Sulphur cycle in CESM2-WACCM and UKESM1

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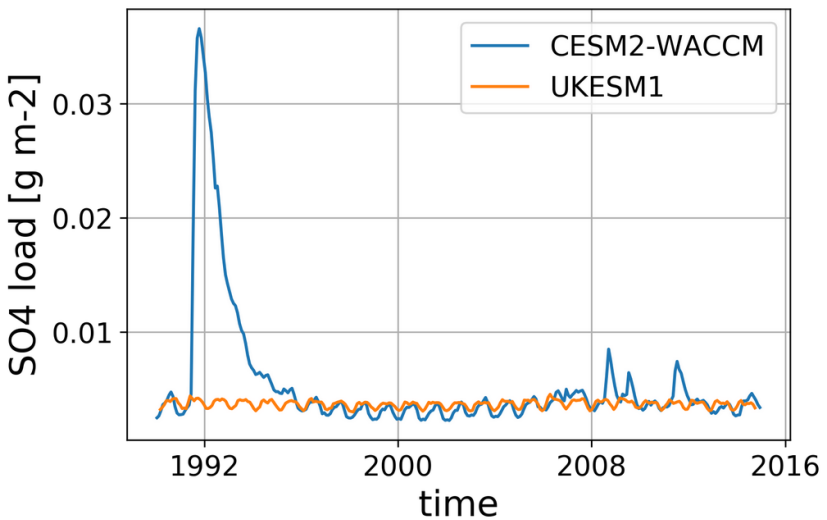
