Automatic Weather Station Observation Strategies and Hardware Updates

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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 $\pm 0.3$ 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:
    - $<0$ $\pm 0.15$ C
    - $>0$ $\pm 0.1$ C
  - Small form factor
  - Inexpensive
  - Time Constant: 7 seconds

- **Apogee ST-300**
  - 100 ohm PRT
  - Non calibrated accuracy: $\pm 0.1$ 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?