Applications for TEMPO data in the Western U.S.

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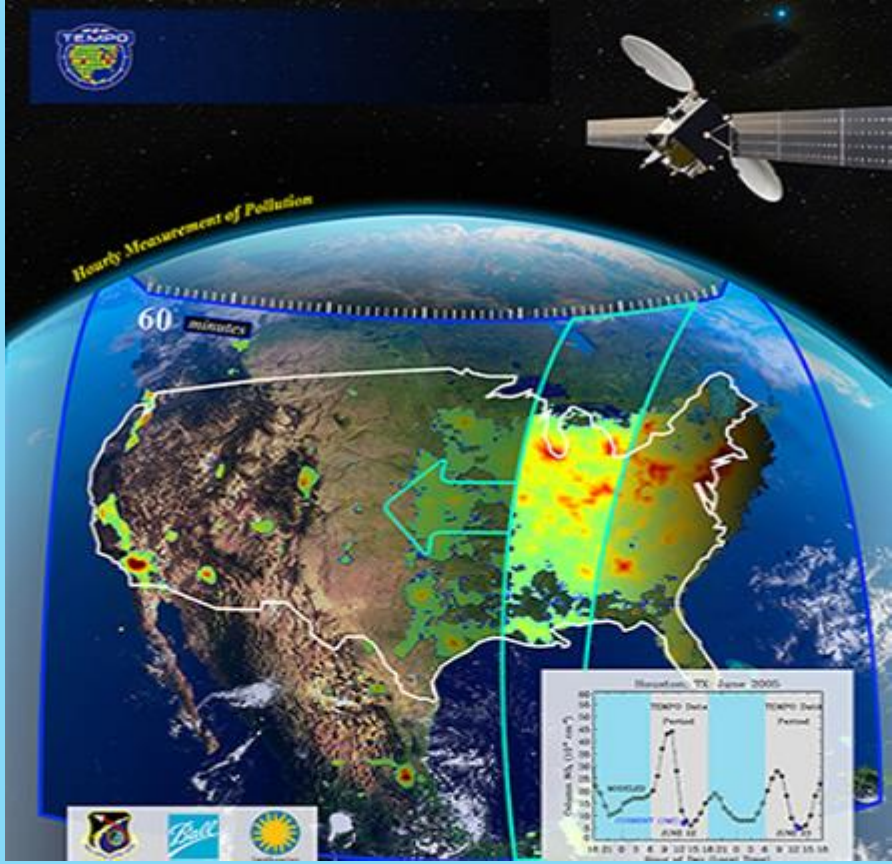

