DKRZ - Project 853:
ESCiMo Consortial simulations
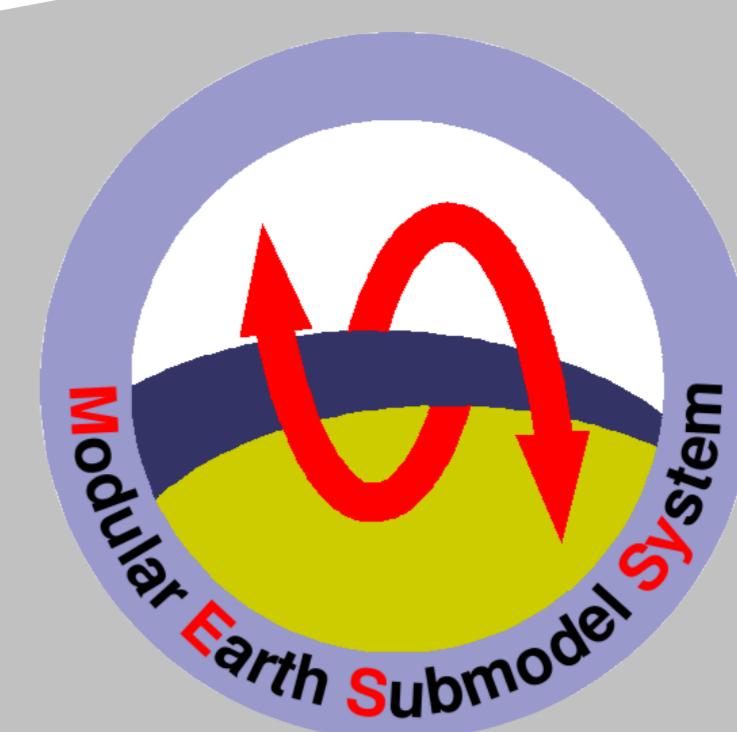
Earth System Chemistry integrated Modelling (ESCiMo)

SPARC · CCMI (chemistry-climate model initiative) · IGAC · SHARP

definition of set-ups and boundary conditions → ..... → EMAC → ..... → Scientific Community → ipcc WMO/UNEP Ozone assessment
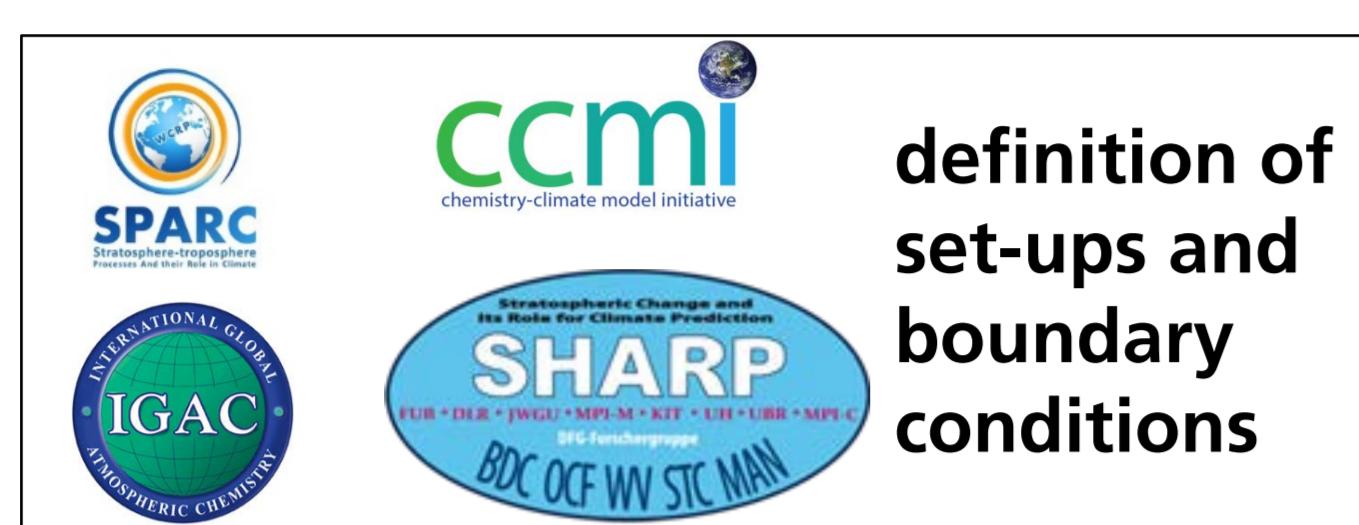
DKRZ DEUTSCHES KLIMARECHENZENTRUM
Powered by DKRZ
6 Mill. CPU-h
2 Petabyte data

Development of ozone in the ESCiMo model simulations in comparison with observations

NOx emissions

anthrop. NOx (prescribed)

