

Greenland Climate Network



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Status of climate network

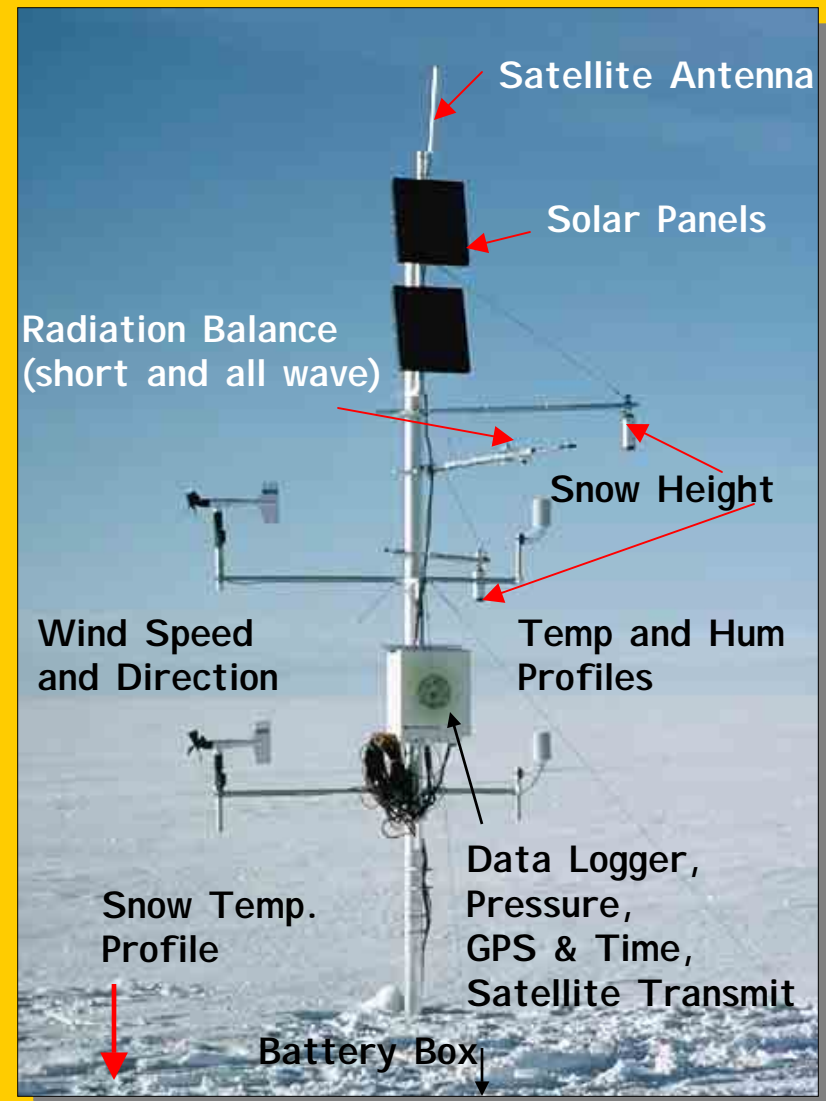
Greenland Climate Network (GC-Net)

Objective

Assess daily, annual and interannual variability in accumulation rate, surface climatology and energy balance at selected locations on the ice sheet where high sensitivity of ice sheet mass balance to climate anomalies is predicted from modeling results.

- Total network of 20 AWS in fall 2003
- Total of 6 SMS installed
- Five stations operational since 1995
- Each station records 32+ parameters
- hourly data transmission via satellite link
- data available online in near-real time

