8.6 UPDATE ON THE IMPLEMENTATION
OF THE NATIONAL WEATHER SERVICE'S RADIOSONDE REPLACEMENT SYSTEM

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1. INTRODUCTION

The National Weather Service (NWS) is developing the Radiosonde Replacement System (RRS) to replace its antiquated Microcomputer Automatic Radio-theodolite (Micro-ART) system, which has been in operation since the late 1980s. The RRS comprises a new Global Positioning System (GPS) tracking antenna called the Telemetry Receiver System, or TRS; 1680 MHz GPS radiosondes and a Signal Processing System (SPS); and a new NT-based workstation. In addition to the deployment of the RRS, a new surface weather observing system called the Radiosonde Surface Observing Instrumentation System (RSOIS) and precision digital barometers will be deployed at most of the 102 observation sites located from the Caribbean to Guam and from Alaska to Pago Pago, American Samoa, in the Southern Hemisphere.

This extended abstract discusses the strategy for deploying and commissioning these systems as well as the impact of these systems on the meteorological community as the transition takes place.

2. CURRENT NWS NETWORK

Figure 1 identifies the types of upper air systems in use today at NWS locations, including the Micro-ART system (variants of the Automatic Radio-Theodolite for the Ground Meteorological Device, or GMD, and the Weather Bureau Radio-Theodolite, or WBRT) and the W9000 system purchased from Sippican, which can operate with either GPS or LORAN (long-range aid to navigation) radiosondes.

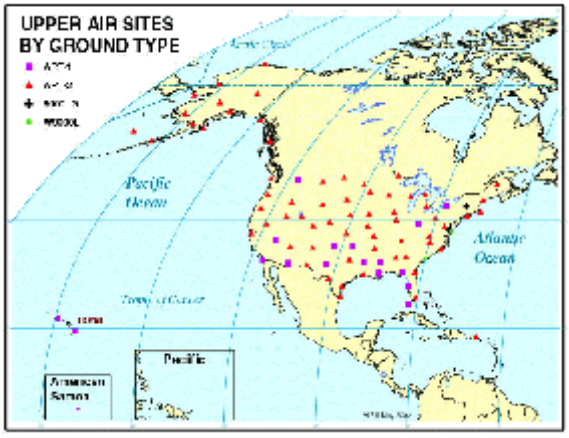

Figure 1. Types of Upper Air System in Use at NWS Locations.

Figure 2 shows the types of radiosondes currently flown in the NWS network, including the Sippican B2/Mark II variety (V49LG, V49L, V51) and the Vaisala RS 80 (VSL52), and their locations. These radiosondes will be phased out of the NWS upper air network with the introduction of the new GPS radiosondes. Two vendors, Sippican and InterMet Systems, have developed radiosondes of the new GPS design.

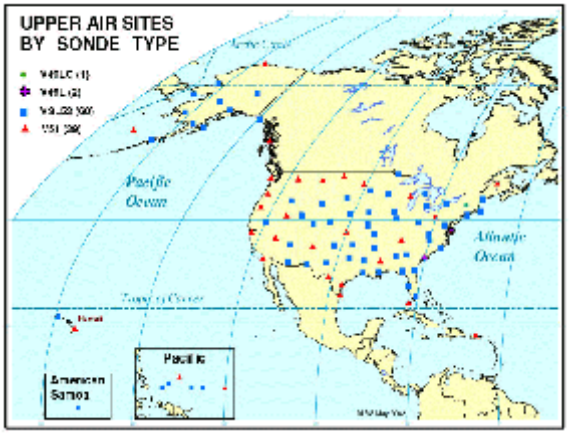

Figure 2. Types of Radiosondes Used at NWS Locations.

3. RRS FREQUENCY

One of the major features of the RRS is its use of state-of-the-art GPS radiosondes operating in the 1680 MHz radiosonde frequency. Until recently, most commercial systems and radiosondes sold around the world were based on the 403 MHz frequency. Unfortunately, this band is very congested, with thousands of licenses already issued. The NWS has been using the 1680 MHz band for its Radio Direction Finding systems almost exclusively for more than 50 years and has experienced minimal interference from other users.

