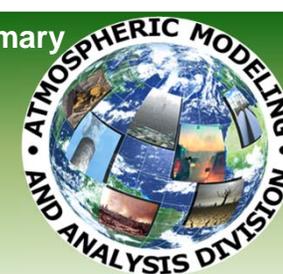




Crop Residue Burning Emissions in the National Emission Inventory: A Review and Summary



George Pouliot[†], Venkatesh Rao[&], Jessica McCarty^{*}, Amber Soja[%], Tom Pierce[‡]

[†]National Exposure Research Laboratory, EPA, Research Triangle Park, NC 27711
[&]Office of Air Quality Planning and Standards, EPA, Research Triangle Park, NC 27711
^{*}Michigan Tech Research Institute, Ann Arbor, MI
[‡]National Institute of Aerospace (NIA), NASA Langley Research Center, Hampton, VA

Background

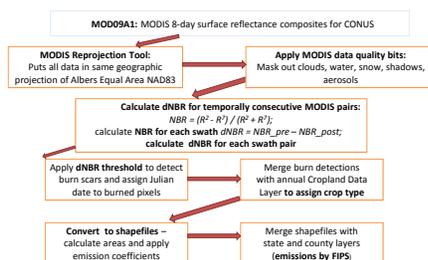
- Biomass burning: an important contributor to the degradation of air quality because of its impact on ozone, particulate matter and Hazardous Air Pollutants (HAPS).
- Using EPA methods, crop residue burning is poorly characterized in the 2011 National Emission Inventory (NEI) for some parts of the country (feedback from the states)
- A more robust method is needed for future NEIs.

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/HMS fire detections used one fixed field size, emission factors all mapped to one SCC.
- 2011 NEI modeling platform: J. McCarty satellite-based procedure used; it was based on changes in the land surface over a 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
2003	McCarty	24,134	8 day totals
2004	McCarty	23,473	8 day totals
2005	McCarty	23,583	8 day totals
2006	McCarty	20,718	8 day totals
2007	McCarty	23,583	8 day totals
2008	NEI	49,653	HMS data, SmartFire Based
2011	Platform	141,184	Based on McCarty & State data
2011	Crop only	38,209	HMS data, new method
2011	Grass/pasture	69,941	HMS data, new method

Current 2011 NEIv1 EPA Method



Shortcomings with 2011 NEI v1 Method

- Uncertainty in mapping burned cropland
 - Irrigated lands can be assigned as burned
 - Plowed fields (dark soils) can lead to false detection
- Inconsistent state-level data
- Sensitivity to Collection of MODIS data
- 8 day satellite retrievals (need daily)

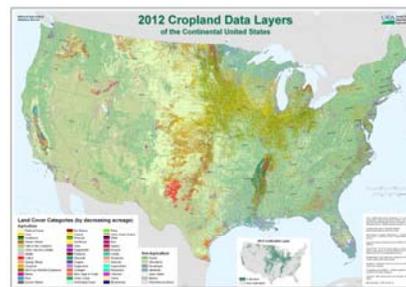
New Method

- NOAA's Hazard Mapping System (HMS) daily operational satellite product with QA provides "hot spots".
- Year-specific** National Agricultural Statistics Service (NASS) cropland data layer product distinguishes burned agricultural lands from rangeland.
- Each burn location assumed to have state-average field size.
- Method used to generate **day-specific, county-resolved crop residue burning emissions for 2011 by crop type**.

Example of NOAA's daily HMS product

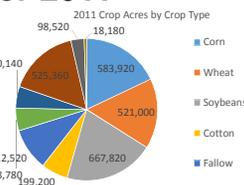


Example of year-specific cropland data layer product

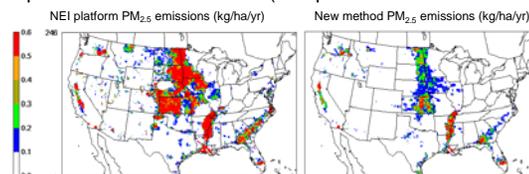


Results for 2011

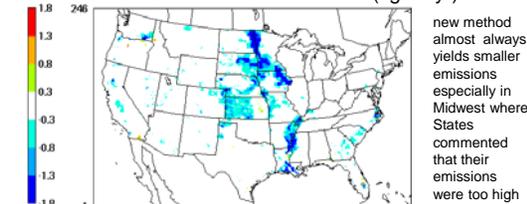
Crop residue burning acres by crop type for 2011 for the CONUS



Comparison of 2011 emissions (NEI platform vs new method)

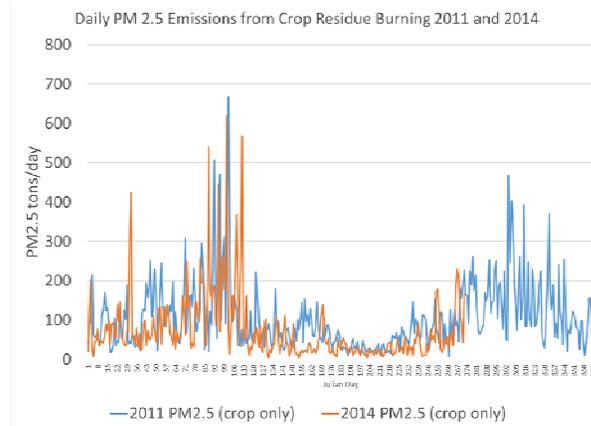


Decreased emissions with new method (kg/ha/yr)



(New method - 2011 platform)

Method Applied to 2014 in Near Real Time



New Method being tested for 2014 with near real time CMAQ simulations in preparation for 2014 NEI; comparisons show year to year differences in this sector

Summary and Future Directions

- Method provides an efficient way to estimate crop residue burning emissions.
- Method allows for easy updates and improvements.
- Estimates for 2014 will be available in January 2015.
- States will have access to review the information for their 2014 NEI submissions.

References

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- McCarty, J.L., Korontzi, S., Justice, C.O., and Loboda, T., 2009. The spatial and temporal distribution of crop residue burning in the contiguous United States. *Science of the Total Environment.* 407 (21): 5701-5712.
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