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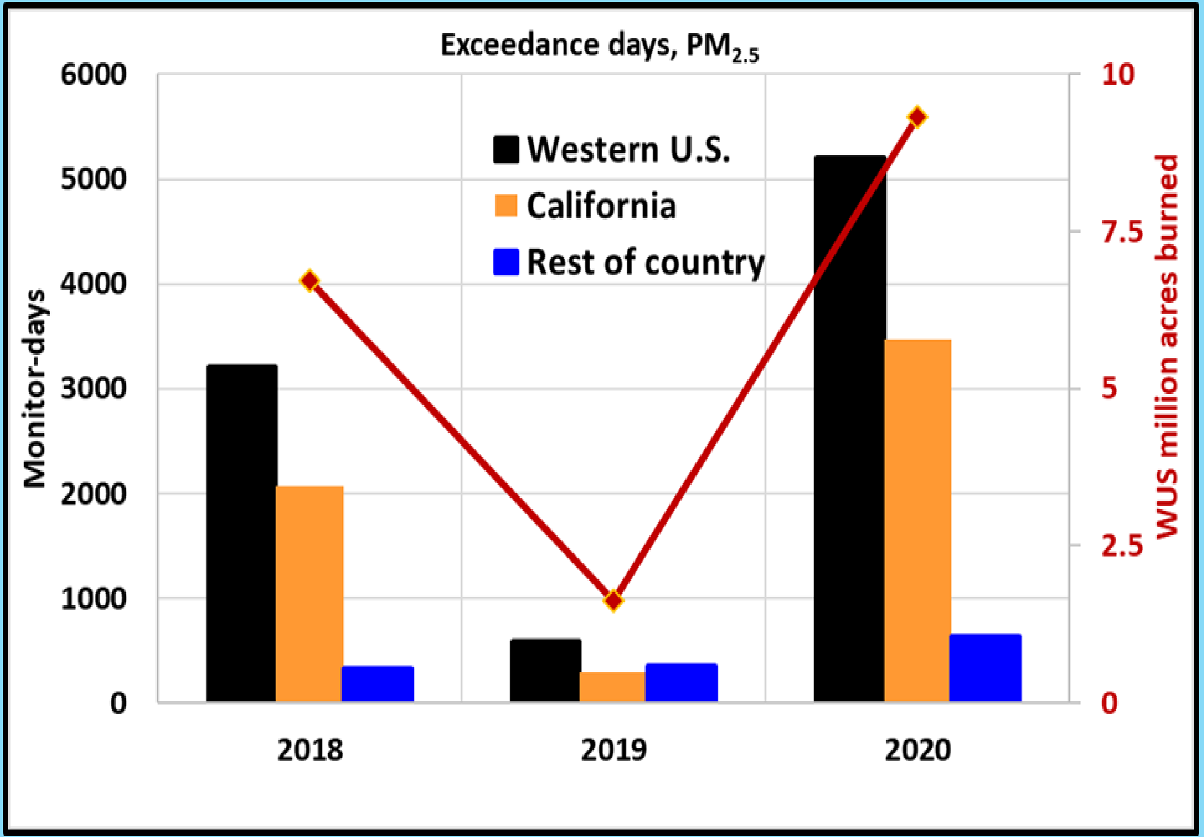
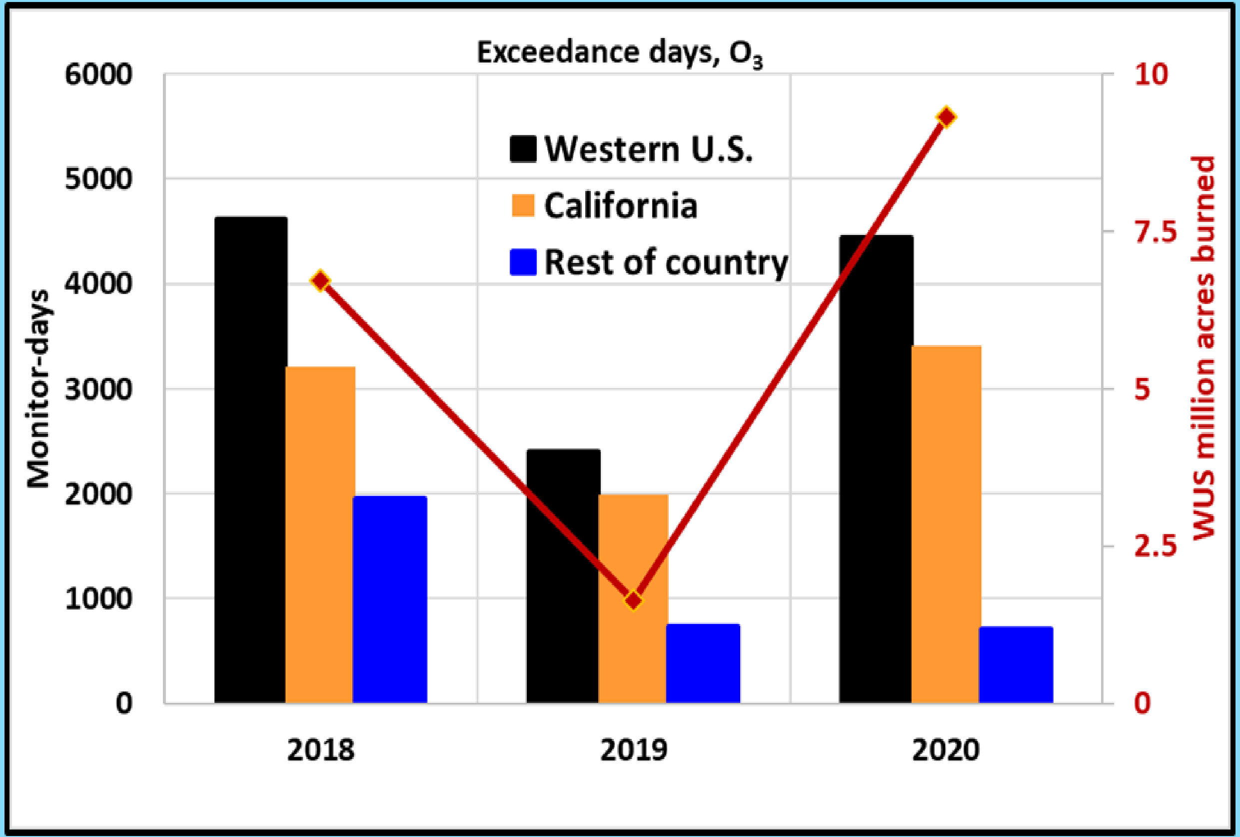
U.S. exceedance days for $PM_{2.5}$ and O_3





