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

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GAINS/ECLISE emissions from ag burning

GFED4.1 distribution; bottom-up burned biomass

Source: GAINS model, Scenario: ECLIPSE V6b; Klimont et al., under preparation
Ag fires in perspective

Share [%] of ag burning in total anthropogenic emissions in 2015

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

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

GAINS/ECLISE emissions from ag burning change little over time

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

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*
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

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
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