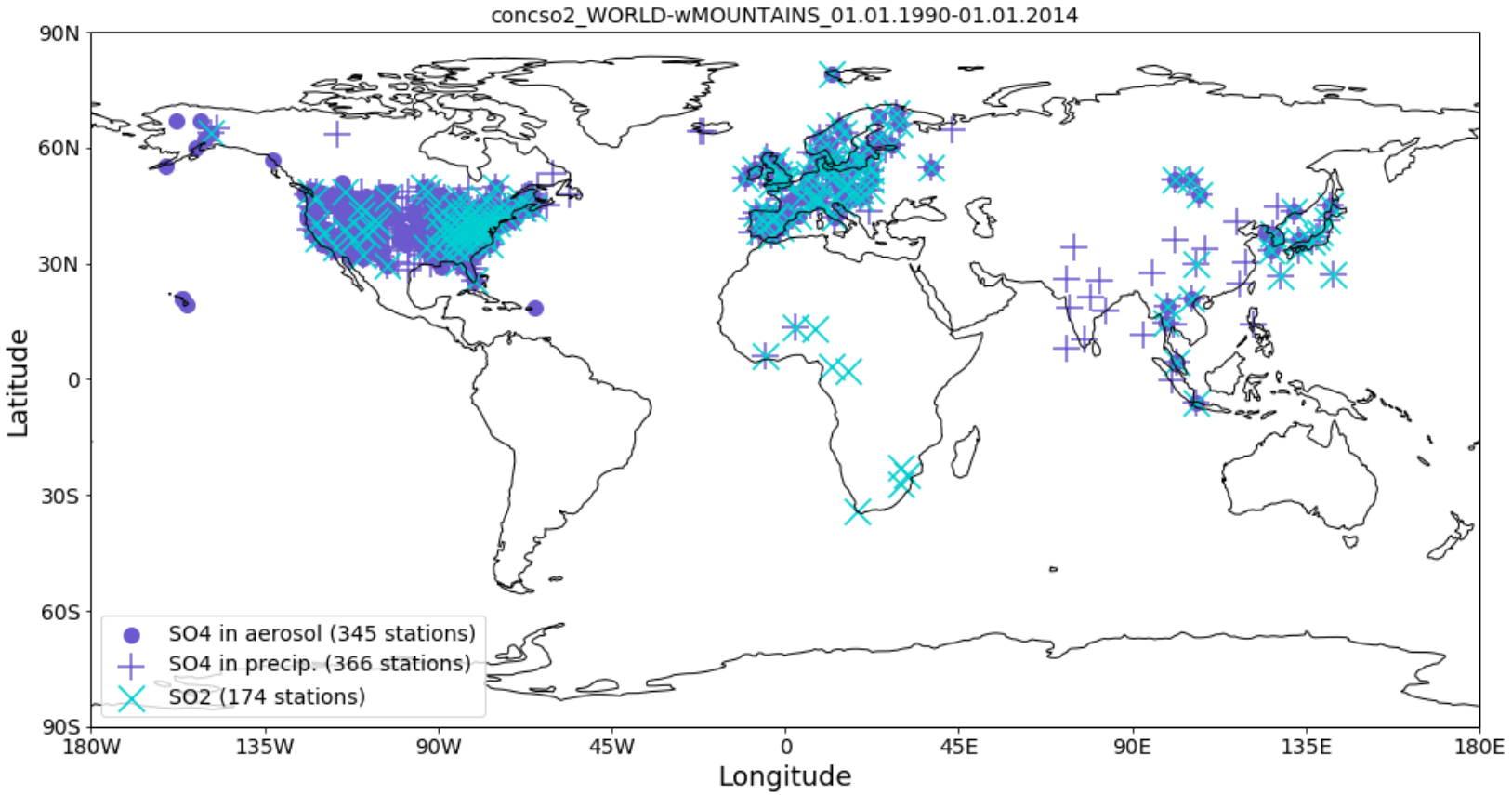
Volcanic sulphur in models

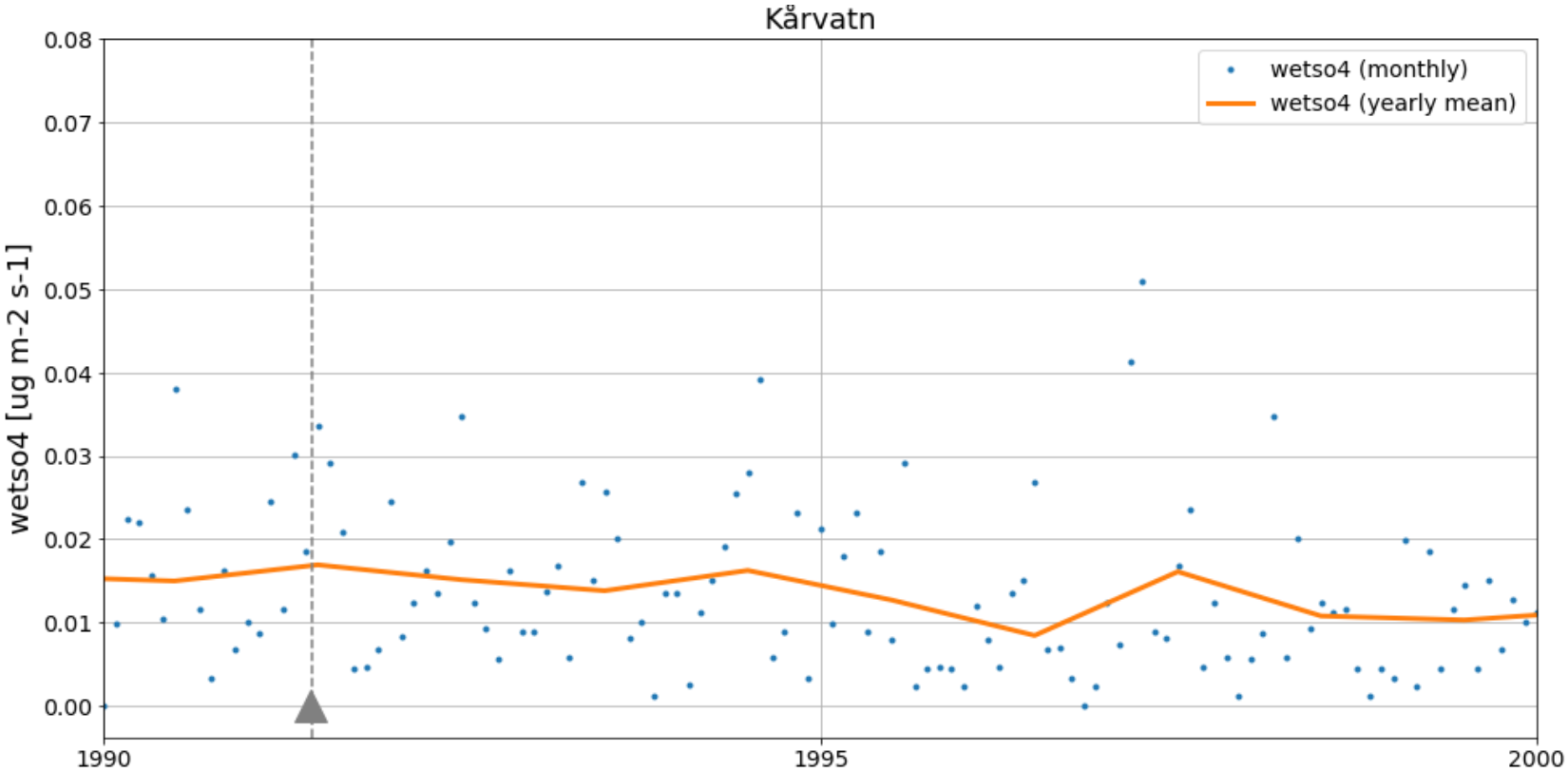