$PM_{2.5}$ exceedance day = daily mean g.t. 35 µg/m^3

O_3 exceedance day = 8 hour mean g.t. 70 ppb

For this figure Western U.S. includes coterminous U.S. west of 100° longitude.

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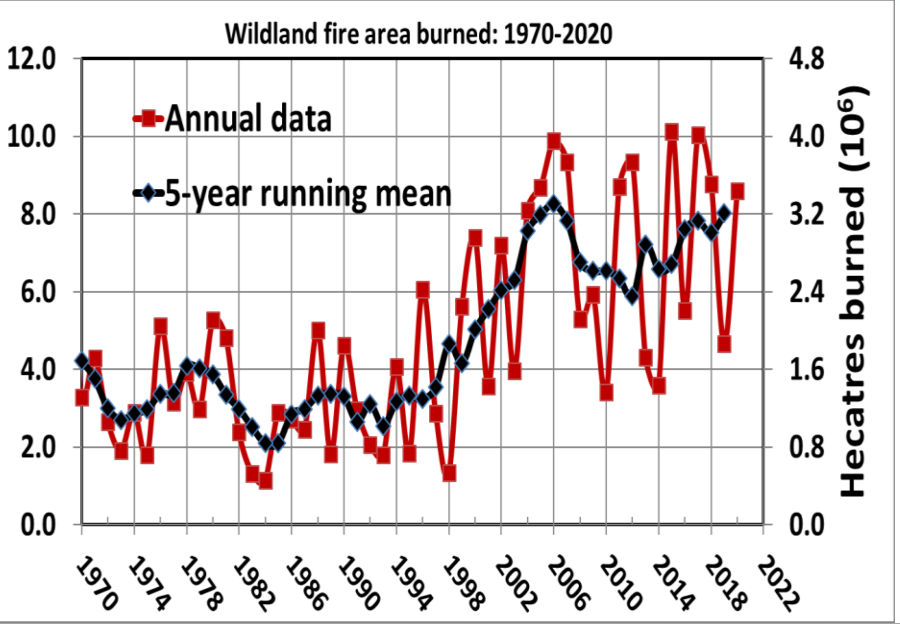
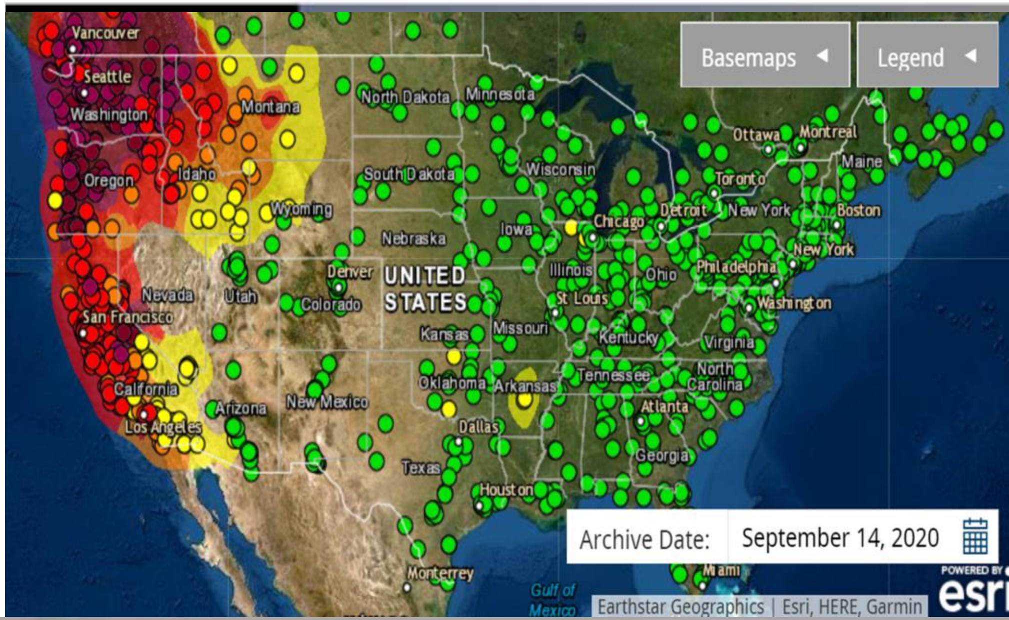


