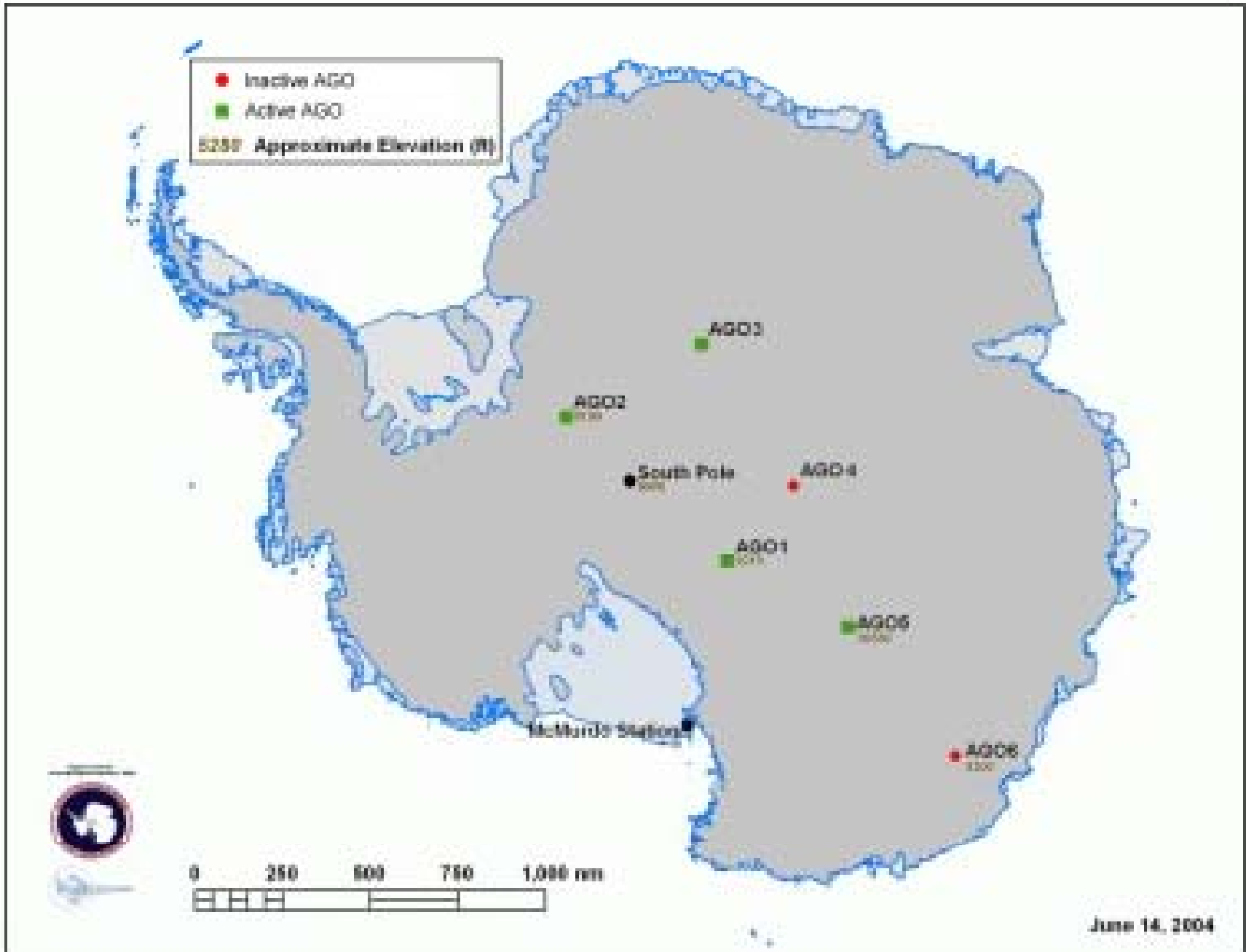


Wind Turbine Problems and Solutions at the Automatic Geophysical Observatories On the Antarctic Plateau

