HTAP Fires Overview

22 April 2024

HTAP Fires Project

- Towards a Multi-Model, Multi-Pollutant Modeling Study of Fire Impacts
- **Objective:** bring together all pollutants under the LRTAP convention (O3, CH4, PM, SLCFs, Hg, POPs, etc) and focus on one major source: biomass burning
- **Status:** Full draft of model experiment design paper: https://nextcloud.gfz-potsdam.de/s/JQNn2NdZz4d66dn? Finalizing design and manuscript asap.
- **Survey:** https://forms.gle/MWLbm3k44qTB2UNY7

Timeline up until now

- Scoping meetings/workshops held online:
  - **Pre-November 2022**: general outline of the white paper written
  - **November 2022**: community started contributing to the white paper and indicating their interest (google doc at the time)

  - **January 2023**: white paper collaborative document moved to nextcloud
  - **April 2023**: focused on source/receptor relationships, key parameters & uncertainties, available observations, and next steps.
  - **June 2023**: focused on Hg and POPs emissions and future fire emissions
  - **November 2023**: Fire Emissions Workshop (IGAC BBURNED initiative) decided on GFASv1.2 historical fire emissions for base HTAP fire model experiments

  - **25 April 2024 (later this week)**: discuss remaining issues/gaps in the model experiment design paper (aka white paper)

Outline of the model experiment design paper

1. **Introduction** on why open burning is important for AQ, climate, HTAP, etc.
2. Motivation: **science and policy questions** driving the multi-model project
3. **Scope** and background info: pollutants, impacts, and parallel efforts related to fires
4. Discussion of **model options**, including a list of models that may potentially be used, observations for evaluation, experiment types, inputs, and outputs
5. **Recommended plan**: including time periods to simulate, emissions inputs, regions for emissions perturbations (S/R exps), model output data table, etc.

Current list of authors (self-identified)

- Cynthia Whaley, Terry Keating, Tim Butler, Jose Adame, Rupal Ambulkar, Steve R. Arnold, Sabine Eckhardt, Benjamin Gaubert, Douglas S Hamilton, Min Huang, Hayley Hung, Christoph Knote, Gerbrand Koren, Jean-Luc Kouassi, Meiyun Lin, Jianmin Ma, Jessica L. McCarty, Mariano Mertens, Helene Peiro, Pallavi Saxena, Saurabh Sonwani, Damaris Tan, Wenfu Tang, Veerachai Tanpipat , Oliver Wild, Yuanyu Xie, Paquita Zuidema

- If you've written and don't see your name here, please add your name to the document.

Current list of model experiments

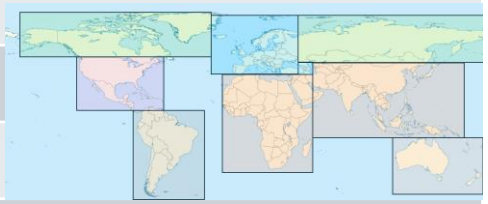
Experiment name	Description	Purpose
1 Baseline simulations	Historical time period (1 season, 1 year, 5 year and 20 year options), all models use the same set of emissions**	Model evaluation and baseline for perturbation simulations
2 Case studies	Specific fires in specific regions	Model evaluation
3 Emissions sensitivity	Same as baseline but with different fire emissions	Model/emissions evaluation
4 Future simulations with prescribed fires	Future climate drivers and future fire emissions from *	Determine how future fires and their impacts will change
5 Regional emissions perturbations	Turn fire emissions (wildland, agricultural, waste) off in different regions to see the impact on concentrations	Quantify regional source/receptor relationships and uncertainties as compared to exp 1
6 Fire processes	Parameterization/process perturbations	To determine impacts of different model fire parameterizations
7 Online fires	For models (usually ESMs) with online fire modules	To determine how wildland fires will change in the future with an interactive climate (and compare to exp 4)
8 Data assimilation (?)	Inverse modelling to combine CTMs with observed atmospheric VMRs	Infer surface-atmospheric emissions/fluxes.

Recent instructions to co-authors & contributors

- **The goal of this paper is mainly to justify the experimental design decisions for the multi-model study that will be performed in the years to come.**
  - It is *not* meant to be a general review paper about fires. The paper is currently ~50 pages, so efforts to reduce/shorten text (particularly Section 3) are welcome. Text could be moved to appendices if needed.
- Include citations and references properly in Copernicus citation/reference format. Any references should be placed in alphabetical order within the existing References section.
- Include your full affiliation on page 3
- Check appendix A.4 (last 2.5 pages) which is a temporary place that I moved orphaned notes/comments to. If you see any that are yours, please consider how best to incorporate your thoughts into the main text. They will soon be removed.
- Check out Section 5: the recommended plan. Ensure that the Sec 2-4 content is consistent with the recommended plan for the multi-model experiment and that you're happy with the plan.
  - For example, does the model output spreadsheet (link in Section 5.6) contain the required output variables that would be needed to assess the various impacts? Please add additional text in Section 5 if the plan is missing, or not reflective of your content.

Agenda for Thursday, 25 April

Time (UTC)	
12:00 – 12:15	Welcome, introductions, and the day's objectives: • to make sure the community is happy with the model guidelines for the Fires project
12:15 – 12:30	Current status of Fires white paper and plans for next steps
12:30 – 1:00	Present results from the survey
1:00 – 1:30	Discussion: regional definitions for emissions perturbations
1:30 – 1:50	**Health break** (and chance to add to the survey if you haven't already)
1:50 – 2:05	Revisit the survey results with new additions
2:05 – 3:50	Discussions continued, including, but not limited to: • Sections 4 (options) and 5 (recommendations) for the model design • Remaining gaps? • When and where to get *input* data • When and where to submit *output* data
3:50 – 4:00	Next steps and closing



Timeline going forward/next steps

- **April-May 2024**: “finalize” multi-model design, mold the white paper into GMD format and submit to journal
  - Starting soon, will take document offline for formatting
- **Summer 2024**: paper undergoes review, possible changes to the design
- **Fall 2024**: all inputs available to modelling groups, white paper published, and simulations can begin
- **Late 2024-2027:** model output can be stored on the ERA comms server
- **2025-2027:** publications based on analysis of model output in a special issue*

Parallel BBURNED timeline:

- ~May 2024: FEW 2023 BAMS article on fire emissions datasets may be finished and submitted
- 14-15 September 2024: hybrid workshop “FUNCHEM: Fire Uncertainty: Chemistry, Emissions, and Modelling”
  - ½ day sessions focused on emissions, fire plume chemistry, and modelling
- 2025-2026: special issue for studies related to fire/biomass burning uncertainties

Parallel AMAP SLCF timeline:

- ~2027, possible AMAP SLCF report on biomass burning impacts in the Arctic?

Communication

- To keep up to date with the HTAP Fires project, you can subscribe to receive its emails:
  - https://www.listserv.dfn.de/sympa/subscribe/htap-fires?previous_action=review or by sending an email with the subject "SUBSCRIBE" to htap-fires-request@listserv.dfn.de
  - **Note:** might get a German email asking you to click a link to confirm before this will work.
  - Check your spam/junk mail folder

- To keep up to date with the BBURNED activity, including the FUNCHEM workshop, you can subscribe to receive its emails at this link: http://eepurl.com/imSwmE
  - Check your spam/junk mail folder