Smoke in Seattle

September 14, 2020
$PM_{2.5}$ = 264 µg/m^3



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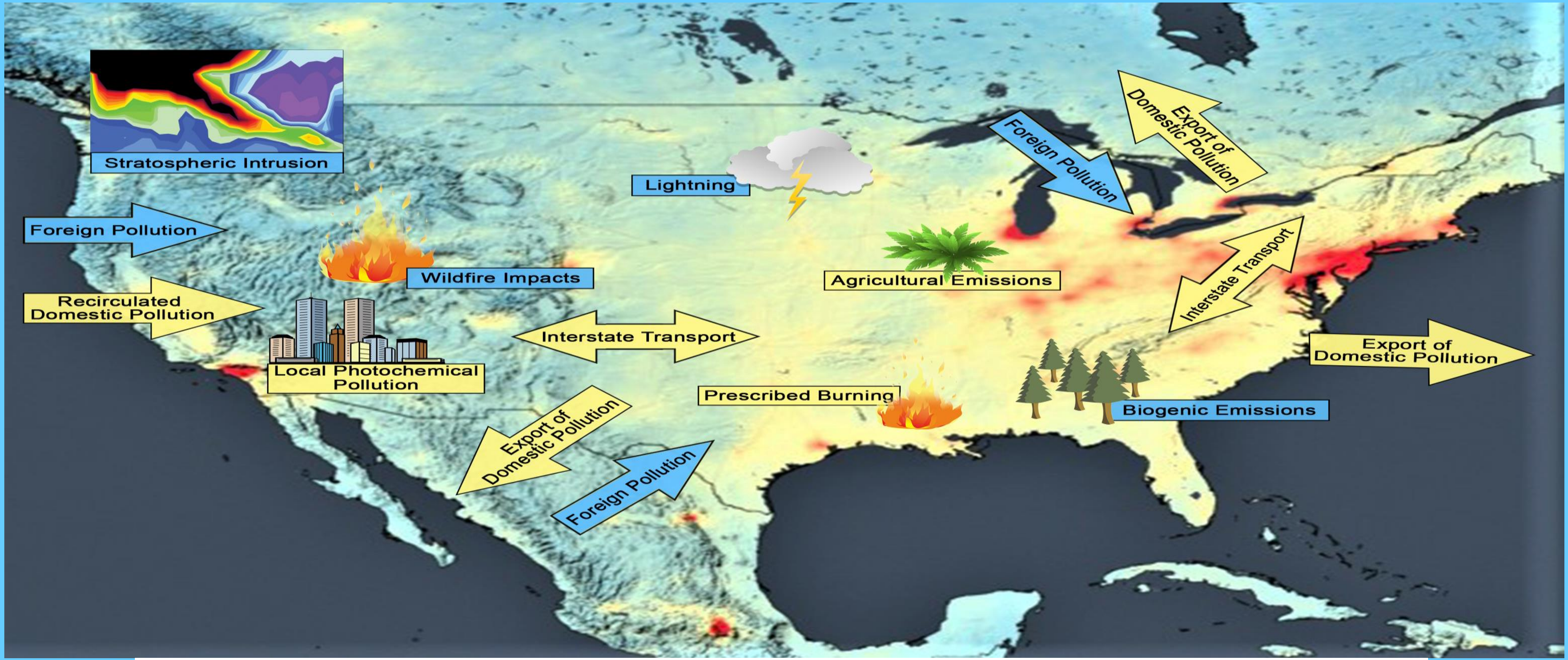
Influence of background O_3



Domestic/controllable O_3 sources in yellow .
Foreign/non-controllable O_3 sources in blue.

Jaffe et al 2018. Scientific assessment of background ozone over the U.S.: Implications for air quality management. doi:http://doi.org/10.1525/elementa.309.