<http://cires.colorado.edu/steffen/>



Greenland Climate Network

+ Petermann
+ Pet. ELA + Tunu-N

1990, 1995, 1996, 1997, 1998,
1999, 2000, 2002, 2003

+ Humboldt

+ Gits

+ NASA-E

+ NGRIP

+ NASA-U

+ Summit

+ Crawford 1

+ ETH/CU

+ JAR1

+ JAR2

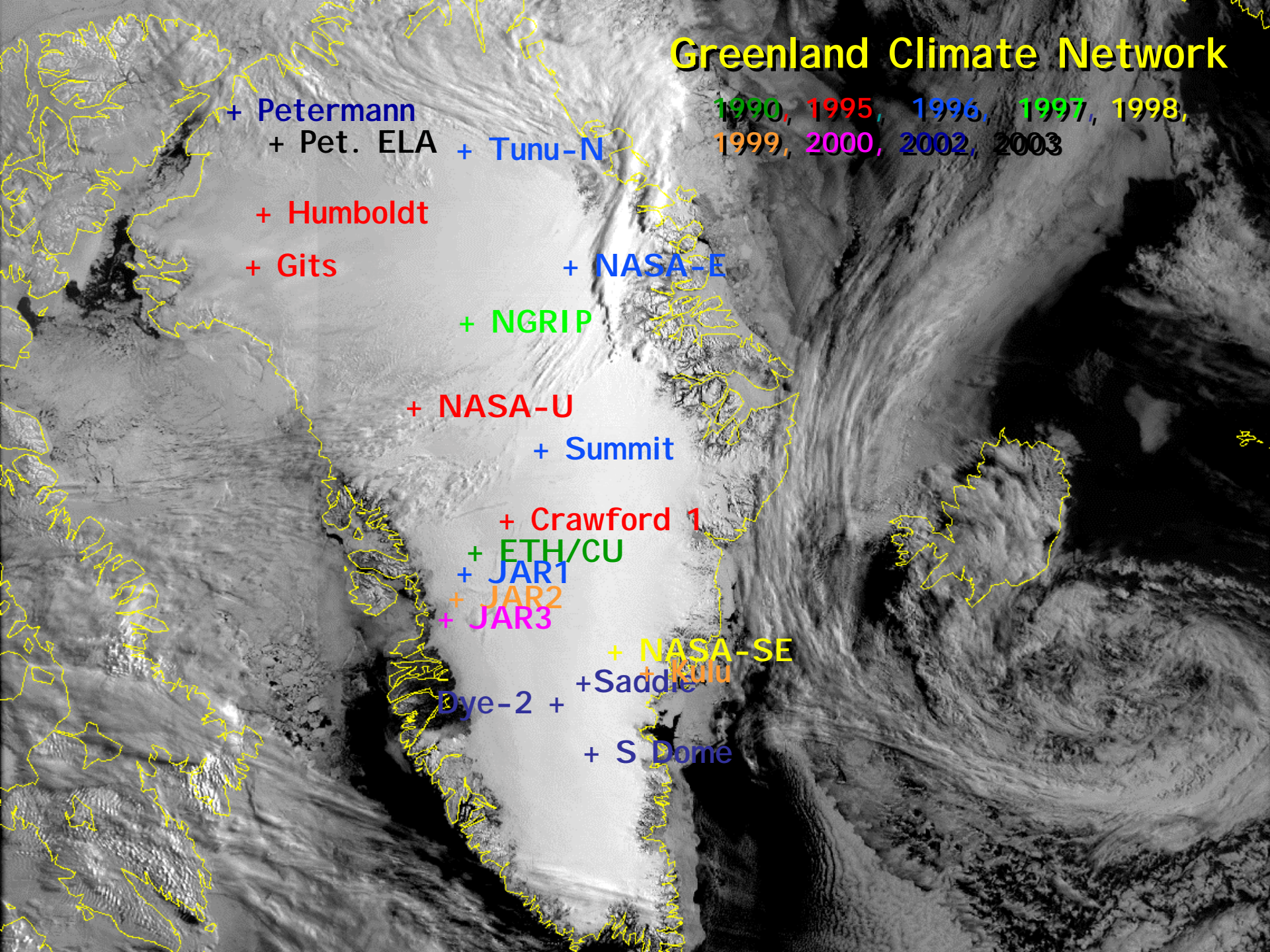
+ JAR3

+ NASA-SE

+ Saddle

+ Dye-2

+ S Dome



GC-Net Setup and Data Collection

Data (32 channels)

- All-wave radiation balance
- Short-wave incoming and reflected radiation
- Profiles of temp, hum, wind, wind dir
- Acoustic snow heights sensors (2x)
- Snow temp profile to 10 m depth (10x)
- Pressure
- Battery voltage
- Statistics (temp max/min, wind max)

- 15 s logging (radiations)
- 60 s logging (all other channels)
- Hourly average
- Daily transmissions of hourly data
- Final storage on site for 2 years