4. CONUS TRANSITION

The plan for the continental United States (CONUS) upper air sites is to transition into the RRS in a cost-effective manner. The RRS will be deployed in a phased approach starting with an Operational Acceptance Test (OAT) of first article production units at selected sites, followed by full deployment at the remaining locations.

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The purpose of the OAT will be to validate the installation of the system, evaluate system performance, and determine if any critical problems exist before full deployment commences. OAT sites are designated in Figure 3 by a red star; a red triangle indicates the location of Global Climate Observing Stations (GCOS).

One approach to CONUS deployment under review within NWS is to begin with warm weather sites in the winter, continuing north as the seasons progress into summer, and then moving south again with the return of winter. (This seasonal progression is indicated by the green arrows in Figure 3). The current plan is to deploy between one and two systems per month beginning in mid-calendar year (CY) 2003.

The new GPS radiosondes have different sensor characteristics than the radiosondes currently fielded and will therefore have a significant impact on operations with respect to temperature, pressure, and relative humidity measurements. For this reason, NWS will study the data collected by these sensors under a variety of climatic and meteorological conditions to determine the effects on data continuity. This study will be conducted at OAT and other selected sites. At the time this extended abstract was written (September 2002), the list of study sites was not yet complete.

5. OCONUS TRANSITION

The RRS transition plan for upper air sites outside the continental United States (OCONUS) entails a phased approach similar to that of the CONUS sites. Deployment of the IMS 1500C (a varient of the RRS) will begin at the Carribean Hurricane Upper Air Stations (CHUAS) in late CY 2002 and will continue at other sites through early CY 2003. Figure 3 shows the general location of the OCONUS sites.

In Alaska, where the harsh winter makes work outdoors difficult, RRS will be deployed during the non-winter months, with deployment continuing until all sites shown in Figure 3 are ready for commissioning.

For the Pacific region (shown in Figure 4), the greatest difficulty in deploying RRS is getting to the sites, which are dispersed over a large area.

6. COMMISSIONING PLANS

Commissioning is a formal process within NWS to determine if a new system meets a set of evaluation criteria before it is used in an official capacity. Once the evaluation criteria for the RRS have been established and approved, they will be documented in the RRS Site Component Commissioning Plan along with specific plans and procedures for commissioning the system.

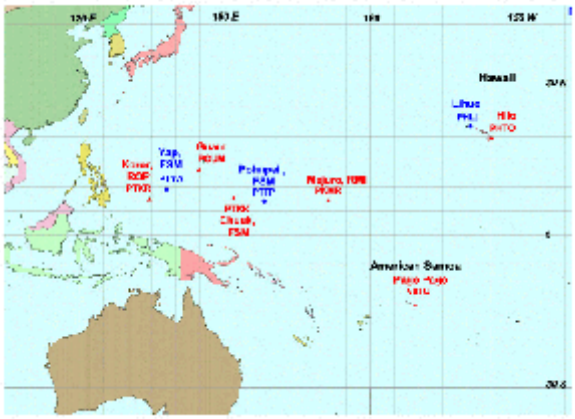

Figure 4. Pacific Upper Air Locations. *(Sites in red are GCOS.)*

Commissioning of the RRS will be done on a site-by-site basis, beginning with the sites identified for the OAT. The plan is to commission the system at each site within about 30 days after installation.

7. CONCLUSION

The transition to new radiosondes will necessitate a data continuity study for determining measurement differences between the new and current radiosondes. Through the commissioning process, the NWS will prepare field units for the implementation of RRS and ensure a smooth transition by addressing operational issues and impacts before the system is put into official use. The commissioning process has guided the successful deployment of other new technologies within NWS and will be an important factor in helping NWS meet its goals for implementing the RRS.

8. REFERENCES

U.S. Department of Commerce, 2002: National Weather Service Policy Directive 80-2, *System Commissioning and Decommissioning*.

National Weather Service, RRS Program Management Plan (draft), July 2001.

