

# RADIOMETER HEATING AND VENTILLATION: GNDRAD



# WHERE WE WERE, WHERE WE ARE, WHERE DO WE NEED TO GO

## Inception of problem

- Issue with frost on domes of radiometers. Both upward and downward facing radiometers affected.
- Skyrad mitigation systems design and development were robust. Testing at NSA with various heaters, radiometers, ventilator covers etc.
- Led to design of current system being installed at all cold weather sites. Consistency among ARM sites with respect to fans, heaters, opening in mount plates, etc.
- Operations could use additional guidance on when to turn on heaters and when to turn off. Should these/could these be thermostatically controlled? Is this desirable or too complex? Would we need to log temp to determine when heaters are on or not?
- GNDRAD system also experiencing frost on domes.
- There has been no consistent design or recommendations to solve problem.
- Resolution has been a work in progress since 2003. Different sites have solved problem differently.

# WHERE WE WERE CIRCA 2002: NSA SITES ONLY

Ventilators and heaters, no cover



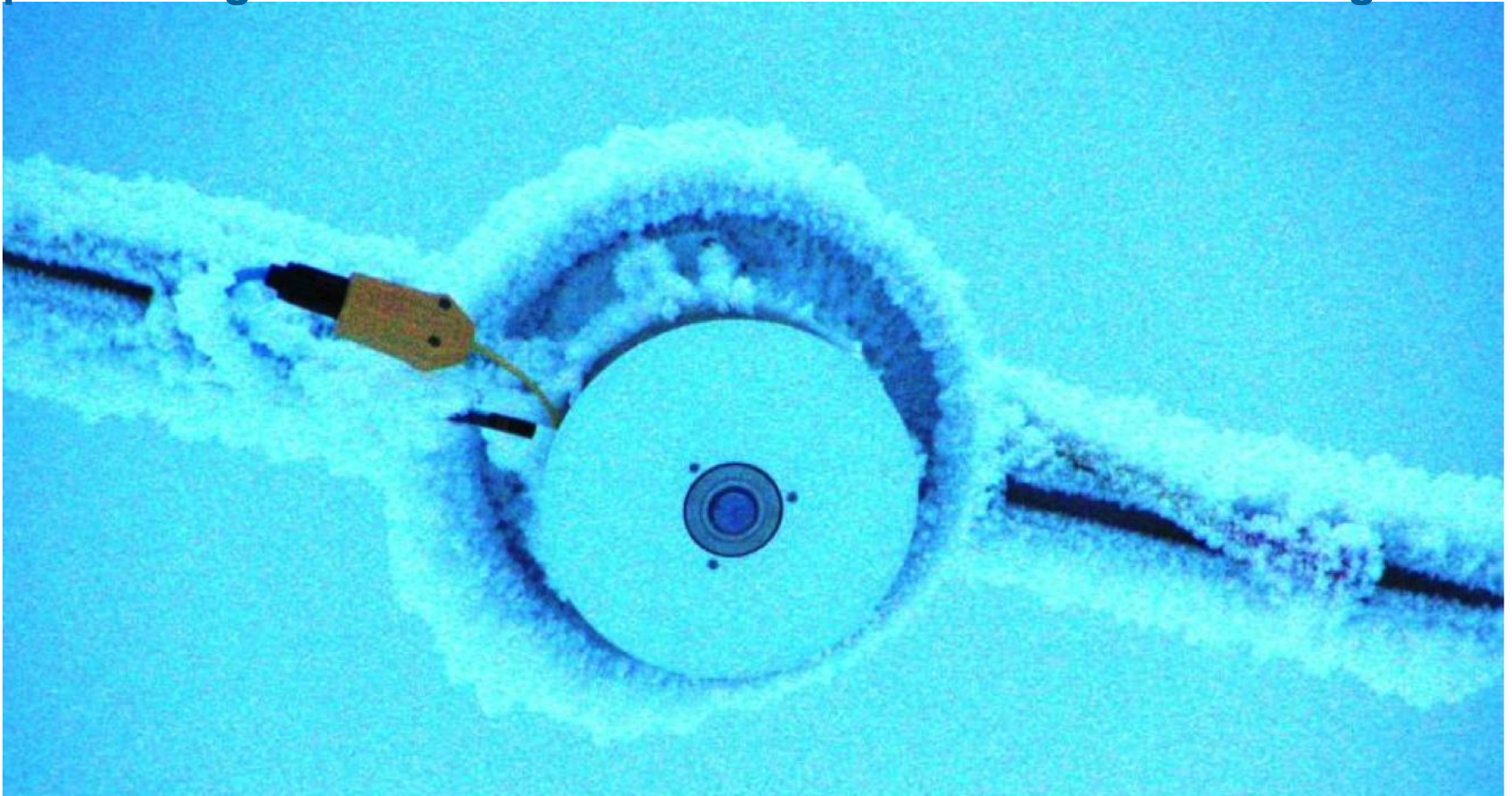
# SECOND ITERATION: NSAC1 AND C2 ONLY CIRCA 2003-NOW

