

# AEROCOM CONTRIBUTIONS TO TF HTAP – PHASE 2

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# AeroCom

- AeroCom – Aerosol Comparisons between Observations and Models
- It was initiated 10 years ago in light of then new satellite aerosol products from MODIS, MISR, and others and a growing number of global models capable of simulating aerosols
- AeroCom had contributed to the HTAP phase 1 experiments (results presented in HTAP 2010 report, previous HTAP meetings, and publications)
- In the recent AeroCom workshop, several new model experiments were proposed, including contributions to the HTAP2 assessment, that are going to be coordinated to maximize the participation

# AeroCom HTAP2 model experiments

## ■ Years:

- 2008-2010 (high priority year is 2010 for HTAP2, but 2008 would be the base year for coordinated AeroCom activity with other model experiments, e.g., biomass burning, nitrate, and perturbation)

## ■ Emission:

- Anthropogenic: HTAP2
- Biomass burning: GFEDv3 daily (in conjunction with BB experiment)
- Volcano: Thomas Diehl (1980-2010) – available through HTAP/AeroCom
- Dust and sea salt: model calculated based on winds and surface conditions – no unified emissions

## ■ Regions:

- Two-tiered set of regional definitions with HTAP2 region masks

# Simulation priority (Tier 1 regions)

### Priorities for HTAP2 Simulations

Base	BASE
Increase CH4 Conc	CH4INC
Decrease CH4 Conc	CH4DEC

	2008	2009	2010
1	1		1
			1

**For aerosols, emissions from dust, volcanoes, and sea salt have also to be considered!!!**

Highest Priority  
Next Priority  
Lower Priority

1

### Region of Emissions Perturbation

[illegible]

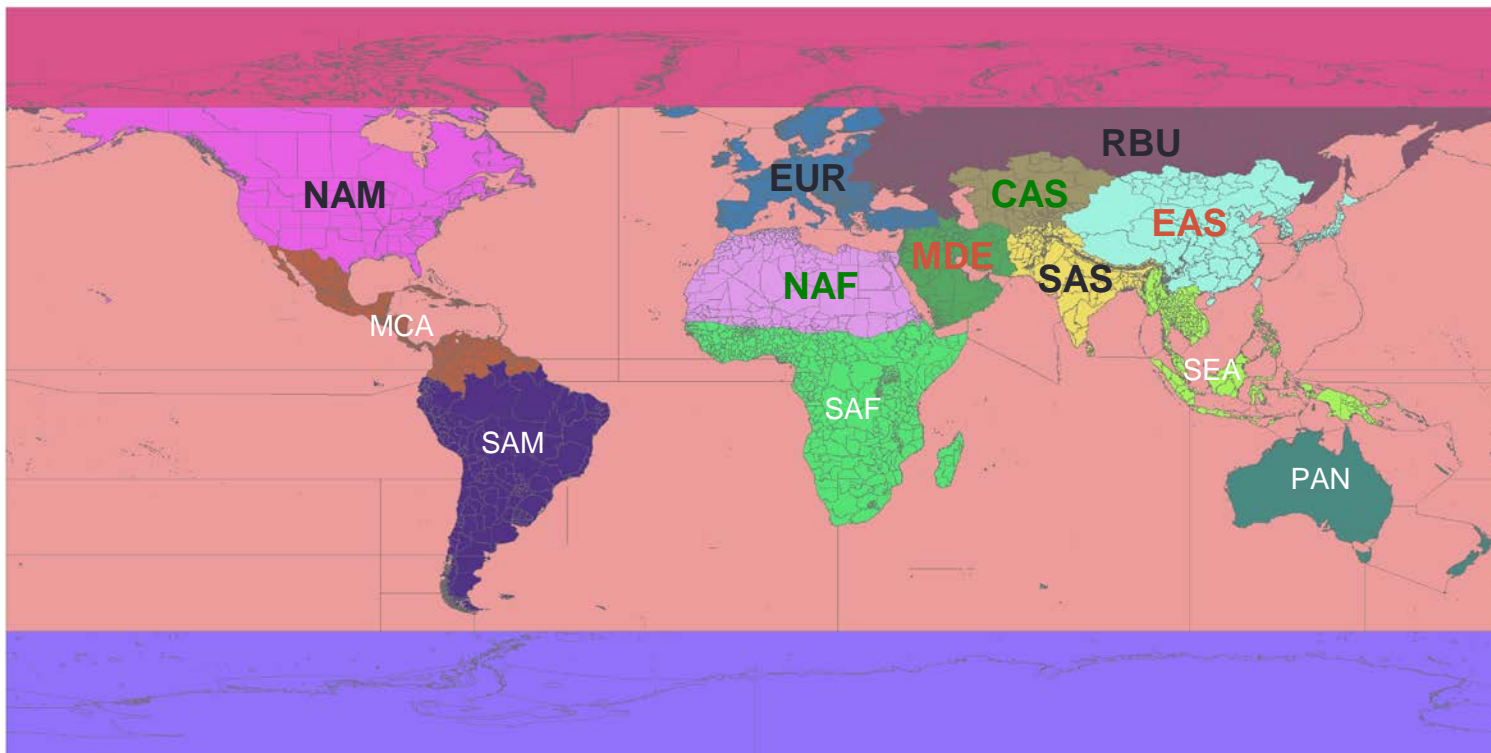
PM = Other Particulate Matter (BC, OC, PM<sub>10</sub>, PM<sub>2.5</sub>)

