

# HTAP3-OPNS Launch Meeting

April 10, 2024, online

# Agenda for today

- Recap on motivation for HTAP3-OPNS
- Updates since the April HTAP meetings
- Overview of model runs
- Status of input datasets
- Output fields and format
- Next steps
- Discussion – question and answer time

# Motivation for HTAP3-OPNS

- Revision of the CLRTAP Gothenburg Protocol
  - GAINS LRTAP future scenarios
  - Ozone, Particles, and the deposition of Nitrogen and Sulfur
  - Special focus on methane as an ozone precursor
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- For further information, the HTAP3-OPNS white paper:
    - <https://nextcloud.gfz-potsdam.de/s/NqgxtQb6ELJw76S>

# Updates since the last meeting

- Last meeting was the HTAP Spring workshop, April 22-25, 2024
- In May, the Working Group on Strategies and Review (WGSR) of CLRTAP decided to adopt 2040 as the target year for optimized scenarios for the revisions of the Gothenburg Protocol
  - The base run for the CTM perturbation experiments will now be 2040
  - The CCM transient future experiments will now stop at 2050
- The treatment of hydrogen in all experiments will be simplified
  - 530 ppb specified mole fraction globally in all runs
- Some small adjustments to the priorities of some perturbation experiments
  - The number of "priority 1" simulations remains unchanged (14 runs)
- We now have a plan for coordinated regional simulations for Europe
  - Boundary conditions will be provided from the global CTM simulations

# Overview of model experiments

- White paper: <https://nextcloud.gfz-potsdam.de/s/NqgxtQb6ELJw76S>
- Participation table: <https://nextcloud.gfz-potsdam.de/s/anZw7MLYMzpbqyW>
  - Please check/update your entries!
- Work streams in HTAP3-OPNS
  - CCM future transient experiments
    - Direct assessment of GAINS future scenarios
  - CTM perturbation experiments
    - Source-receptor relationships for long-range transboundary air pollution
    - Regional model simulations
  - CTM historical transient experiment
    - Links with other activities:
      - HTAP3-Fires
      - WMO MMF-GTAD

# Overview of CCM future transient runs (2010-2050)

Run name	Priority	Transient emissions scenario	Climate forcing
ssp245-CLE-CH4conc <b>OR</b> ssp245-CLE-CH4emis	1	GAINS LRTAP CLE	SSP2-4.5 transient
ssp245-MTFR-CH4conc <b>OR</b> ssp245-MTFR-CH4emis	1	GAINS LRTAP MTFR	SSP2-4.5 transient
ssp245-HILO-CH4conc <b>OR</b> ssp245-HILO-CH4emis	1	Hybrid scenario HILO	SSP2-4.5 transient
clim2015-CLE-CH4conc <b>OR</b> clim2015-CLE-CH4emis	2	GAINS LRTAP CLE	Constant 2015
clim2015-MTFR-CH4conc <b>OR</b> clim2015-MTFR-CH4emis	2	GAINS LRTAP MTFR	Constant 2015
clim2015-HILO-CH4conc <b>OR</b> clim2015-HILO-CH4emis	2	Hybrid scenario HILO	Constant 2015

# Overview of CTM perturbation runs (all with 2015 meteorology)

## Priorities for HTAP3 Simulations

Base (CLE 2040 emissions)

### Global Perturbations

Decrease CH4 Conc

Decrease CH4 Conc and all anthro emissions

Increase H2 conc

Decrease All anthro emissions

Decrease anthro NOX

Decrease anthro VOC

Decrease anthro CO

### Global Scenario Runs

CLE 2015 emissions

MTFR (2040)

HILO (2040)

## Regional Emissions Perturbation (2015 meteorology, 2050 CLE emissions)

N America

EMEP Domain

EMEP West

EMEP East

East Asia

South Asia

South and East Mediterranean

Middle East

North Africa

SE Asia

Mex/C America/Caribbean

Rest of World (SAM+SAF+PAN)

South America

Southern Africa

Aust/NZ/Pacific

International Shipping

Aviation

Fires (all fires)

## 2015 meteorology / 2040 emissions

BASE (CLE2040)

1

CH4DEC

1

CH4ALL

1

H2INC

2

GLOALL

1

GLONOX

1

GLOVOC

1

GLOCO

1

CLE2015

1

MTFR2040

2

HILO2040

2

	All	NOX	VOC	CO	SO2	NH3	PM
NAM	1	2	2	4			
EMEP	1	2	2	4			
EMEPW	3	4	4	4			
EMEPE	3	4	4	4			
EAS	1	2	2	4			
SAS	1	2	2	4			
SMD	1	2	2	4			
MDE	3	4	4	4			
NAF	3	4	4	4			
SEA	3	4	4	4			
MCA	3	4	4	4			
ROW	3	4	4	4			
SAM	3						
SAF	3						
PAN	3						
SHIP	1						
AVI	2						
FIRE	3						