9. ACKNOWLEDGMENTS

The author would like to thank Ruth Parmerlee of Raytheon Technical Services Company and Rita Lewis of QSS Group, Inc., for their technical editorial support.

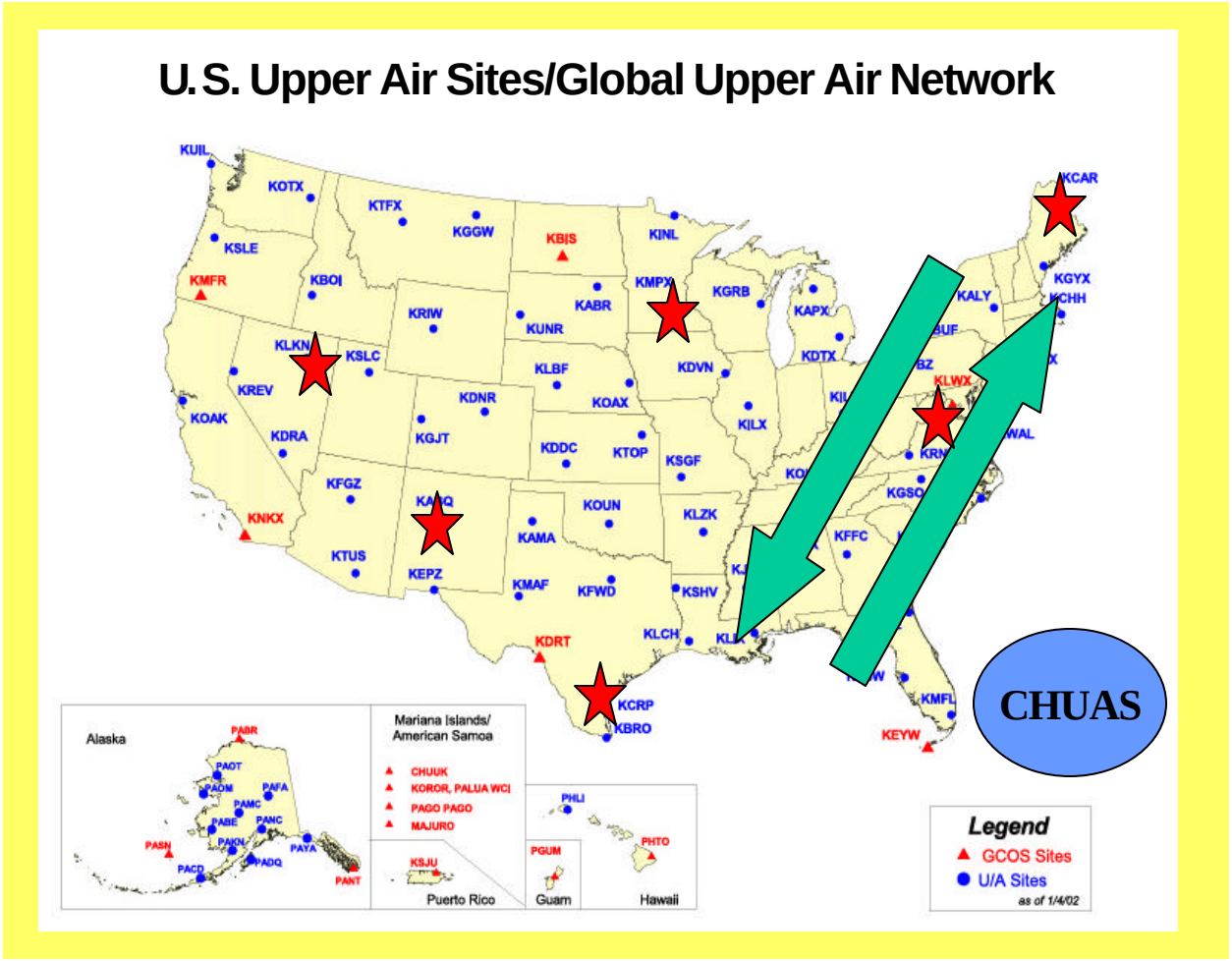

Figure 43. RRS Deployment Strategy