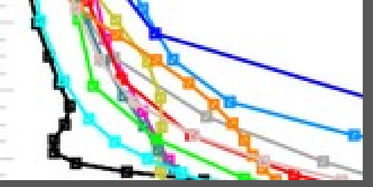
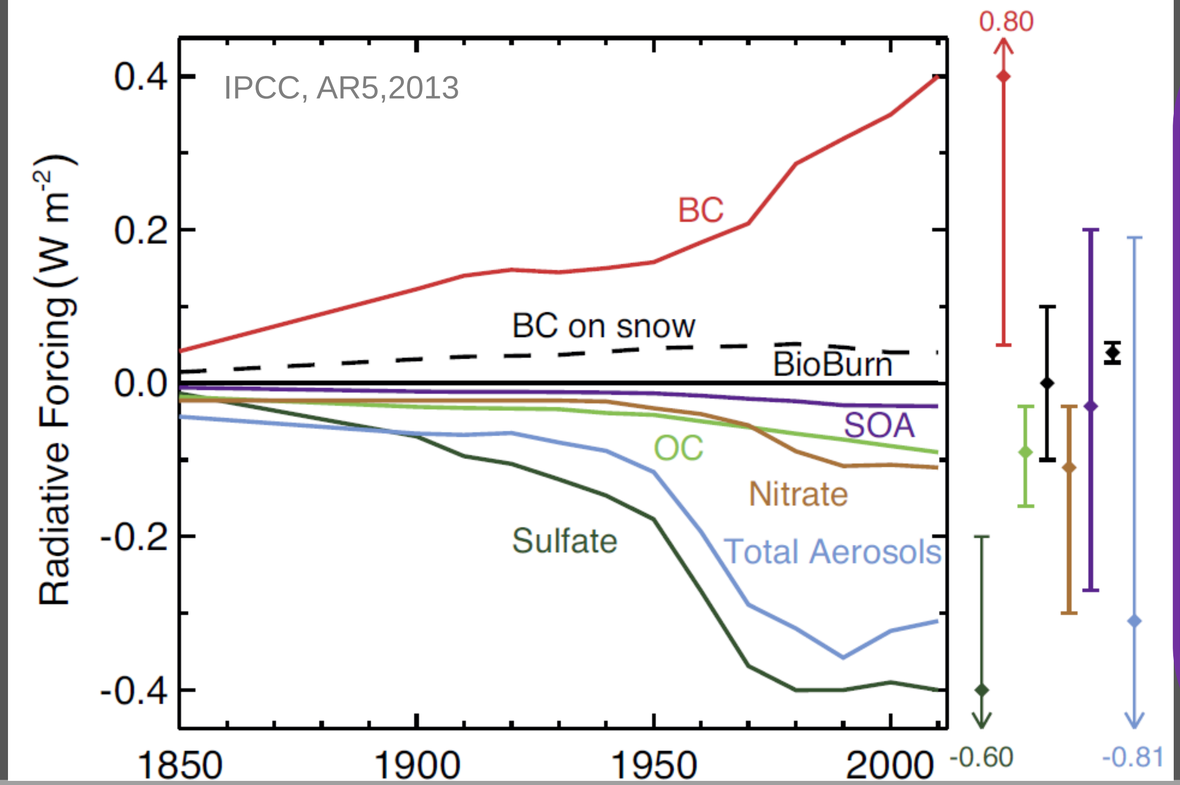


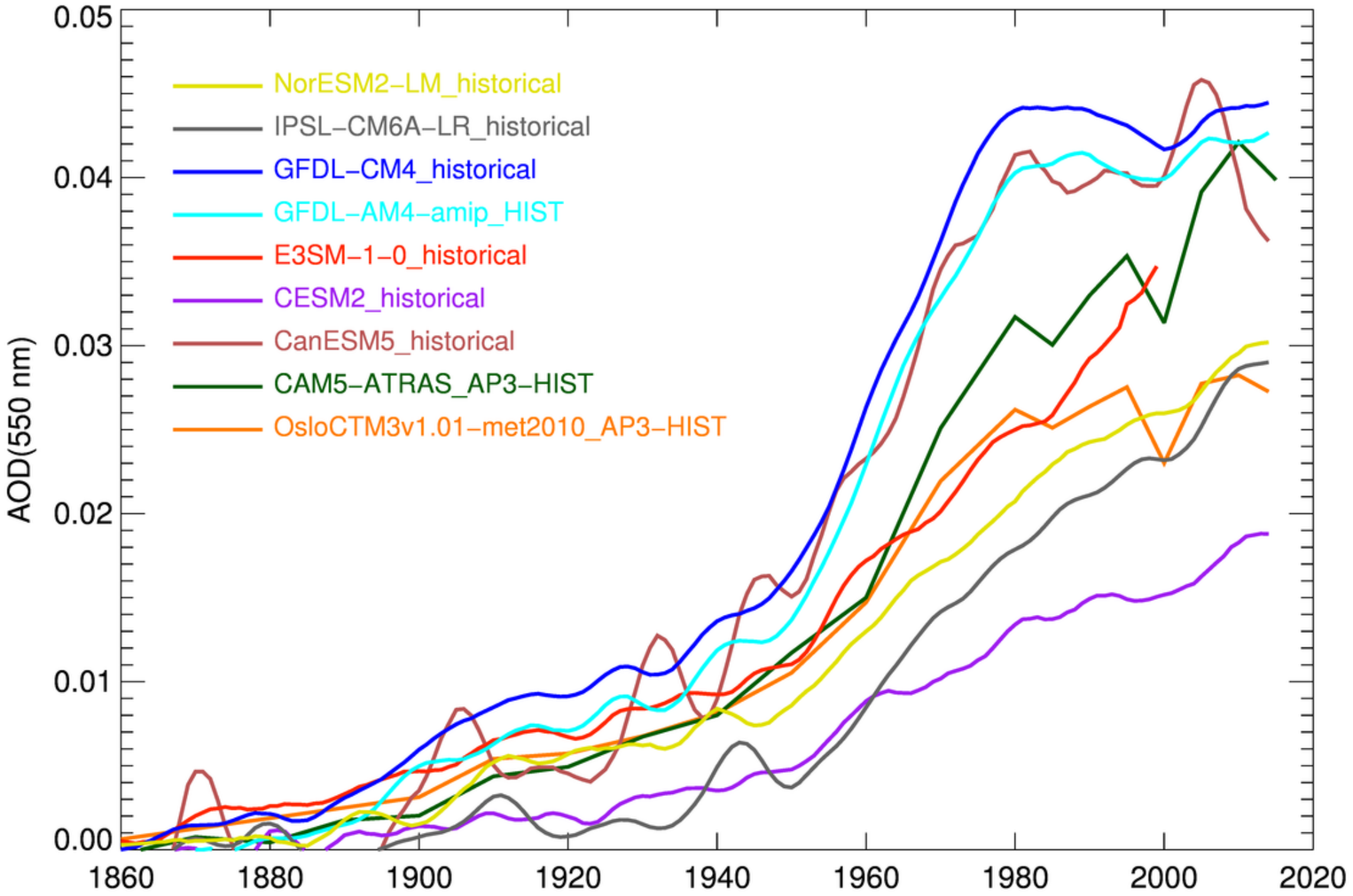


- How robust is the time evolution of aerosol components during industrial era from AeroCom models?
- Is it possible to generate vertical profiles, loads and AOD among the AeroCom models without too large spread?
- How important is the model diversity in aerosol composition for radiative forcing?
- So far 12 model submissions to the historical experiment.
- Want more AeroCom models to participate / more output!

AeroCom Historical Experiment

Gunnar Myhre and AeroCom modellers

Aerosol optical depth (550 nm)



