The 2014 National Emission Inventory for Rangeland Fires and Crop Residue Burning

George Pouliot [+], Venkatesh Rao[*], and Joseph Wilkins[+]

[+]National Exposure Research Laboratory, EPA, Research Triangle Park, NC 27711
[*]Office of Air Quality Planning and Standards, EPA, Research Triangle Park, NC 27711

Background

- Biomass burning is an important contributor to the degradation of air quality because of its impact on ozone, particulate matter and Hazardous Air Pollutants (HAPS).
- Crop residue burning characterization in previous emission inventories has been difficult to stabilize
- Feedback from the states has been inconsistent with remote observations
- A more robust method is needed for the National Emission Inventory (NEI).

Previous NEI Methods

- 2002 NEI: 23 states reported emissions for this sector; no satellite information was used.
- 2005 NEI: This sector was not estimated, 2002 estimates used.
- 2008 NEI: SMARTFIRE/Hazard Mapping System (HMS) fire detections used one fixed field size, emission factors all mapped to one SCC.
- 2011 NEI : J. McCarty satellite-based procedure used based on changes in the land surface over an 8 day period plus updates from the states, McCarty (2011)

Year	Source	PM2.5 (Tons/Yr)	Notes
2002	NEI	224,684	23 states reported only
2008	NEI	49,653	HMS data, Smart Fire Based
2011	NEI	141,184	based on McCarty & states
2014	EPA estimate	49,369	HMS data, this method
2014	NEIv1	28,927	State submitted data
2014	NEIv1	64,994	Final version 1

2014 Method

- Hazard Mapping System (HMS) daily operational satellite product
- **Year-specific** National Agricultural Statistics Service (NASS) cropland data layer product
- Emission factors (same as in 2011)
- Average field size by state
- Grassland/Pasture separated from crop
- No double counting with other parts of the fire inventory (wildfires & prescribed fires)
- State review of data with additional filtering
- Daily snow cover used to filter out fire detections in the winter
- Crop residue emissions: day-specific, county level, by crop type emission inventory for 2014
- State specific inputs replace EPA estimates