- CESM2-WACCM: includes volcanic sulphur
- UKESM1: eruptions represented in terms of AOD



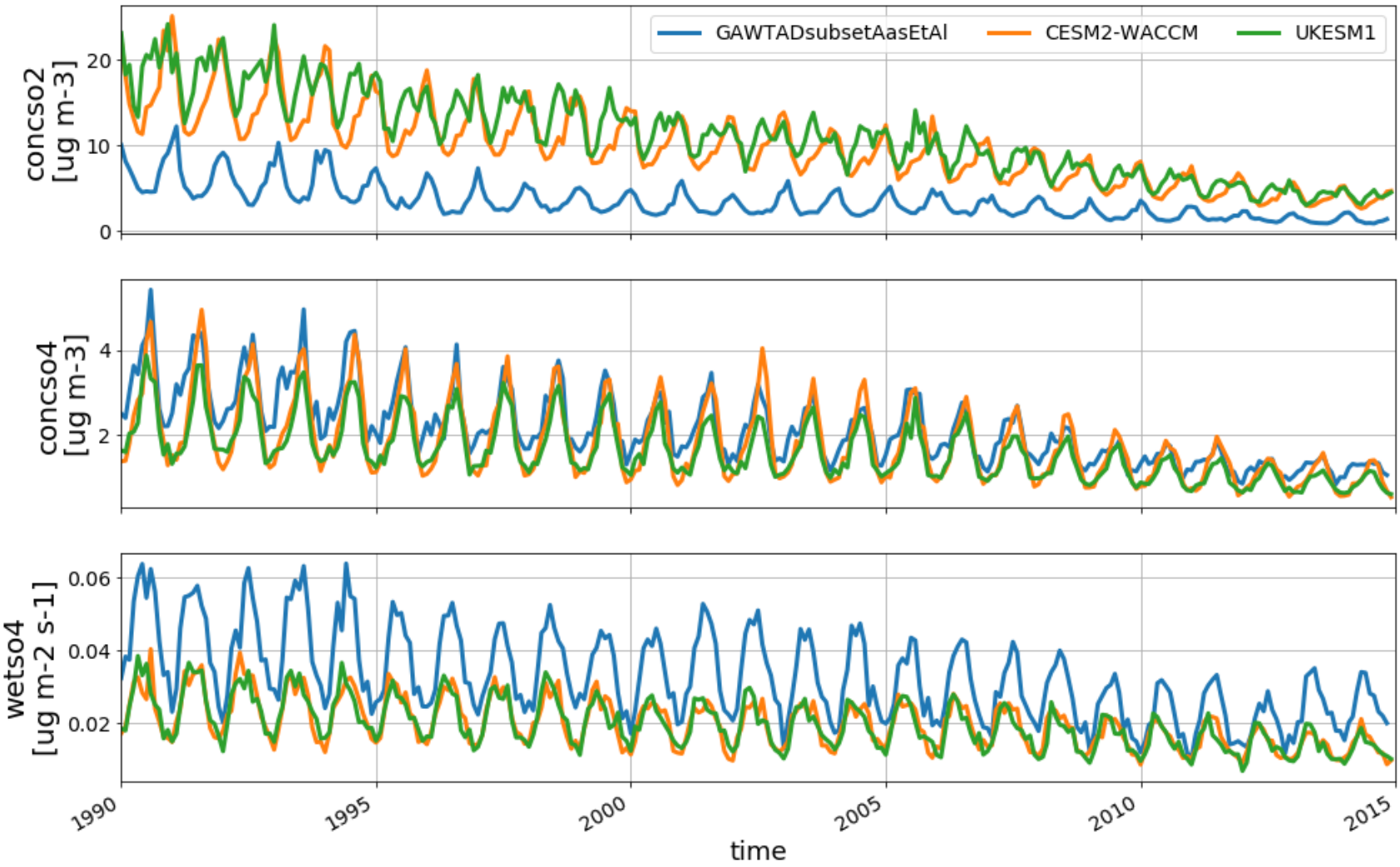
Observations



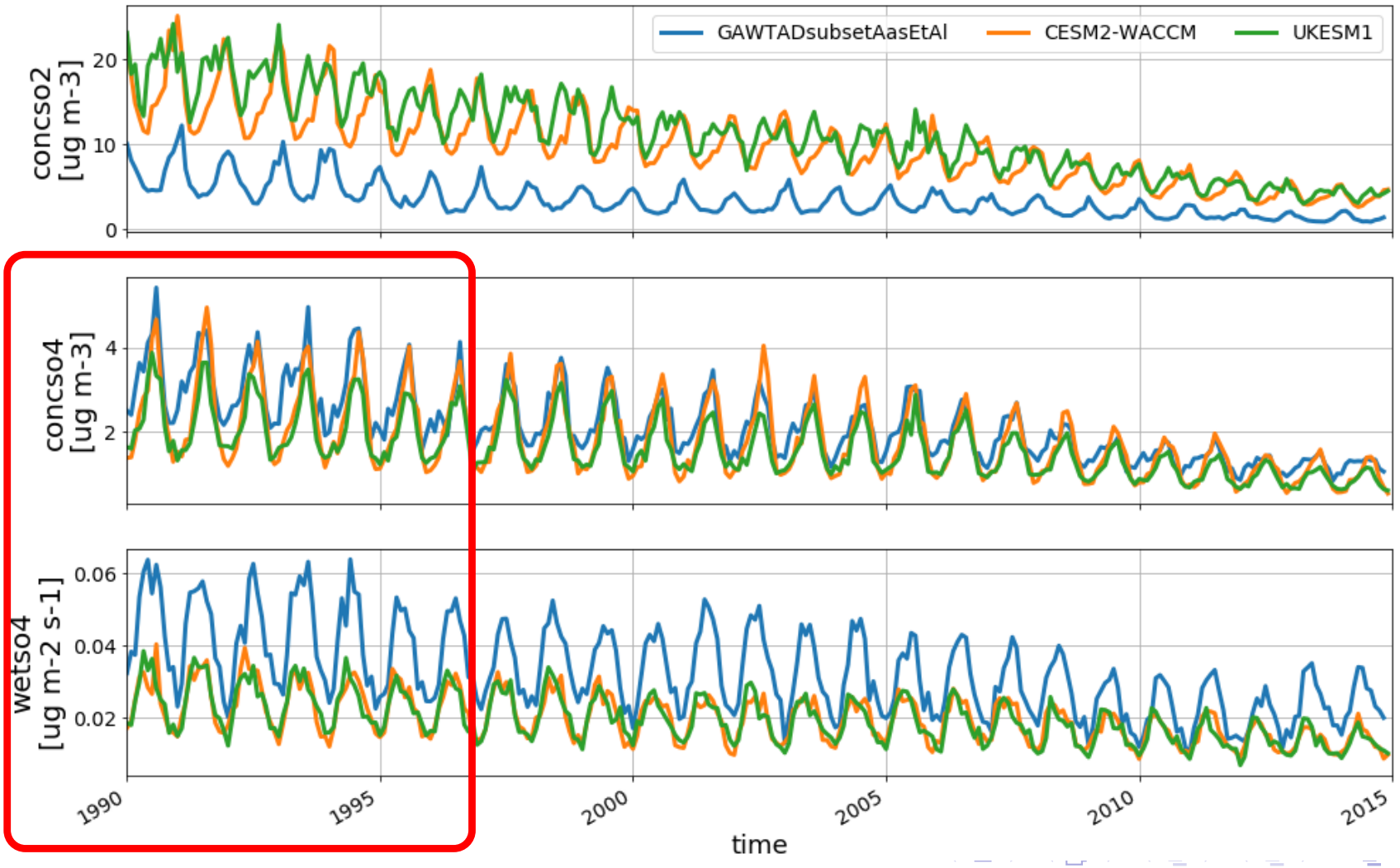
Volcanic signal in pristine locations?