Power system

- 4x100 Ah batteries
- 2x20 W or 20 & 15 W solar panels

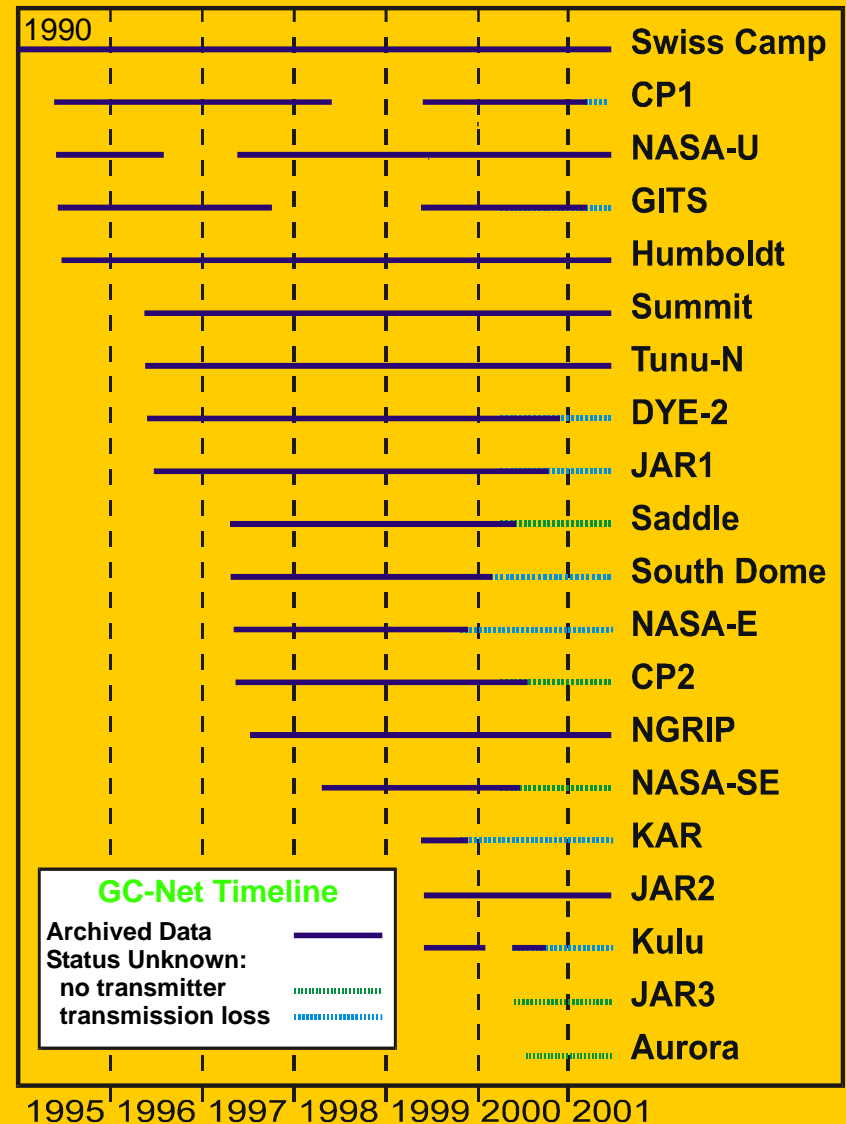


GC-Net Status

- 50+ station years archived
- Rigorous QC software in place
- Annual, monthly, daily, and hourly means
- Quality identifier code
- Automation of data link.
- Automatic WWW update
- 55+ Data users

Support group: University of Colorado

1991 – present	Koni Steffen
1991 – 1994	Ted DeMaria
1991 – 1996	Waleed Abdalati
1995 – 1998	Jeff Weber
2000 – 2002	Kate Daniels
1995 – 2003	Jason Box
1999 – present	Nicolas Cullen
2000 – present	Sandy Starkweather
2002 – present	Russel Huff
2002 – present	Todd Albert



GC-Net Maintenance

AWS need to be visited every 1-4 years

- Replace broken instruments
- Reset data logger clock (now GPS clock accurate)
- Reset transmission if failure
- Calibration of temp and hum sensors
- Relative calibration of wind, temp, and hum
- Replace polyethylene dome of net radiometer
- Tower extension in high accumulation area
- Download data if transmission failure

By skidoo
along profile [Jar1](#), [Jar2](#), [Swiss Camp](#), [CP1](#)

By helicopter
in ablation region: [Kulu](#)

By C130
at major ice camps: [Summit](#), [NGRIP](#), [DYE-2](#)

By Twin Otter
[Humboldt](#), [Tunu-N](#), [Tunu-S](#), [Gits](#), [NASA-U](#), [NASA-E](#),
[NASA-SE](#), [Saddle](#), [S-Dome](#)



