GEOG640 Seminar #3 (6 February 2019) Notes

Instructions from Dr. Rodrigue: List 6-8 takeaways from each article that summarize the main point of that article.

1. Climate Change and Future Fire Regimes: Examples from California. (John Keeley and Alexandra Syphard)
    a. Most climatic models are dependent on average temperature and precipitation rates in their regions, and are often accordingly weak or misleading in their capability for fire prediction. The outlook for significant and meaningful improvement in the near future is very weak. The reasons for this are many:
    b. Average temperature and average precipitation data are spatiotemporally widespread and convenient, but are very indirect and incomplete measures of the flammability of fuels. They are more closely controlled by seasonal fluctuations in temperature and *evapo*transpiration, and even then, these sensitivities must be acknowledged on a case-by-case basis as different kinds of climatic conditions will increase the risk that certain kinds of wildfires, unduly affecting certain kinds of vegetation, might occur.
    c. Even if the temperature and precipitation data exhibit fire trends that are consistent for a certain region or subregion, their actual effects (and extent of their climatic sensitivities) are obviously dependent on the spatial distribution of different types of vegetation. The spatial heterogeneity may exist at a resolution that is too fine for present data and evaluation methods to truly evaluate quantitatively.
    d. Even if the climatic forcers on a region in the past are well-understood, anthopogenic climate change is likely to have changed their rules for the modern era, or (at the very least) to have created situations of climatic and vegetational interaction that have no precedent in the past and thus their fire regimes cannot be directly evaluated with historical data.
    e. Even if researchers have viably established the trends associated new forcers affecting a region's climate in the modern era, other confounding factors (CO_2 or N fertilization, and the emergent interactions from their resulting effects on pests) are not traditionally evaluated despite their significant effect and may lead to oversimplifying interpretations about new climate patterns and thus further constraints on the effectiveness of that model's predictive capacity.
    f. In the case of human activity, there is no dependence on climate whatsoever. Human-induced fires also affect concentrations and distributions of fuel, disrupting the timing and predictive abilities of naturally-induced (eg. Lightning) wildfires. However, it is difficult to characterize the dynamics of anthropogenic wildfire spread cleanly as well, as fire management districts have inconsistently shifted from more aggressive to more conservative wildfire containment policies. The ramifications on forest density (higher, with more aggressive fire containment) then feed into the natural system's fire spread dynamics as well.
    g. Statistical models are inherently inadequate as they are not effective in capturing the mechanistic aspects (that is, the dependence of a region on the sequence of events in its history, and on its "initial" conditions) of climate change on the fire regime of any one given area.

2. Increasing western US forest wildfire activity: sensitivity to changes in the timing of spring (Anthony LeRoy Westerling)
    a. Periods of typical springtime temperature are widening across the western Untied States. Strikingly, since the 1970s, the southwestern American fire season has shifted forward in time by up to 50 days, inducing a far earlier spring and a longer summer period.
    b. The onset of these earlier springs induces higher temperatures for a more sustained period of time, which diminishes the moisture budget of the vegetation in these regions. This effect is compounded by the desiccation of the soils in which these vegetations grow. Certain kinds of vegetation in certain areas (eg. mid-elevation montane forests in the Californian Sierra Nevadas that typically experience two to four snowless months) are sharply magnified in their susceptibility to wildfire.
    c. The author of this work, however, proposes an additional explanation to this discussion. For terrains such as the previously-mentioned montane forests, timing of increasing flammability in those regions tracks exponentially with the advancing timing of late spring snowmelt.
    d. Anthropogenic wildfires are often evoked as the source of increases in fire activity in the western United States. The author contends that this footprint – overall – is very small, and is not the driving factor behind the changing springtime trends observed and discussed in this study.
    e. The author acknowledges that the metric used for gauging the changing in spring snowmelt timing is sparse in observations of the forests of the American Southwest. This bias may be significant, as the author did not find the forests of the Southwest to correlate with the snowmelt correlation that he is proposing in this study.
    f. The author alludes to the possibility that transitions more conservative fire management policies may have been impactful enough to confound comparisons between large wildfires treated according to the aggressive "10am policy" and ones treated according to the "constrain and contain" philosophy. The author set this consideration outside of the scope of his analysis.