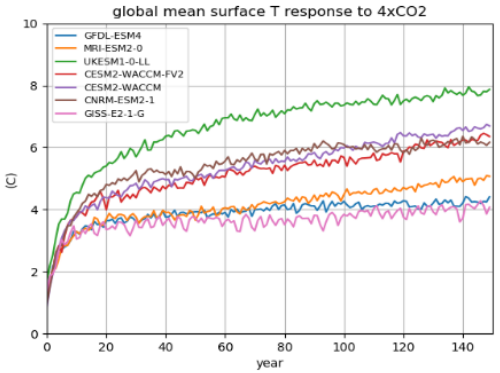
The response of the ozone layer under abrupt 4xCO2 in CMIP6

G. Chiodo, W. T. Ball, P. Nowack, C. Orbe, J. Keeble, M. Diallo and B. Hassler

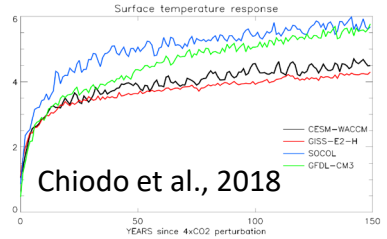
- Motivation: **interactive ozone** important for ECS under 4xCO2, yet there is **model uncertainty** and the **role of ozone still unclear**
- CMIP5 models show **large spread** in ozone response to 4xCO2, existence of **very different time-scales** and possible **relationship with climate sensitivity**
- In this work, we use **CMIP6** to further **explore ozone response in DECK experiments** (more models & wider range of ECS!)

1) Global warming in CMIP6 vs CMIP5

CMIP6



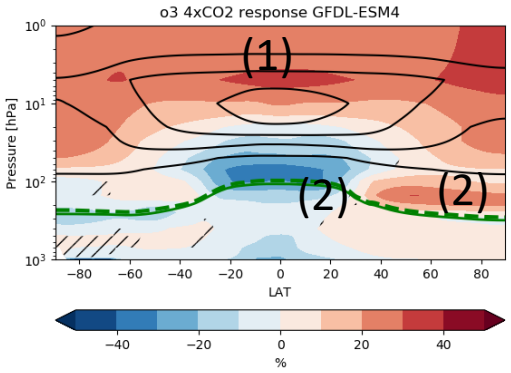
CMIP5



Chiodo et al., 2018

More models in CMIP6, and generally higher ECS (e.g. CESM-WACCM)

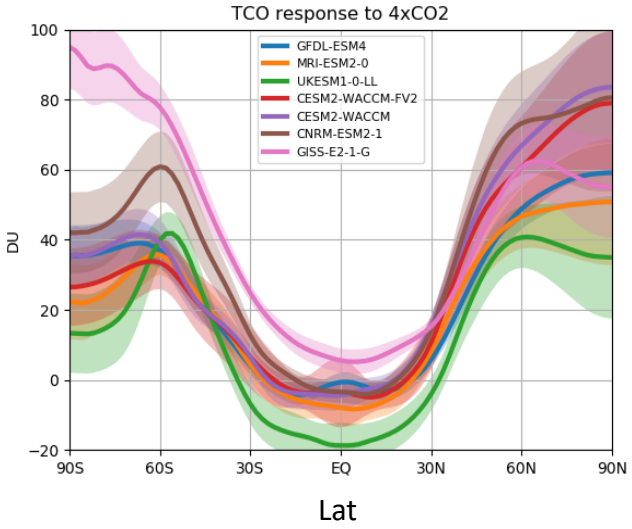
2) What is the ozone response to CO2?



(1) Increase (CO2-cooling)

(2) Decrease (increase) in the lower strat. due to **faster BDC**

→ Consistent with CMIP5 (Chiodo et al., 2018)



Tropical TCO **uncertain** (competition btw. O3 increase in upper strat. and decrease in lower strat.) → models with higher ECS project TCO decline

Polar TCO increase (100% uncertainty)

Conclusions and Outlook:

1) Ozone response in CMIP6 similar to CMIP5. Spread in tropical TCO related to model sensitivity

2) Spread in model sensitivity does not explain entire ozone spread (e.g. polar regions!)

3) Analysis of transient CO2 exp. underway, to elucidate linearity and relationship to radiative forcing