MACCity
ACCMIP+AR5/RCP6.0

Tg/a
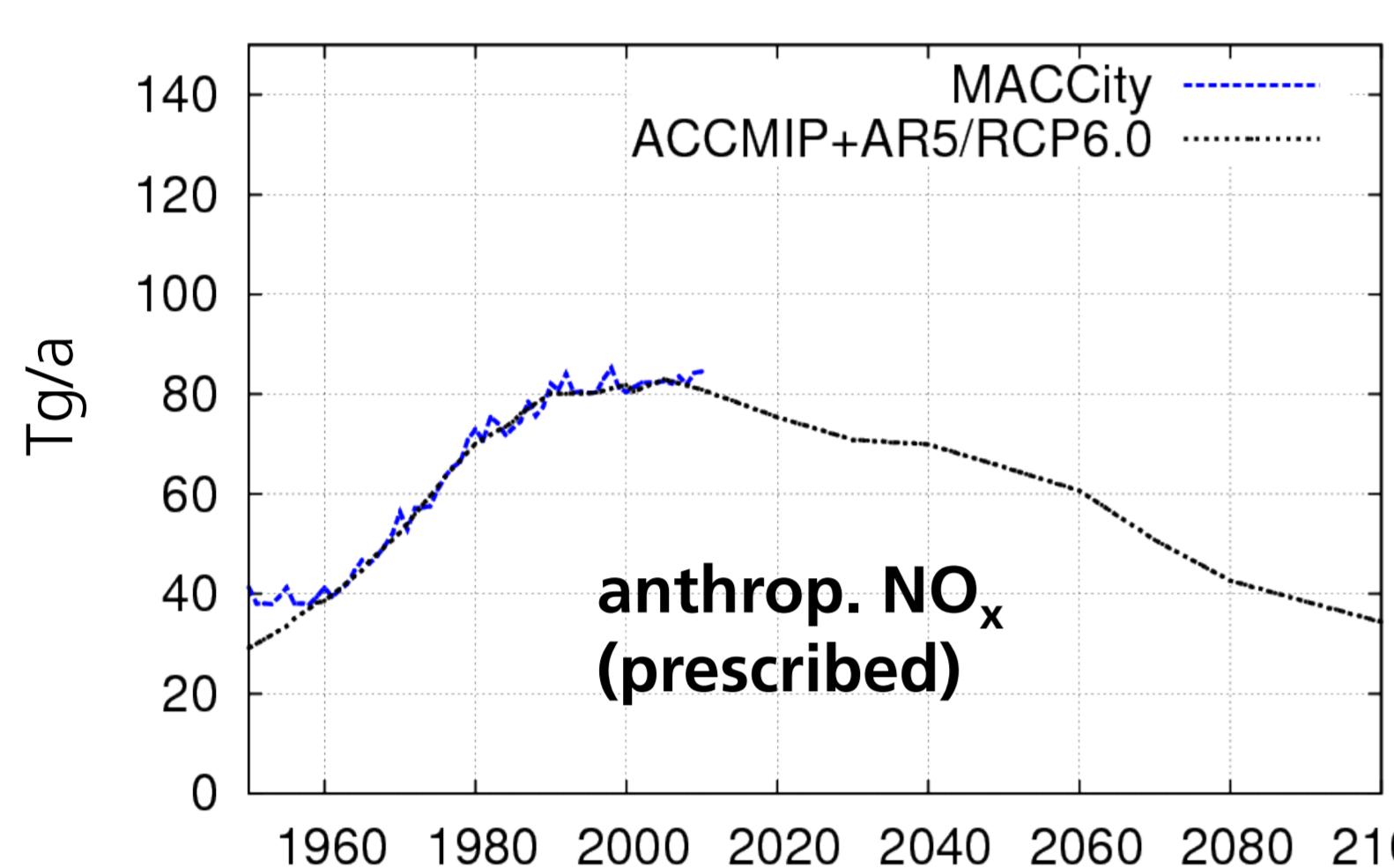
lightning-NOx (simulated)

surface-NOx (simulated)

