



This project is funded by the European Union

Comments-thoughts on the current (and future?) GAINS emissions and projections for agriculture burning

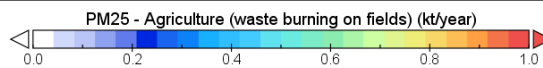
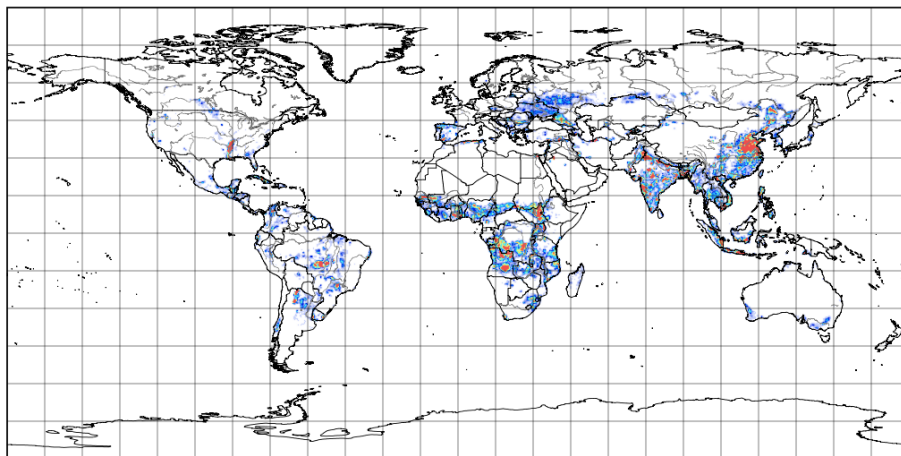
Z. Klimont

TFTEI meeting-Open burning day, Ottawa, Canada, 24 October 2019

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GAINS/ECLISE emissions from ag burning

GFED4.1 distribution; bottom-up burned biomass

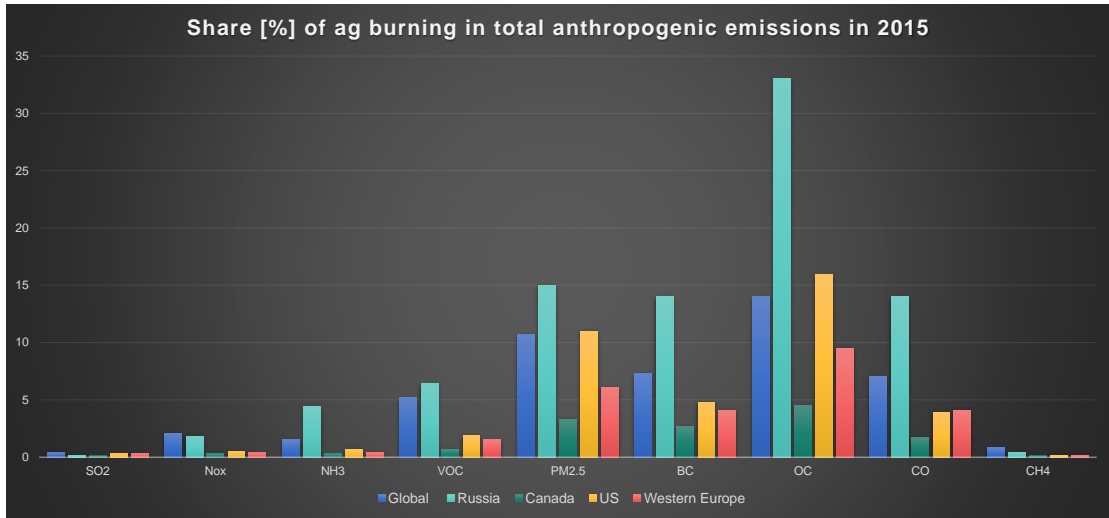


Data Min = 0.0, Max = 25.6, Mean = 0.0

Source: GAINS model, Scenario: ECLIPSE V6b; Klimont *et al.*, under preparation

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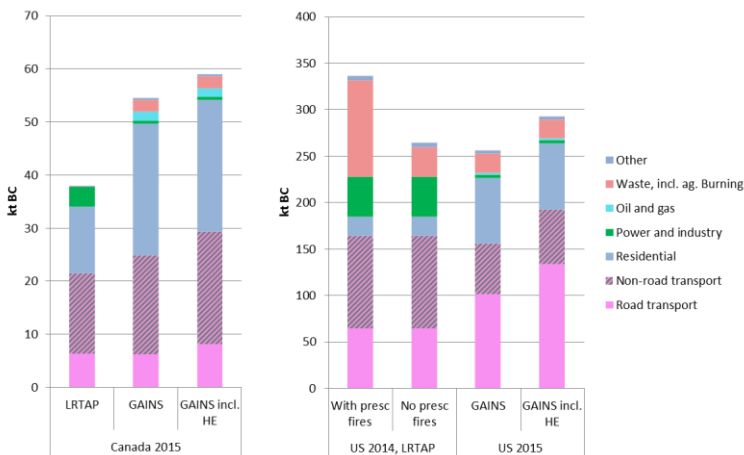
Ag fires in perspective