By
Andrew Stillinger
March 2011







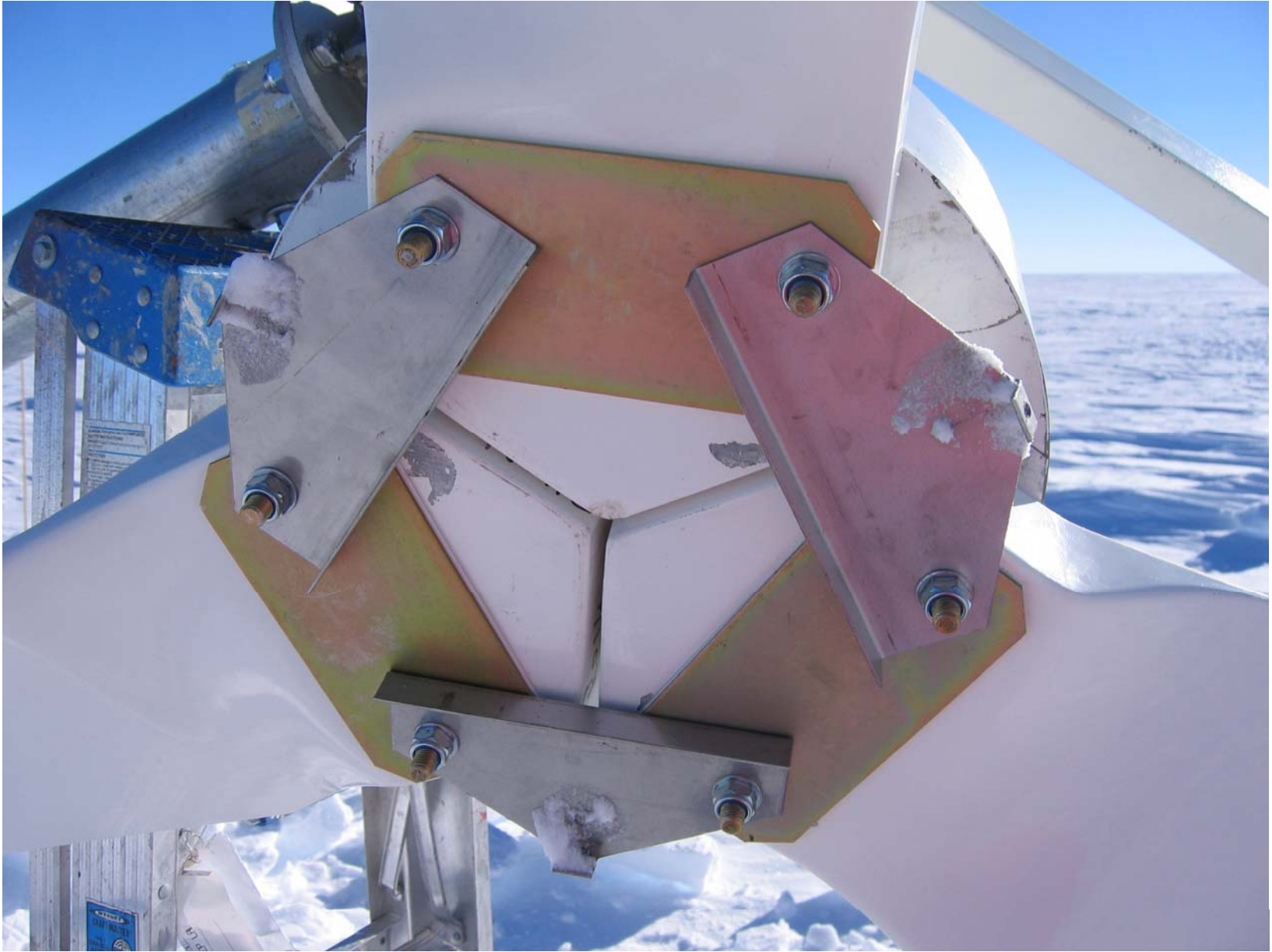
AGO Wind Turbines

- Ampair Pacific 100 turbines on right are no longer used – 100w with 18” blades
- An African Wind Power 3.6 turbine is currently used at all five active AGO sites. It can generate about 1kw at 28 volts with a 20 knot wind and spins several hundred rpm
- All the turbine systems have failed ...but we're making progress