Annual mean tropospheric ozone column

DU

30N – 60N
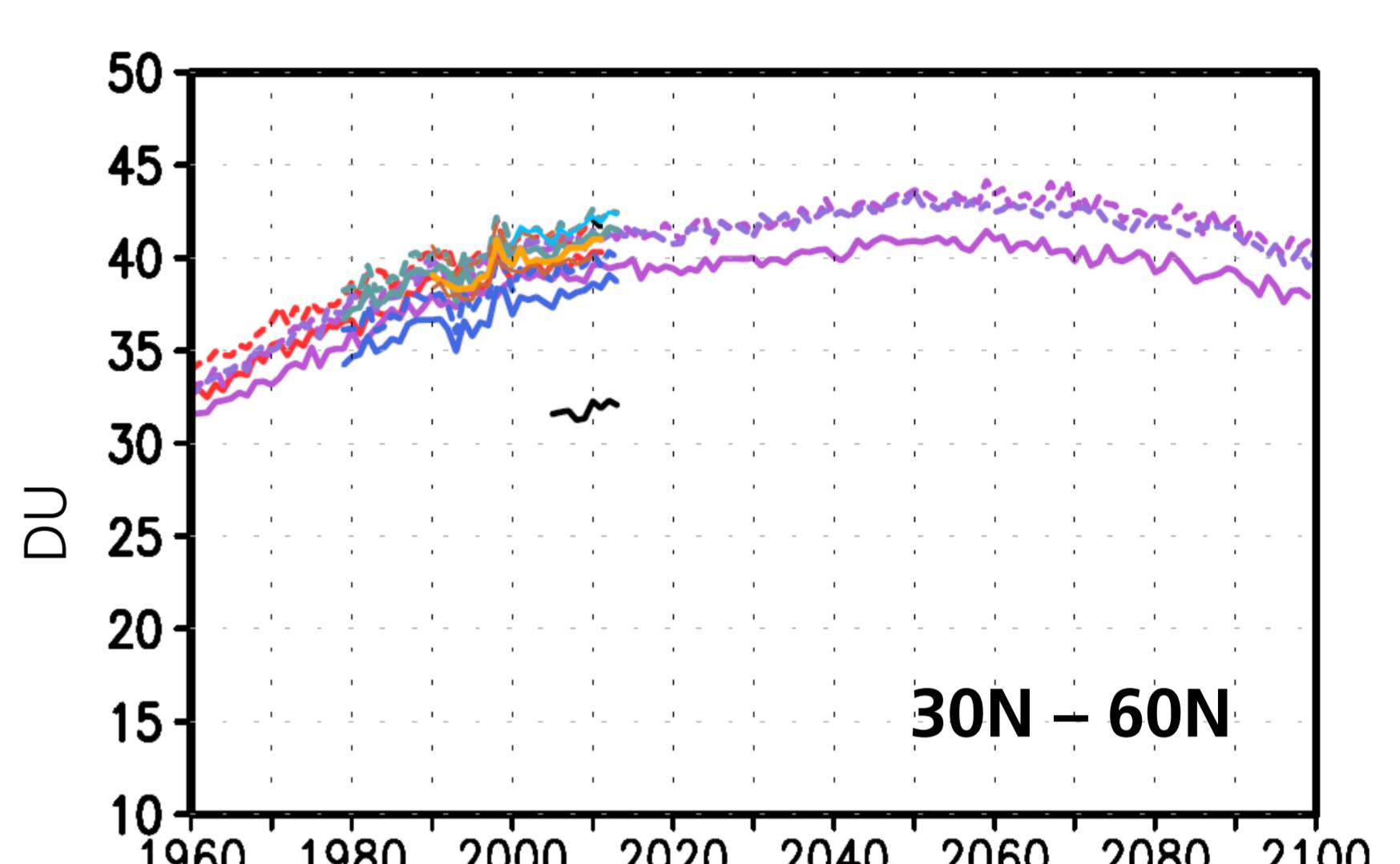
Sensitivity study

Influence of the mean temperature nudging on the production and loss rates of ozone.

ozone production rate — ProdO3
ozone loss rate — LossO3

Pressure [hPa]

10^{-6} mol/mol/month

−0.05 −0.04 −0.03 −0.02 −0.01 0 0.01 0.02 0.03 0.04 0.05