PV Batteries

AWS in accumulation area

2 x 100 Ah for transmitter

2 x 100 Ah for datalogger and instruments



GNB Industrial Power

Photovoltaic and Alternate Energy

SUNLyte™ 12-5000x

<http://www.gnb.com/stationary/stat-sunlyte.html>

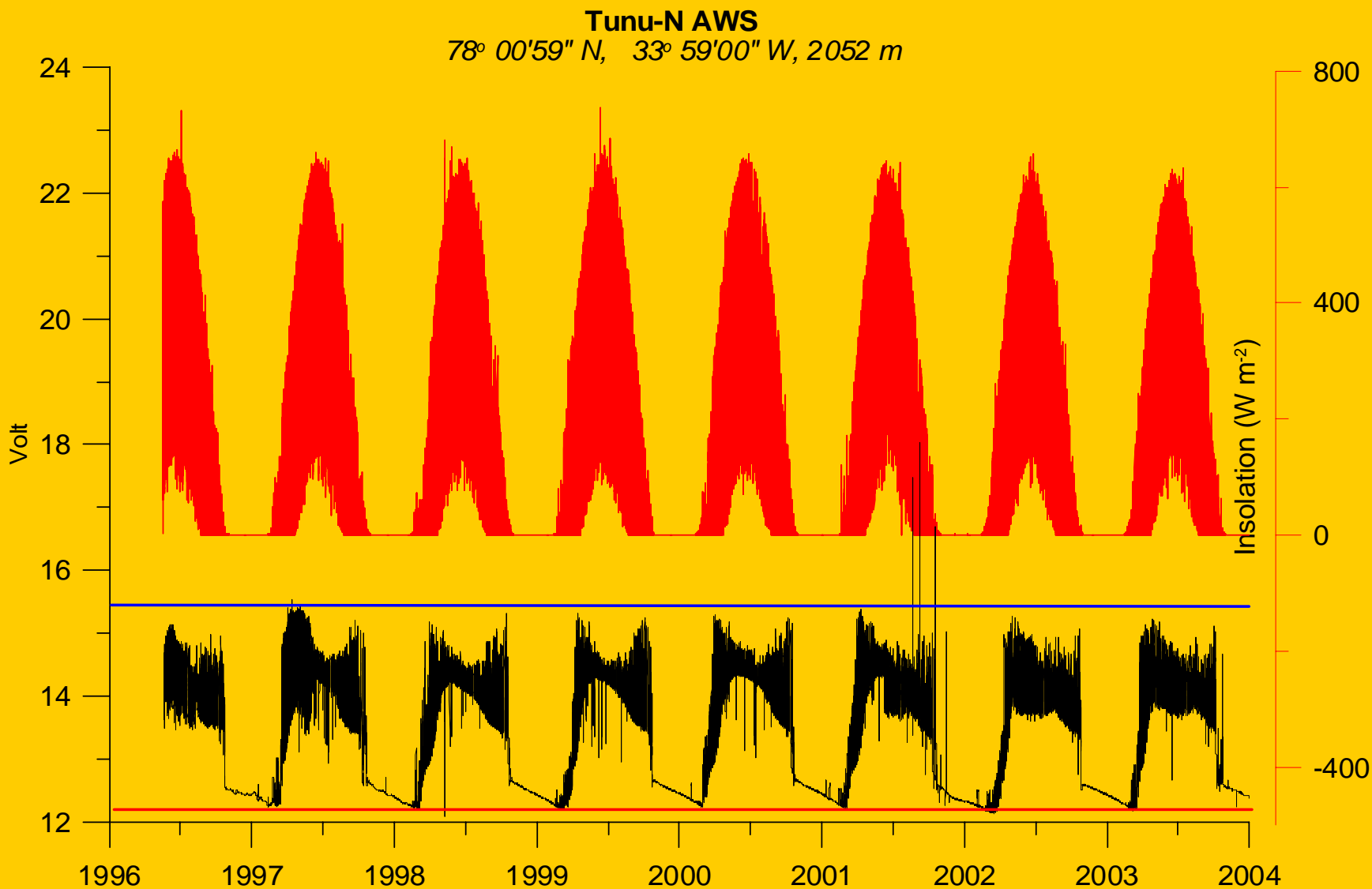
AWS in ablation area

4 x 20 Ah for transmitter and datalogger



12 Volt Sealed Lead-Acid Batteries

Diurnal Insolation and Battery Voltage







Batteries

Trimble 4000 SSi GPS

4 x 50 Ah for
with 2 x 20 W solar panels
and wind turbine

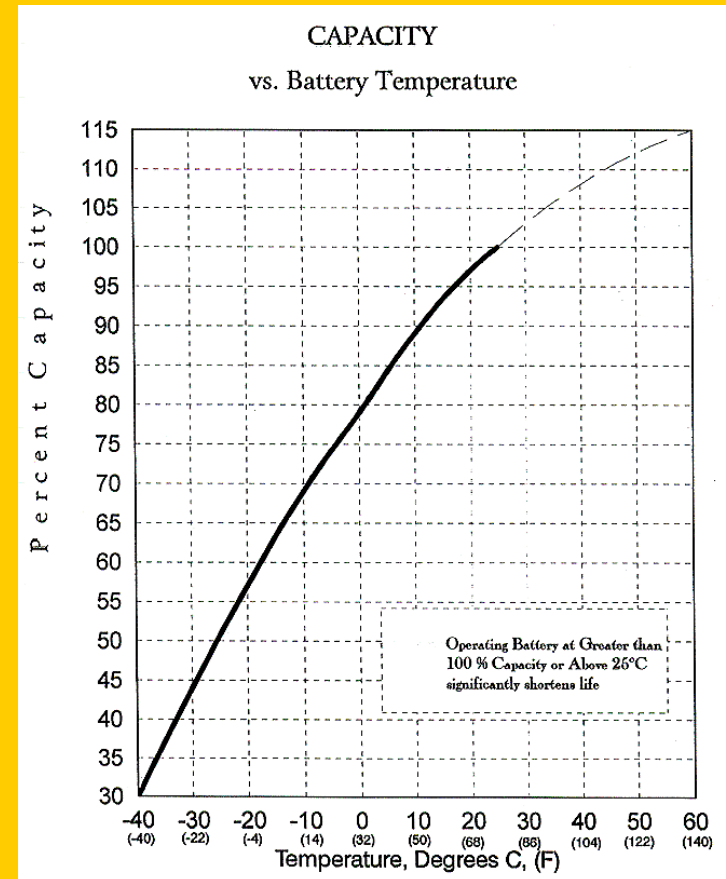
