

Automatic Weather Station Observation Strategies and Hardware Updates

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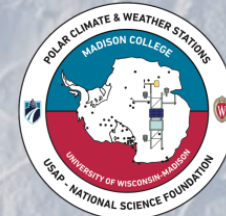
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Outline

- Hardware Updates:
 - Discontinued products
 - Satellite Comms
 - Temperature Measurement
- Observational Strategies
 - Past method
 - Instantaneous and 10 Min averages
 - Proposed method
 - WMO standard for each instrument

Discontinued Products

- Argos ST-21
 - These are the primary transmitter for the CR1000 systems
 - We currently have enough for the network but should plan for the future
 - Do not work with PCWS currently
- CF card module
 - Major problem for continuing to use/reuse CR1000 systems
- CR1000 system discontinued/replaced with CR1000x



New Satellite Comms options

- Iridium
 - 9602-N Modem primary
 - Also using the A3LA-X modems in some areas with mixed success
 - Xeos XI-202 in extreme cold
- ARGOS-3 PMT Kenwood
 - Still in testing
- SWARM Tile
 - Still in testing



Iridium

- Nal Research 9602-N

- Through DOD Network
- 340 byte messages
- Cold temperature limitation cutoff
- Currently in use on 12 stations
- Tested and working with CR1000, CR3000, CR1000x, and PCWS systems
- 200mA transmission power draw
- 45mA Idle power

- Xeos XI-202

- Through DOD Network
- 340 byte messages
- Uses the 9602 platform, adds a heater to extend cold temperature cutoff
- Tested with CR systems
- PCWS work needed
- 50mA transmission power (averaging 30 seconds to transmit)

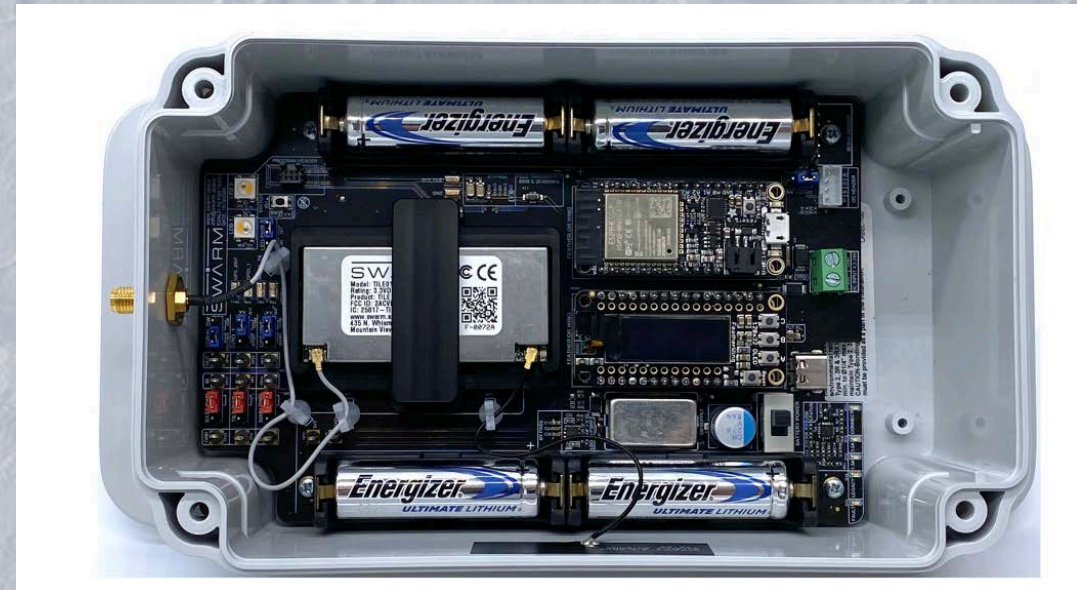
Argos Kenwood PMT-3

- Current Testing ongoing for viability with CR1000
- 0.1mA idle power draw
- 620mA at 7V for transmission
- 0.5-2W power draw depending on data transfer rate
- Temperature minimum -20 C
 - Testing ongoing to determine if this is a hard cutoff
- Command structure and integration issues
- Max data rate: 400 bits per second



SWARM Transmitter

- Currently works with CR systems
- Satellite network still expanding
- Cold testing ongoing
- Transmission frequency
- Sleep Mode power: 33 microamps
- Transmit power: 888-939mA
- Data rate: 1kbps



Temperature Measurements

- RM Young 43347
 - 1000 ohm Platinum Resistance thermometer
 - Non calibrated accuracy ± 0.3 C
 - Larger form factor
 - Expense
 - Added module needed to work with CR1000
 - Time constant: 42 seconds
- Apogee St-110
 - Epoxy coated thermistor
 - Non calibrated accuracy:
 - <0 ± 0.15 C
 - >0 ± 0.1 C
 - Small form factor
 - Inexpensive
 - Time Constant: 7 seconds
- Apogee ST-300
 - 100 ohm PRT
 - Non calibrated accuracy: ± 0.1 C
 - Larger form factor
 - Middle expense
 - Time Constant

Observation Methods

- Argos
 - 10 minute average values or instantaneous measurement depending on the instrument
 - Transmitted every 200 seconds
- Iridium
 - Full dataset of instantaneous measures
 - Full set of 10 minute averages
- Proposed WMO Standard:
 - Adds 1 minute averaged values of most instruments
 - Adds 2 minute Wind averaging
 - Test on Iridium systems
 - Possibly update Argos systems
 - Integrate other instruments with different observation strategy needs (e.g. Net Radiometers)

Questions?