- Some models have huge AOD annual /decadal variability. CESM2_WACCM excluded due to strong volcanic signal.
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- Three models with extensive output: CESM2, GFDL-AM4-amip, OsloCTM3v1.01-met2010
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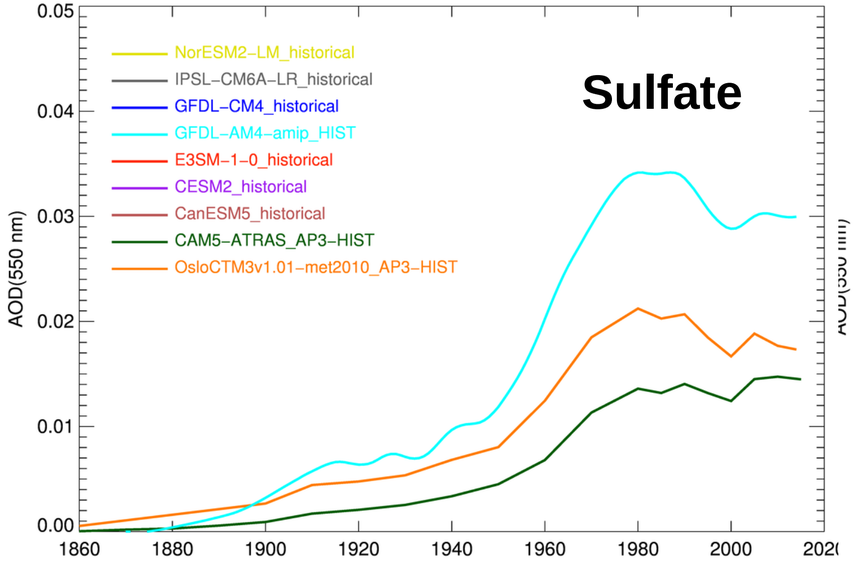
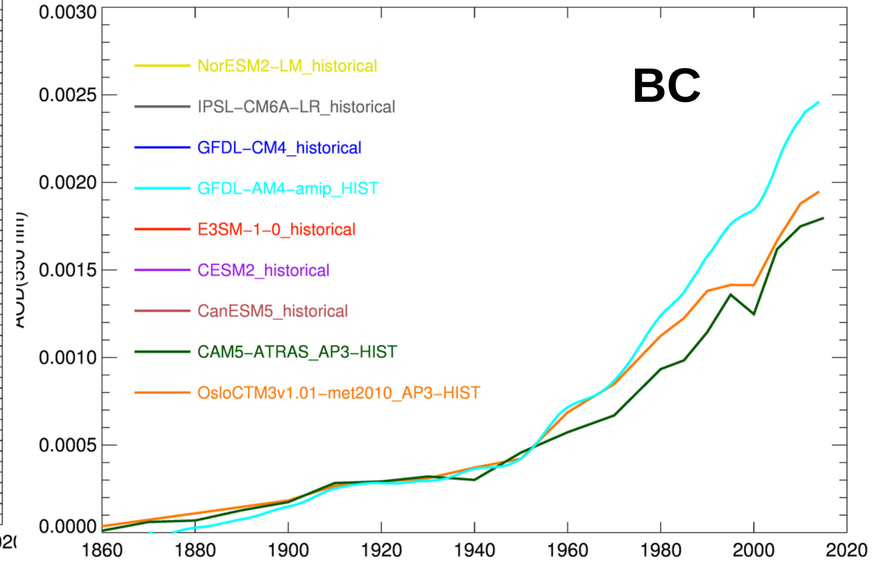
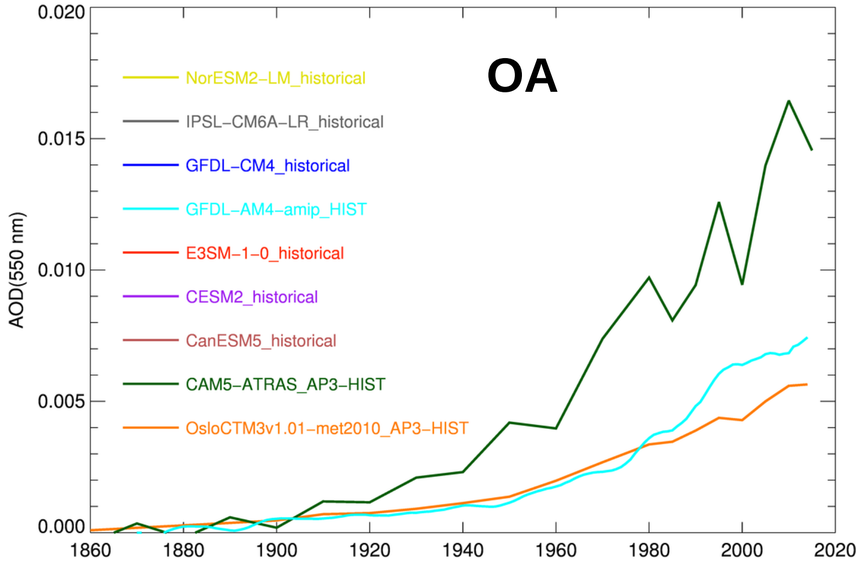
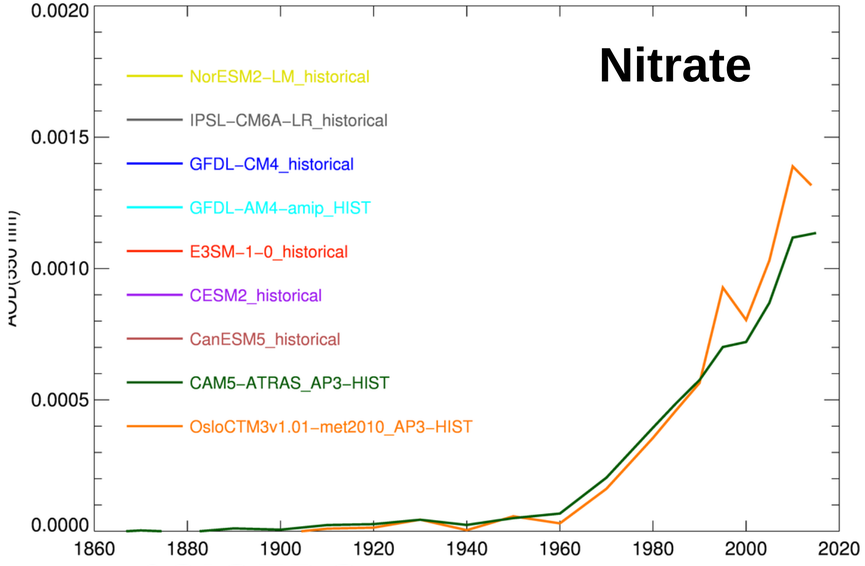
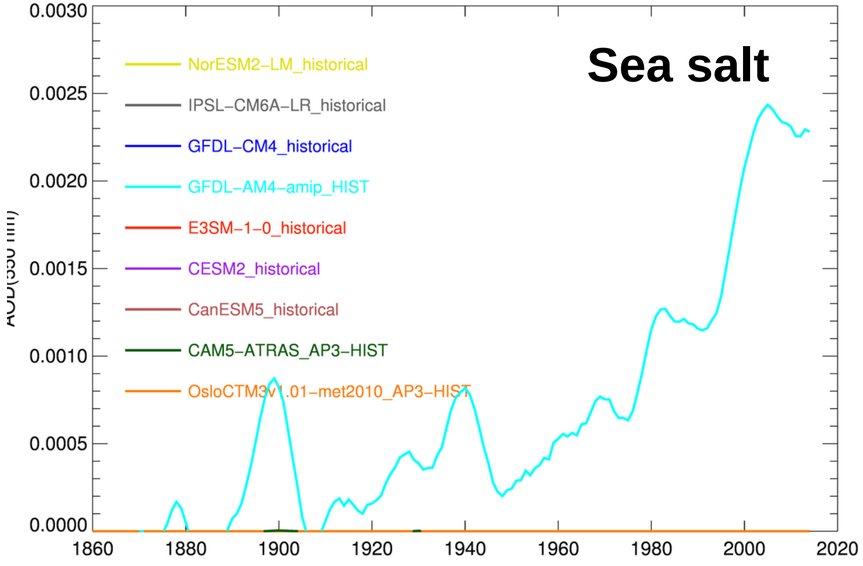
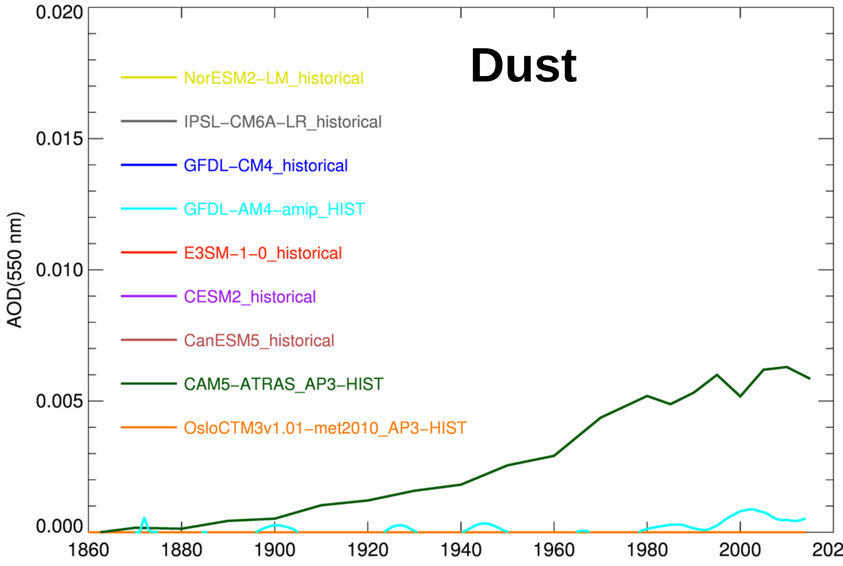