RC1−base−07 · RC1−base−07a · RC1−base−08 · RC1−base−08a · RC2−base−04 · RC2−base−05 · RC2−oce−01 · RC1SD−base−07 · RC1SD−base−08 · RC1SD−base−09 · RC1SD−base−10 · RC1SD−base−10a · RC1 aero · OBS
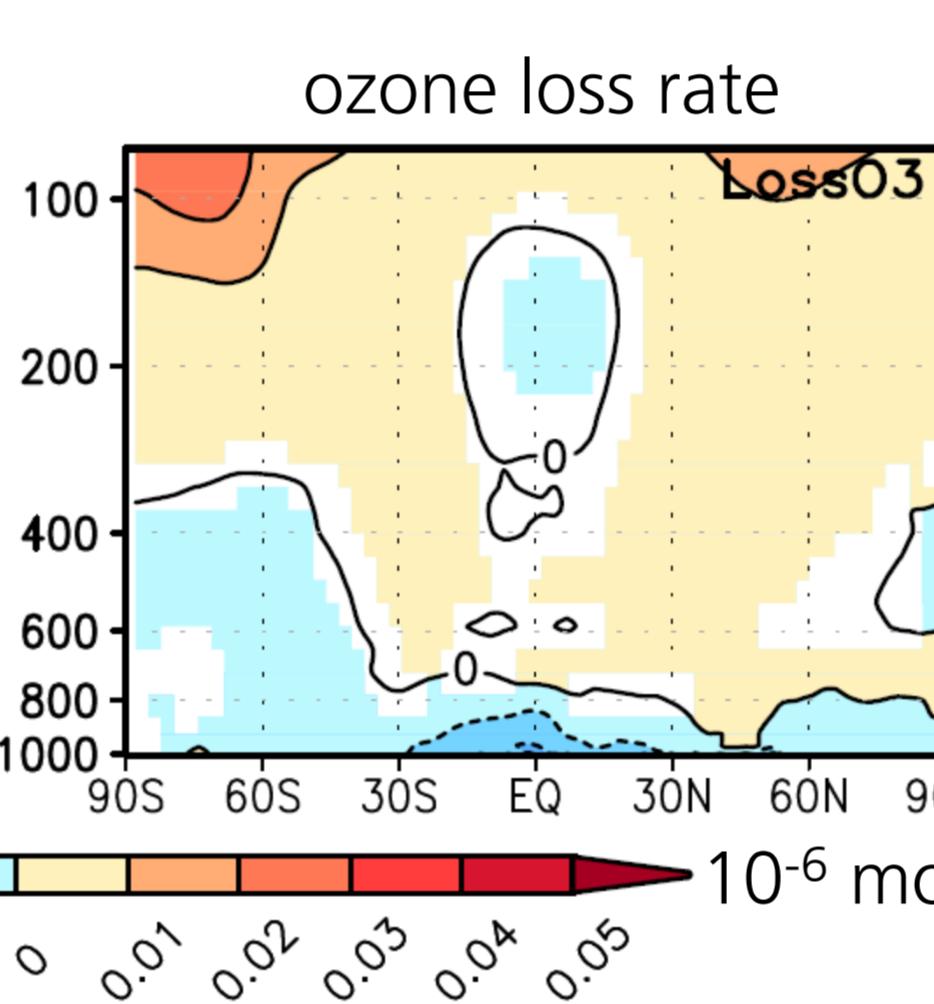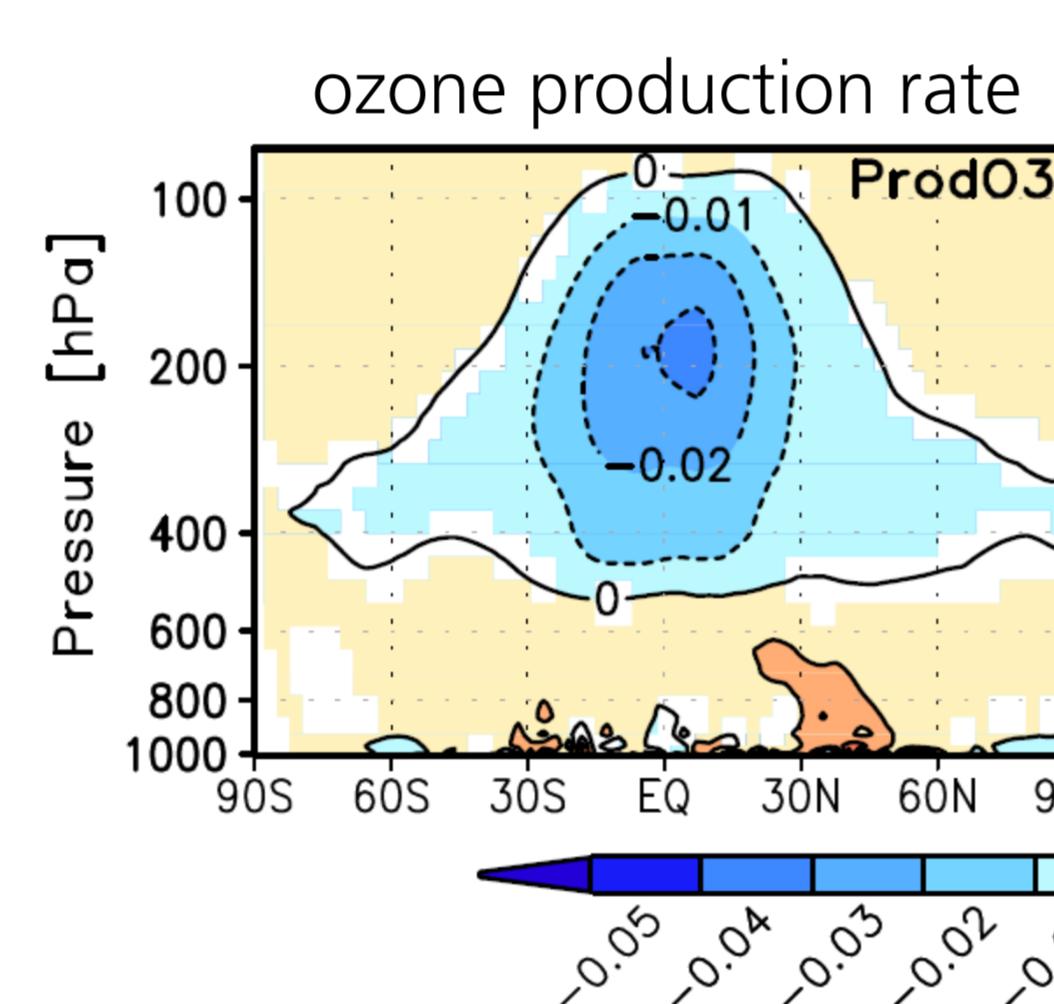
Comparison of CO climatologies (2005-2013)

