

Emissions Harmonization Update

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RCP Emissions

A major product of the RCP exercise consists of: regional emissions of GHGs and pollutant substances, globally gridded emissions (at 0.5°) of short-lived compounds, and GHG concentration pathways.

- GHG Emissions: CO₂, CH₄, N₂O, Fluorinated Gases
- Pollutant Emissions: NO_x, CO, NMVOCs, SO₂, BC, OC, NH₃

Regional and gridded emissions to be provided in 12 source sectors in order to allow for later spatial/temporal desegregation and NMVOC speciation.

Air Transportation

International Shipping

Ground transportation

Electric power plants, energy conversion, extraction and distribution

Solvents

Waste (landfills, waste water, non-energy incineration)

Industry (combustion and process emissions)

Buildings (Residential and Commercial)

Ag. waste burning on fields

agriculture (agricultural soils, other agriculture)

Savannah burning

Land use change (Deforestation)

Emissions Production Timeline

Pollutant gas emissions will be harmonized to a common, gridded year 2000, gridded consensus inventory.

Gridded historical emissions (1850-2000) will also be produced consistent with the base-year 2000 grid.

End of September

Regional 2000 anthropogenic industrial and biomass burning emissions

October to mid-November

Future and past gridded emissions completed

November/December

Evaluation and testing of emissions by climate/chemistry modeling groups

Production of historical gridded natural emissions

End of 2008

Final delivery of RCP scenarios

Pollutant Gas Harmonization

In order to provide a consistent starting point for all four scenarios, emissions will be harmonized to a consistent, year 2000 grid.

This means that the product will be regional and gridded emissions pathways that match a common set of base-year data. This does not necessarily mean that the native output from each model matches this grid, but that at least a procedure is applied (by each IAM group) to produce harmonized emissions output.

The first step in this process was the selection/construction of a regional consensus year 2000 inventory for all pollutant emissions.

- NO_x, CO, NMVOCs — (JRC, John.van-Aardenne)
- SO₂ (coarse regions) — (JGCRI, Steve Smith)
- NH₃ (Ag sources only) — (PBL Lex Bouwman)
- BC & OC (energy) — (Tami Bond and Cathy Liousse)
- Biomass Burning — (GFED, GICC, & RETRO, Martin Schultz)
- International Shipping — (ATTICA assessment, Veronika Eyring)
- Aircraft — (DLR and QUANTIFY, David Lee)

Attempting to also obtain emissions to 2005 as well.

- *No 2000 or 2005 consensus data on GHGs? Also F-gas*

Pollutant Gas Harmonization (pt 2)

Data from a number of additional inventories and short-term projections has been (and is being) collected for comparison.

- EDGAR FT — (used in consensus reactivities)
- UNFCCC submissions — (used in consensus reactivities)
- REAS (emissions from Asia)
- Zheng et al.
- IIASA-GAINS (Ag sources only)
- Other country/regional estimates (USA, Canada, EMEP)

Pollutant Emission Grids

Short lived substances will be mapped to a 0.5 degree emissions grid. Base-year 2000 gridded emissions are in development.

- The goal is for all four RCPs to begin with identical year 2000 gridded emissions
 - Exact (to machine precision) harmonization is likely not possible, but emissions should be close.
- Each IAM will use own methodology for producing future gridded emissions.
- Basis for gridding is not clear at this point
 - Population only, source-specific inventories?
 - Issue of consistency between different groups (land mask, source distribution)
 - Probably won't be 100%, but may not be significant on a GCM modeling scale.
- Marine and (3-d) aircraft emissions will be scaled globally to the IAM emissions scenarios.
- NMVOC speciation is in progress.

2005 Emissions

The climate modeling community has requested that 2005 be the starting year for the scenarios.

This is not a trivial request to satisfy.

- Comprehensive inventory data is not available for 2005.
- Not all IAMs simulate the year 2005.

A "best as possible" harmonization will be performed for 2005 so that emissions from the four RCPs are not too different.

Principal GHG concentration pathways will be harmonized to observed values out to at least 2005.

- Need to determine how to best harmonize IAM emissions outputs with observed concentrations.