Specific Points of Failure

- Bearings
- Electrical Connections
- Rectifiers
- Regulators
- Azimuth/yaw assemblies
- Tails

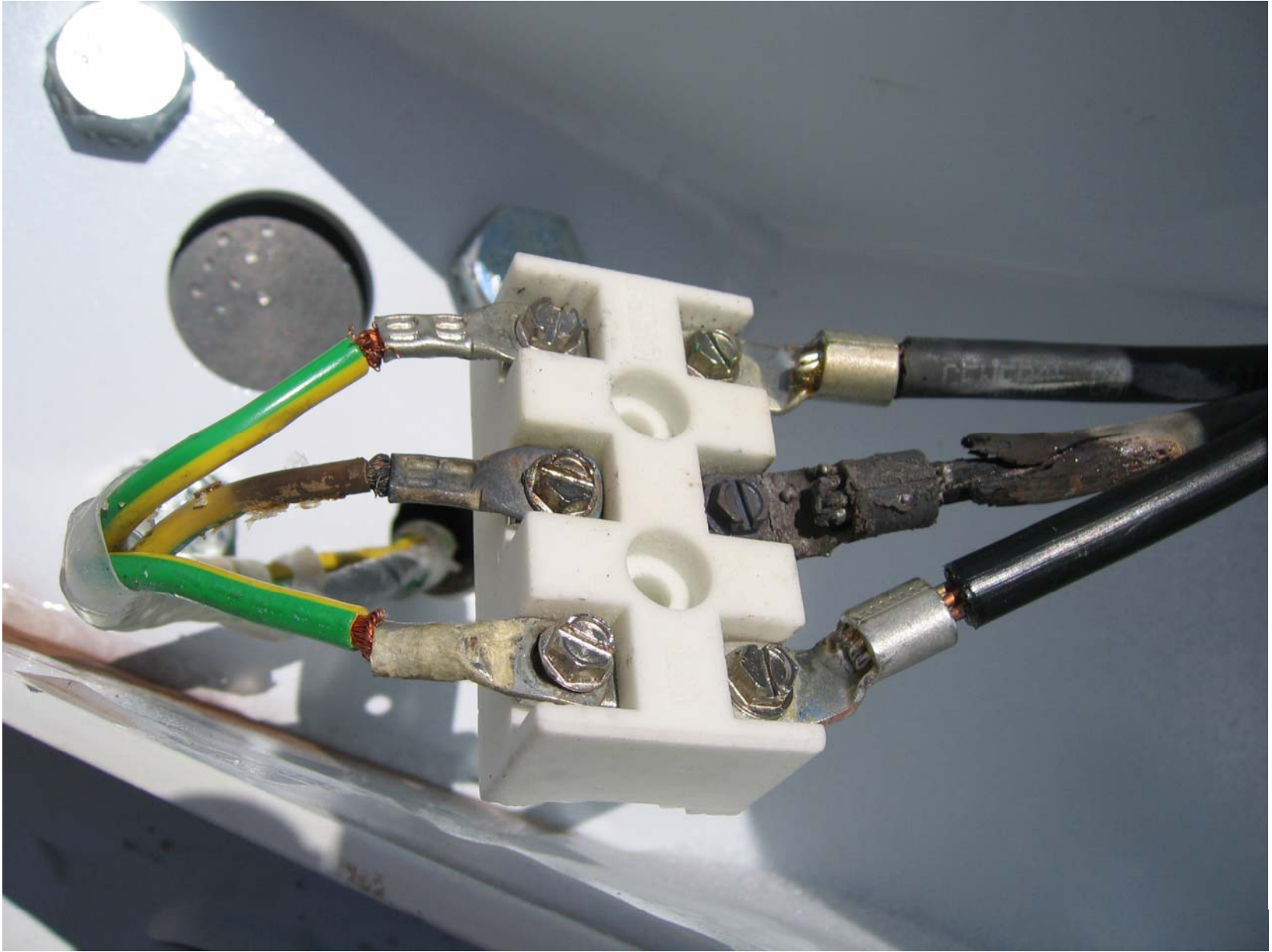