- 500 mA recording
- 20 mA sleep mode
- (8 h every 12 days = 80 Ah)

Trimble 5700 GPS

4 x 50 Ah for
with 2 x 20 W solar panels

- continuous recording

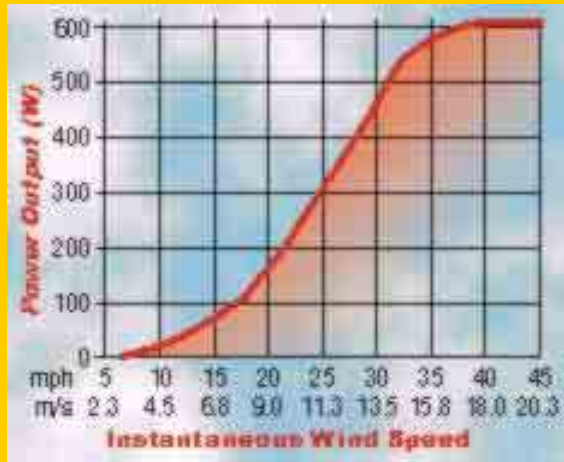
- Recombination of AGM (Absorbed Glass Mat) VRSL (Valve Regulated Sealed Lead-Acid) Lifeline Batteries



Windseeker 500 W Turbine



AIRwind module & Windseeker

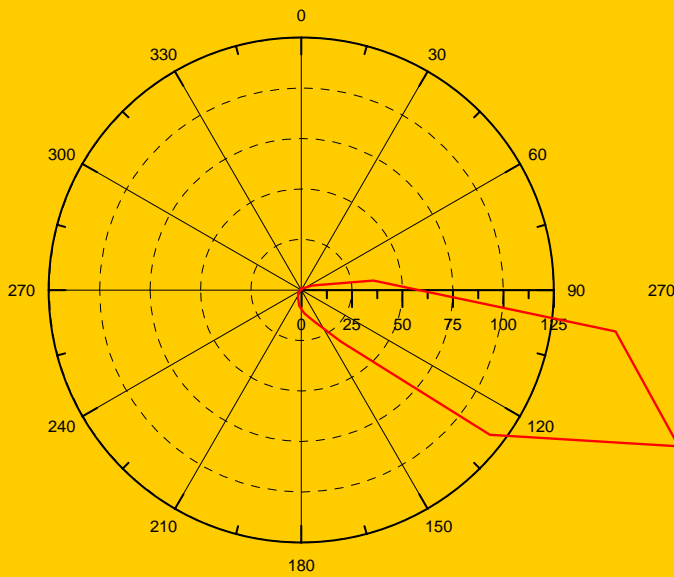


Rotor Diameter: 46 inches (1.17m)
Weight: 13 lbs (6 kg)
Start up windspeed: 7 mph (3.0 m/s)
Voltage: 12
Output: 400 watts at 28 mph (12.5 m/s)
600 watts at 38 mph