CARIBIC measurements
CO meas, @35<lat<60 @wholeday @180<p<280
HrelTP [km]
measurement

Model
CO model, @35<lat<60 @wholeday @180<p<280
HrelTP [km]
tropopause
RC1SD-base-10a
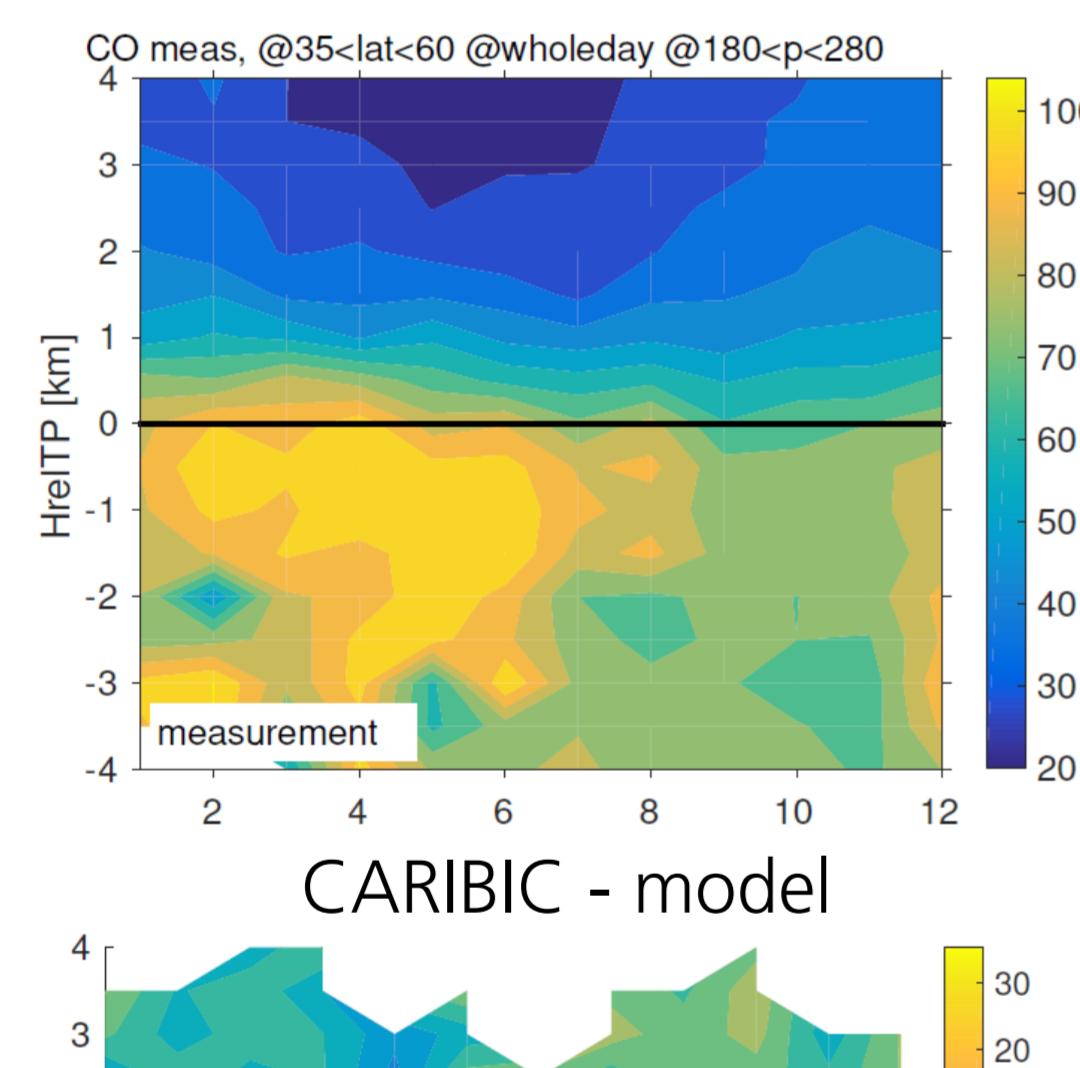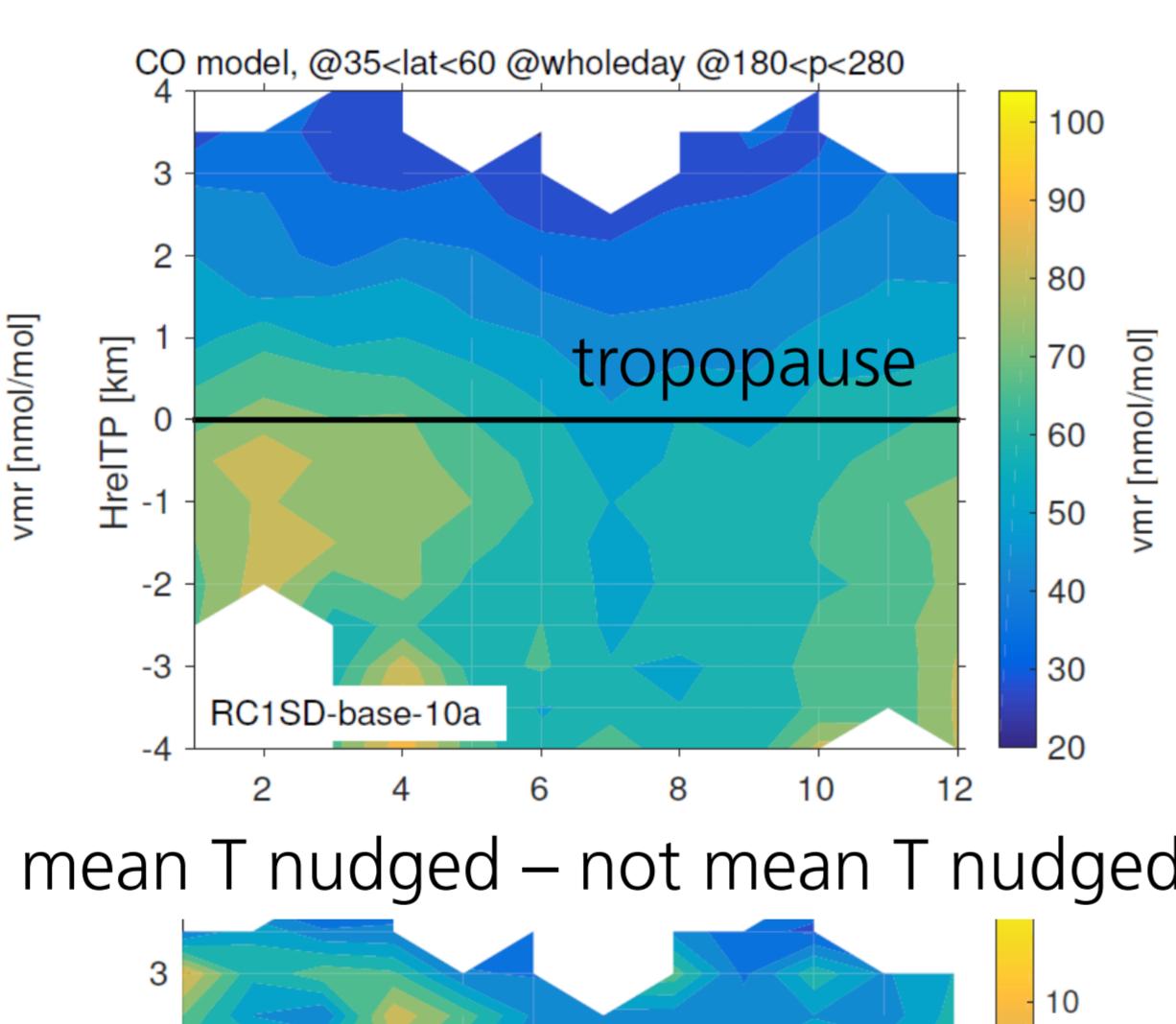
CARIBIC - model
HrelTP [km]
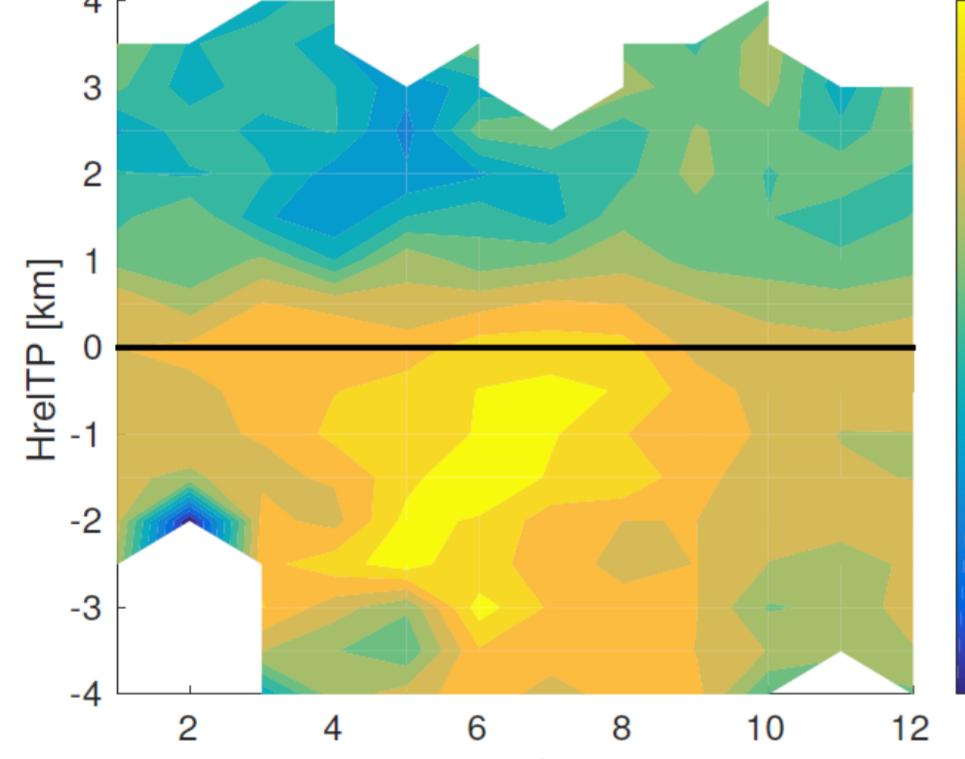
mean T nudged – not mean T nudged
HrelTP [km]