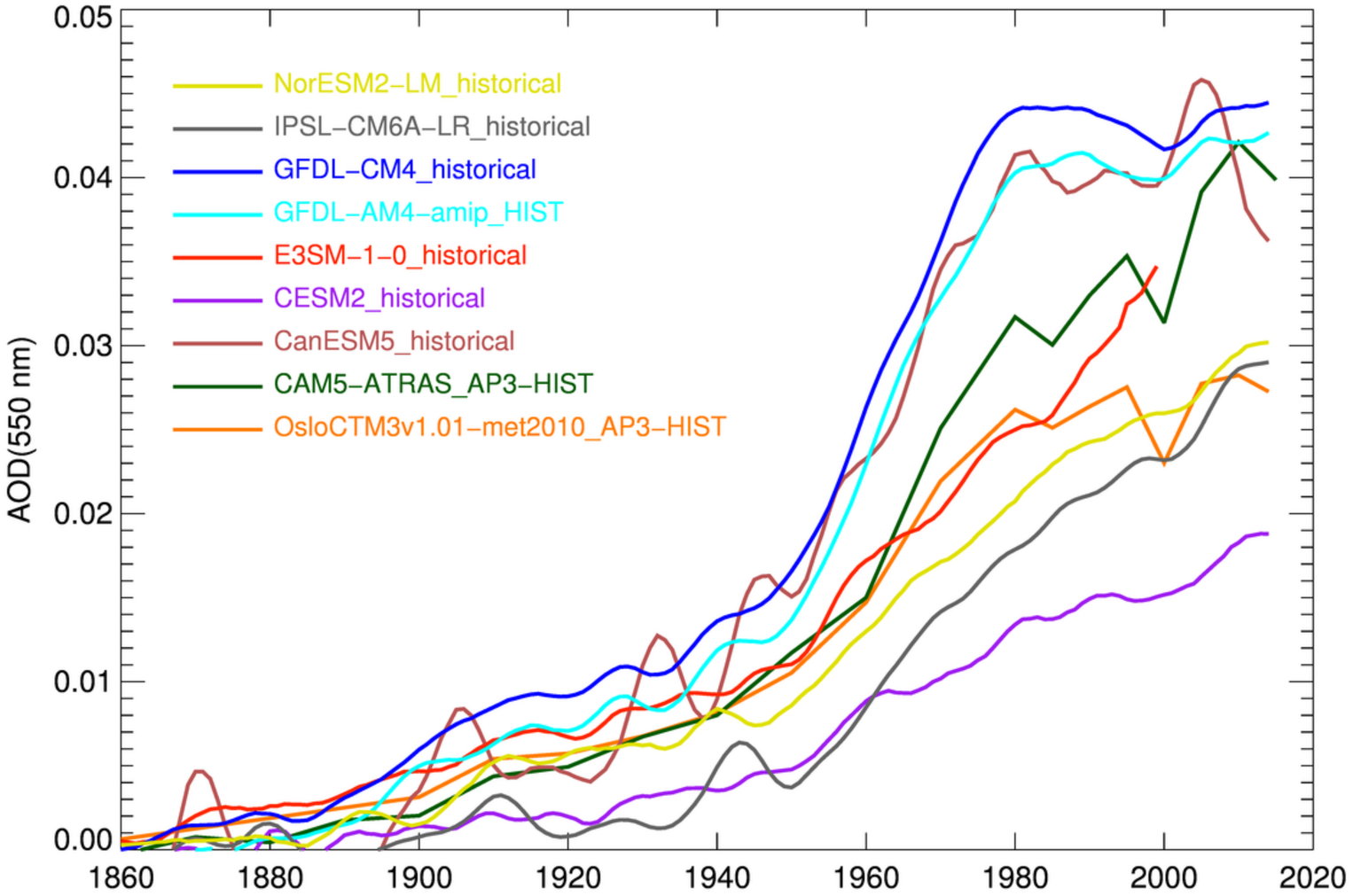






CICERO

Aerosol optical depth (550 nm)



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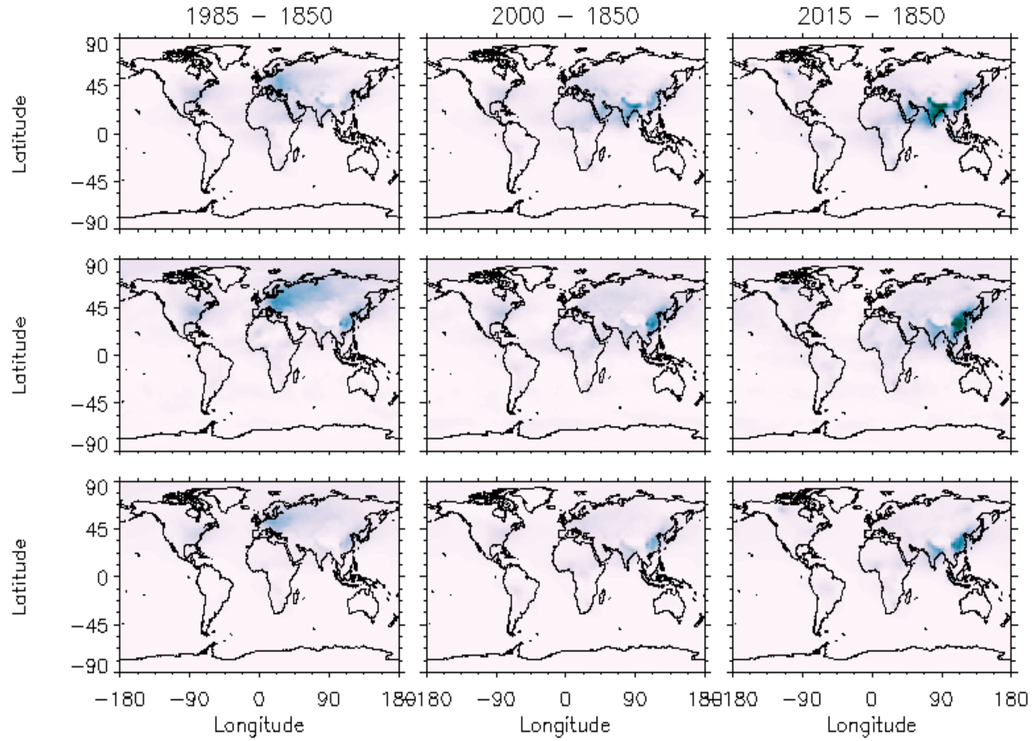
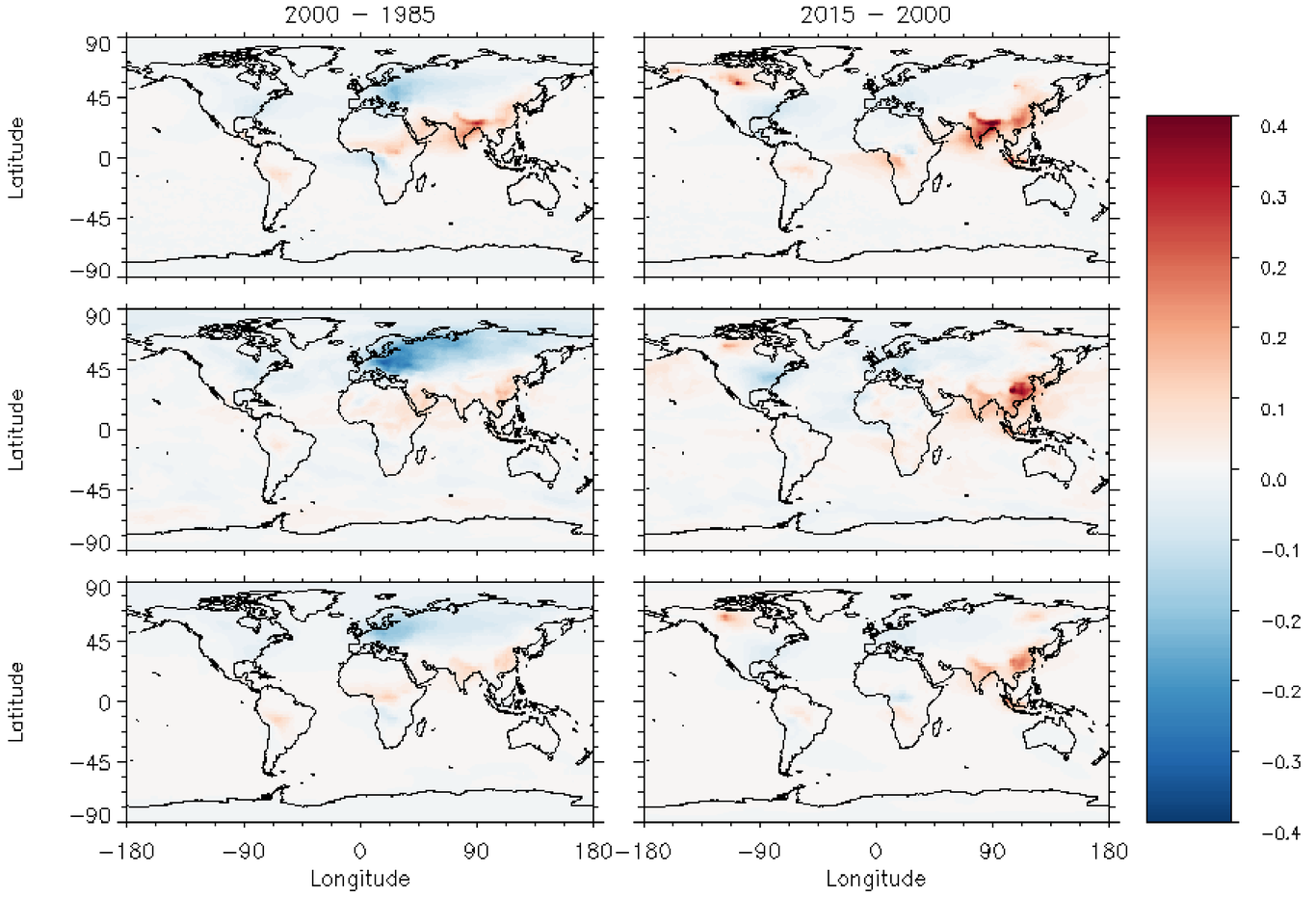
- Quality check needed