Source: GAINS model, Scenario: ECLIPSE V6b; Klimont *et al.*, under preparation

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Ag fires in Perspective: BC emission comparison, LRTAP vs GAINS Canada and US



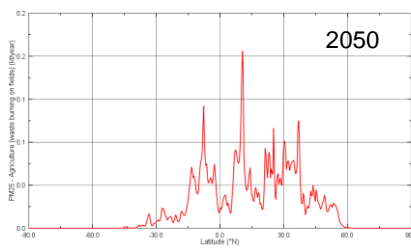
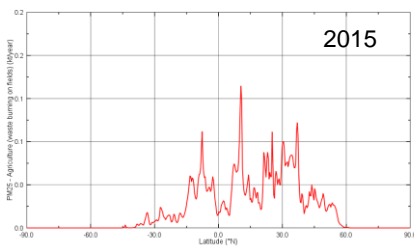
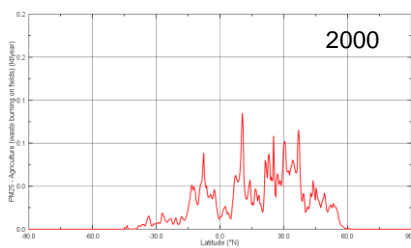
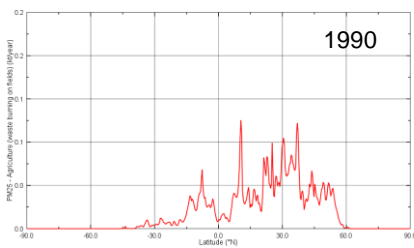
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Current ag burning estimates and projection in GAINS are simple

- GAINS relies on the spatial pattern from GFED v4.1 and bottom up estimates for burned mass of ag residue.
- For the future, the baseline remains pretty flat (although there is some variation in some regions)
- There is generic mitigation option assuming in the mid term 90% of burning can be eliminated – drawing on the experience in several countries of the EU, OECD

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GAINS/ECLISE emissions from ag burning change little over time



— PM2.5 - Agriculture (waste burning on fields) (kt/year)
Data Year = 0.0, Year = 0.1, Interval = 0.0

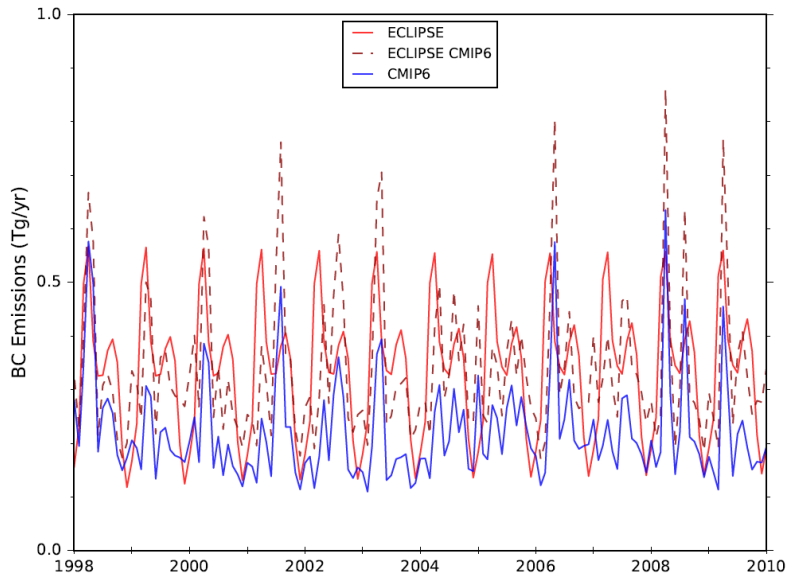
Source: GAINS model, Scenario: ECLIPSE V6b; Klimont *et al.*, under preparation

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Interannual variability of ag burning BC emissions

ECLIPSE/GAINS larger than CMIP6 (van Marle *et al.*, 2018) but has little interannual variability; Here an example how it can be modulated by CMIP6 for the past years