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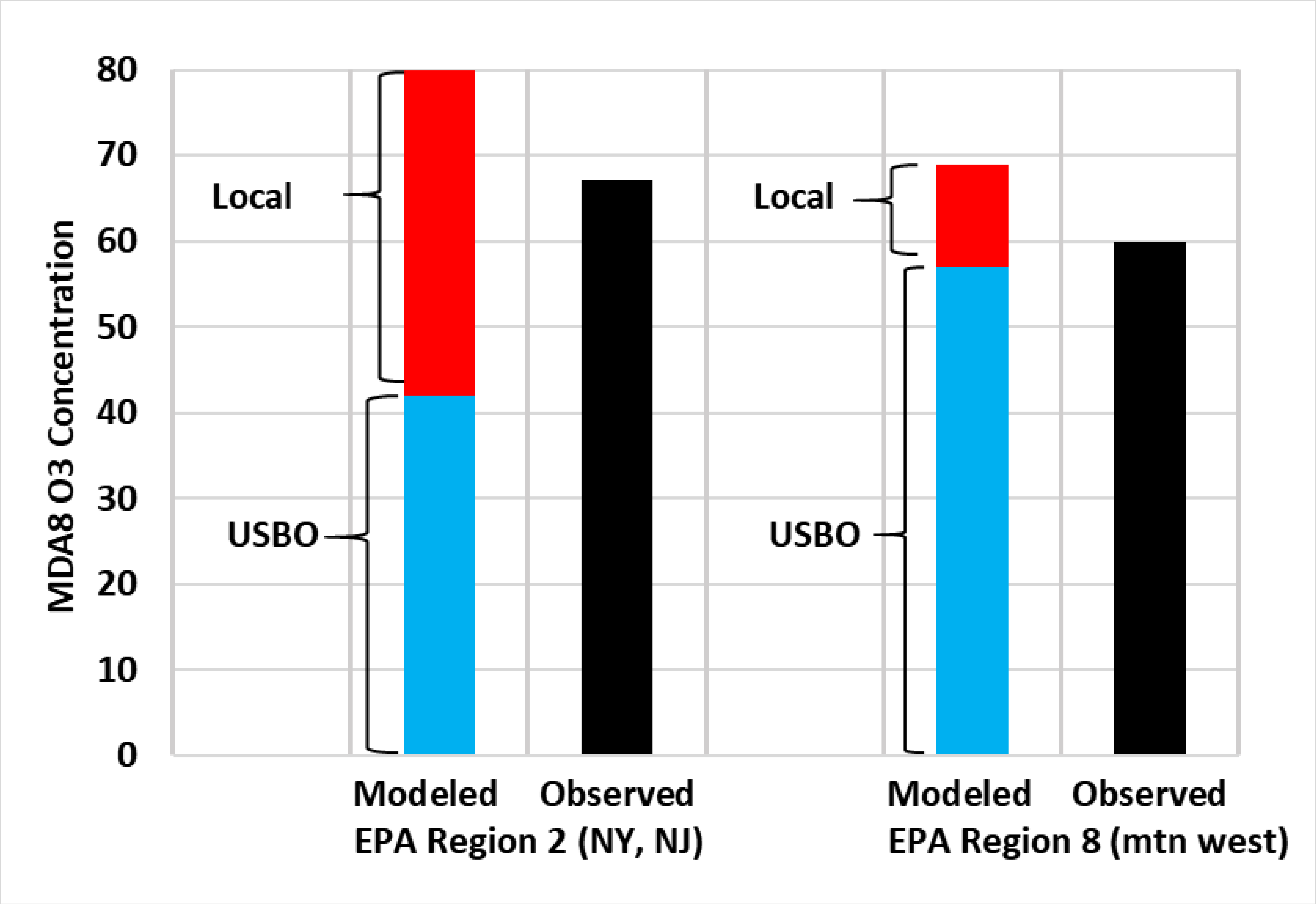
U.S. Background O_3 (USBO) on 10 highest days in summer



USBO includes all sources that can't be regulated. (strat, soil, lightning, biogenics and international pollution).

In EPA region 2, modeled USBO on top 10 days is 42 ppb.

In EPA Region 8, modeled USBO on top 10 days is 57 ppb.

Jaffe D.A., Fiore A.M. and Keating, T.J. (2020). Importance of Background O_3 for Air Quality Management. EM November 2020.

