



Overview of the Upper Air Data Continuity Study: An Intercomparison Between the National Weather Service's Legacy Upper Air System and the New Radiosonde Replacement System to Assess True Climatic Variation

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Data Continuity Study

- Network-wide conversion within the NWS to a new generation of radiosonde observing systems
- Antiquated MicroART being replaced by Radiosonde Replacement System (RRS)
 - Introduction of GPS radiosondes
 - Improvements in sensor design for temperature, pressure, and relative humidity measurements
 - Effects on measurements unknown
- Due to biases in changing instruments, the Data Continuity Study:
 - Is determining the impact on upper air measurements in a variety of climatic and meteorological conditions
 - Is assessing differences in characteristics and performance between the old and new instruments

Data Continuity Study

- National Weather Service Directive (10-2101) requires a DCS to be conducted:

“As new instruments are introduced, studies to determine instrument transfer functions are required to account for differences between old and new sensors and gauges...to make the changes as seamless as possible in terms of the official long-term historical climate record.”

- Collaborative effort in establishing DCS requirements
 - NWS, NCDC, climate users, etc.

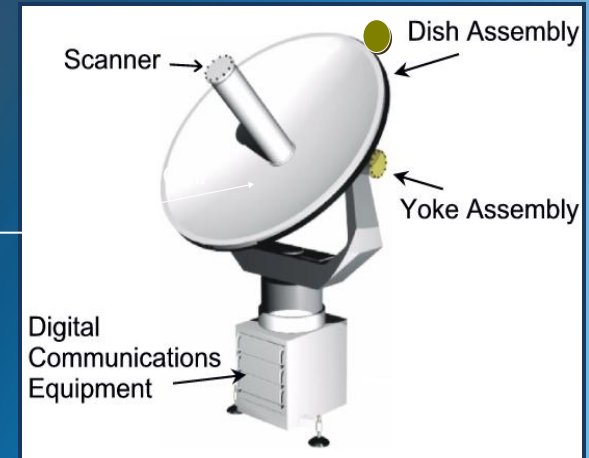
Data Continuity Study

Tracking Systems and Radiosondes



MicroART

- MicroART in operation since late 1980s
 - Use of IBM XT computer
- RRS comprised of telemetry receiving system (TRS)
 - Use of Signal Processing System (SPS)



TRS



Sippican B2

- LMS B2 utilizes RDF for wind finding
- Vaisala RS92-NGP utilizes GPS for wind calculations

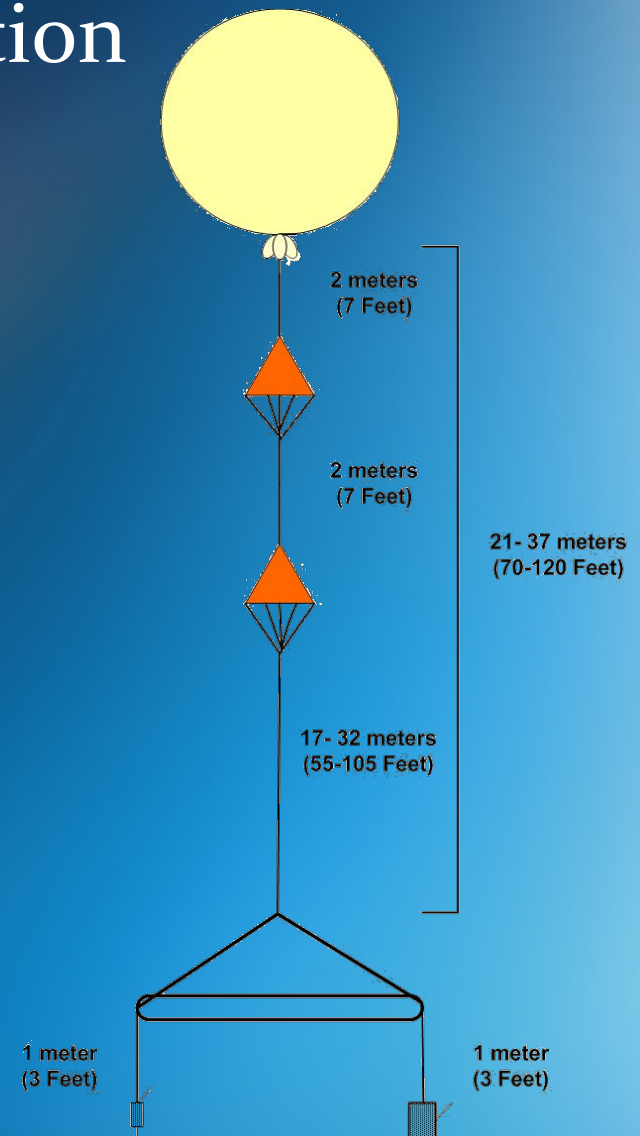


Vaisala RS92-NGP

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Flight Configuration

- Balloon is larger than those used in normal operations
- 2 radiosondes on one balloon separated by approximately 6 feet
- Requires a 2-person release



