What to expect in **METR 430 Meteorological Computing**?

The new AMS recommendation for B.S. Meteorology degree suggests the following required skills in:
Scientific computing and data analytics

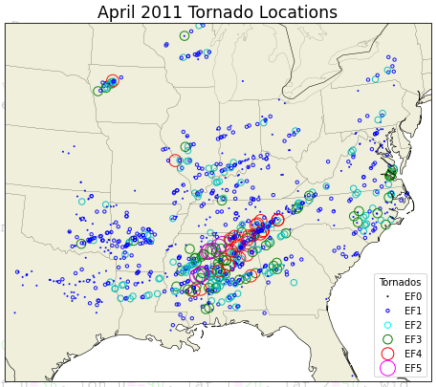
- *Data analysis, modeling, and visualization to make inferences about and analyze the atmosphere*
- *Application of numerical and statistical methods to atmospheric science problems*
- *Scientific software development in a suitable computing environment*[1]
- *Exposure to commonly used programming tools within the atmospheric sciences (e.g., Python, MATLAB, R, NCL, FORTRAN, and IDL), and practices of open-source software development and FAIR data principles*

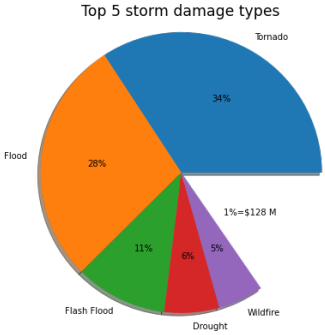
This class will help you obtain those skills. You might have used Excel, IDV, ArcGIS or other software to deal with meteorological data, but by programming you have unlimited freedom to process data the way you want.
Here are just a few example skills:

- **work with various data formats available on the internet**, e.g., text, excel, netcdf, grib, hdf, …;
- **automation of tedious tasks,** e.g., thousands of mouse clicks can be replaced by a couple lines of code;
- **make weather maps the way you want it to display,** e.g., total control of colors and anything in display;
- **animation of storm systems, etc.;**

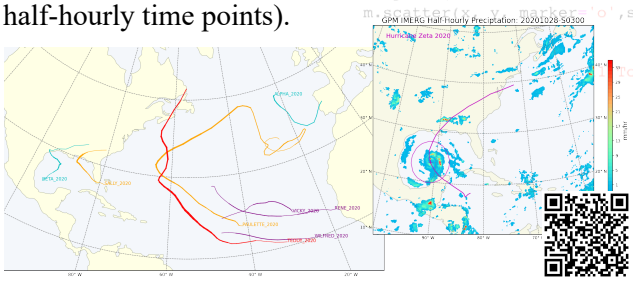
----- and unlimited options based on the questions you ask about the data!

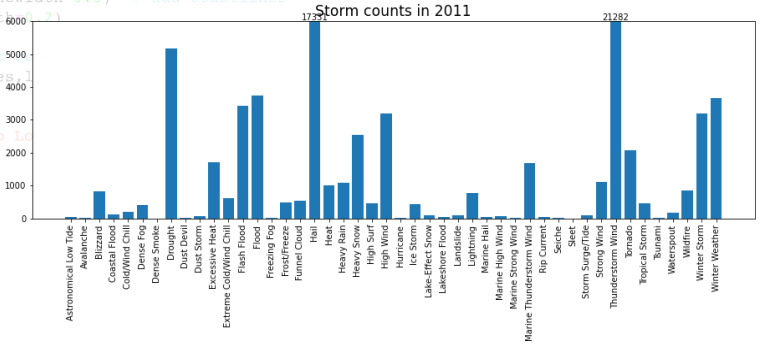
Example 1 – storm dataset:
(right) Just for 2011, the file contains about 83 MB data in 80,000 rows and 25 columns if opened in Excel. With a python program of ~36 lines of code, you can easily generate the following tornado location map. With an additional ~20 lines, a pie-chart of top 5 damaging storm types, or another 20 lines for a simple count of different storms, can be plotted.





Example 2 – Hurricane datasets:
(below) Best track of a few Atlantic hurricanes that have time overlap. Scan the QR code to see an animation of Hurricane Zeta 2020's satellite observed precipitation (GPM data over a 5-day period with 264 half-hourly time points).





Example 3 – NAM model output:
(bottom) You can make single time/level or composite weather maps, or diagnostic maps for storm analysis, or even make with your own favorite color schemes (right panel from a former student).