2014 Timeline

- May 2015: EPA-based draft emission estimates posted on CHIEF for review by the states
- May 2015-Dec 2015: State/Local/Tribal (SLT) review of EPA estimates
- Jun 2015-Jan 2016: SLT submittals
- Feb 2016-May 2016: Review of SLT submittals and revisions to EPA estimates based on comments received from SLTs
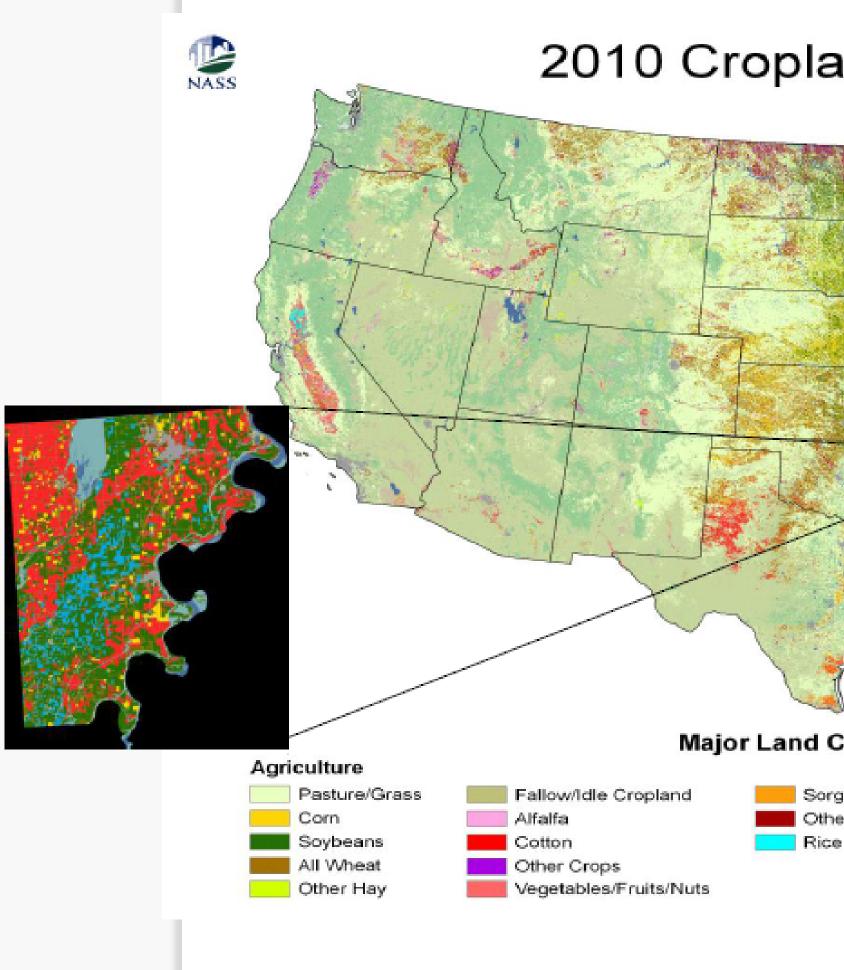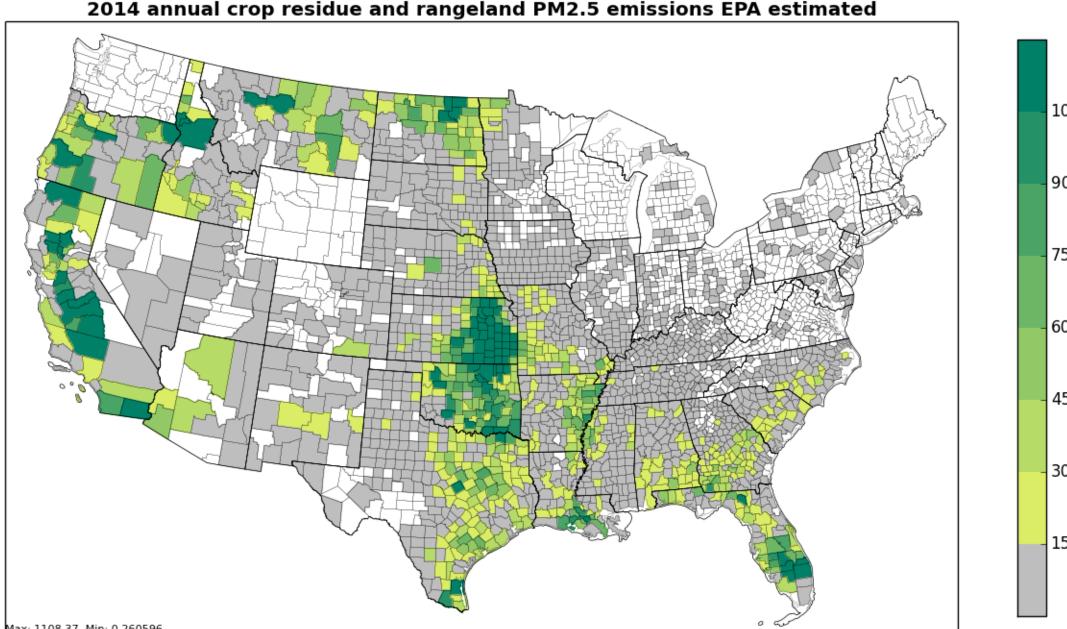- Sep 2016: Final NEI **v1**
- Aug 2017: Expected Final NEI **v2**

Example: HMS Fire Detections Oct 30, 2014

Example: Cropland Data Layer (2010)