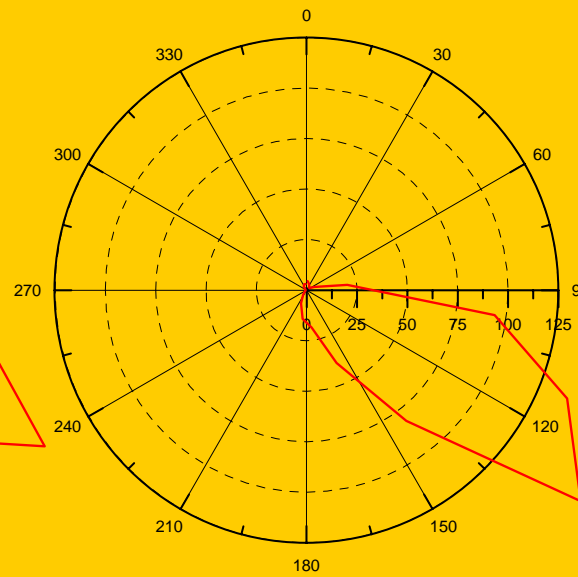


Rotor Diameter: 60" (1.52 m)
Weight: 20 lbs (9 kg)
Start up windspeed: 5mph (2 m/s)
Output: 500 watts
Alternator: PM 3 phase brushless
Output Voltage: (adjustable)
Preset 14.8 - 12 volt model

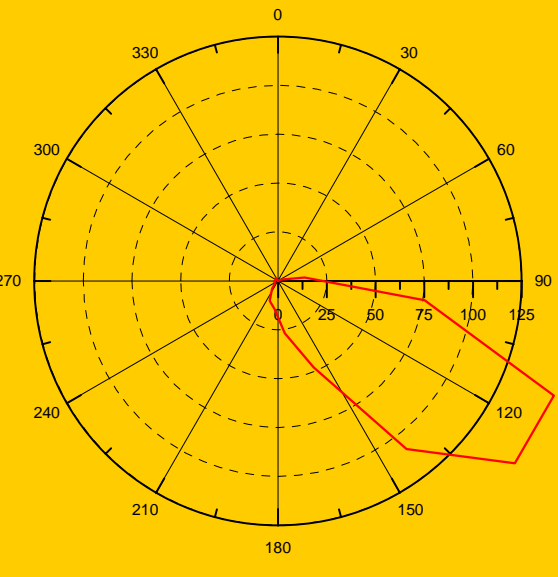
Five-Year Average Wind for the West Slope of the Greenland Ice Sheet (km/day)



JAR (962 m)

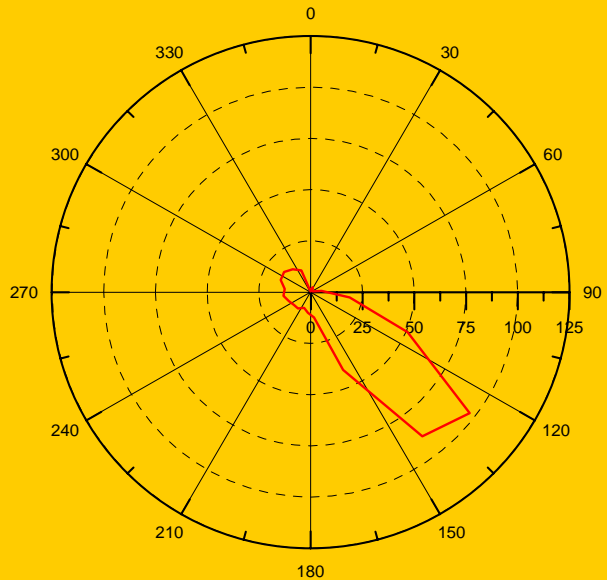


Swiss Camp (1149 m)

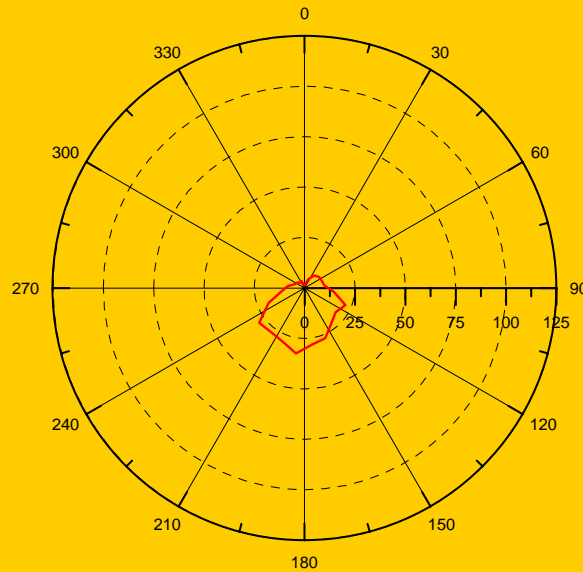


Crawford P2 (1990 m)