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Test Locations



Sterling, Virginia

- Humid Subtropical Climate
- Well-defined seasons
 - Wide range of relative humidity levels
- Precipitation evenly distributed throughout the year
 - All precipitation types



Caribou, Maine



- Humid Continental Climate
- Cool summers and severe winters
 - Abundant rainfall in the summer
 - Frequent snowfall
- Temperatures of coldest month less than -3°C (experienced -20°C at surface)



Barrigada, Guam

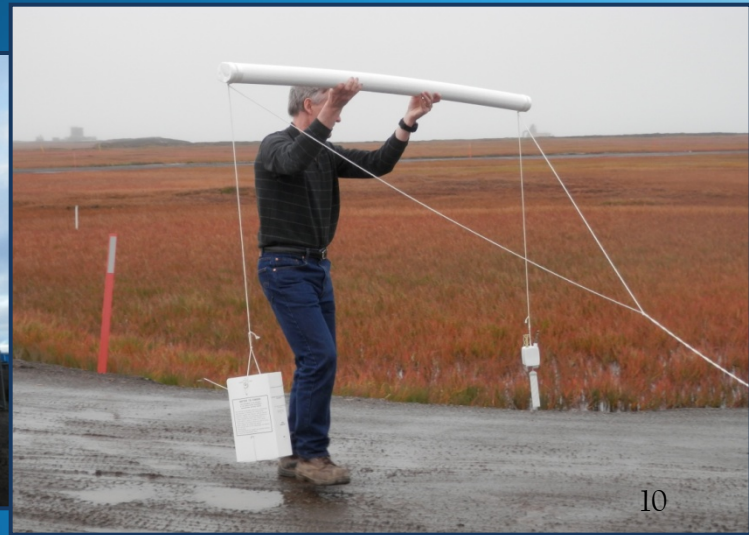
- Tropical Rain Forest Climate
- Warm and humid year-round
- Trade winds strong during dry season
 - Breakdown occurs during rainy season
- Typhoons not uncommon