Aerosol optical depth (550 nm)

- Total AOD, in order CAM5, GFDL, OsloCTM3





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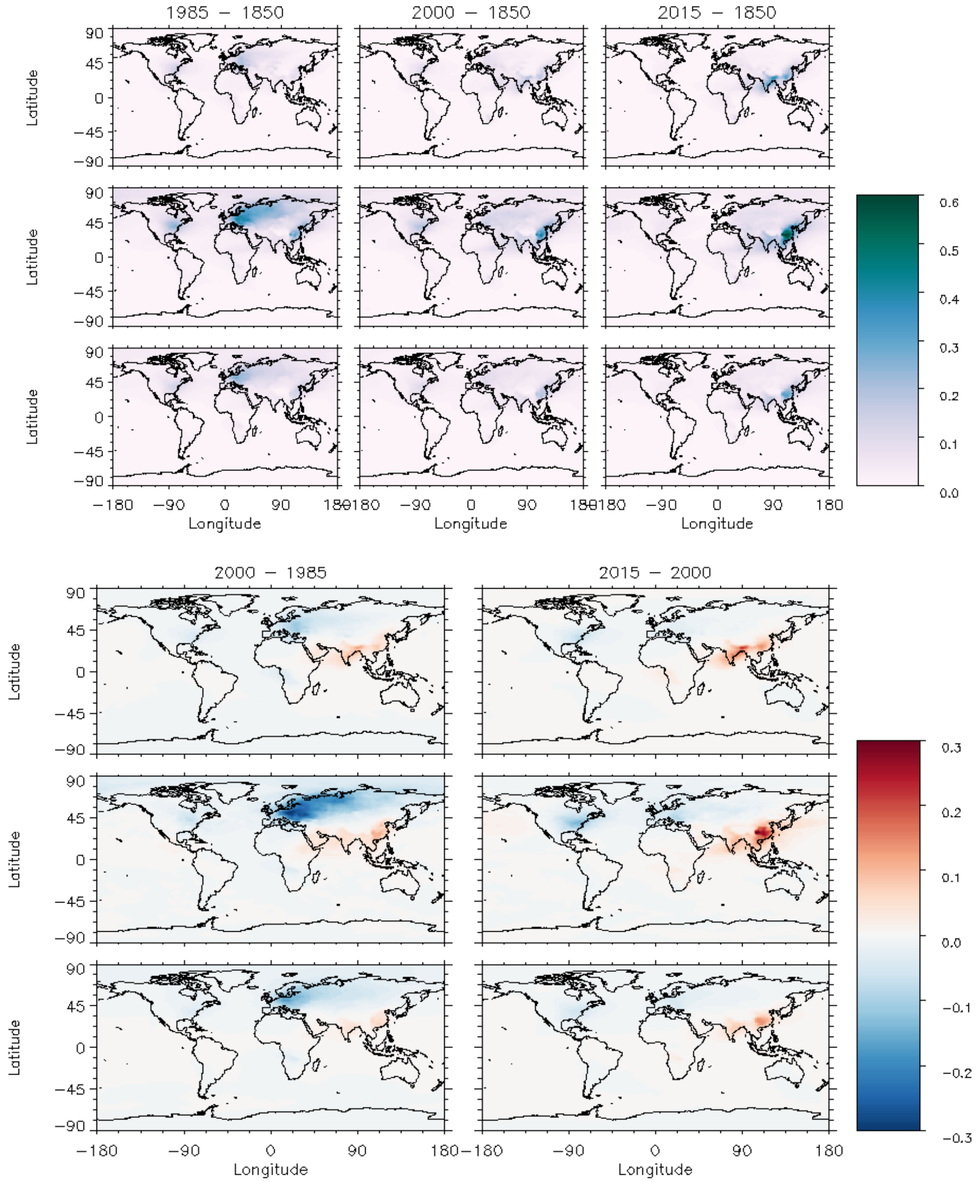
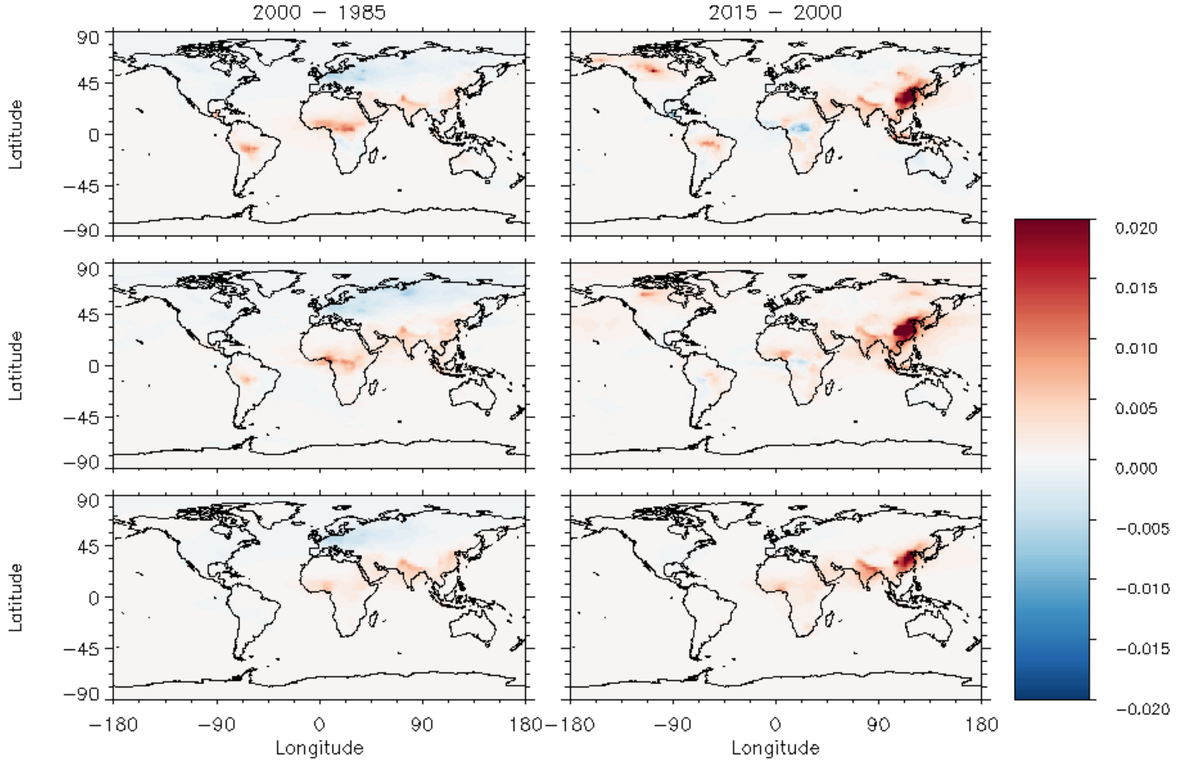
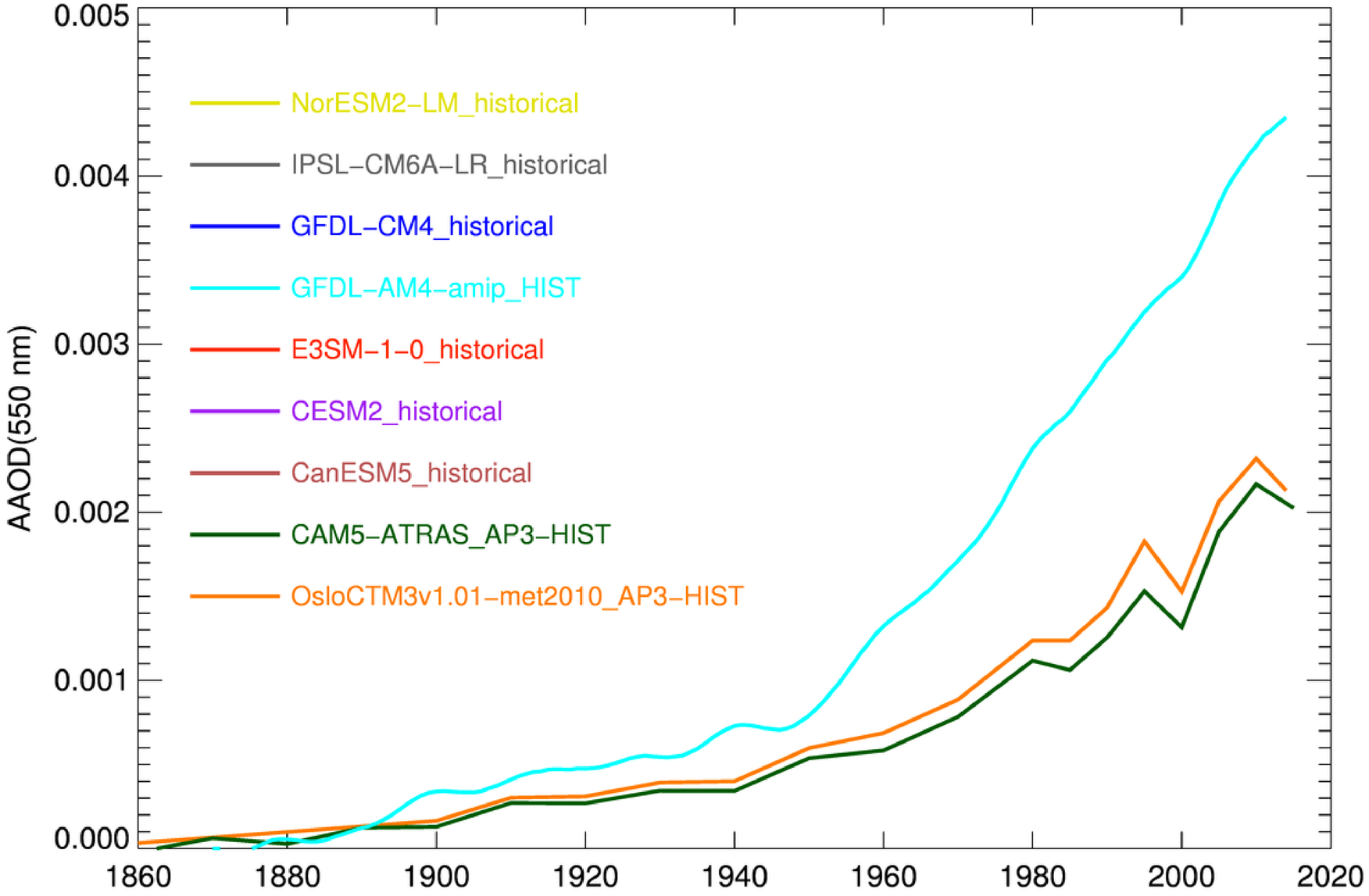
Aerosol optical depth (550 nm)