month

Global annual average of SSTs and SICs

Simulation with coupled ocean compared with simulations with prescribed SSTs/SICs and ERA-interim.

RC2−oce−01 · HadGEM2−ES · ERA−Interim · HadISST1

global average ice free SST (K)
global average sea ice coverage (10^{12} m2)
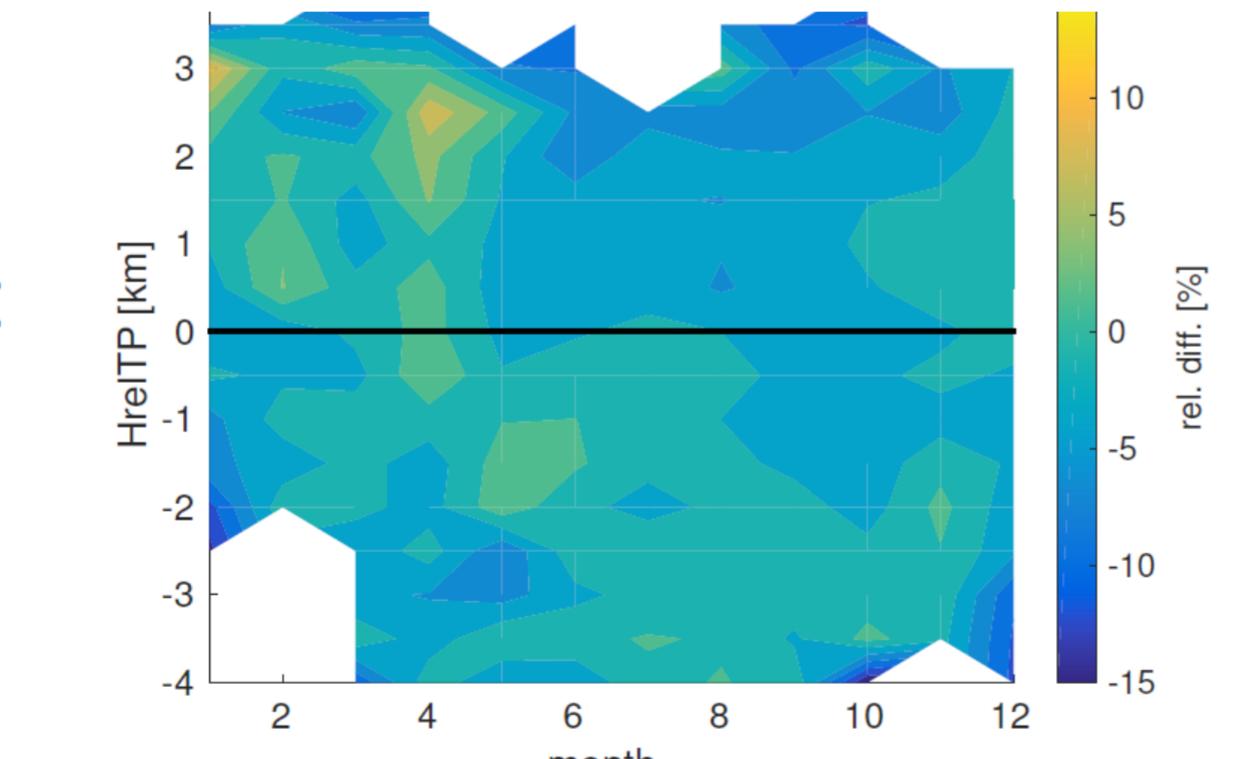
Stratospheric water vapour variability

Millennium „Drop"

HALOE/MLS water vapour anomaly, 83 hPa
ppmv
RC1SD
3-point running mean

water vapour anomaly 83 hPa, 60N-60S
RC1SD · RC1 · RC2
ppmv
12-point running mean

Millennium „Drop"