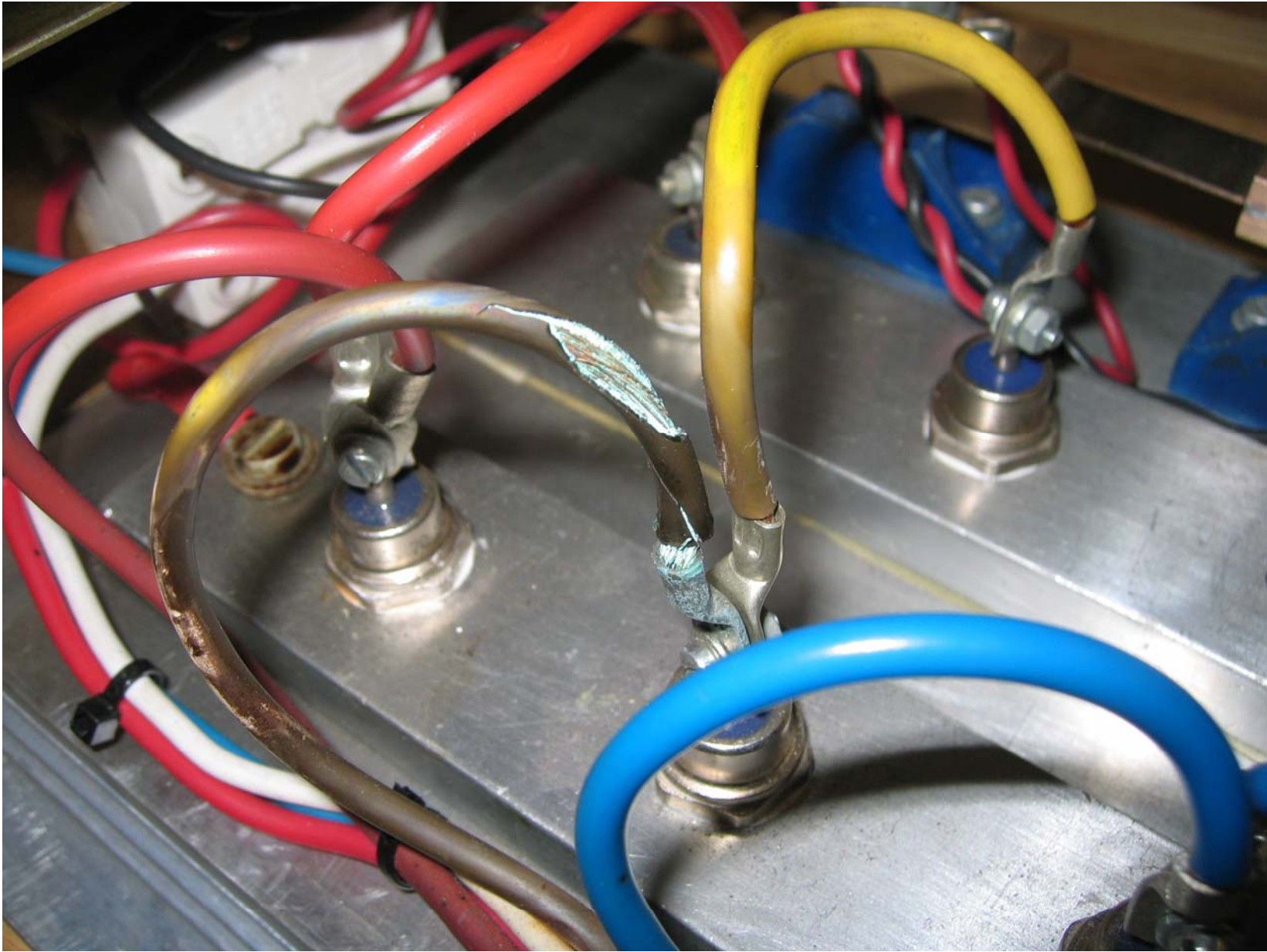








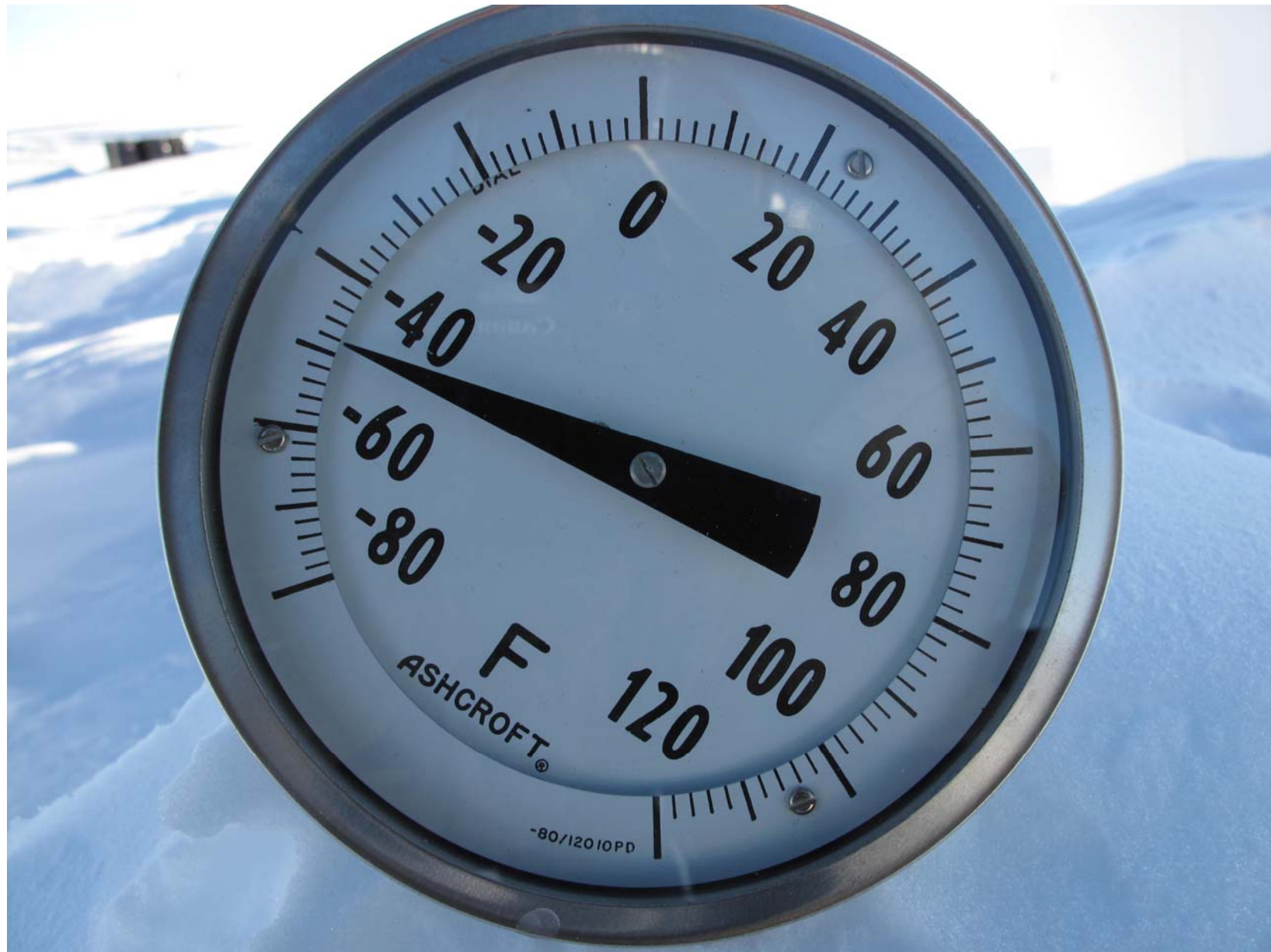






Disadvantages of Location

- It's really cold