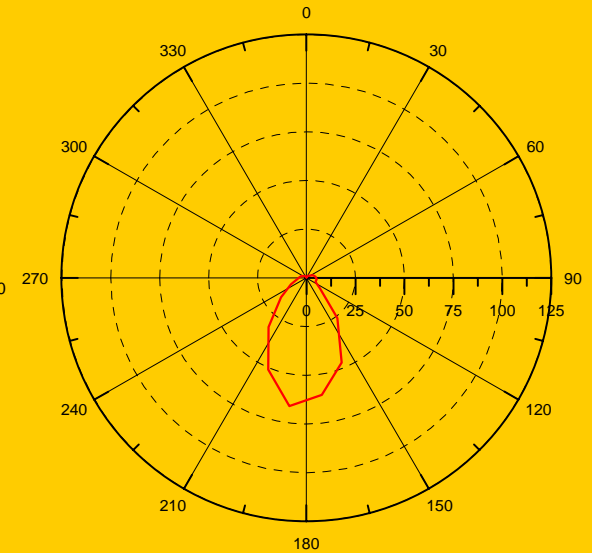
Five-Year Average Wind for the Central of the Greenland Ice Sheet (km/day)



Saddle (2559 m)

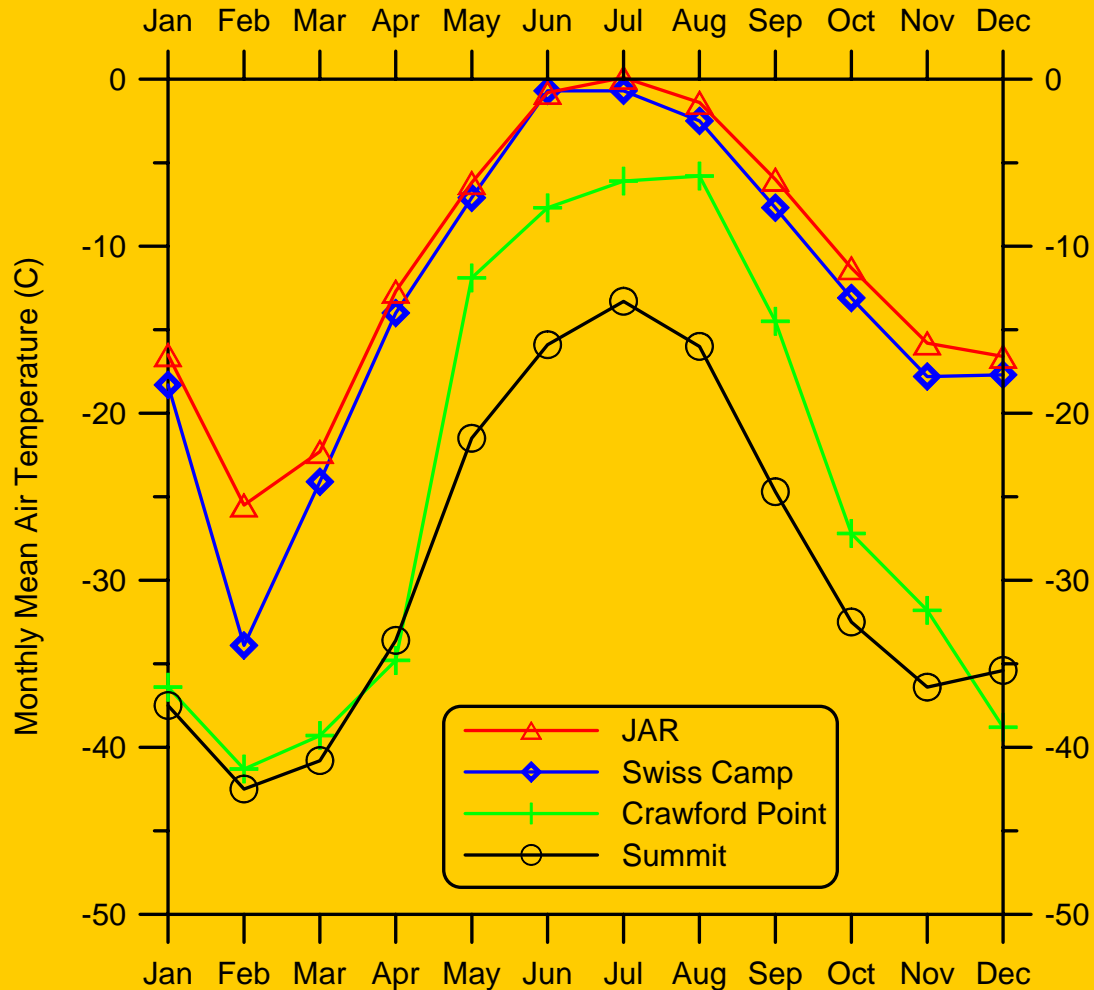


Summit (3254 m)