Barrow, Alaska

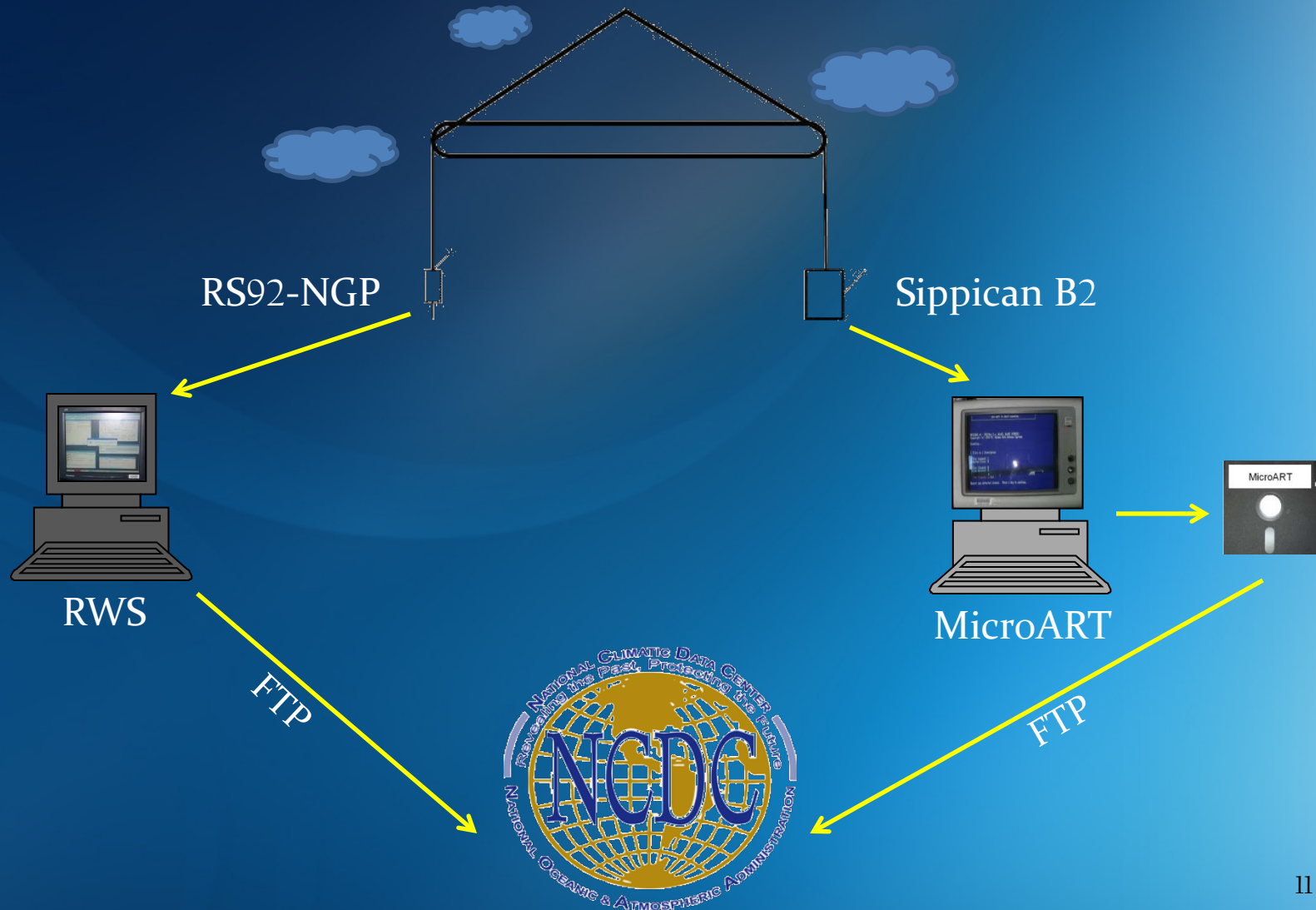


- Polar Tundra Climate
- Temperatures remain below freezing for the majority of the year
- Periods of continual light and darkness
- Level tundra provides few barriers as protection from high winds



Data Continuity Study

NCDC Archival



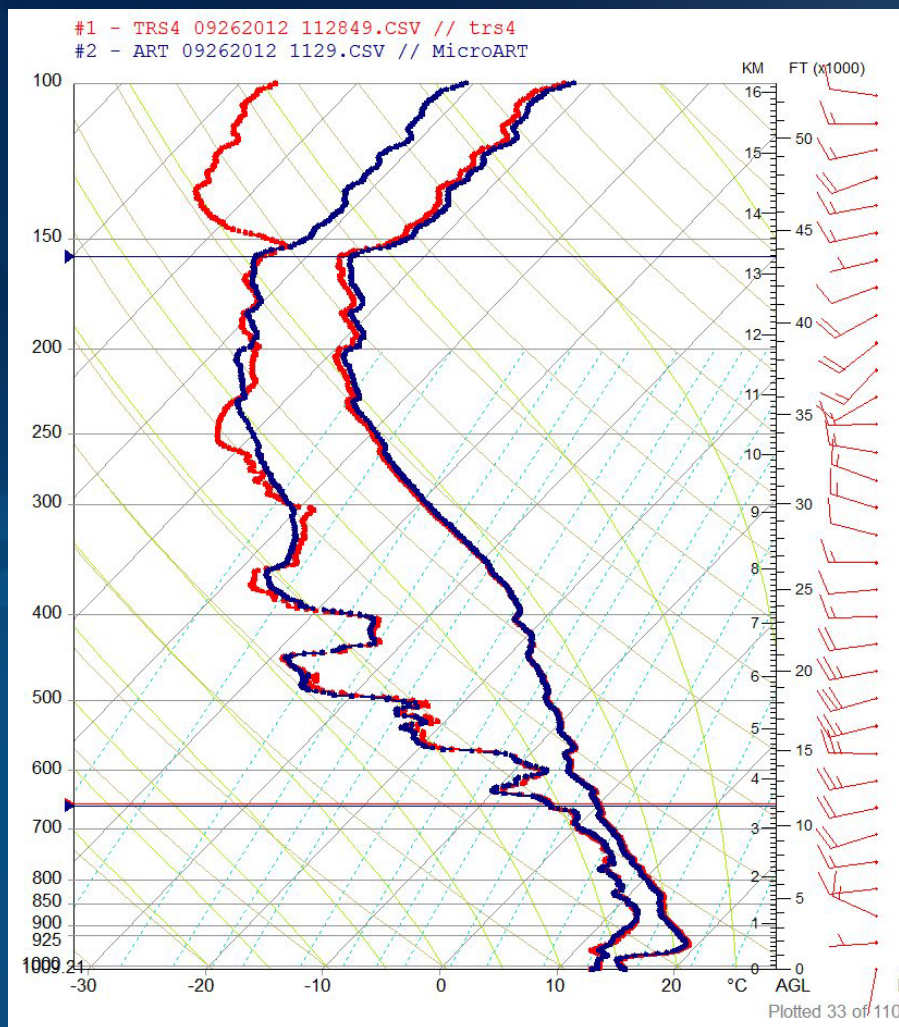
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Data Analysis and Quality Control Procedures