Source: https://fcsm.sites.usa.gov/files/2015/11/YangCropScape2015_FCSM_GIG2.pdf

2014 EPA estimate of PM2.5 from Crop Residue and Rangeland Fires
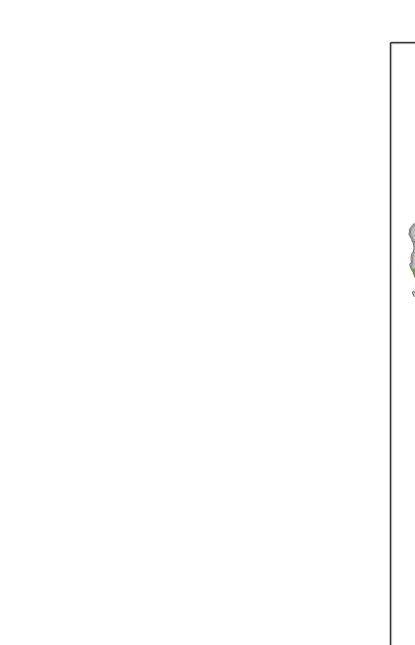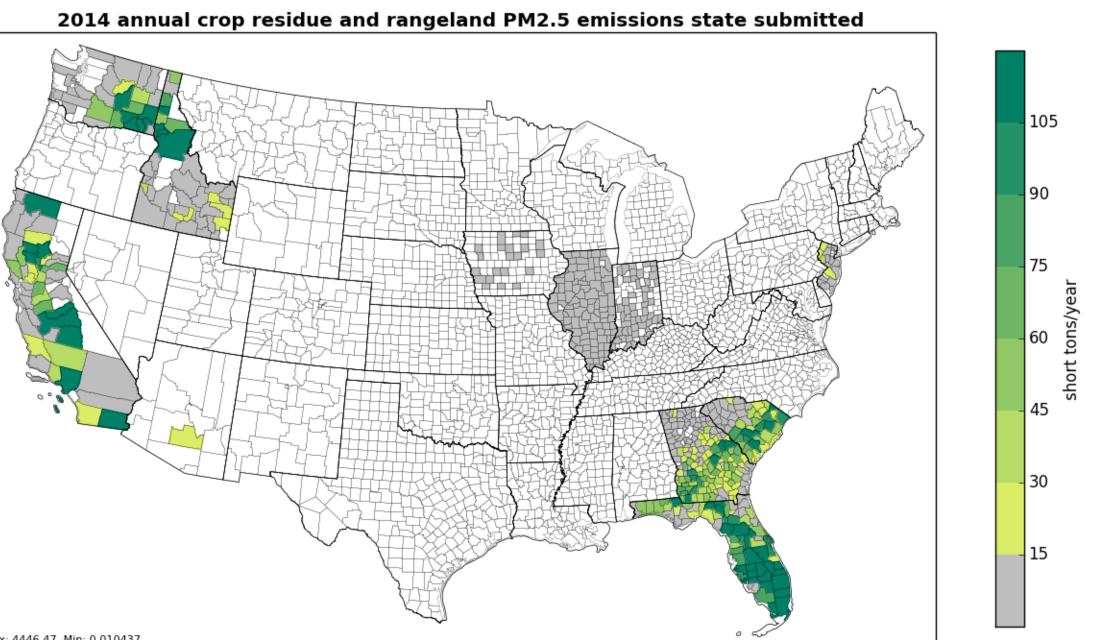

State Submitted Estimates for 2014

Final 2014 NEIv1

Summary and Future Directions

- 2014 NEIv1 for crop residue and rangeland burning used data from multiple sources and addressed some of the shortcomings in previous methods for this sector
- Improve the geolocation of crop residue fires and identification
- Testing method for other years 2013, 2015, 2016
- Incorporate into the SMARTFIRE system to avoid double counting and undercounting
- Update Emission Factors with latest available measurements
- Understand differences between EPA and state submittals

References:

McCarty, J. L. 2011. Remote Sensing-Based Estimates of Annual and Seasonal Emissions from Crop Residue Burning in the Contiguous United States. Journal of the Air & Waste Management Association 61 (1), 22-34. doi:http://dx.doi.org/10.3155/1047-3289.61.1.22.

Han, W., Z. Yang, L. Di, and R. Mueller. 2012. CropScape: A Web service based application for exploring and disseminating US conterminous geospatial cropland data products for decision support, Computers and Electronics in Agriculture, 84, 111-123, doi:http://dx.doi.org/10.1016/j.compag.2012.03.005.

https://fcsm.sites.usa.gov/files/2015/11/YangCropScape2015_FCSM_GIG2.pdf

Pouliot, G., V. Rao, J. L. McCarty, A. Soja. Development of the Crop Residue and Rangeland Burning in the 2014 National Emissions Inventory using Information from Multiple Sources, (submitted, Journal of the Air and Waste Management Association)