Highest Priority

Next Priority

Lower Priority

1 or 2

n

# Overview of regional model simulations (Europe)

All simulations April-September with 2015 meteorology

Regional model simulation	Boundary conditions from global model			
	CLE2015	CLE2040	MTFR2040	HILO2040
CLE2015-EMEPdomain <b>OR</b> CLE2015-CAMS-domain	X			
CLE2040-EMEPdomain <b>OR</b> CLE2040-CAMSdomain		X		
MTFR2040-EMEPdomain <b>OR</b> MTFR-2040-CAMSdomain			X	
HILO2040-EMEPdomain <b>OR</b> HILO2040-CAMSdomain				X
CLE2040glob-MTFR2040reg-EMEPdomain <b>OR</b> CLE2040glob-MTFR2040reg-CAMSdomain		X		

# The historical transient run

- 2003-2020
  - HTAP v3.1 anthropogenic emissions
  - GFAS v1.2+ biomass burning emissions
- As well as being valuable itself, this run will serve two other purposes
  - This is the baseline run for the HTAP3-Fires exercise
  - This will contribute to the WMO MMF-GTAD exercise

# Overview of required input datasets

- CCM transient future experiments
  - GAINS LRTAP scenarios
  - Corrected aviation emissions
  - Future fire emissions
- CTM perturbation experiments
  - GAINS LRTAP scenarios
  - Corrected aviation emissions
  - GFAS v1.2+ fire emissions
  - HTAP3 source region definitions
- CTM historical transient experiment
  - HTAP v3.1 historical anthropogenic emissions
  - GFAS v1.2+ fire emissions

# Status of GAINS LRTAP scenarios

- The baseline CLE scenario is ready, and will be available soon
- The MTFR scenario is expected to be available in August
- Corresponding methane surface concentrations will be available very soon after the emissions become available

# Status of corrected aviation emissions

- Corrected historical emissions are available here:
  - <https://zenodo.org/records/7846185>
- Corrected future emissions for SSP2-4.5 will also be made available soon via zenodo

# Status of future fire emissions

- We have no current update on the status of these emissions, but hope that they will be available soon
- News flash: these emissions should be ready by late August – early September 2024

# Status of GFAS v1.2+ biomass burning emissions

- We have no current update on the status of these emissions, but hope that they will be available soon
- News flash: these emissions should be ready by late August – early September 2024

# Status of HTAP3 region definitions

- The region definitions are available here:
  - <https://zenodo.org/records/12654038>

# Status of HTAP v3.1 anthropogenic emissions

- This dataset is currently expected to be ready by September 2024

# What is holding each run up?

- CCM future transient runs
  - ssp245-CLE-\* and clim2015-CLE-\* runs are waiting for...
    - GAINS LRTAP CLE scenario
    - Future fire emissions
  - ssp245-MTFR-\*, clim2015-MTFR-\*, ssp245-HILO-\*, and clim2015-HILO-\* runs are waiting for...
    - GAINS LRTAP MTFR scenario
    - Future fire emissions
- CTM perturbation runs
  - All priority 1 runs and most other runs are waiting for...
    - GAINS LRTAP CLE scenario
    - GFAS v1.2+ fire emissions
  - MTFR2040 and HILO2040 are waiting for...
    - GAINS LRTAP MTFR scenario
    - GFAS v1.2+ fire emissions
- Regional model runs are waiting for...
  - The global CTM runs: CLE2015; CLE2040; MTFR2040; HILO2040
- Historical transient run is waiting for
  - The HTAP v3.1 anthropogenic emissions
  - GFAS v1.2+ fire emissions

# Output fields and formats

- Table of output fields: <https://nextcloud.gfz-potsdam.de/s/sp8XmMY2rQizjA4>
- All data submission should follow CF conventions
- Data should be submitted to the AeroCom server: <https://aerocom.met.no/>

# Next steps

- We are working to make all of the input data available as soon as possible
- Please join our email lists for updates and to ask questions
  - htap-opns-announce:
    - Send an email to [sympa@listserv.dfn.de](mailto:sympa@listserv.dfn.de) with subject “subscribe htap-opns-announce”
  - htap-opns-discuss:
    - Send an email to [sympa@listserv.dfn.de](mailto:sympa@listserv.dfn.de) with subject “subscribe htap-opns-discuss”

# Upcoming meetings

- We plan regular meetings to exchange information on progress with the work and discussion of results
  - October 2024 (suggested date October 7, to be confirmed)
  - January 2025 (date TBD)
  - April 2025 (date TBD)
  - ...
  - Possible session at the 2025 AGU Fall Meeting
  - Possible session at the 2026 EGU General Assembly

# Remaining questions and discussion