- Hard to get to
- Fog



ASHCROFT®

F
120
100
80
60
40
20
0
-20
-40
-60
-80

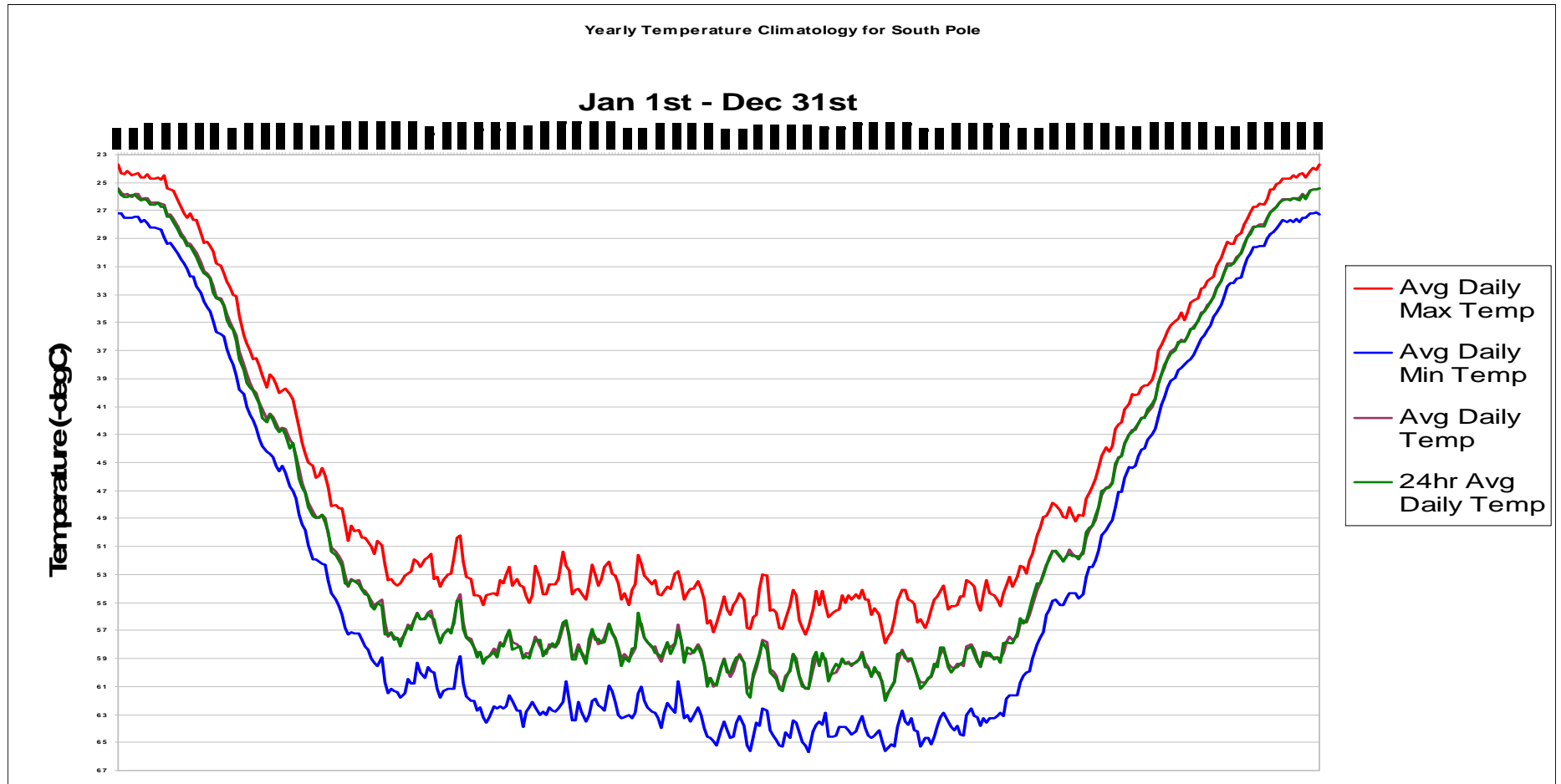
-80/120 IOPD