- Sulfate and BC AOD, in order CAM5, GFDL, OsloCTM3





Aerosol absorption optical depth (550 nm)

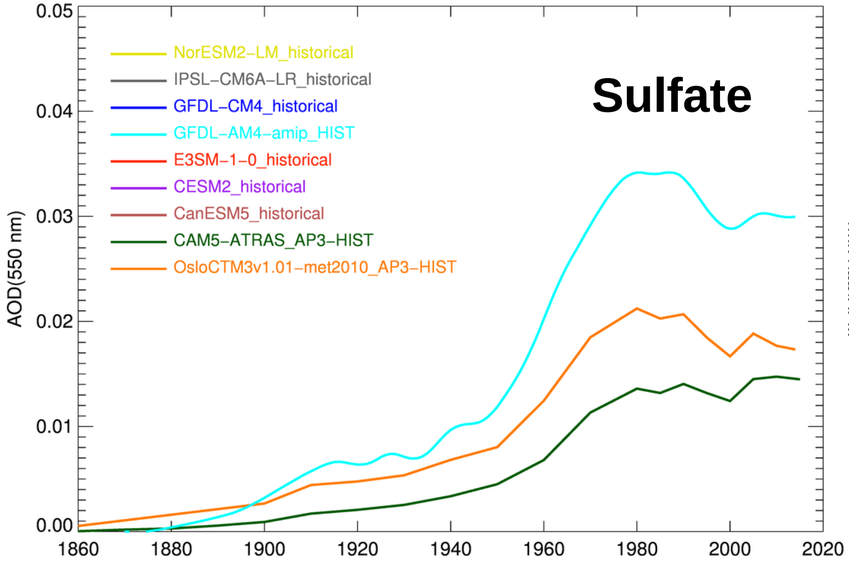


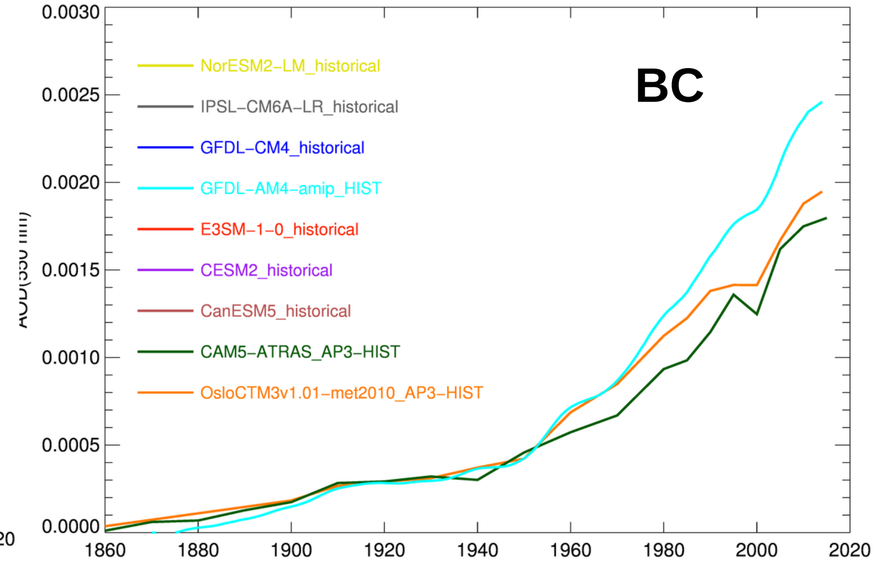
- Larger differeernces than for AOD BC

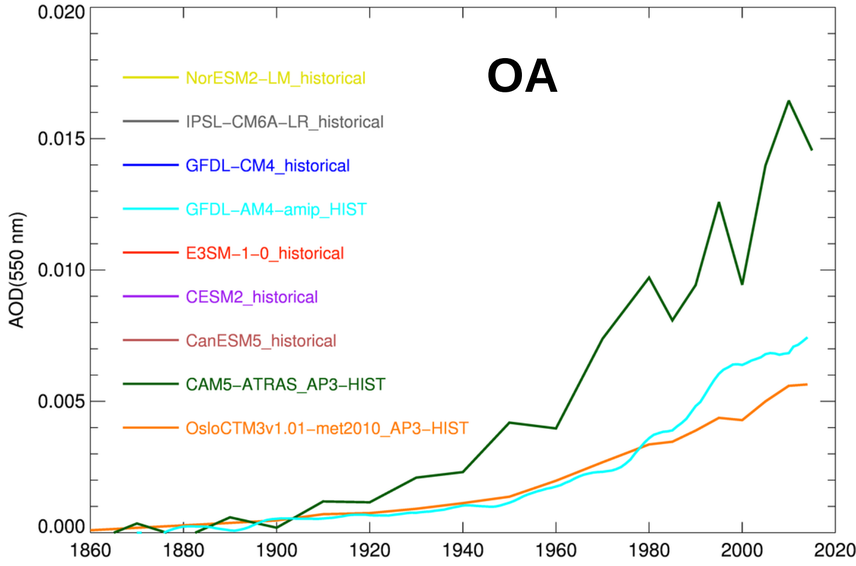
°CICERO

Aerosol optical depth (550 nm)

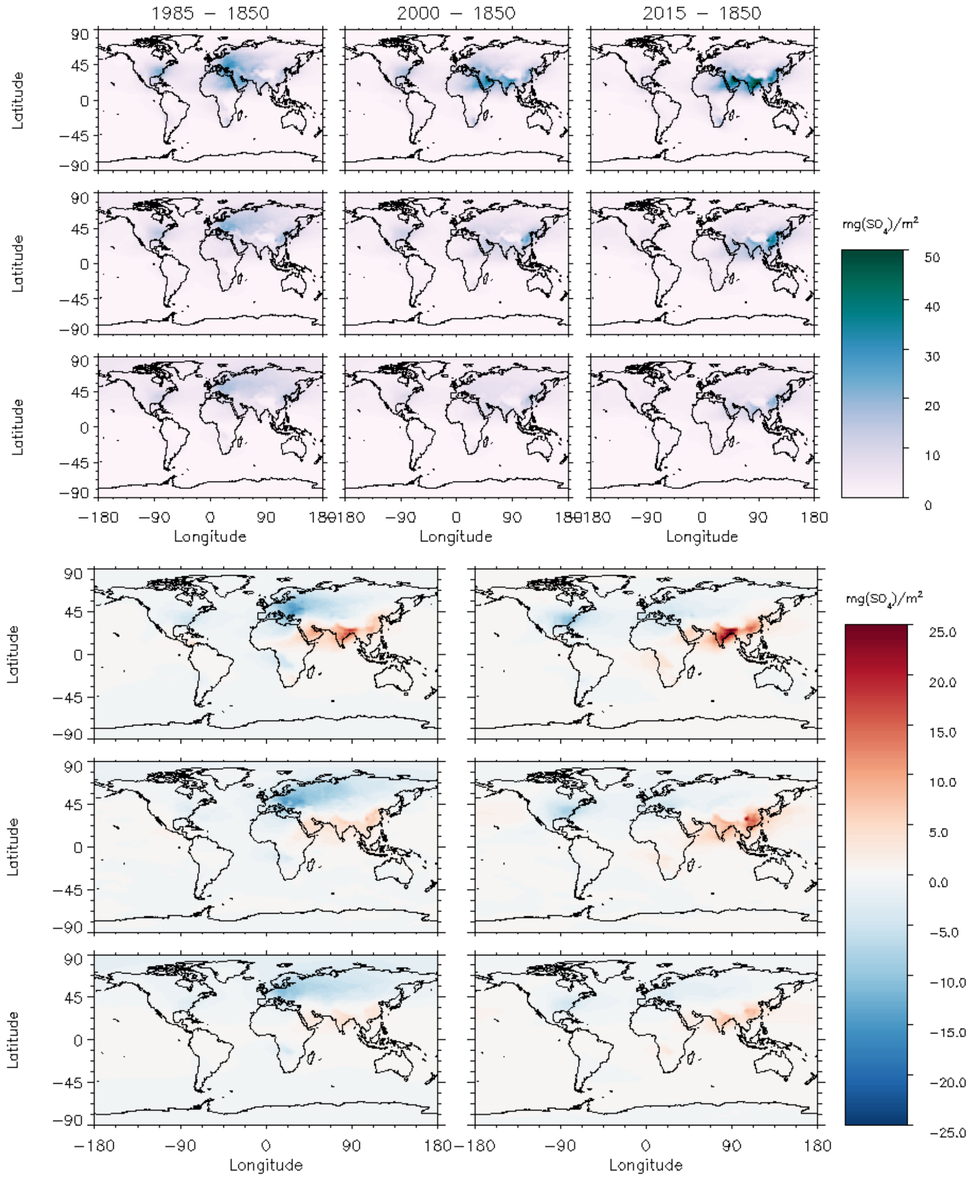
- Three models with extensive output: CESM2, GFDL-AM4-amip, OsloCTM3v1.01-met2010