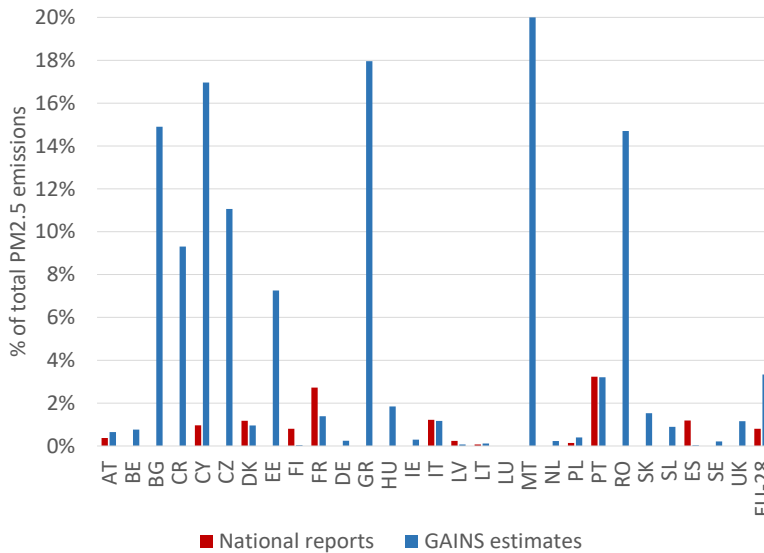
Courtesy of Steven Arnold



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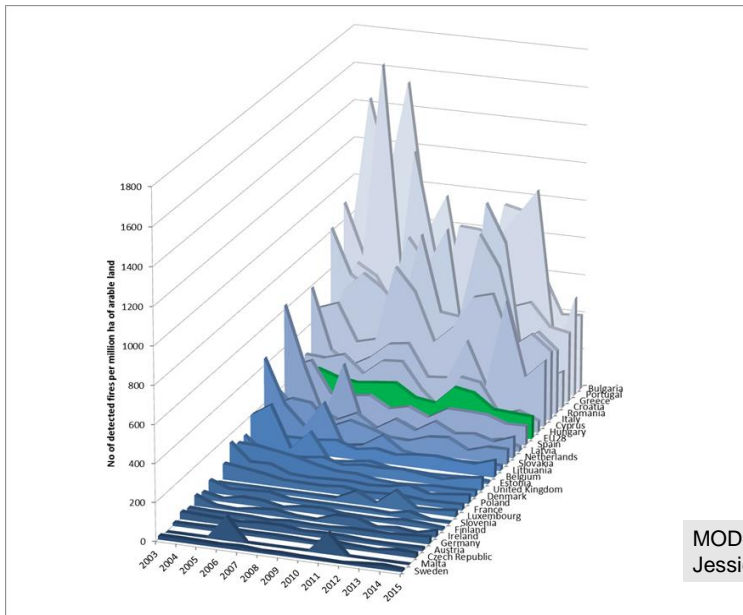
CONTRIBUTIONS OF AG BURNING TO TOTAL PM2.5 EMISSIONS IN 2015; FIGURES REPORTED BY MEMBER STATES IN THEIR OFFICIAL INVENTORIES COMPARED TO GAINS ESTIMATES.

Source: http://ec.europa.eu/environment/air/clean_air/outlook.htm



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Are these ag fires real?



Change in number of fires in the EU; based on MODIS;

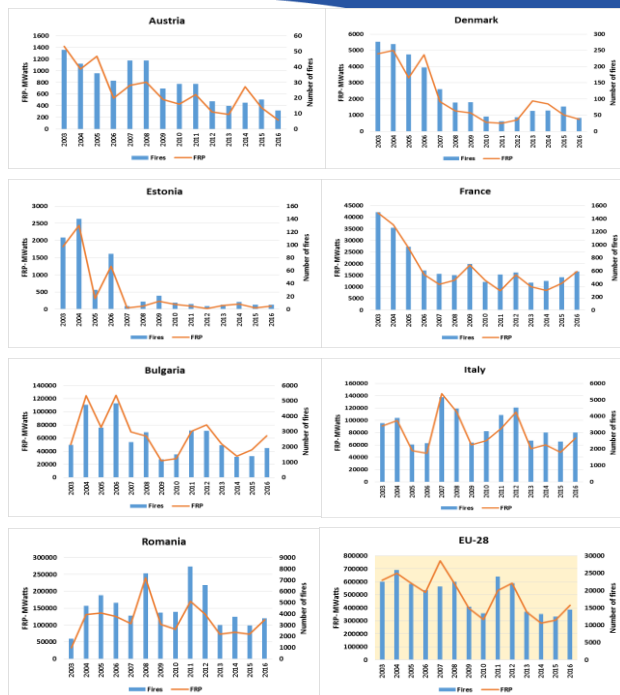
Source:
http://ec.europa.eu/environment/air/clean_air/outlook.htm

MODIS retrievals courtesy of
 Jessica McCarty-Kern, Miami University, Ohio, US

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Change in number of Fires in selected EU countries:

Source:
http://ec.europa.eu/environment/air/clean_air/outlook.htm



MODIS retrievals courtesy of
 Jessica McCarty-Kern, Miami University, Ohio, US

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The smarter set of scenarios could use

- Available information about type of land use (biomass burned) and link this to the projections of land use (e.g. SSP) as this would reflect on expected changes in crop production and type of production.
- For mitigation cases, explicit consideration of regional crops would allow to apply appropriate mitigation measures and timing of their introduction creating a more realistic reduction case
- Consider also possible impact of climate change (potential link to the FireMIP and AgMIP work of IPCC)
- Connect to forest fires and management priorities – also issue of fires spreading from ag fire to forest can be looked at closer
- Potential to improve the costs of mitigation for measures reducing open burning as these could be represented by regionally specific technologies for which cost data can be collected and used in a more consistent way