TRN = Ground Transport Sector; PIN = Power and Industry Sectors; RES = Residential Sector; OTH = Other Sectors (Ships, Aviation, Agriculture); FIR = Fire

DST = Dust \* For dust, some models should divide the NAF source into separate source regions for the Sahara (091+092, in the Tier2 regions) and Sahel (093).

# Tier 1 regions

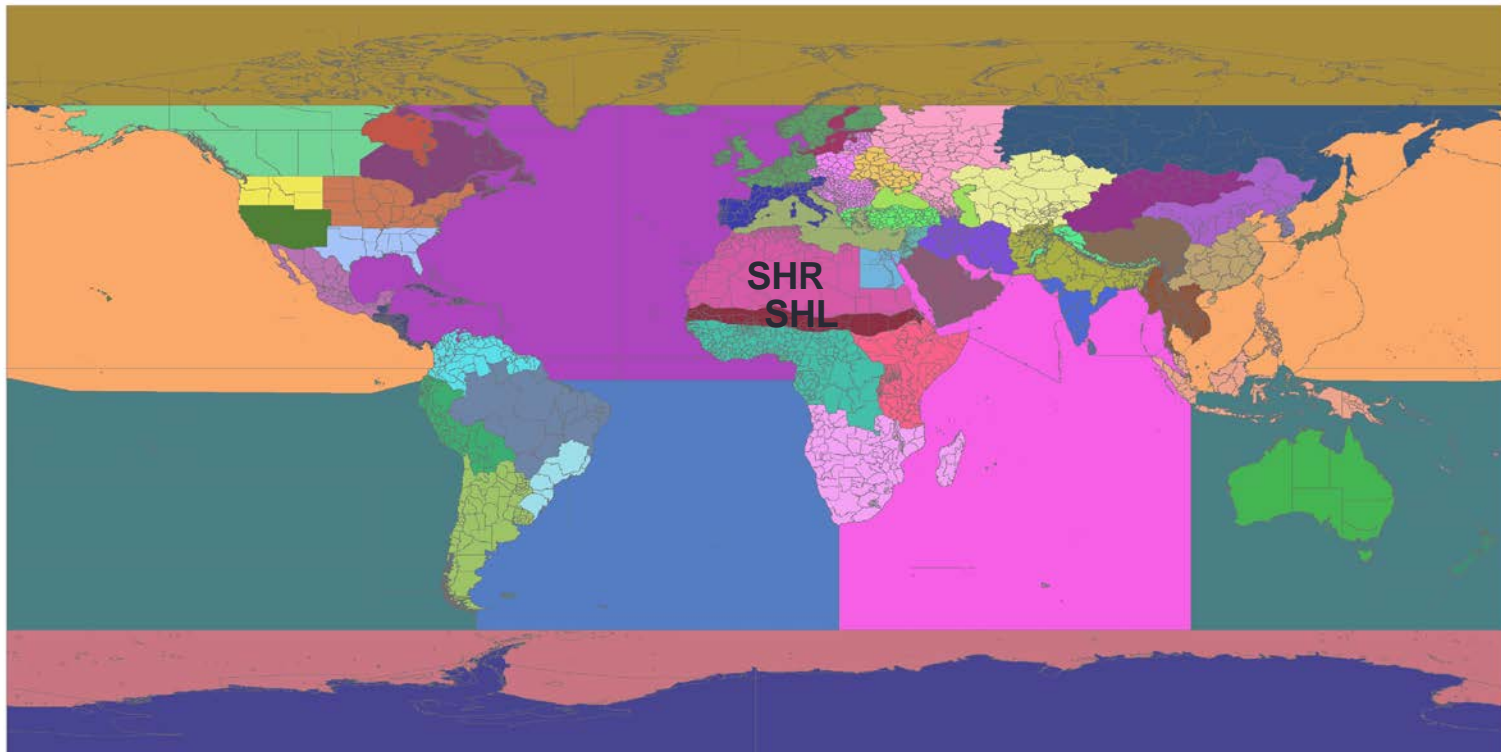
- 17 regions including the whole globe, the oceans, Arctic, Antarctic, and 13 land mass regions
- Both source and receptor regions