- RAOB (Skew-T)
 - Evaluate radiosonde's meteorological representation of the atmosphere
 - Compared meteorological parameters
- WMO Mandatory Levels (TTAA and TTCC)
 - Evaluate differences being calculated at pressure levels
- High Resolution Analysis
 - Evaluate radiosonde's meteorological representation based on 6-second resolution
 - Performed only for SFSC
- Throughout all analysis, difference calculations are MicroART minus RWS

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Preliminary Results – Relative Humidity



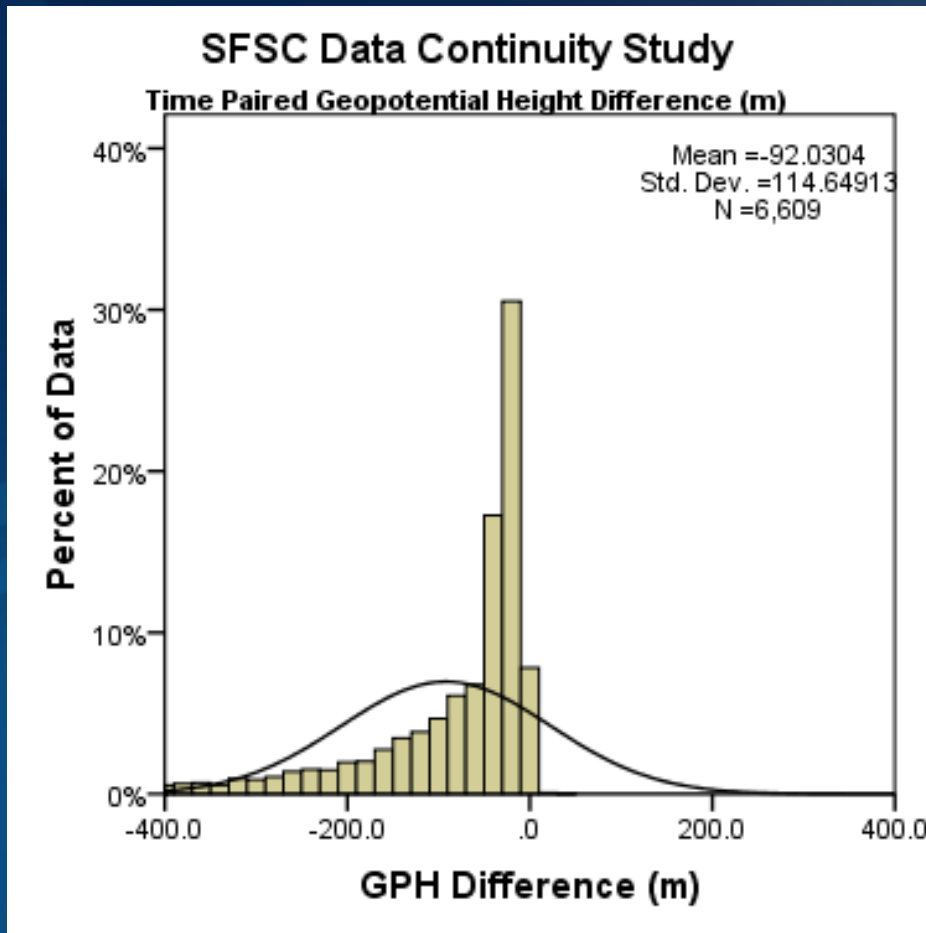
Time Paired Humidity Difference Statistics

Pressure Intervals (hPa)	Mean (% RH)
19 to 0	9.69
49 to 20	17.92
99 to 50	22.51
199 to 100	12.70
299 to 200	-1.58
499 to 300	-0.13
849 to 500	-2.35
1070 to 850	-1.49
ALL	8.99
400 to 4	12.43
SFC to 400	-1.81

High Resolution Analysis for SFSC

Data Continuity Study

Preliminary Results – Geopotential Height



Time Paired GPH Difference Statistics	
Pressure Intervals (hPa)	Mean (m)
19 to 0	-279.36
49 to 20	-134.39
99 to 50	-75.53
199 to 100	-53.51
299 to 200	-37.87
499 to 300	-27.42
849 to 500	-19.35
1070 to 850	-12.56
ALL	-92.03
400 to 4	-115.22
SFC to 400	-19.12

High Resolution Analysis for SFSC

Data Continuity Study

Expectations for the Future



- Successful Flights Completed by Site
 - Sterling – 120
 - Guam – 100
 - Barrow – 74
 - Caribou - 52
- Analysis procedures continue to be developed
 - Basic analysis of all sites for quality control purposes by SFSC
 - High resolution analysis to continue for SFSC flights
 - NOAA Technical and AMS reports on high resolution data will be completed by SFSC
- Comprehensive report will be completed by NCDC

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*For additional information please visit the
Sterling Field Support Center's website*

<http://www.nws.noaa.gov/ops2/ops22/sfsc%20html/index.html>

or Google “Sterling Field Support Center”

Questions?