Added pie tins to prevent precipitation from getting into ventilators



# SECOND ITERATION EFFECTIVE

Helped keep hoar frost off domes. Prevented precipitation penetrating ventilators. Allowed detection of SW at low sun angles



# THIRD ITERATION: AMF2 AND AMF3

AMF2 and Oliktok pictured. Enlarged housing for ventilators and to prevent detection of SW at low sun angles



# THIRD ITERATION DESIGN DIFFERENCES

## No standard design

- AMF3 used metal housing units and 110V AC fans
- AMF2 used dark grey plastic housing and 24V DC fans.
  - Pie tins and no ventilators for AMIE-GAN
- AMF2 only uses during cold weather deployments.
  - StormVex
  - BAECC
  - AWARE
    - Heaters installed but not turned on.
    - Dry air, rime ice rarely forms
- MICRE only have ventilators installed, no heaters on recommendation of Mark Kutchenreiter
  - No information on type of housing used
- BRW still has short pie tins
- AMF1 has no housing or heaters for GNDRAD

# WHERE DO WE GO FROM HERE?

## Different designs at different locations. Can we standardize?

- If we are able to standardize the SKYRAD system we should be able to standardize the GNDRAD system.
- Need to determine best practices and design.
- Some concerns over current designs:
  - Can heat pool in deep covers in low wind conditions? How much does this affect measurement?
  - Are heaters required or is ventilation in deeper housing sufficient? Not as much loss when pointing toward ground compared to clear sky.
  - Need to come up with design useable at all sites.
    - Considerations include marine environments
    - Extreme cold weather—ease of install and removal of entire unit to work inside
    - Vents with or without filters at top to allow warm air to escape
    - Consistent stand off distance of ventilator from housing to allow proper air flow
    - Use of 24V DC fans
    - Directives on when to turn on and off (part of thermostat control question)



# SUGGESTED PATH FORWARD

## Time for an IOP

- Propose we design an IOP to look at one or more designs.
- As has been stated there is little consistency among sites and designs.
- Once best design proposed find a vendor to build the housing so Operations Labs do not have to figure out.
- Need to transfer knowledge on heater build so that SNL is not stuck building heaters for all of ARM.
- Currently only need them for AMF1, AMF2, AMF3 and NSA C1.
- If Mobile portions of SGP move to a cold weather site potentially could have to build housing & heating for 20+ SIRS along with an additional 20+ heating systems for radiometers on trackers.
- If Atqasuk ever comes back online will need new systems there.
  
- Potentially a large number of systems could be needed by ARM in 3-5 years

**WE SHOULD PROPOSE A LEAD—NOT ME, I AM  
LEAD BY DEFAULT AS THE INSTRUMENT  
ENGINEERING MANAGER**

**THANKS FOR ATTENDING  
SORRY I COULDN'T MAKE IT TO SEE ALL YOUR  
SMILING FACES**

**-MICHAEL RITSCHKE**