FIFTY-YEAR AMUNDSEN-SCOTT SOUTH POLE STATION CLIMATOLOGY: QUALITY CONTROL AND ANALYSIS

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1. OVERVIEW

A fifty-year analysis of Amundsen-Scott South Pole Station's meteorological data record has been analyzed for developing a comprehensive and definitive climatology from the meteorological observations for the station. To reach the goal of a full climatological analysis, a full quality control review of the data was conducted. The results of the review triggered a series of data corrections before analysis could be completed. This project provides an example of how critical data stewardship can be. Analysis is underway, with preliminary results available for temperature and general fifty-year climate.

2. QUALITY CONTROL

A series of data corrections were discovered while analyzing South Pole's observations. While corrections to their Local Climate Data (LCD) summaries have occurred in the past, comparisons of computed results from the data itself to the reported values in LCDs revealed a set of issues. Two different time offsets were discovered in the original observations. From 1 January 1959 to 9 December 1968, the time stamp on the data was found to be 12 hours off. Hence, instead of a day being from the standard 1 Universal Time Coordinated (UTC) to 0 UTC the next day, it was instead set to 13 UTC the previous day to 12 UTC in the current day. A second time offset was revealed as observations from 10 December 1968 to 30 November 1985 were all in New Zealand Standard Time rather than the UTC standard.

Two sets of missing data have been added to the observational data set. While correcting the second time offset, additional observations were added for the period 1 January 1985 to 5 November 1985 that were found to be missing. Missing pressure observations from the period 1981 to 1983 were also added to the observational data set. Many of these efforts required tedious by hand key in and data entry of these data from paper records.

The LCDs have been reissued several times to take into account the above corrections as well as to fix typos, especially in the temperature, pressure and wind reports. One of the largest corrections done in recent years was the conversion of the average daily temperature from the method that utilized the average of the minimum and maximum temperatures to recalculating all of the historical values using all of the available observations. The corrections to the LCDs have been posted to the AMRC ftp site at
ftp://amrc.ssec.wisc.edu/pub/southpole/climatology

3. PRELIMINARY ANALYSIS

While the effort to complete a full analysis of South Pole's climatology is underway, some initial results are summarized in Table1. These results fit the generally known climate for the station. Some sampling analysis shows the fifty-year daily temperature, pressure and wind speed mean measurements at the station (See Figures 1-3). These analyses are not yet smoothed. Procedures that have been used to smooth daily means by the National Climatic Data Center (NCDC) have been recently changed (Arguez et al., 2011)

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Table 1. General climatology for South Pole Station over the full observation year period 1956-2010.

Variable	Value
Average Temperature	-49.3°C
Average Pressure	681.3 hPa
Resultant Wind	4.1 m/s from 39° (NE)
All time High Temperature	-13.6°C on 27 December 1978
All time Low Temperature	-82.8°C on 23 June 1982

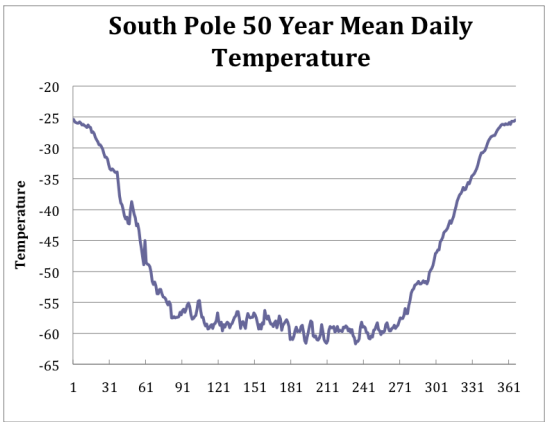

Figure 1. The South Pole Station daily mean temperatures show the classic kernlose or "coreless" winter (data is unsmoothed).

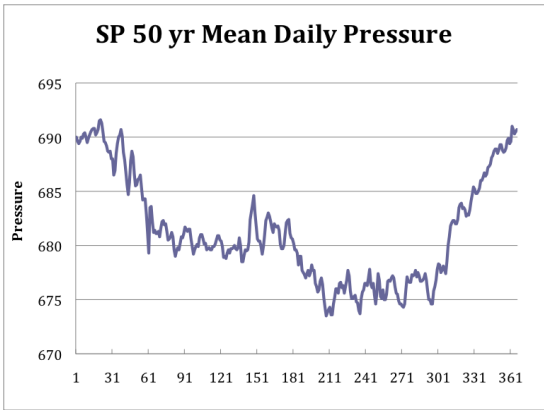

Figure 2. South Pole Station daily mean pressure shows higher station pressures during the brief austral summer season, and lower values during the austral winter (data unsmoothed).

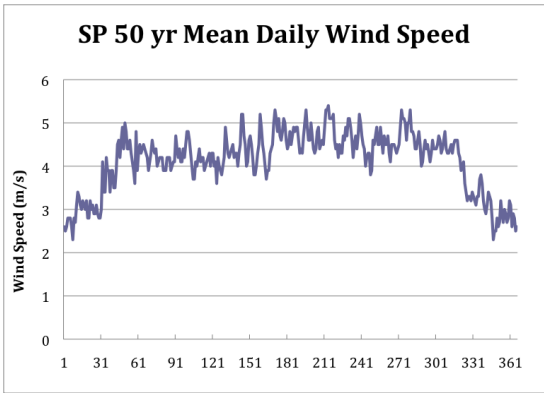

Figure 3. Wind speeds at South Pole are overall lower during the brief austral summer season, and higher the rest of the year (data unsmoothed).

4. REFERENCES

Arguez, A., S. Applequist, I. Durre, M.F. Squires, R.S. Vose and X. Yin, 2011: NOAA's 1981-2001 Climate Normals: A Preview. 23rd Conference on Climate Variability and Change (91st American Meteorological Society Annual Meeting), Seattle, WA, 24 January 2011.

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