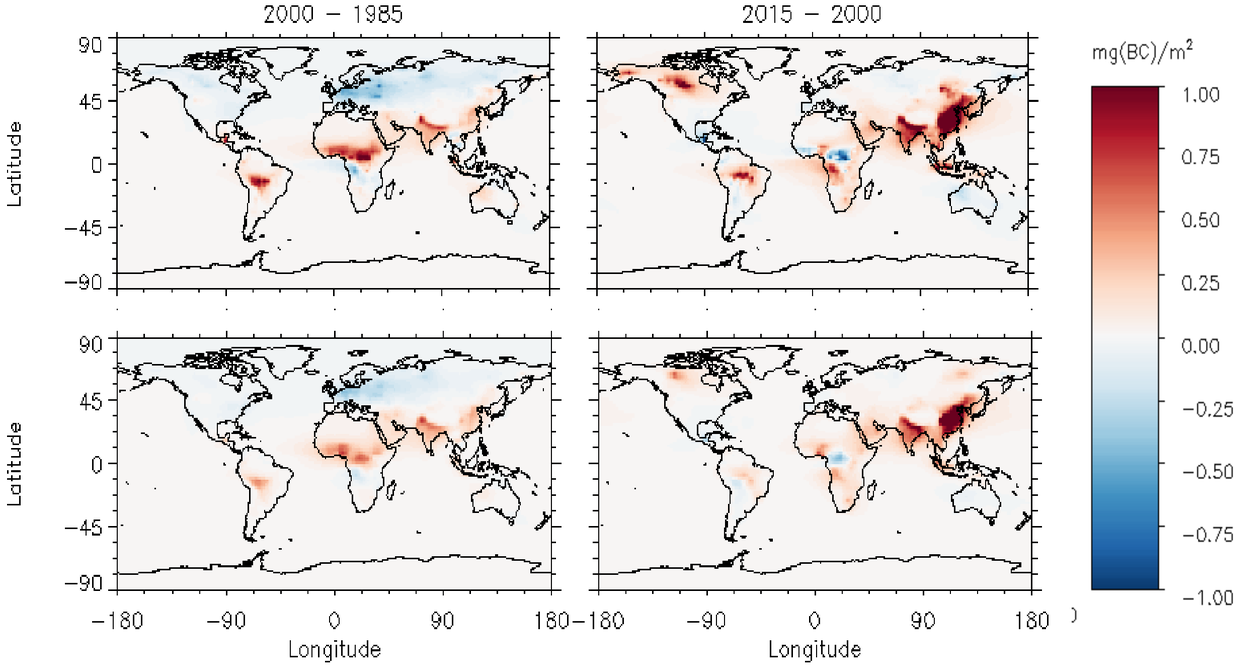




Aerosol load (mg/m2)



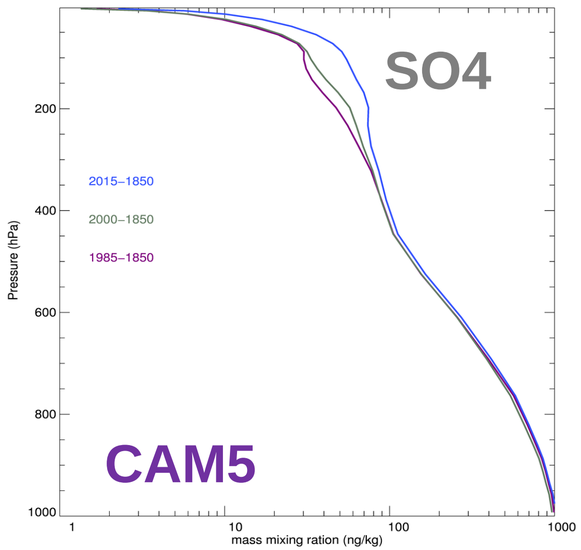
- Sulfate to the left and models in order CAM5, GFDL, OsloCTM3
- BC to the right in order CAM5 and OsloCTM3

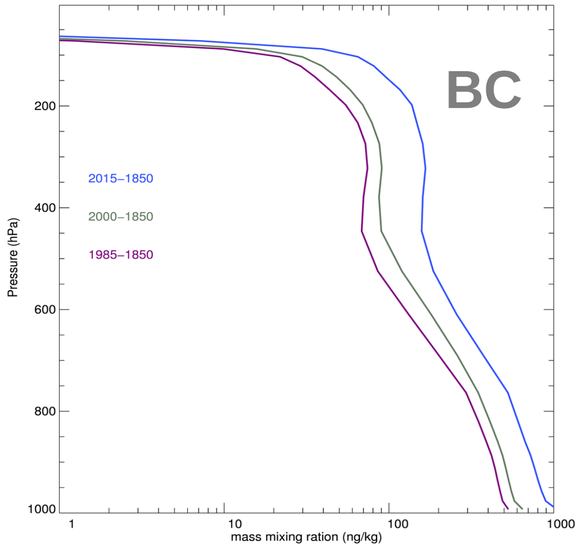


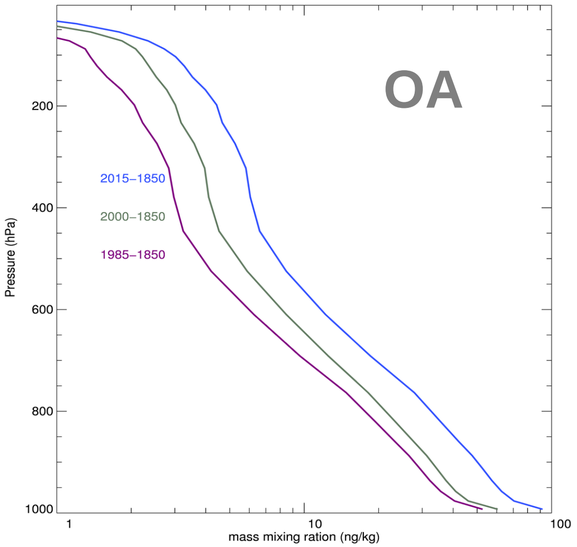
°CICERO

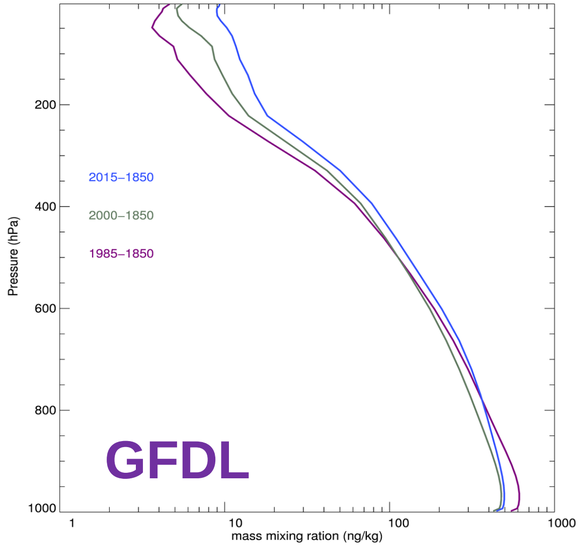
Mass mixing ratio (ng/kg)

