GEOG 401 Due: April 7, 2015

Bonus assignment: Climate-wildfire relationships

Motivation: Wildfires have numerous direct and indirect impacts to ecological and hydrological systems as well as society. In most areas there is large year to year variability in fire activity that can be quantified through aggregated total burned area. Climate and weather are respective key enablers and drivers of wildfire activity including fire occurrence, area burned and fire behavior, although often work alongside human factors and fire regimes for a given area. Prior studies of climate–fire relationships across the western United States suggest two general climate–fire regimes.

> **A fuel-limited regime:** In areas where vegetation quantity is often lacking to carry wildfire, increased fuel abundance resulting from increased moisture availability leads to heightened wildfire activity the following year through increased fuel connectivity and the ability of the landscape to carry fire.
>
> **A flammability-limited regime:** In areas where there is sufficient vegetation to carry fire, but often contain fuels that are insufficiently dry enough to be flammable, moisture deficits may allow for fuels to carry fire.

Such conditions and forecasts are used in the development of seasonal wildfire outlooks that can help identify geography areas prone to heightened fire risk during certain months and years.

Your tasks:

1) Acquire the time series of annual area burned for the "West Central Idaho Mountains" Predictive Service Area in the Eastern Great Basin Geographic Area Coordination Center. This area covers the much of the Boise and Payette National Forests in Idaho. The dataset which extends from 1984-2010 is available here: http://alturl.com/vx92e
2) Develop a set of at least three hypotheses that invoke relationships between inter-annual climate variability and wildfire activity that can be tested using climate metrics available through the WestWide Drought Tracker. Clearly state these hypotheses. For example, "The presence of a shadow seen by Phil results in an early green-up of vegetation in Pennsylvania."
3) Use the WestWide Drought Tracker time series option [http://www.wrcc.dri.edu/wwdt/time/] and select "Predictive Service Areas" to select the datasets you would like to use to test your hypotheses.
4) You should test your hypotheses using statistical approaches. This could include any of the following or other approaches:
   - examining the correlation between are7 burned and your climate metric. You can further identify whether the correlation is significant or not as we've done in other labs. Due to the skewed nature of the area burned data, you may conduct your correlation analysis using the natural logarithm of the data.
   - calculating the average anomaly for "big fire years" versus all other years for your climate metric.

   Be sure to document the *method(s)* you used to test your hypotheses.

Write a short paragraph with your results and conclusions. Include graphical analysis and results of any statistical tests you used. Additionally, identify at least one additional climate/ hydroclimate variable you might want to examine with respect to the wildfire dataset