PROPER USE OF XMCLIMATE IN THE NATIONAL WEATHER SERVICE

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Introduction

Reliable climate data is very important to the media, public, and for research. As far as the media is concerned, "extremes" or "records" of any kind make great headlines. That's part of what journalism is all about. As a result of this desire for climate information, accurate climate data should be provided by the National Weather Service (NWS).

There are several sources for NWS employees to acquire climate data such as LCD's (Local Climate Data) and CD's (Climate Data). The LCD's and the CD's are paper copies of official climate data for a site and can be obtained from the National Climatic Data Center (NCDC). Another source for climate data is to download the data from the NCDC database, which can be utilized by a program called xmclimate (Dierking).

Xmclimate is an easy to use and flexible tool to quickly access climate data from a particular site. Using xmclimate, the user is able to do a quick search for a variety of record events including maximum temperature, minimum temperature, rainfall, snowfall, and monthly records. Additionally, the user is able to use xmclimate to sort through various records and to perform different searches. This makes xmclimate easier and quicker to gather climate information than the LCDs.

Despite the advantages of xmclimate, there are two significant drawbacks. The data downloaded and used by xmclimate are considered "preliminary" data by NCDC and not official. As a result, errors may exist, which xmclimate is unable to flag. In addition, data available on the NCDC page generally begin at 1948. However, official data for a particular site may exist prior to the start of the digitized data. For example, official data for Billings Logan International Airport and Sheridan Airport started in 1934. As a result, the missing time periods produce different records compared to the official LCDs. WFO's must be aware of this when inputting data into the AWIPs climate database.

Since xmclimate can be a powerful tool to analyze climatological data, the authors felt that the problems in simply using the digitized data without scrutiny should be understood. Therefore, the method that was used to update the xmclimate data for Billings MT, Miles City, MT, and Sheridan will be presented. This paper will also detail the errors and differences found between the digitized data (used in xmclimate) and the official LCDs.

1.   Data and Methodology

Climate data for Billings, Miles City, and Sheridan, were downloaded from the NCDC database (*http://cdo.ncdc.noaa.gov/plclimprod/plsql/poemain.accessrouter?datasetabbv=SOD*) into xmclimate. NCDC first obtained the data from either COOP forms or ASOS data. The data were then sent to a contractor that manually input the data for use in the NCDC database. Since the data are quality controlled manually, typographical errors (such as transposing numbers) may still exist. There is usually a 3 month lag time before the data are available, which is considered "preliminary" data. After six months, the data are considered "final", however due to typographical errors, the information may still not be free of errors.

Digitized data for Billings and Sheridan starts in 1948. Therefore, the data from 1934 through 1948 were manually input into xmclimate from the LCDs. This data includes daily maximum temperature, minimum temperature, precipitation, snowfall, and snow depth. The digitized data for Miles City were available starting in 1937.

After all the data were acquired and updated, a comparison was made between the digitized data from NCDC and the official LCDs for Billings, Miles City, and Sheridan . Seven fields were compared which include maximum temperature, minimum temperature, precipitation, snow, snow depth, heating degree days, and cooling degree days. This included analysis of more than 25,000 fields for each 10 year period. Any discrepancies noted were corrected. However, only discrepancies from January, 1990 through December, 2000 were documented.

2.   Results

Analysis of the data revealed discrepancies between the digitized data from NCDC and the LCDs. Only 0.53% of the data for Billings were in error from January, 1990 to December, 2000. Similar errors were also observed for Miles City and Sheridan. Even though the error percentages are small, the actual errors observed were occasionally significant. For example, over 10 record temperatures, which are included in the daily climate reports, were in error for each site from January 1990 to December 2000. Some values were also transposed such as the snowfall for Billings on January 11, 1993. The LCD reported 6.0"

of snowfall while the digitized data showed 0.6" of snow. In general, there did not seem to be one particular field that had a higher error rate. In addition, all three sites also had approximately the same type and number of errors.

Since the digitized data did not include official records prior to 1948 for Billings and Sheridan, numerous differences in record events were noted between the LCD and digitized data. For Billings alone, 361 record events occurred between 1934 and 1948 that were not included in the digitized data. Similar amounts were noted for Sheridan. These record events included record high temperatures (including an all-time record high temperature), record low temperatures (including an all-time record low temperature), record rainfall, and record snowfall. The number of differences noted clearly shows the importance of inputting all available official data into xmclimate.

3.   Conclusion

Since xmclimate can be such a powerful tool to respond to public and media inquiries, as well as for research purposes, the authors felt the data should be quality controlled. Analysis of the LCD data with the digitized data from NCDC revealed discrepancies. Some of these discrepancies were significant such as extreme temperatures and precipitation. Any NWS forecast office that utilizes xmclimate should be aware that these significant errors may exist. Additionally, official records that were not digitized needs to be input into xmclimate in order for the records to be accurate.

4.   References

Dierking, C.F., 1997: *Modernized Use of Alaska Climatology Information in the Operational Environment*, Preprints, 13th Intl Conference on Interactive Information and Processing Systems for Meteorology, Oceanography, and Hydrology, AMS, February 2-7 1997, Long Beach, California, 387

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