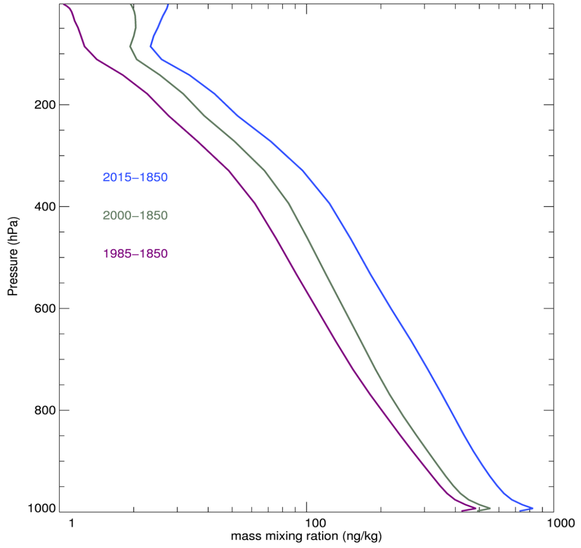
- CAM5 and GFDL

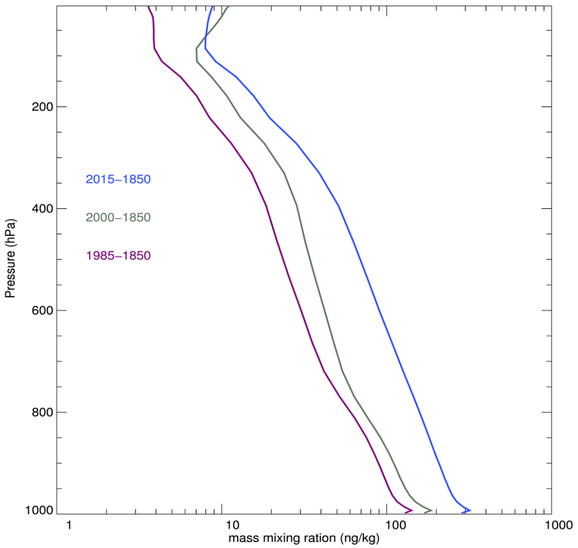












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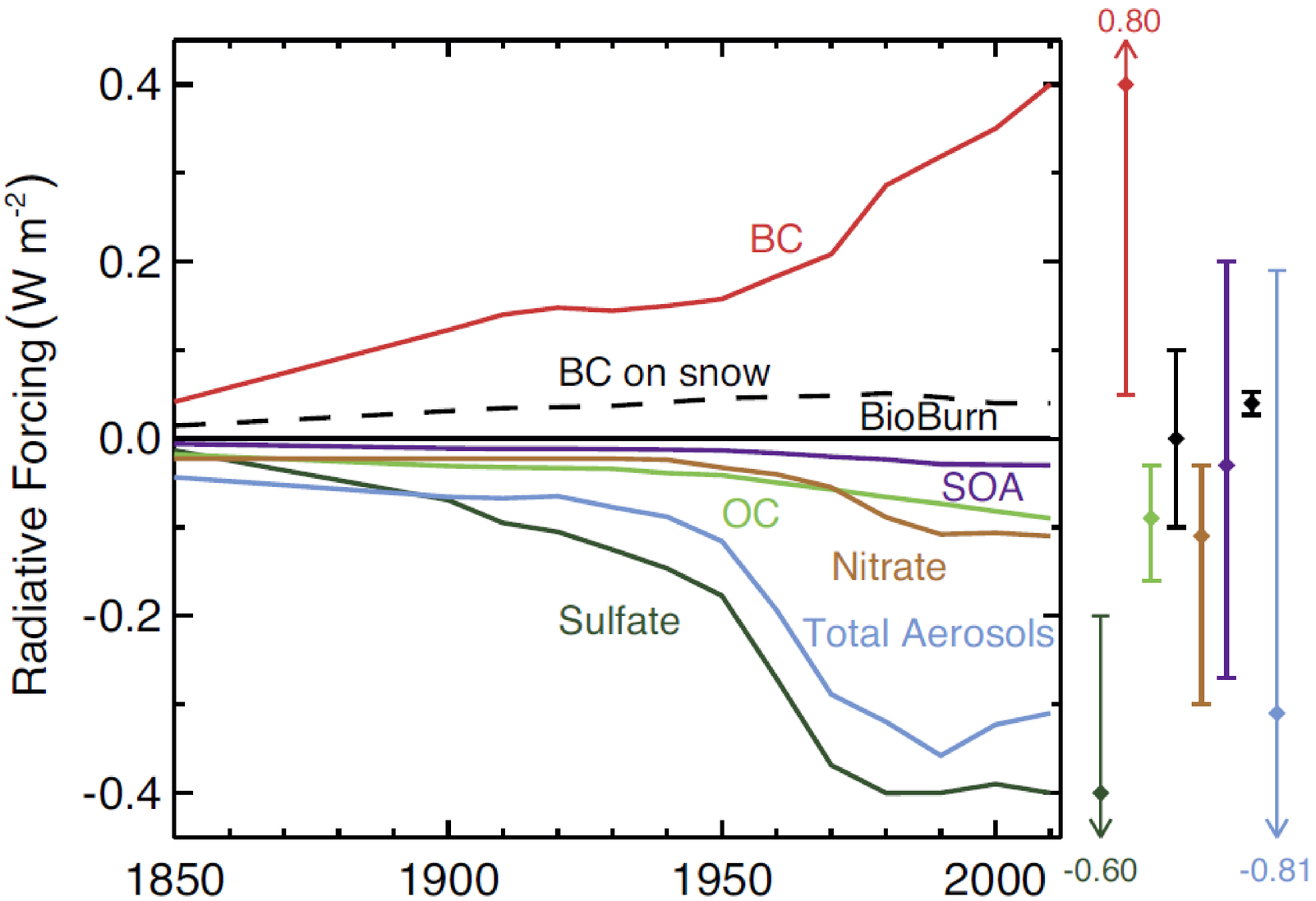
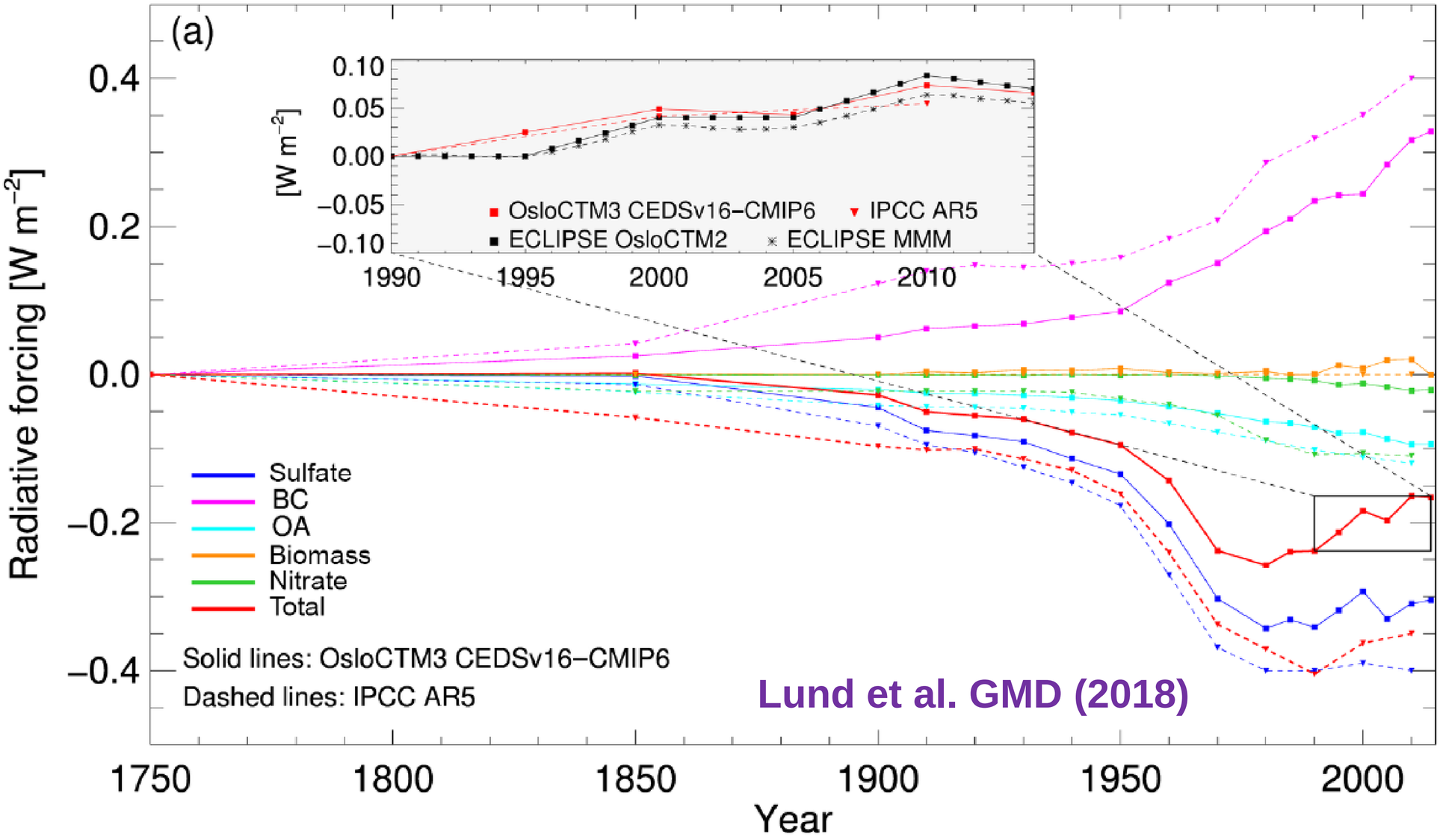
Radiative forcing

