Major takeaways from this article by McClure and Jaffe (2018):

1) In general, particular organic matter in the United States is decreasing, particularly sulfates and $PM_{2.5}$. The one exception in location (with a muted decrease rather than an increase, in the case of sulfates) appears to be affecting the Northwestern United States.
2) The increase in wildfire activity in the United States might output enough $PM_{2.5}$ to offset the diminuation of $PM_{2.5}$ due to other environmentalist improvements elsewhere in the country.
3) In areas that are unaffected by wildfires, far from the Northwestern United States, $PM_{2.5}$ shows a stable diminishing trend consistent with the reduction of human-sourced emissions across the country. (eg. Mammoth Cave National Park, Kentucky). All quartiles decrease uniformly.
4) In areas affected by wildfires but which are within the vicinity of major metropolitan areas (Seattle-Portland is mentioned within the paper), this nevertheless appears to be the dominating force.
5) SO_4 is not a major contributor to the $PM_{2.5}$ increases in the Northwestern United States (or in much of the US anymore. Neither are biogenically-sourced carbon emissions stimulated by warmer temperatures (which would register a systematic increase in TC and $PM_{2.5}$ rather than a high-quartile one). The only sensible source are the wildfire contributions.

Statistical tools used:

- Quantile regression (QR) of the 98^{th} quantile: used to calculate points displayed on map of $PM_{2.5}$ for 1988-2016
- Kriging (interpolation of line separating $PM_{2.5}$ trends, for readability)
- Gaussian geostatistical simulations (GGS) – examine spatial pattern, of trend errors incorporated into final Krige product

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Comments noted by individuals during the moderated discussion

Neysha: The goal is to find the change of $PM_{2.5}$ across the country as a result of wildfires.

Turn to Figure 3. There is a motivation in distinguishing the effect of wildfires

Derek: Air quality standards from emissions is improving over time.

Turn to Figure 1.

Lluvia: [expressed opinions on the quality of the map and how it is misleading, as there are only a finite number of data points and the interpolation was *very* liberal in representing interpolated values over the entirety of the United States as some continuous value]

Lilian: More people live in Seattle and California, offsetting the apparent effect of the wildfires.

Neysha: This arises from an interpolation method. If you graph the data it will predict what is next to it. Because you have many low values in the East. They are working from point data, which is very low resolution here. The map claims misleading states of accuracy.

Rodrigue: San Francisco is in an intermediate area, so it has always enjoyed good air quality. Also quantile regression (see Figs 2 and 3) – when you run regressions, usually you are trying to use variations in an x-variable to predict variations in a y-variable, related in a linear fashion. So basically you have interacting means. Some may remember that one lab exercise, where you have an outlier, and it totally blew the results in the analysis of gun death out of proportion. One data point, Washington DC, which skewed things in the database. Quantile regression is using a more stable measure of central tendency. It started originally as calculating for the 50^{th} percentile, the median. And then people noted that you could do it for a bunch of other percentiles. 50% above, 50% below. So think about income. IF you lived in Bill Gates' neighborhood, the average income in that census tract will be in the billions of dollars a year. The median cancels out a lot of those outliers, so people use positional measures rather than averages. But some one later figured out that you could test at different percentiles. The most extreme variations in the prevalence of $PM_{2.5}$ particular matter is in the topmost percentiles. The Sawtooth National Forest conforms with the East Coast if you look at the typical distribution of the 2.5s. If you look at the extreme events then it gets pulled out of line. Those extreme events would be the wildfires.

Segnide: [comment on sulfates versus TOC]

Christiana + Lluvia: They focused on a study area, emphasizing the United States and the specific pollutants. They are taking the perspective of Neysha's paper an extra step. The next step after her article, focusing on this American perspective with a statistical and mathematical analytical approach to particulate matter. The general idea of this would have been one of those papers in this literature review for this area.

Segnide: Particulate matter – they are isolating the role of particulate matter between the effects of wildfires and that of human-driven effects.

Rodrigue: When people are developing a literature review, you read the introduction, fast forward to the results and discussion. What is it about? What did they find out? Then you circle back and you read into their methods. "Since this is how people really read these things, can we make it explicit?"

Rodrigue: There is a big difference between the model and the actual data point's location. So the krige standard error says is that there is a large amount of uncertainty in the results. This result is not flattering for the map relating to the standard error for total carbon, which has its lowest accuracy over the "hotspot" in the northwestern United States. But it does have minimal error for the other kriging-interpolated maps over this same hotspot.