J8.11 **NCDC's GCOS LEAD CENTER ACTIVITIES**

Thomas C. Peterson *, Gregory R. Hammer, Matthew J. Menne
NOAA National Climatic Data Center, Asheville, North Carolina

1. INTRODUCTION

The Global Climate Observing System (GCOS) has two primary meteorological networks: The GCOS Surface Network (GSN) and the GCOS Upper Air Network (GUAN). Though designed for global climate monitoring, these networks have not achieved their potential (GCOS, 2003). To help make them more useful for climate change analyses, several different GCOS Centers have been established including Monitoring, Archive, Analysis and Lead Centers (Daan, 2002; Commission for Basic Systems, 2002). NOAA's National Climatic Data Center (NCDC) has served as GSN and GUAN Archive and Analysis Centers for several years and has more recently formally accepted the role of the World Meteorological Organization (WMO) Commission for Basic System (CBS) GCOS Lead Center. As a Lead Center, NCDC has accepted some additional obligations but also gained an important tool to use in its effort to improve the networks: CBS specifically authorized GCOS Lead Centers to contact countries. In the past, GCOS country contacts went formally through WMO Secretary General which was time consuming and did not provide the opportunity for the interactive follow up with individual countries that is critical in encouraging data exchange.

2. GSN

2.1 *Contacting Countries for GSN Data*

During the past year, NCDC's Greg Hammer has directly contacted both GCOS Focal Points for countries that have not provided daily GSN data and, for countries that have not provided Focal Points, countries' Permanent Representative to WMO seeking both data and metadata. Approximately 100 countries have provided GCOS Focal Points and 60 countries with GSN stations have not.

Through this activity, NCDC has acquired daily GSN data from 17 countries:

Algeria
Argentina
Costa Rica
Estonia
Kyrgystan
Mauritius
Namibia
Norway
Papua New Guinea
Seychelles
Tajikistan
Tanzania
Thailand
Turkey
United Kingdom
Uruguay and
Venezeula

2.2 *Providing GSN Data*

In addition to seeking out new data directly from the countries, the GSN is being improved in two important ways. The first is that for countries that have not provided data or provided very little data (e.g., one country provided only six years of GSN daily data), NCDC supplements the GSN with digital data which NCDC has and is allowed to release. The primary focus of this work has involved the Global Historical Climatology Network (GHCN) – Daily Version 1.0 dataset, which NCDC's Byron Gleason has just put together. Included in this dataset are daily observations derived from synoptic reports transmitted over the Global Telecommunications Systems (GTS) during the last several decades. While the synoptic reports are not as complete as one would expect daily observations to be in the countries' archives, they do improve the availability of GSN data. The second improvement is a system, under development by NCDC's Data Access Branch, to provide the data easily to users.

2.3 *GSN Performance Indicators*

Analyses were performed on the GSN archive to quantify the performance of the network. These include the begin and end dates, the number of missing values, data quality problems, the number of stations with data in the archive over the past 100 years, and how these compare with the potential data availability. The potential data availability was determined from a variety of data sources (such as monthly or daily data whose release is restricted) as well as sources of information about the data which were used in the initial selection of the GSN (Peterson et al., 1997). Figure 1 provides an indication of how much daily GSN data are available compared to the potential and how this varies with time. Figure 2 shows the GSN station network and the fraction of data available on a per station basis.

* *Corresponding author address*: Thomas C. Peterson, National Climatic Data Center, Asheville, NC 28801; e-mail: Thomas.C.Peterson@noaa.gov.

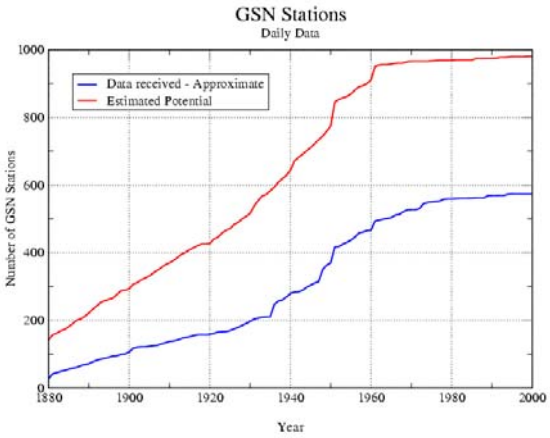

Figure 1. Number of GSN stations with daily data in the GSN archive (blue) compared to the estimated potential GSN station observations. The blue line is only approximate as recently received data were not included.

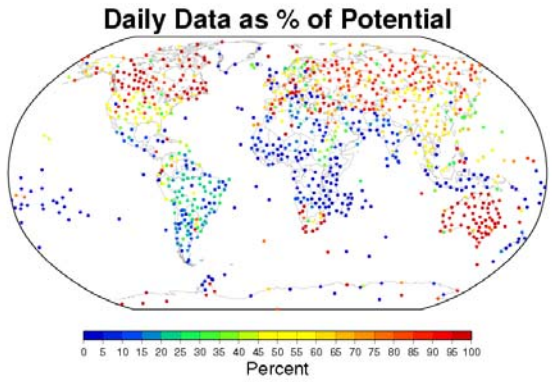

Figure 2. Available GSN daily data from all sources as a percent of potential data. Recently received data were not included in this figure.