- IPCC (2013), aerosol-radiation interactions

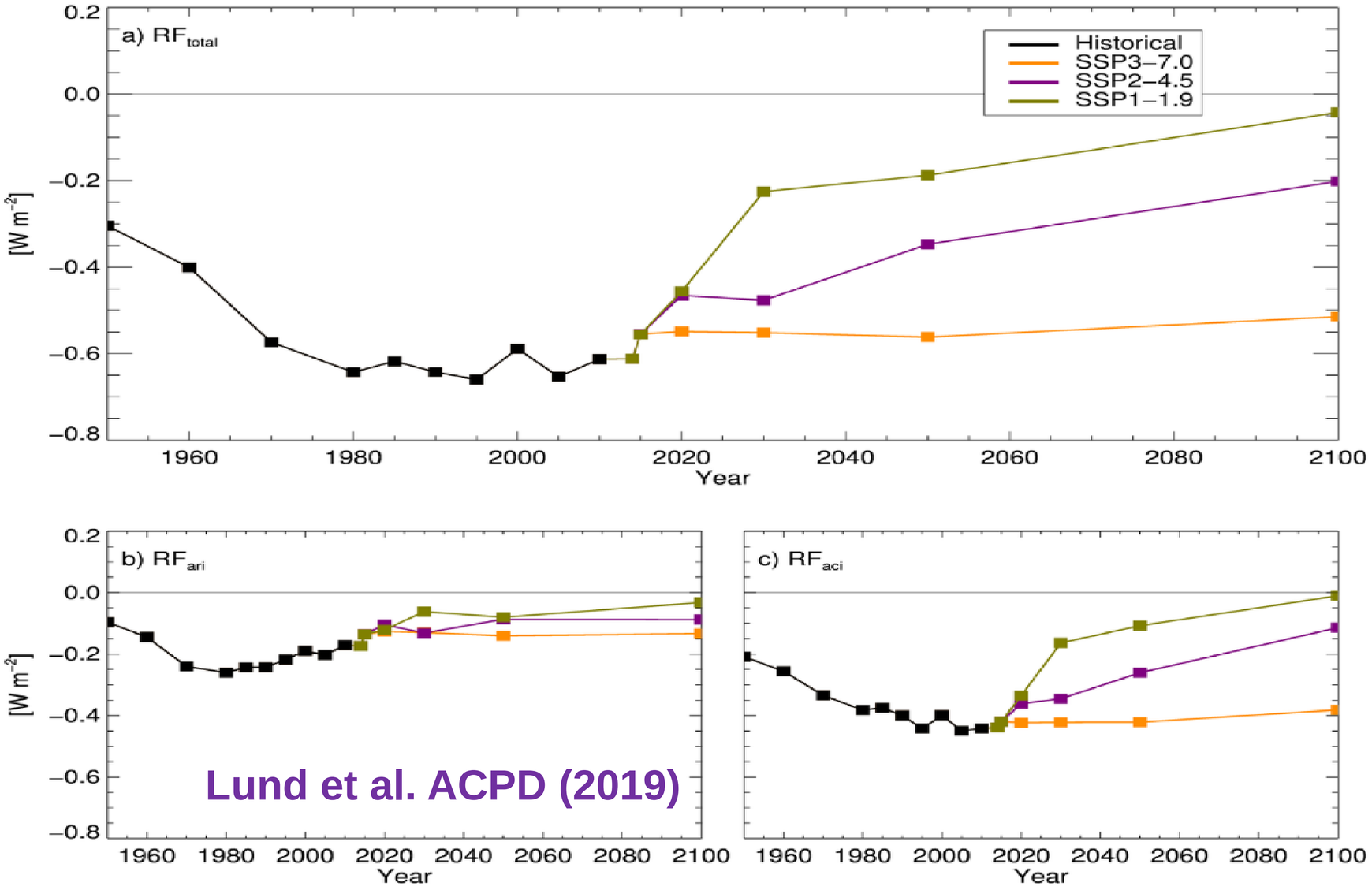


Radiative forcing



- Initial results indicate that mass extinction coefficients differ (as expected)
- We aim to include aerosol distributions from the AeroCom models into off-line radiative forcing calculations taking differences in MEC and MAC.

Radiative forcing



Historical experiment

https://wiki.met.no/aerocom/phase3-experiments

Historical experiment

The main aim of the historical experiment is to understand regional trends in aerosol distribution from 1850 to 2015 and make an AeroCom reference aerosol distribution dataset (1850-2015). This experiment will also quantify the aerosol impact on TOA and surface forcing with a main emphasis on the direct aerosol effect. We underscore that the CMIP6 CEDS emissions must be used for the historical simulations. Simulations can either be performed with fixed sea-surface temperature (SSTs), historically evolving SSTs or fixed meteorology for one year. We encourage radiative forcing simulations, but if difficult to achieve on a short time frame we are interested also to have the aerosol fields without forcing diagnostics. To perform radiative forcing calculation in the case of using SST fields, we encourage double radiation calls. This output should as a minimum be every 10th year until 1980, thereafter a minimum of every 5th year 1980-2015 (preference yearly).

Contact: Gunnar Myhre gunnar.myhre@cicero.oslo.no

Status: Diagnostics and new instructions (new filenames) are given in the new excel sheet. Taking submission.

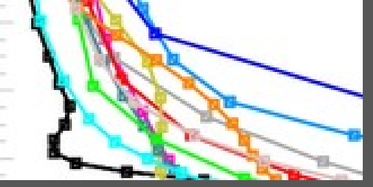
Submission deadline: 01 June 2019

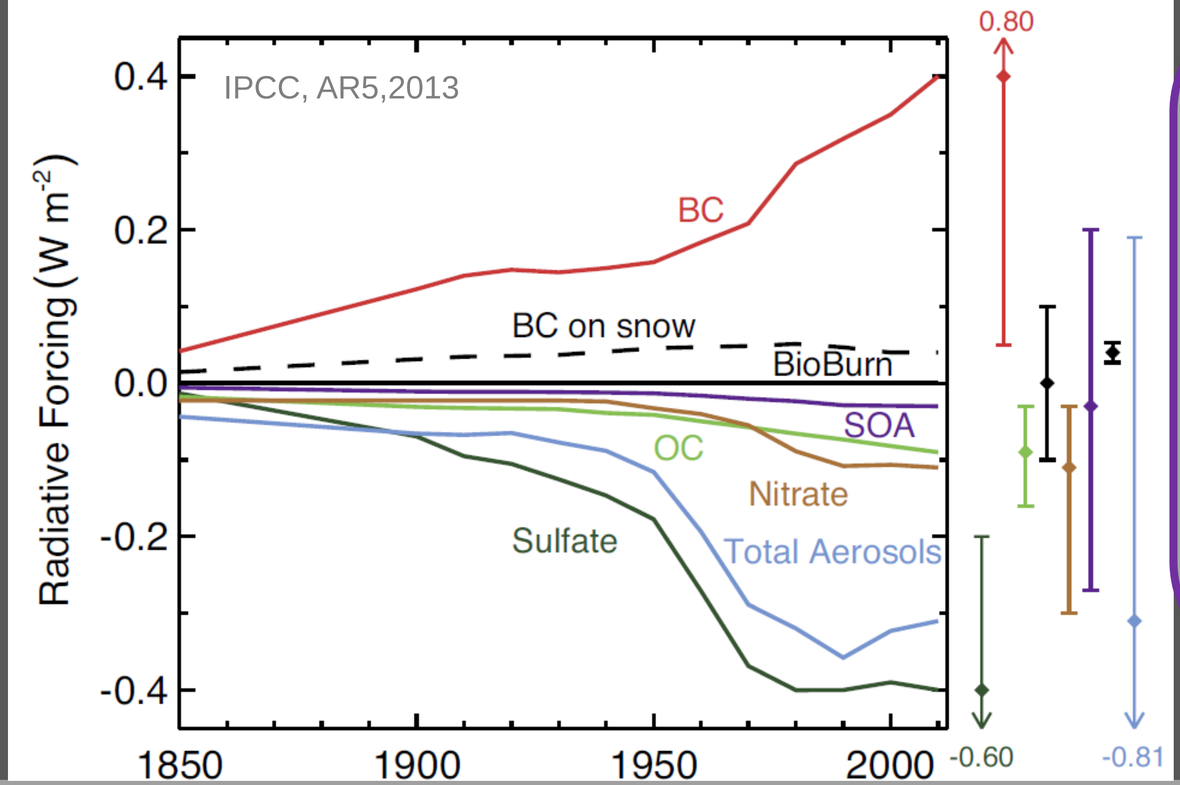
Timeline: Initial analysis of trends in aerosols distribution and radiative forcing ready by next AeroCom workshop in September 2019. Paper to be submitted by December 2019 (IPCC deadline).

Column with diagnostic requests in excel sheet: HIST

Document(s) with more info:Concentrations and radiative forcing of anthropogenic aerosols from 1750 to 2014 simulated with the Oslo CTM3 and CEDS emission inventory (Lund et al., 2018) https://www.geosci-model-dev.net/11/4909/2018/gmd-11-4909-2018-discussion.html

- **Useful to have a discussion on want to include in a manuscript for the historical experiment to be submitted by the end of the year.**





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