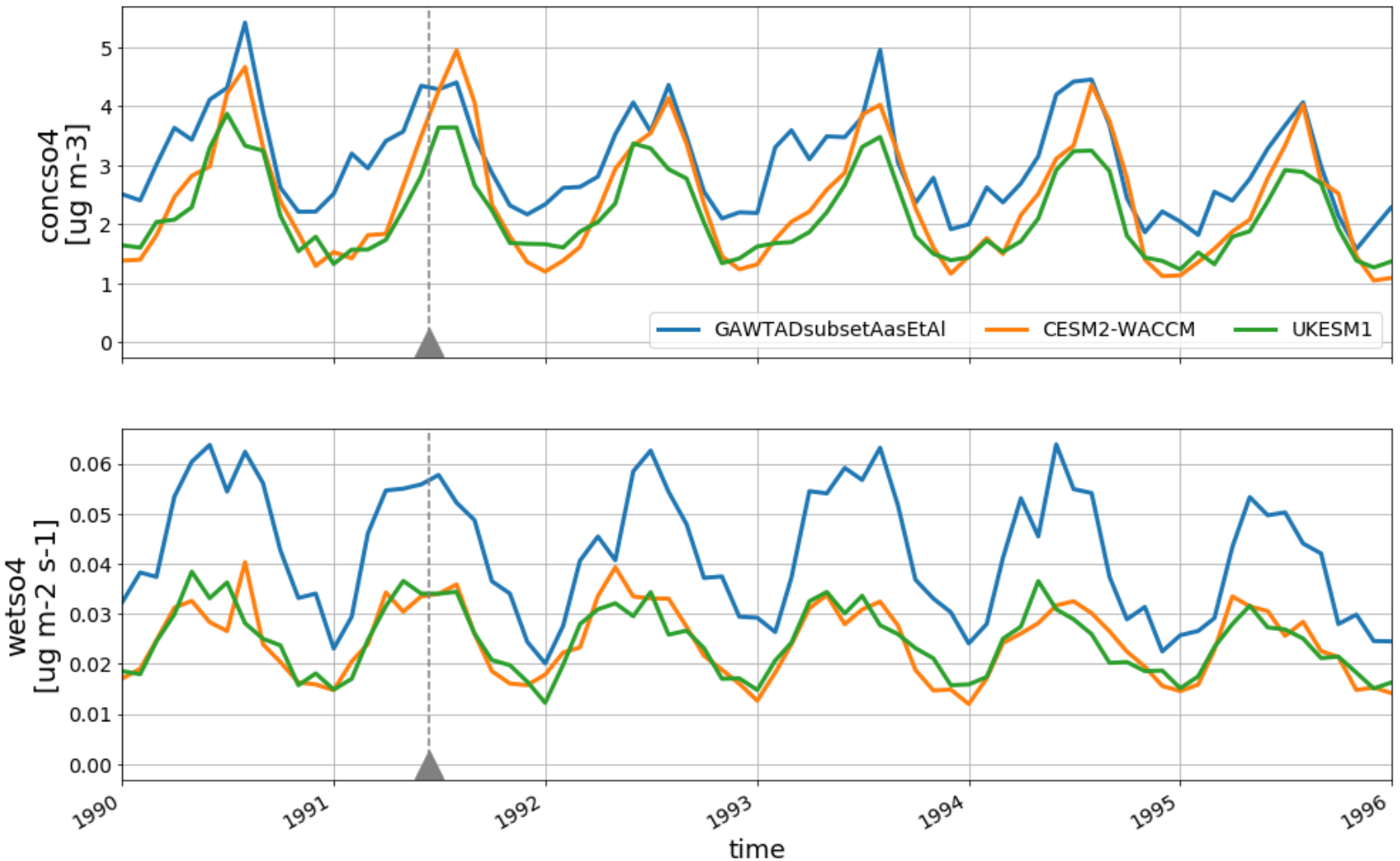
Sulphur cycle time series



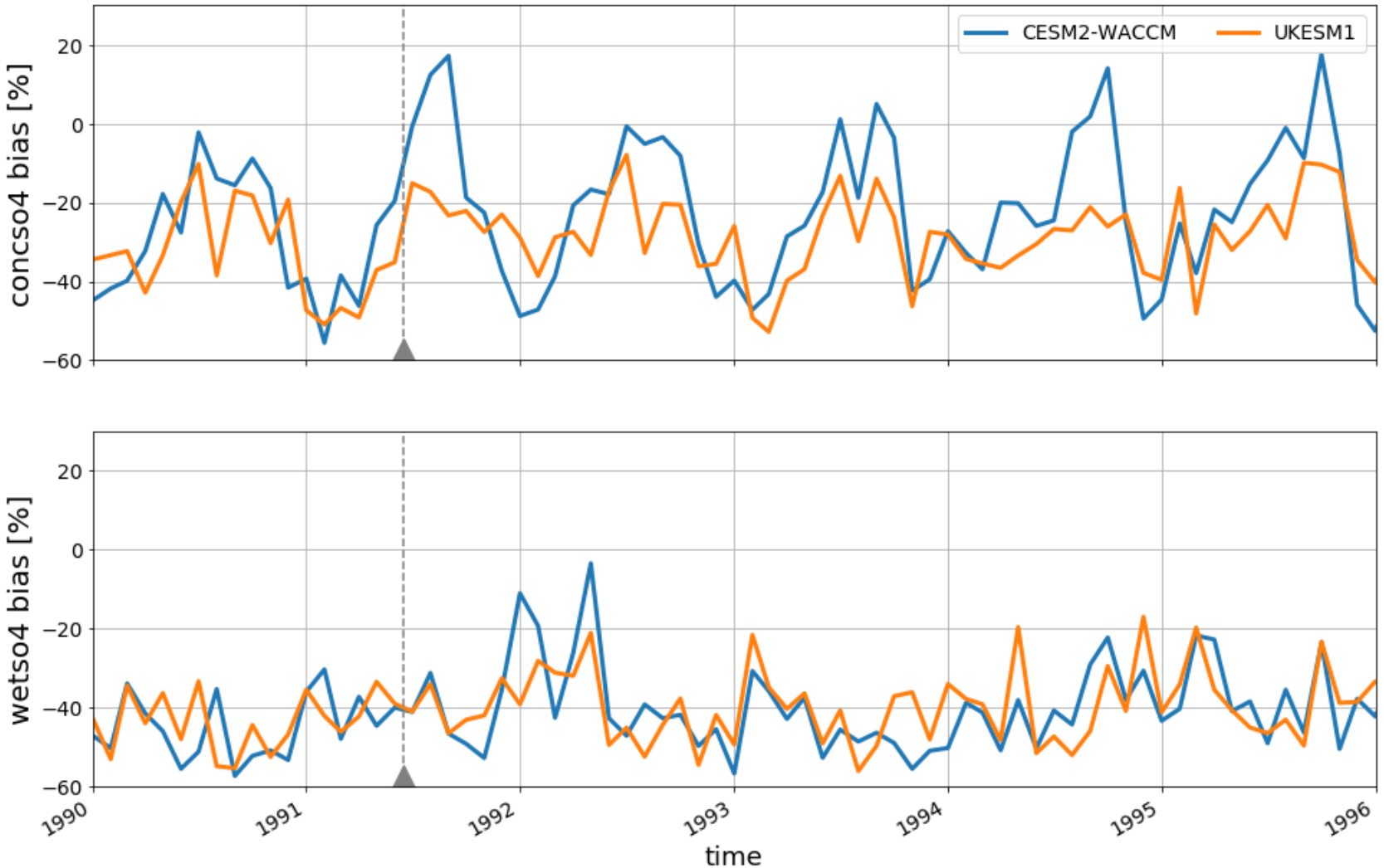
Sulphur cycle time series



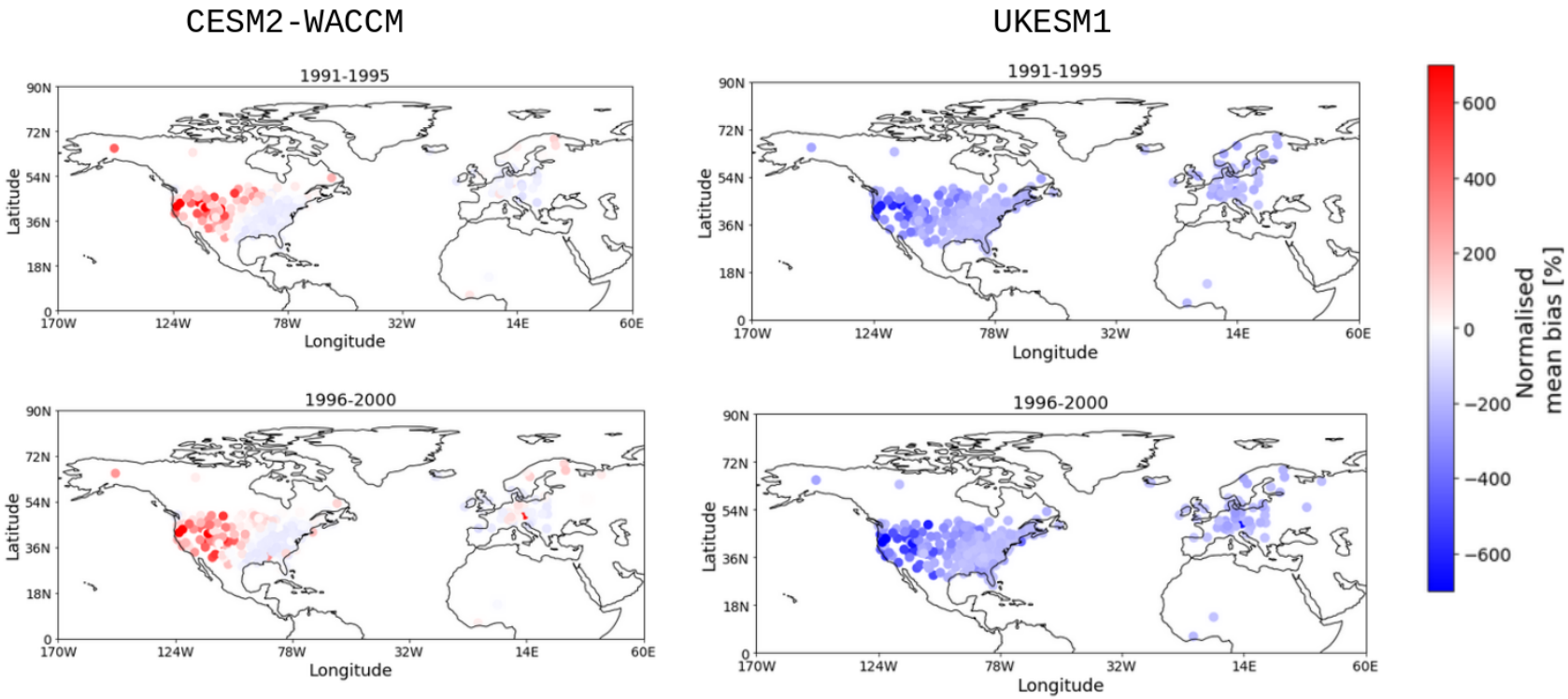
Sulphur cycle time series (90s)



Model bias after Pinatubo



SO4 wet deposition bias



Conclusions

- Including/excluding volcanic sulphur emissions impacts bias in surface SO4 and wet deposition
- CESM2-WACCM overestimates SO4 aerosol lifetimes
- UKESM1 underestimates SO4 aerosol lifetimes

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- Including/excluding volcanic sulphur emissions impacts bias in surface SO4 and wet deposition
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- To-do:
  - What determines the lifetimes in the models?
    e.g. check: Is modelled lifetime changing with moving emission locations?
  - Can I quantify the impact of lifetime on forcing?