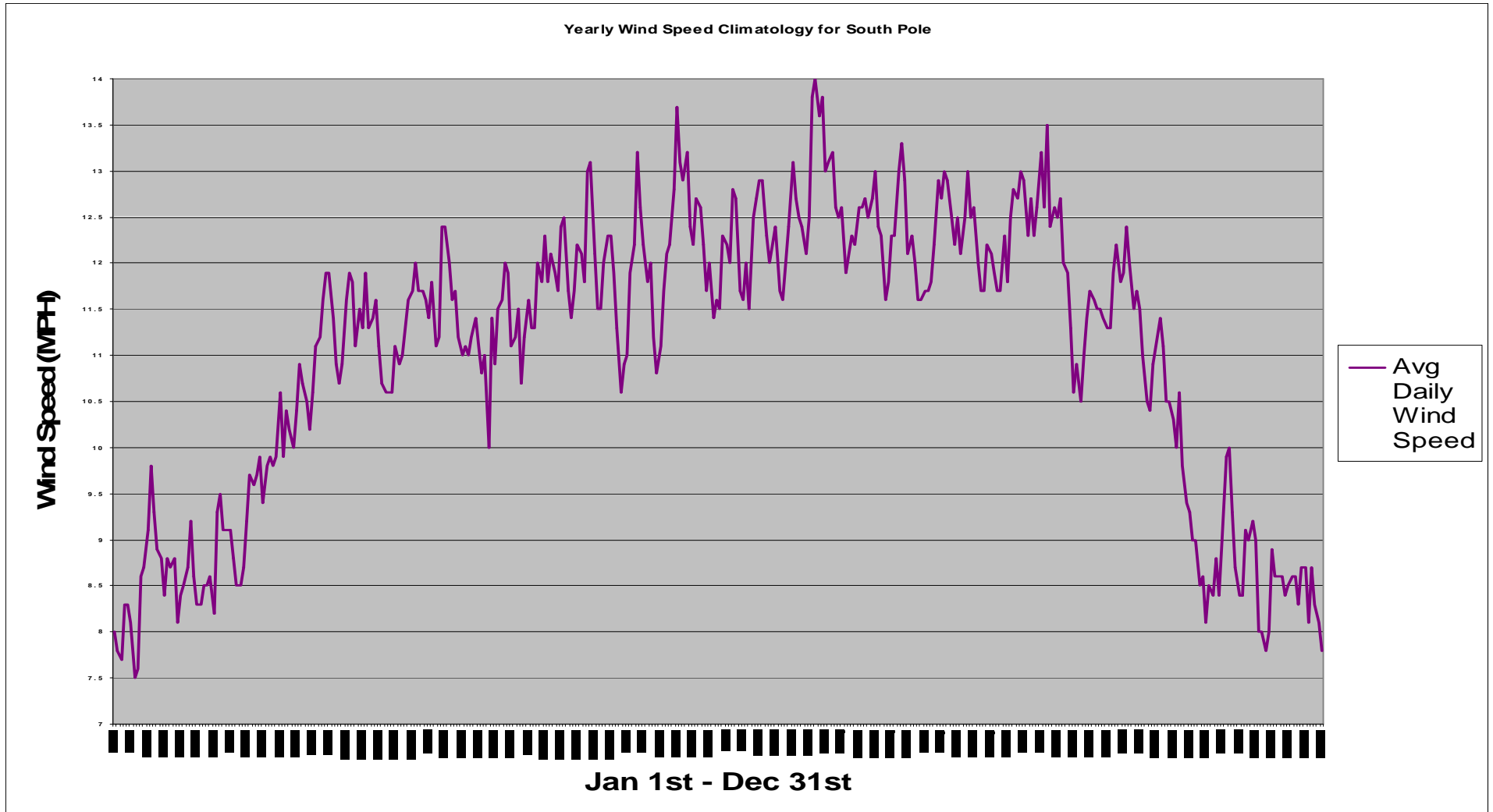
Advantages of Location

- Temperature range about 100F – same as USA
- No dirt, grit, trees/branches, liquid H₂O (no icing)
- Approx 40 knot maximum wind speed compared with 150+ knots near coast
- Wind comes from one direction
- Flat with no upwind obstructions

