Title: Offering Dynamic Climate Normals for Custom Applications

Office: National Oceanic and Atmospheric Administration, National Centers for Environmental Information (NCEI), Center for Weather and Climate (CWC).
POC: Ed Kearns, ed.kearns@noaa.gov

Description of the Challenge:
Provide the capability to compute "Dynamic Climate Normals" to meet specific users' needs to understand how climate is changing for them.

Scientists regularly use so-called "Climate Normals" to place recent weather and extreme events into a historical context. Commonly conveyed in weather apps and reports as one's expected local environmental conditions, they are also utilized in the regulation and operations of many industries including energy, agriculture, water management and construction. NOAA's official computation of Climate Normals follows the recommendation of the World Meteorological Organization (WMO) to compute 30-year averages of meteorological quantities at least every 10 years. NOAA's NCEI has a responsibility to fulfill the mandate of Congress "... to establish and record the climatic conditions of the United States." However, there may be additional custom applications for "dynamic normals" for users for which the 30 year period is not appropriate, more frequent computations are desired, or a different geographic sampling is needed.

Our ask to the hackers would be to provide mechanisms to allow a user to determine the geographic location, interval (hour, day, month) and duration (span of years) for their custom "normal" climate, and compute averages, probabilities, standard deviations and similar metrics of their "normal" conditions.

Hopeful Outcome:
An API, browser extension or addon (for Internet Explorer or Chrome) that allows users to compute their custom normals from NOAA's records of surface temperature and precipitation.

Create a prototype or concept for design that will allow users to select:
● a geographic region or attribute of interest
● time period (years)
● interval (hour, day, month)
● A self-specified period of interest (a particular "slice" or slices of the calendar)
● and selected quantities to compute (averages, uncertainties) of temperature and precipitation
● If time allows, provide a way to link US Census geographic, economic, or population data

Skills Needed:
Coding/development experience, basic mathematical knowledge, some meteorological awareness useful but not required.

Data Sets Required:

● fGHCN Monthly (overview and technical descriptions):
http://www.ncdc.noaa.gov/ghcnm/v3.php

● GHCN Monthly (data access): ftp:// ftp.ncdc.noaa.gov/pub/data/ghcn/v3/

● GHCN Daily (overview and technical descriptions):
http://www.ncdc.noaa.gov/oa/climate/ghcn-daily/

● GHCN Daily (data access): http://www.ncdc.noaa.gov/oa/climate/ghcn-daily/

● Gridded climate data in netcdf format:
https://www.ncdc.noaa.gov/thredds/catalog/data-in-development/nidis/nclimgrid/base_files/catalog.html

References
●https://www.ncdc.noaa.gov/data-access/land-based-station-data/land-based-datasets/climate-normals/1981-2010-normals-data

● http://www.ncdc.noaa.gov/oa/climate/research/ushcn/

● http://gis.ncdc.noaa.gov/all-records/catalog/search/resource/details.page?id=gov.noaa.ncdc:C00005

● GHCN python toolkit: https://k3.cicsnc.org/jared/GHCNpy