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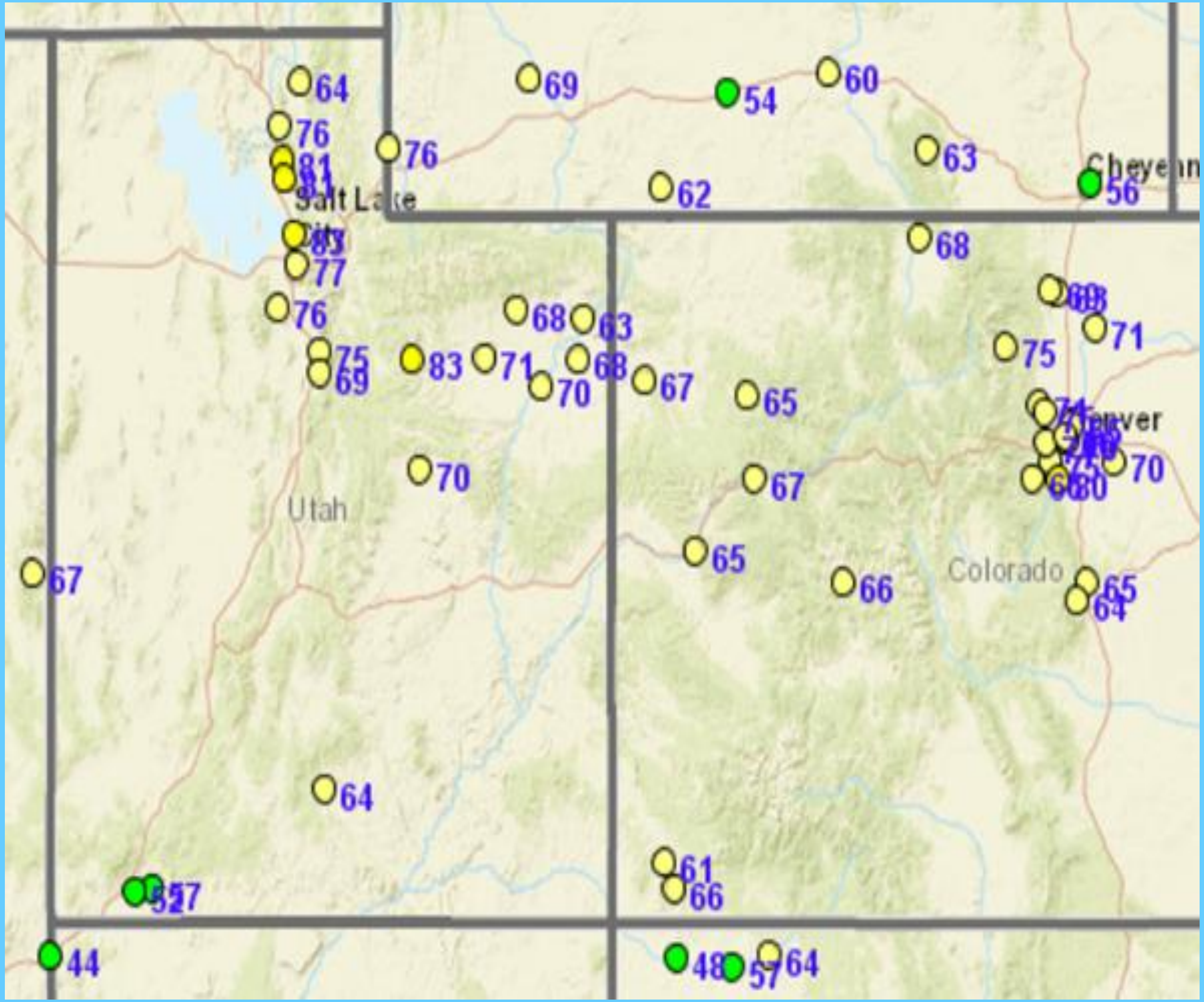
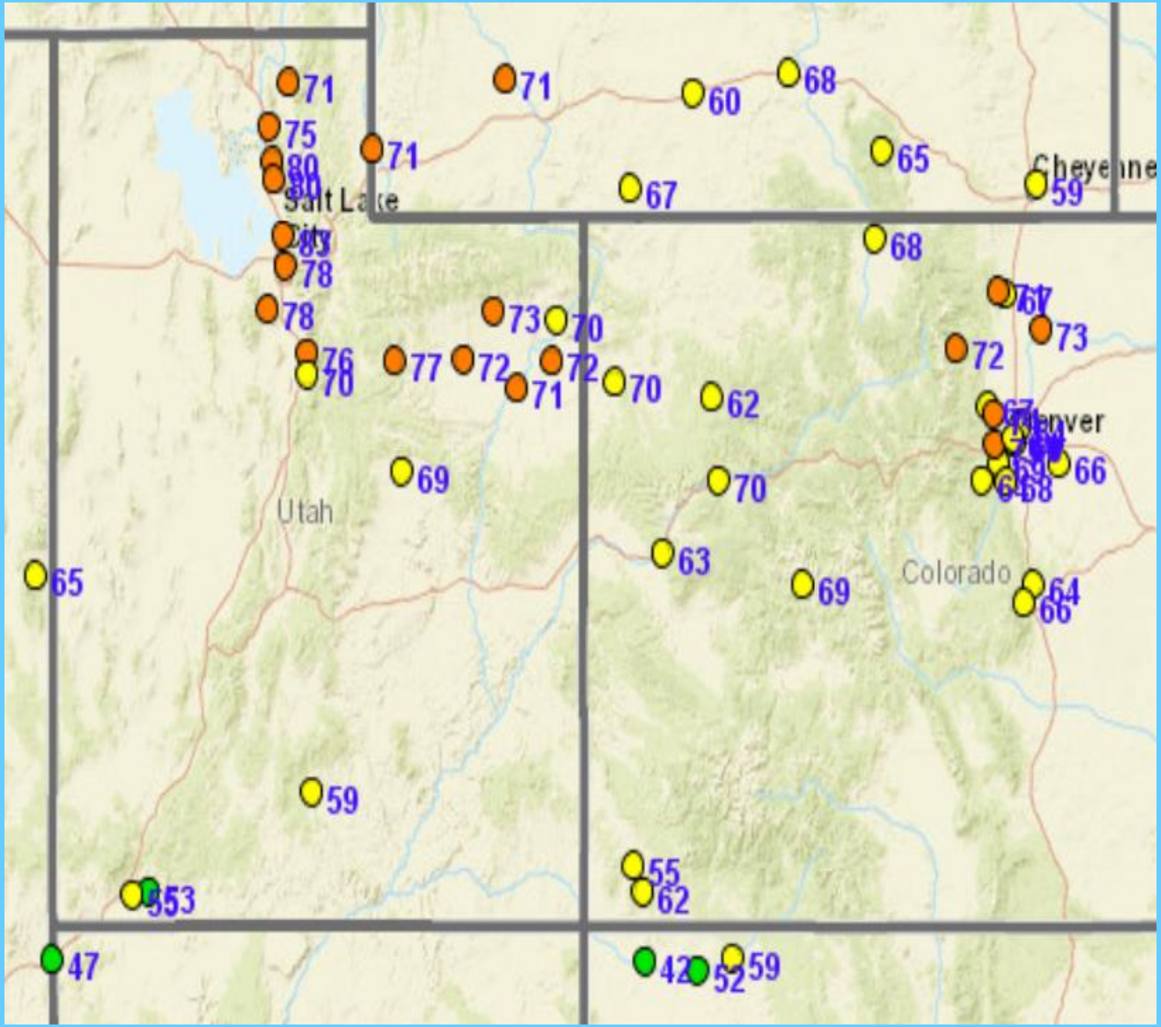
O_3 on June 9, 2015 shows UTLS influence at the surface



11 am MST



MDA8

Time evolution and broad spatial pattern give important clues as to source!

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Key questions for Western air quality

- **What is the contribution of controllable vs uncontrollable sources of pollution?**
- **What are optimum strategies to control the O_3 and $PM_{2.5}$ that we can control?**
- **What is relative benefit of NOx vs VOC controls on O_3 production in urban areas?**
- **What controls O_3 and $PM_{2.5}$ on a day-to-day basis?**

How can TEMPO help in the Western U.S.?

- Time evolution of B.L. O_3 gives important clues as to source (both for smoke and UTLS).
- Vertical distribution of O_3 gives important clues as to source and can show transport from UTLS.
- Mean and diurnal pattern for NO_2 and CH_2O can provide information on sources and NOx-VOC sensitivity, both in rural and urban areas.
- Inclusion of TEMPO data in machine learning models. (We previously used OMI for this).
- High resolution scans will be valuable to examine:
  i. Downwind smoke impacts on photochemistry from large fires.
  ii. Transport of UTLS O_3 from free trop to BL.
  iii. Examination of impacts during accidental industrial releases (e.g. Houston-March 2019).

How is measurement value augmented by high res scans (10 minutes vs 1-2 hour)?

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