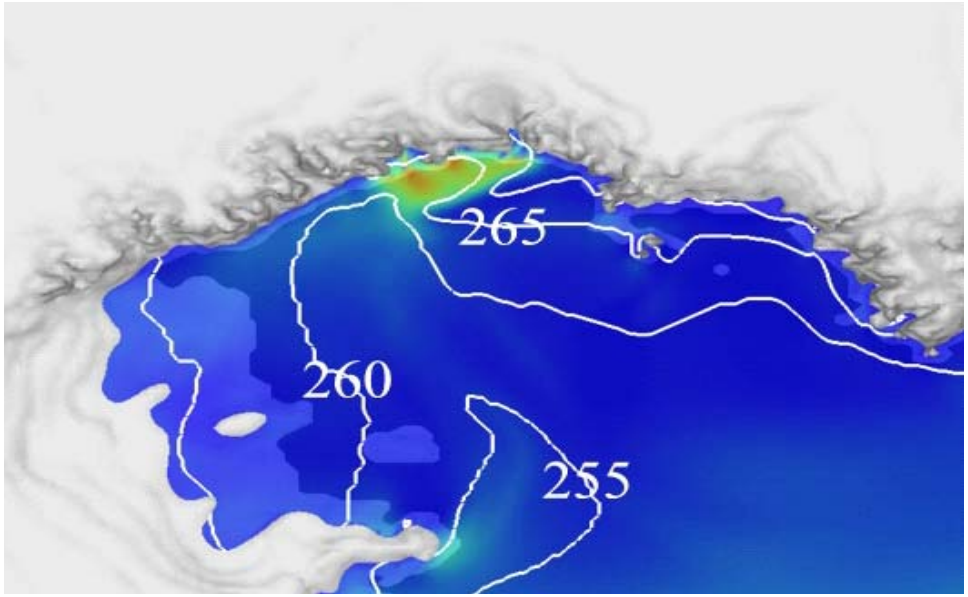

Known Cases Per Time by Type
Cases/time (number/day)
0.2
0.18
0.16
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
B-15A
B-15K
Drygalski
Ferrell
Mary
Nascent
Willie Field
Windless Bight
Stations
Blowing Snow
Blowing Snow and Precipitation
Precipitation

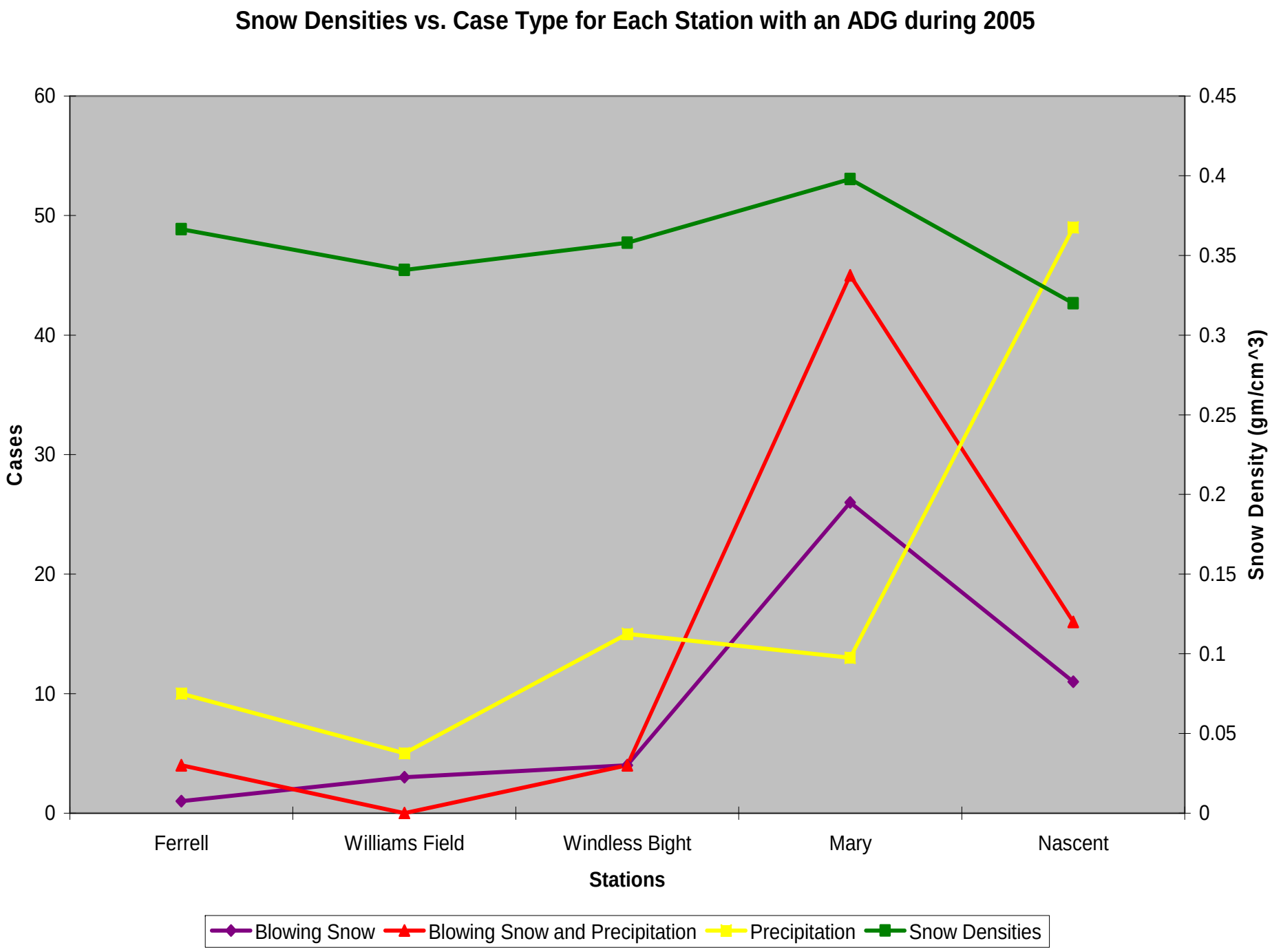




Mary Site

- Base of Transantarctics
- Net accumulation lower (B offsetting P)
- Orographic precipitation
- Katabatic wind flow
- Wave of energy (Adams, 2004)




Snow Densities vs. Case Type for Each Station with an ADG during 2005
Cases
Snow Density (gm/cm^3)
60
50
40
30
20
10
0
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
Ferrell
Williams Field
Windless Bight
Mary
Nascent
Stations
Blowing Snow
Blowing Snow and Precipitation
Precipitation
Snow Densities

Plans

- Install 4-8 ADGs per year to AWS
- Develop a coupled blowing snow/CRM model
- Demonstration precipitation analysis: Assimilate ADG measurements, together with available manned and satellite observations to constrain a CRM prediction of precipitation over limited area in the Ross Ice shelf region