Shaken or Stirred
How Do You Want Your Climate Data?

Jared Rennie
Cooperative Institute for Climate and Satellites – North Carolina
National Centers For Environmental Information (NCEI)
Asheville, NC

Ask the Audience
Carolinas Climate Resilience
September 13th, 2016
National Centers for Environmental Information

- Responsible for hosting and providing access to comprehensive oceanic, atmospheric and geophysical data of the world
- Center for Weather and Climate located in Asheville, North Carolina
CICS-NC

• Cooperative Institute of Climate and Satellites
  – Silver Spring, MD (NESDIS)
  – Asheville, NC (NCEI)

• Within the North Carolina Institute for Climate Studies, which is part of NC State
• Global Historical Climatology Network
  – Consolidated global dataset of weather stations used to monitor and assess the state of the climate

• GHCN-Monthly
  – Global summary of monthly temperature and precipitation
  – Main dataset used in monthly monitoring reports

• GHCN-Daily
  – Integrated database of daily climate summaries
    • Temperature, Precipitation, Snowfall, Other Weather Data
  – 100,000 stations worldwide
  – Updates each night with new data
  – Subjected to a common suite of quality assurance
What do we do with that data?
Accessing GHCN-Daily

• NCEI FTP
  – Text files (one per station), and csv files (one per year)
  – Requires knowledge of file location, formats, readmes

• NCEI “Climate Data Online” Portal
  – Mapping interface
  – Runs on Oracle Database
  – Custom Text / CSV files

• xmACIS
  – Custom Text / CSV files, Visualizations
  – US Data Only
  – “Only for NWS employees”
How Do You Want Your Climate Data?
• Monthly
  – Most of NCEI’s monitoring and gridded products are on the monthly scale
  – Is this good enough? (Probably Not)
Statewide Maximum Temperature Ranks
July 2016
Period: 1895–2016

Record Coldest (1)
Much Below Average
Below Average
Near Average
Average
Above Average
Much Above Average
Record Warmest (122)
• Monthly
  – Most of NCEI’s monitoring and gridded products are on the monthly scale
  – Is this good enough? (Probably Not)

• Daily
  – Some products are on the daily scale (GHCN-D), but very little gridded.

• Hourly
  – Demand is higher
  – USCRN: More Spaced Out
  – ISD: Duplicate Stations, little QC
[CLT] CHARLOTTE/DOUGLAS (ASOS) 1973-2016
Heat Index (when accretive to air temp) Histogram (Entire Year)

<table>
<thead>
<tr>
<th>Heat Index °F</th>
<th>Avg: 367.1</th>
<th>2016: 572</th>
</tr>
</thead>
<tbody>
<tr>
<td>90</td>
<td>367.1</td>
<td>572</td>
</tr>
<tr>
<td>92</td>
<td>259.0</td>
<td>441</td>
</tr>
<tr>
<td>94</td>
<td>180.5</td>
<td>335</td>
</tr>
<tr>
<td>96</td>
<td>119.2</td>
<td>231</td>
</tr>
<tr>
<td>98</td>
<td>66.9</td>
<td>126</td>
</tr>
<tr>
<td>100</td>
<td>36.0</td>
<td>60</td>
</tr>
<tr>
<td>102</td>
<td>15.5</td>
<td>18</td>
</tr>
<tr>
<td>104</td>
<td>6.8</td>
<td>4</td>
</tr>
<tr>
<td>106</td>
<td>2.3</td>
<td>0</td>
</tr>
<tr>
<td>108</td>
<td>0.9</td>
<td>0</td>
</tr>
<tr>
<td>110</td>
<td>0.2</td>
<td>0</td>
</tr>
<tr>
<td>112</td>
<td>0.0</td>
<td>0</td>
</tr>
<tr>
<td>114</td>
<td>0.0</td>
<td>0</td>
</tr>
<tr>
<td>116</td>
<td>0.0</td>
<td>0</td>
</tr>
<tr>
<td>118</td>
<td>0.0</td>
<td>0</td>
</tr>
<tr>
<td>120</td>
<td>0.0</td>
<td>0</td>
</tr>
</tbody>
</table>

Hours Per Year

Expressed in 24 Hour Days

Heat Index °F
• Is station data good enough?
  – Of course there’s satellite, but no climatic trends prior to 1970s

• People want gridded data
  – Exists at NCEI, but at monthly time scale
  – Noisy data?
TMAX data for 2016 08 22

Source: GHCN-D (NCEI)
• Can easily make derived variables from both temperature and precipitation

• Energy Sector
  – Heating / Cooling Degree Days

• Agriculture Sector
  – Growing Degree Days, First / Last Day of Frost
  – Drought indices: PDSI, SPI, SPEI

• Others?
Last Freeze date for 2016
Data Formats

- Text file

ncsu.edu
ncel.noaa.gov

NC STATE UNIVERSITY
Data Formats

- Text file
- Comma delimited file
- Excel
- netCDF File with CF Compliance
- GIS Files
- Others?
Need to find ways to show data so the end user can understand
USW00013881: CHARLOTTE_DOUGLAS_AP

LAT = 35.2236 | LON = -80.9553 | ELEV = 728'
How Do You Want Your Climate Data?

• Time scale?
• Spatial Scale?
• Derived Variables?
• Data Formats?
• Visualizations?
• Anything else?
Thank You!

E-mail: jared@cicsnc.org
Twitter: @jjrennie