6.6 SURFACE DATA PROCESSING AND INTEGRATION AT NOAA'S NATIONAL CLIMATIC DATA CENTER

Stephen A. Del Greco *, Neal Lott, Ron Ray, and Dan Dellinger
NOAA National Climatic Data Center, Asheville, North Carolina

Pete Jones and Fred Smith
Global Science and Technology, West Virginia Division, Fairmont, West Virginia

ABSTRACT

The National Oceanic and Atmospheric Administration (NOAA) National Climatic Data Center (NCDC) is responsible for the stewardship of global climatological data to support the Global Earth Observation System of Systems (GEOSS). In the past, these data were processed through Quality Assurance/Control (QA/QC) systems that were primarily network-specific with no standard for rules/algorithms applied to similar parameters across the different observing networks. Therefore, NCDC implemented a plan to integrate surface climatological data into a common format and data model and process these data through one processing system that capitalizes on network independent standardized QA/QC algorithms and procedures.

NCDC developed an Integrated Surface Data (ISD) format and database and a new QA/QC processing system, the Integrated Surface Data Processing System (ISDPS). ISD and ISDPS integrate QA/QC algorithms into a unified system. Numerous historical datasets have been fully integrated into ISD. Data from several sources and networks, totaling nearly 20,000 active observing sites, are now operationally processed (eg, daily) through ISDPS. These sources include NOAA's Automated Surface Observing System (ASOS), the Automated Weather Observing System (AWOS), global hourly and synoptic data from the Air Force Combat Climatology Center (AFCCC), U.S. Navy station data, the National Cooperative Observers (COOP) Network, and the Climate Reference Network (CRN). Additional historical datasets will be integrated into ISD, and additional data sources and networks will gradually be integrated into ISDPS. NCDC is working with partners (National Weather Service, Regional Climate Centers, State Climatologists, National Center for Atmospheric Research, AFCCC, etc.) to continue developing network-independent standards for QA/QC and to further expand ISD.

We will describe these efforts, focusing on the QC processing system, data integration, and future plans for ISDPS and ISD.

* *Corresponding author address:* Stephen A. Del Greco, NOAA National Climatic Data Center, 151 Patton Avenue, Asheville, NC 28801; e-mail: Stephen.A.Delgreco@noaa.gov.

1. INTRODUCTION

The development of ISD (previously called ISH—Integrated Surface Hourly) and ISDPS has been an iterative process. This includes the development of the integrated format, collection of datasets to include in the initial ISD database, development of a data model to use in a relational database for customer servicing, quality control of the historical ISD, development of the end-to-end ISDPS process, and development of online products (Del Greco, Lott et al 2006).

2. STRATEGY

Often surface weather observing networks have differing primary missions for observing weather and climate. For example the ASOS network's core role supports aviation and CRN's core role is to provide long-term homogeneous observations of temperature and precipitation for the detection and attribution of present and future climate change. Therefore, often data from different networks are processed using systems unique to the individual network. Acquisition, Quality Assurance/Quality Control, data archive and product generation are not integrated and are network dependent or "stovepiped" (see figure 1).

Current technology provides a means for integrating like data into one standard format and processing these data through standardized QA/QC algorithms & procedures. In January 2006 NCDC implemented ISDPS (figure 2) into operations keeping in mind a goal to:

- Integrate like data into one standard format
- Process these data through one system that's network independent with standardized QA/QC
- Move towards fully automated QA/QC processing for weather data (system allows for interactive QC to take place when situations warrant),
- Reduce processing times for final QC digital data and by products,

3. BENEFITS

Moving from multiple "stove piped" systems to one integrated data processing system increases our ability to create higher quality data sets by:

- Reducing subjectivity and inconsistencies among data sets that span multiple observing networks and platforms
- Standardizing QA/QC based on reporting time
- Enabling development of standardized products
- Developing better products utilizing collective experience and expertise
- Making software modular for ease of modification
- Conforming data to documentation (reference manuals, FMH, etc.)
- Completing a distributed network for both data and software
- Integrating real-time and historical data so that any data can be provided to users within servicing time constraints

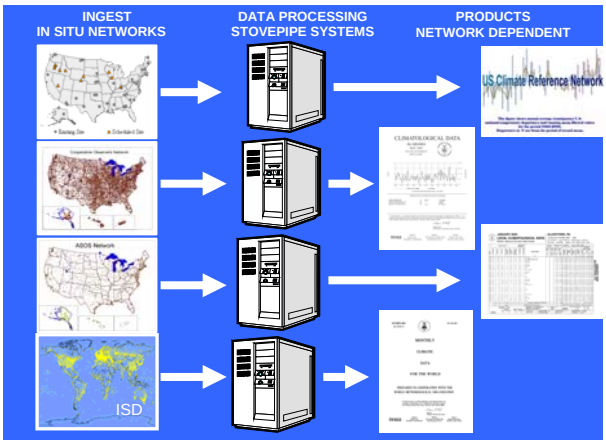

Figure 1. Network dependent data processing

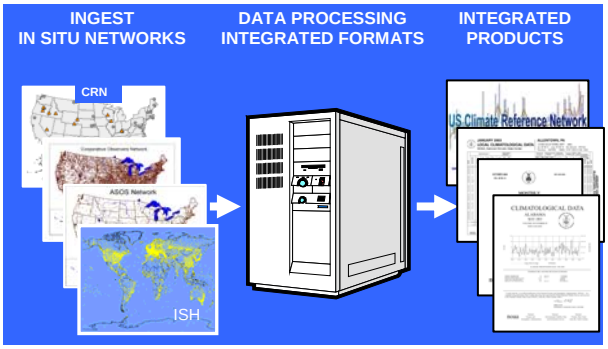

Figure 2. Integrated data processing

4. STATUS AND TARGETS -- ISDPS PROCESS

ISDPS is 95% automated with some interactive QA/QC taking place. The system processes data dynamically on an hourly, daily and monthly basis instead of at end of month. The recent conversion of the Cooperative Observer Network to ISD format took place in FY2006. Current processing of COOP is at the testing level with parallel testing with the legacy system taking place. Plans are to move COOP processing into ISDPS operations in FY2007. With the move of COOP into ISDPS, further QA/QC standardization needs to be done. This is especially true with respect to the use of spatial algorithms. QA/QC standardization needs collaboration among NOAA line offices, State Climatologists and Regional Climate Centers and academia.

Future plans for ISD/ISDPS, include pursuing other weather and climate networks. This includes current and historical datasets from U.S. mesonets, which are incorporated into NOAA operations and from more global weather data as they become available for archive. Future dataset inclusion will be prioritized and implemented into ISD/ISDPS as resources permit.

5. REFERENCES

Stephen A. Del Greco., Neal Lott., Kathy Hawkins., Rich Baldwin., Dee Dee Anders., Ron Ray., Dan Dellinger., Alan Hall., Fred Smith., and Richard Smith., Surface Data Integration at NOAA's National Climatic Data Center: Data Format, Processing, QC, and Product Generation. 22nd International Conference on Interactive Information Processing Systems for Meteorology, Oceanography, and Hydrology. 86th American Meteorological Society Annual Meeting, 2006, Atlanta, GA.