These figures and other performance measures can provide several insights into how the GSN can be improved and where the focus of this effort should be placed. In some parts of the world, free exchange of daily data, even GSN daily data, is not the norm. Digitization of data from early paper archives could improve the percentage of available data. But even here, some recently digitized observations were not made available to the GSN archive. In the U.S., the relatively low percentage will change when the recently digitized pre-1948 daily data is able to be merged into the archive.

3. GUAN

3.1 *Contacting Countries for GUAN Metadata*

Radiosonde observations have a long history of complete or nearly complete data exchange as these observations were made primarily to benefit weather forecast models. Therefore, most GUAN data are already available in the NCDC GUAN archive and the focus of our GUAN related country contacts has been to acquire metadata that indicate changes in the observations that cause artificial biases in the data. A prime example is the brand and type of radiosonde. A survey of radiosonde metadata was made in the early 1990s (Gaffen, 1993; Gaffen, 1996) but needs updating. These metadata are having an immediate direct impact on global climate monitoring activities using radiosonde data (Free et al., 2004). While a few countries, such as Fiji, sent metadata in 2003, during the past year 21 countries have provided radiosonde metadata for the GUAN archive:

Algeria
Argentina
Armenia
Austria
Canada
Chile
China
Greenland
Iceland
Indonesia
Ireland
Italy
Kenya
Mauritius
Mexico
Paupa New Guinea
Philippines
Singapore
Spain
United States and
Zimbabwe

An updated GUAN metadata archive that incorporates these records is expected to be on-line by the end of 2004.

3.2 *Providing GUAN Data*

The complete and routinely updated GUAN radiosonde data set is available via www.ncdc.noaa.gov.

3.3 *GUAN Performance Indicators*

The NCDC has a project to monitor the health of climate observing networks and to create a variety of performance indicators. One example of station level performance indicators for a GUAN station is provided in Figure 3. See the *Monitoring the Health of Weather and Climate Observing Networks* web site, http://www.ncdc.noaa.gov/oa/hofn, for more information.

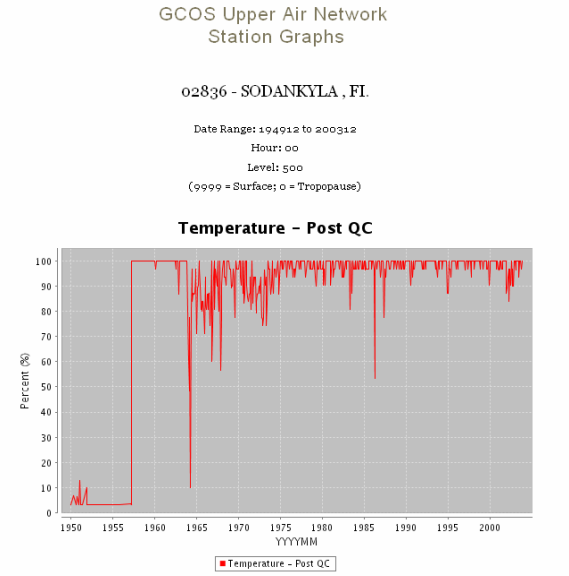

Figure 3. GUAN performance indicator of the percent of data available after NCDC's quality control procedure for the station Sodankyla, Finland.

4. ADDITIONAL ACTIVITIES

Other GCOS related activities at NCDC and by NCDC personnel include serving on the GCOS Atmospheric Observation Panel for Climate (AOPC) and the AOPC's Advisory Group on GSN and GUAN (Thomas Peterson) and serving as the Rapporteur on GCOS Matters for the Commission for Basic Systems Open Programme Area Group on the Integrated Observing System (Matthew Menne). Additionally, participation in regional climate change workshops such as those coordinated by the WMO Commission for Climatology / World Climate Research Programme (WCRP) project on Climate Variability and Predictability (CLIVAR) Expert Team on Climate Change Detection, Monitoring and Indices have afforded opportunities to make a case for GSN data exchange to individuals from many countries (Thomas Peterson). At four of these workshops held in 2004, long-term daily data provided by meeting participants were used to create indices that quantify how extremes are changing in the regions. This work demonstrated the importance of GSN daily data for climate change analysis and the importance of comparing results across national borders, which helped illustrate the need for GSN data exchange. Several countries that had participants in these workshops provided data to the GSN archive during 2004, indicating that, in addition to performing climate change analyses that will contribute to the next Intergovenmental Panel on Climate Change (IPCC) Assessment Report, these workshops contribute to the success of NCDC's GCOS Lead Center.

5. REFERENCES

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