xxx – anthro  
xxx – dust  
xxx – both

# Tier 2 regions

- The Tier 1 regions are divided into 60 sub-regions
- can be used individually or as groups in particular cases as source or receptor regions



Region mask at: <http://iek8wikis.iek.fz-juelich.de/HTAPWiki/WP2.1>

# Priority

## ■ High priority:

- 2008, (2009,) 2010: Base simulation (global, all emissions)
- Base year: 20% reduction by pollutant emissions in GLO, NAM, EUR, EAS, SAS, RBU, MDE
- Base year: 20% reduction by sector emissions of TRN, PIN, and RES globally
- Base year: 20% reduction and 20% increase of dust emissions in GLO, EAS, CAS, MDE, NAF
- Base year: 30% reduction and 5x increase of fire emissions globally

## ■ Next priority:

- Base year: 20% reduction (or other %) of fire emissions in NAM, RBU, SEA, SAF, SAM
- Base year: 20% reduction (or other %) of emissions separately in Sahara and Sahel (Tier-2)
- Base year: 20% reduction by sector emissions in NAM, EUR, EAS, SAS, RBU, MDE
- Base year: Other regions

# Issues in HTAP1

- Model evaluation:

- Large diversity in model simulated surface concentrations, but little model evaluation performed against surface and satellite observations – no vetting process of acceptance
- In HTAP2, the credibility of participating models should be shown before making future prediction

- PM2.5 components:

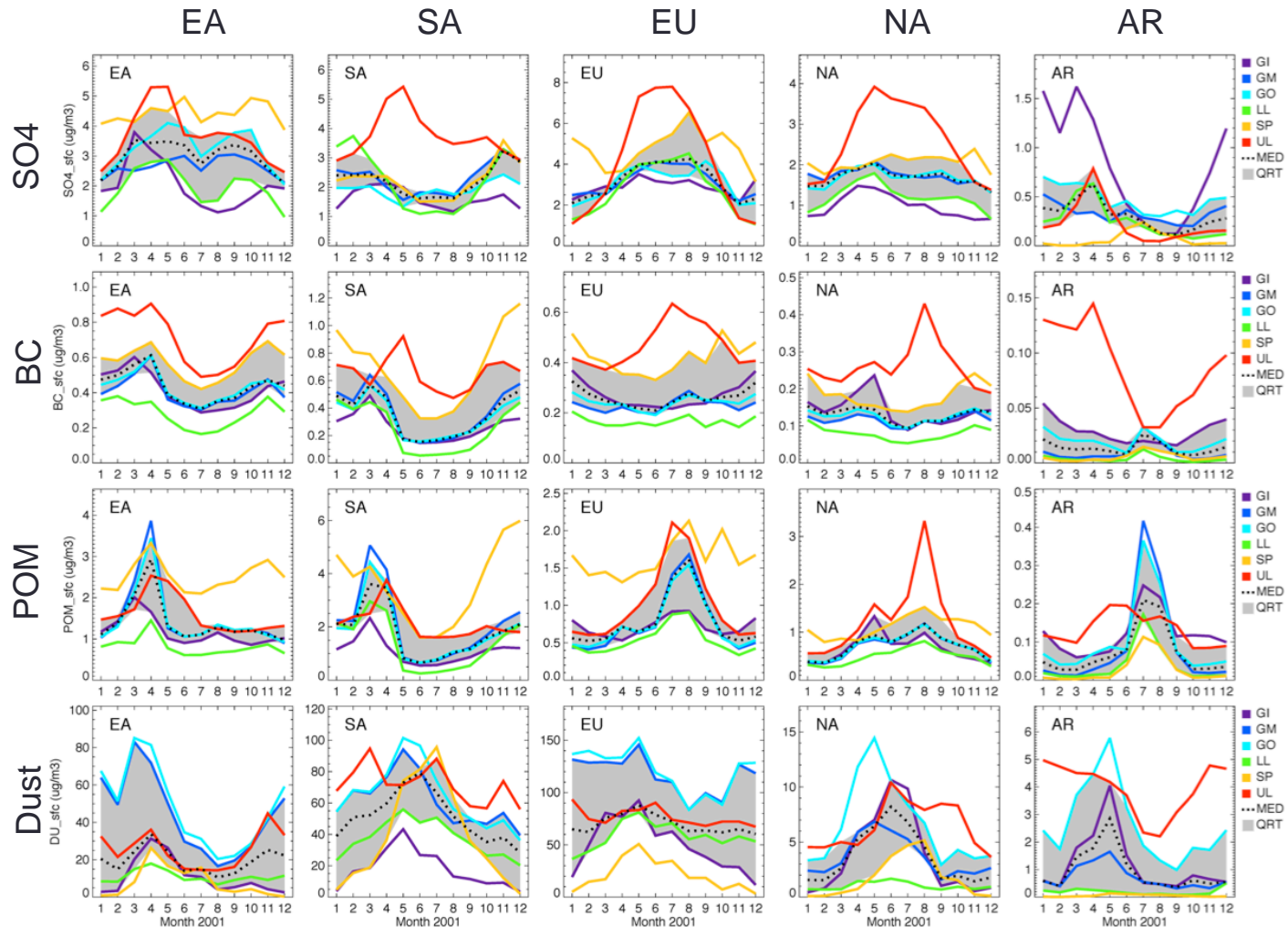
- Separate component is necessary – PM2.5 or PM10 as a whole provide insufficient constraints
- No clear how to use PM2.5 or PM10 emissions since they only contain primary emission while large fraction of PM2.5 is secondary (e.g., sulfate, nitrate, ammonium), and there is also natural primary components (e.g. dust, seasalt)
- Using sulfate+BC+OC as PM2.5 is incorrect

- Impact:

- Most impacts estimate focus on surface concentrations, but long-range transport should have more significant impact on the pollutant amount aloft



# Model “diversity” in HTAP1



- Using median and percentiles are more appropriate than mean and standard deviation
- “Vetting” process to at least put scores for each model

# Model evaluation

- Model output (“standard” diagnostics, similar to previous HTAP and AeroCom experiments)
- Minimal valuation datasets:
  - AOD (satellite, AERONET)
  - Surface concentrations
  - Vertical profiles

# Timeline

- Start model simulations early 2014
- Model evaluation starts middle to late 2014
- Analysis starts late 2014