South Pole Temperature



South Pole Wind Speed

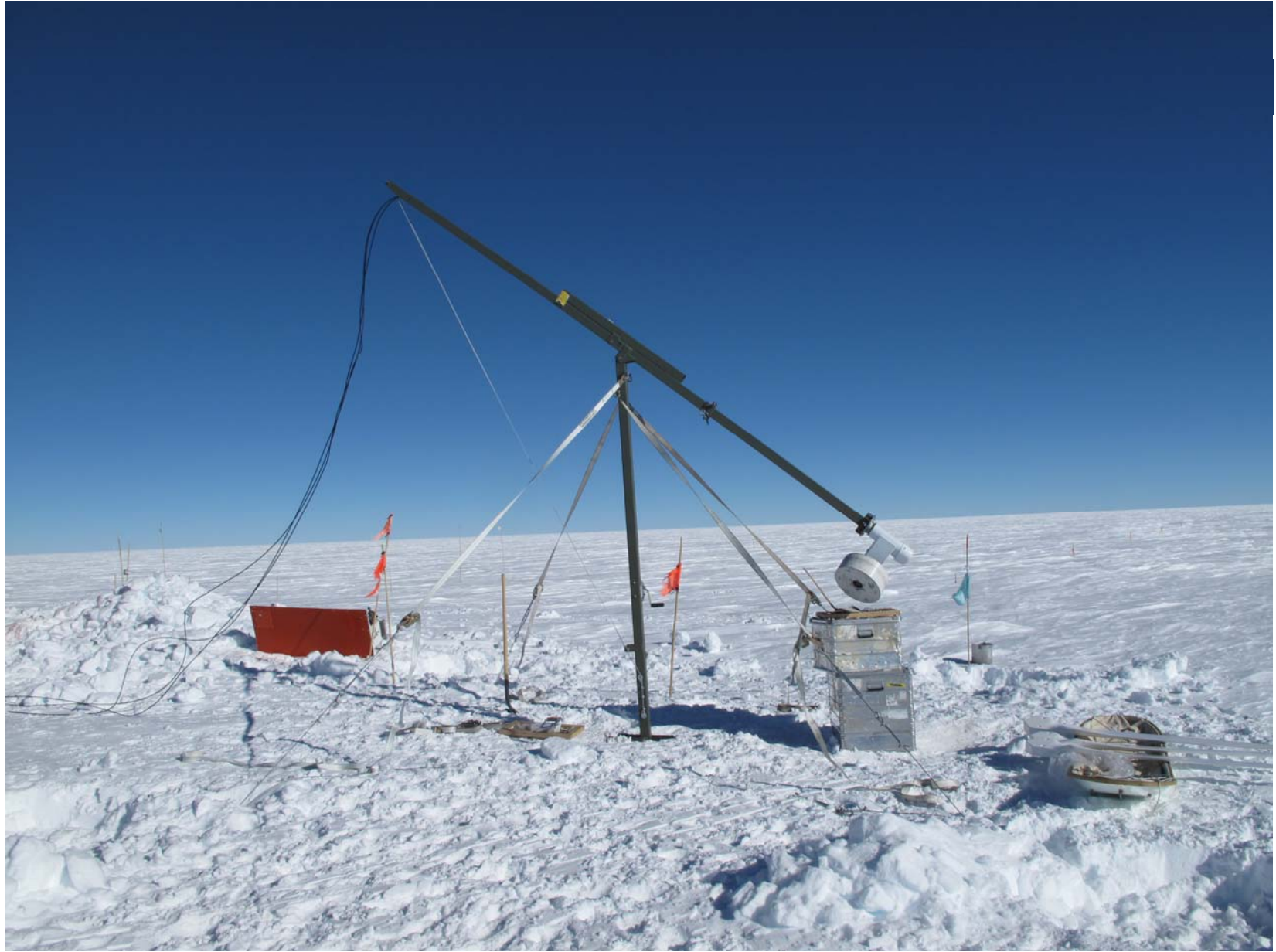


Implemented Solutions/Changes

- All new bearings – sealed not shielded
- Known good quality and properly rated lubricant – Mobilgrease 33
- Aluminum cap with o-ring for front bearing
- Big (really big) diodes for rectifier
- Easier to deploy and use mast assembly







Future Developments

- Shunt voltage regulator that can handle much higher power
- Screw in guy anchors
- Screw in self-supported mast



Thanks

- I hope some of this information was helpful