

A joint initiative of



# AerChemMIP

Main contributors (so far)

Olivier Boucher (France)

Veronika Eyring (Germany)

Jean-François Lamarque (USA)

Michaela Hegglin (UK)

Gunnar Myhre (Norway)

Michael Schulz (Norway)

Drew Shindell (USA)

# Motivation for having AerChemMIP

- Address shortcomings of CMIP5 with respect to documenting composition changes (mostly aerosols and ozone)
- Define combined metrics and diagnostics for composition evaluation
- Identify science questions of relevance to CMIP6 and define the associated simulations
- Single entity to interact with other CMIP6 contributors, including emissions and forcing estimates.
- Chemistry and aerosol model components are tightly linked in many climate models

# Shortcomings in CMIP5 in relation to SLCFs

- ✓ Scenarios (RCPs) are too similar in their projected emissions of short-lived climate forcers (aerosols and tropospheric ozone)
- ✓ No straightforward way of identifying the costs/benefits of air quality measures (including health impacts)
- ✓ No detailed analysis/evaluation of composition from CMIP5 models (output data mostly unavailable)
- ✓ No CMIP5-integrated calculation of radiative forcings from aerosols or homogeneous diagnostics wrt to aerosols and chemical composition
- ✓ Attribution to aerosol effects difficult
- ✓ Limited study of chemistry-climate interactions

# AerChemMIP

## in support of CMIP6

- ❖ Interest in having scenarios to look at impacts of SLCFs.
- ❖ Define other scenarios of interest, e.g. Natural gas/methane for power generation?
- ❖ Understand trends in composition
- ❖ Role of natural aerosols, aerosol-chemistry coupling, other feedbacks (Organic Aerosols, Fires, Dust & Seasalt, OH, Radiation, Dynamics)
- ❖ Usage of observational constraints to bracket projections
- ❖ Identify relationship between regional forcing and climate response
- ❖ Documentation of composition, forcings and feedbacks in CMIP6
- ❖ Provide link to detailed modeling in CCMI & AeroCom
- ❖ Propose aerosol and ozone climatology fields for high resolution climate modeling

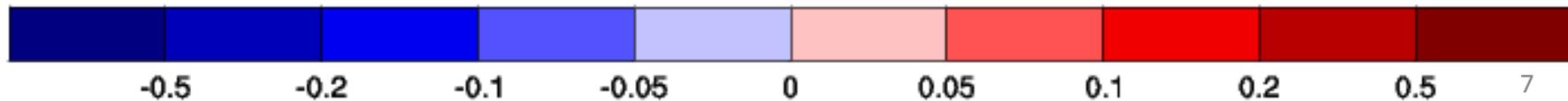
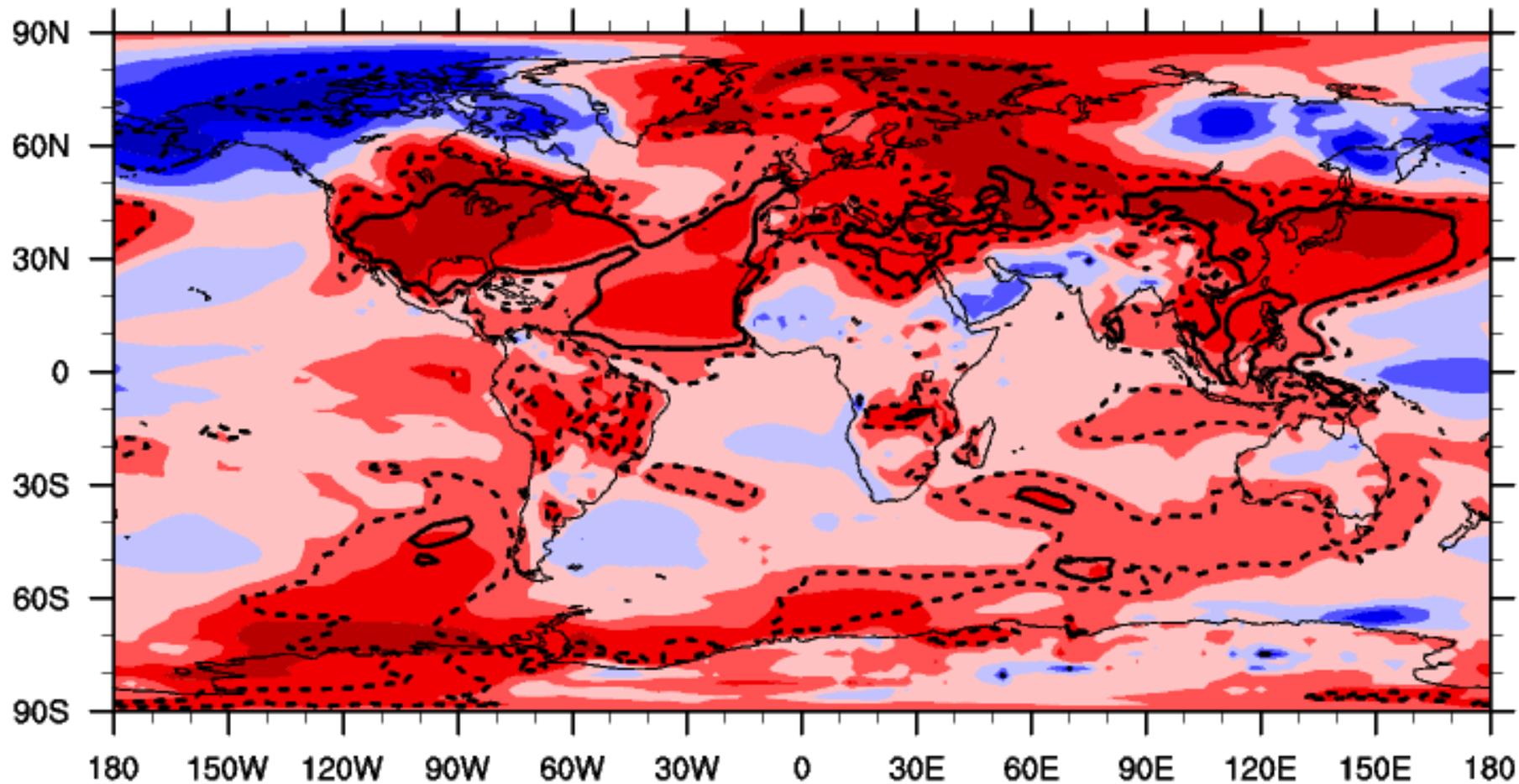
# Next steps

- ❑ AerChemMIP/LUMIP/ScenarioMIP AGCI meeting, Aspen, USA, 3-8 Aug 2014
- ❑ Participation to RFMIP, Hamburg, Germany, 3-5 Sep 2014
- ❑ Submit AerChemMIP application as CMIP6-Endorsed MIP to CMIP Panel, mid-September 2014
- ❑ 13th AeroCom workshop, Steamboat Springs, USA, 29 Sep - 2 Oct 2014
- ❑ AerChemMIP at the CCMI-AEROCOM Joint Meeting ESA-CNR, 14-18 September 2015, Rome, Italy (tentative dates and location)

# Idealized experiments

- Goal: identify the climate response to regional emissions (e.g. from U.S. anthropogenic SO<sub>2</sub>)
- Contrast 2 long (200 years) constant forcing ESM simulations (CESM, GFDL, GISS, UKMO)
- Use control simulation to define statistical significance

# NCAR T US=0



# GISS T US = 0