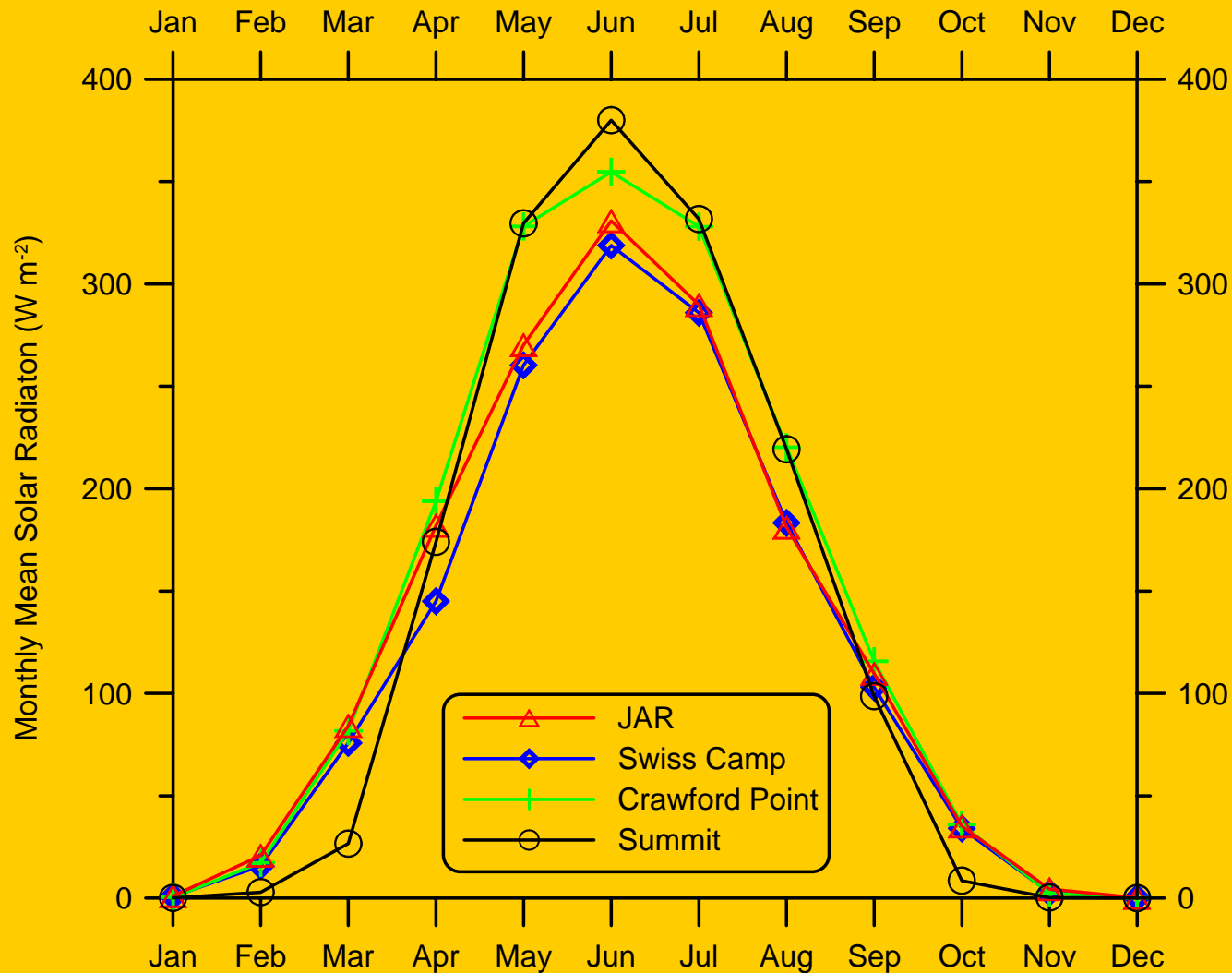


NGRIP (2950 m)

Five-Year Monthly Average Temperature for Western Part of Greenland



Five-Year Monthly Average Solar Radiation for Western Part of Greenland



Five-Year Monthly Average Wind Speed for Western Part of Greenland