Simulation   HALOE/MIPAS

amplitude · date · length

Pressure / hPa
Latitude / degree
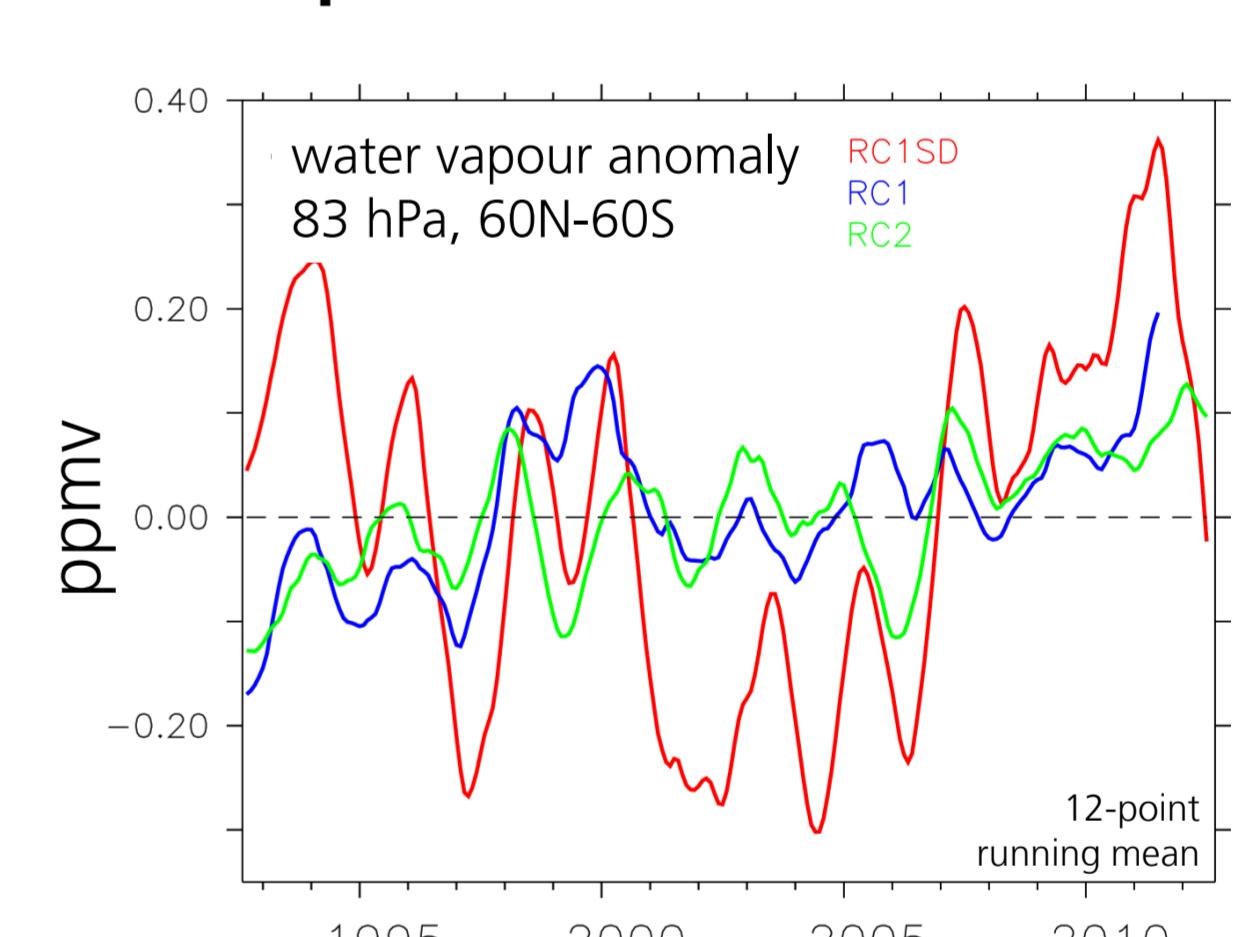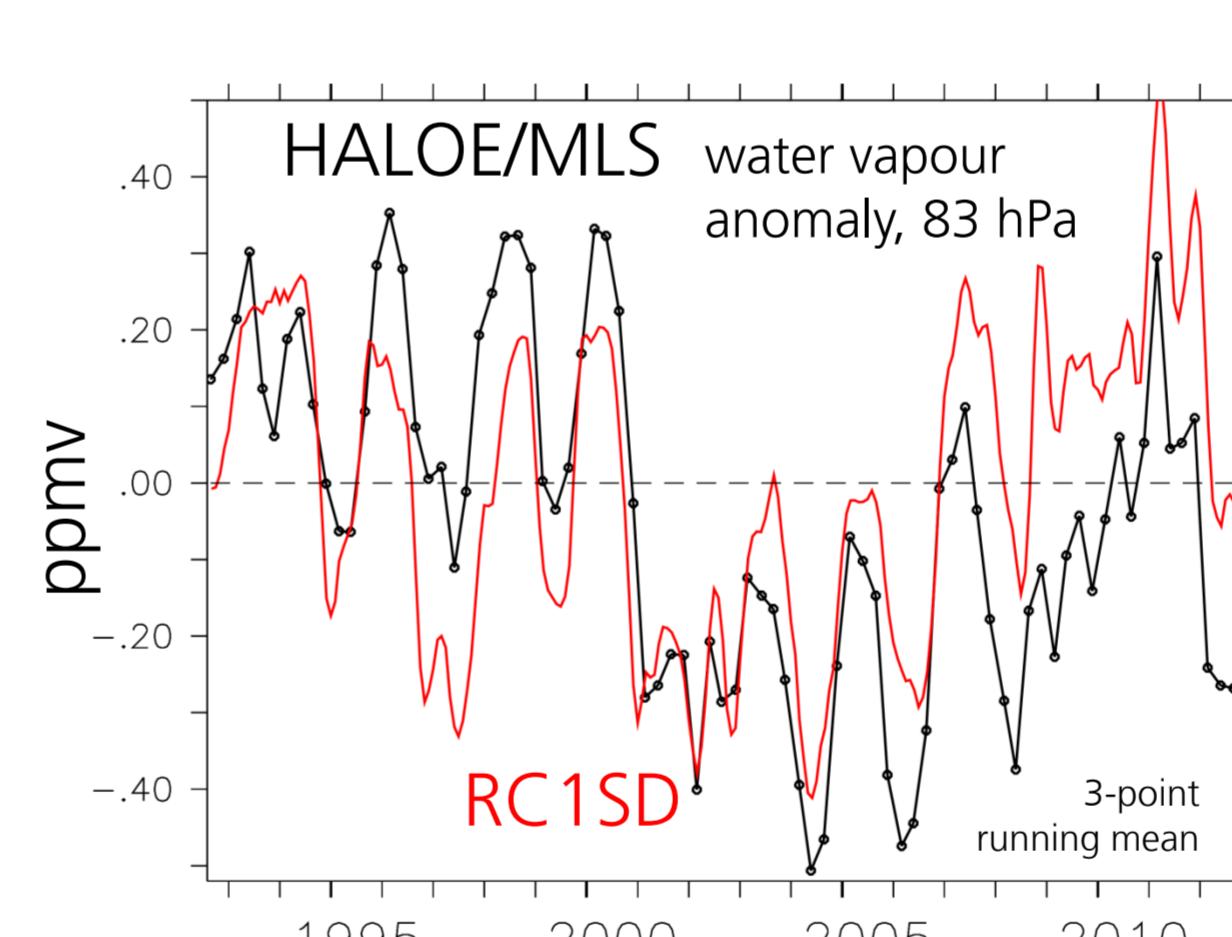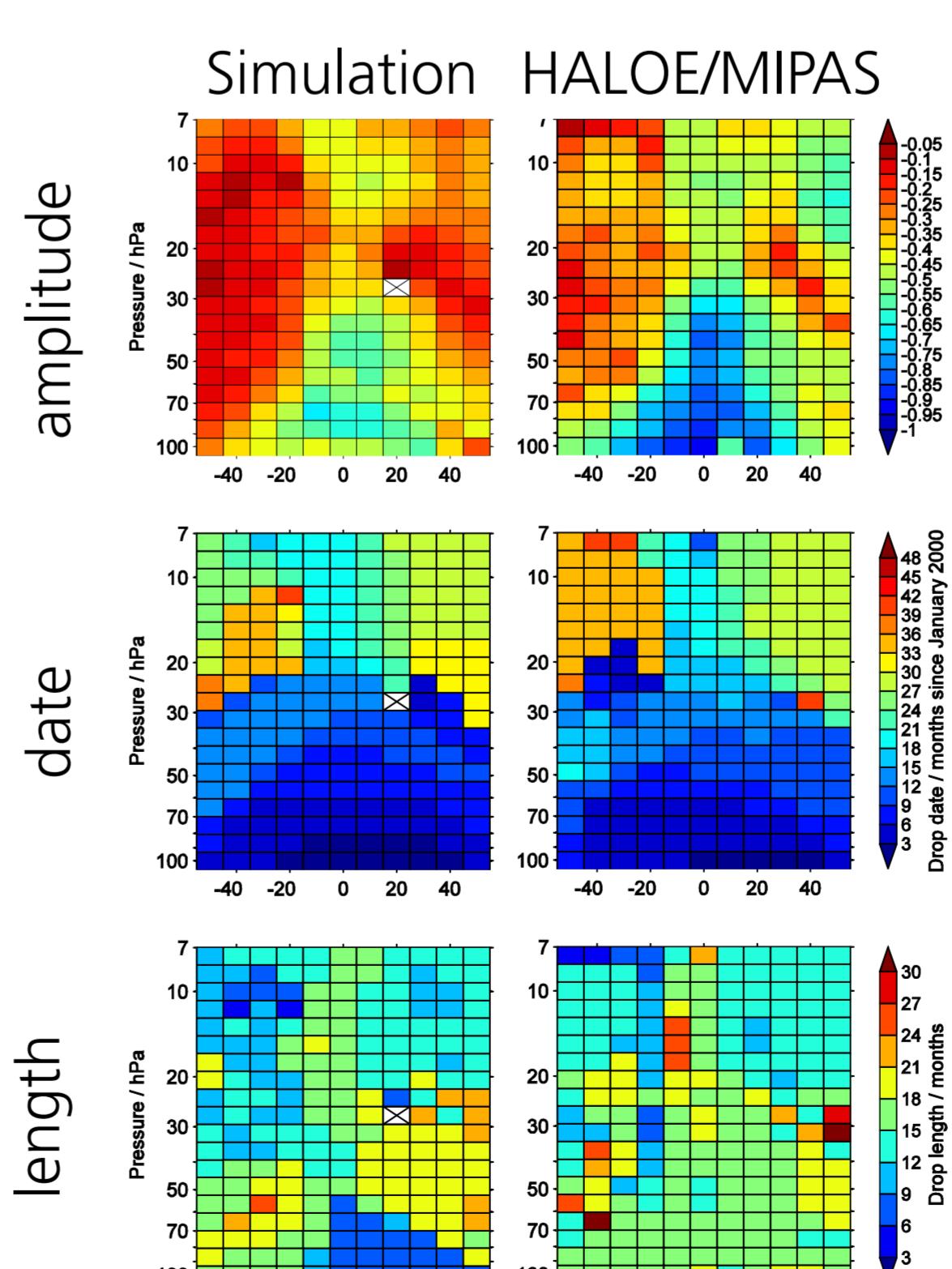
Volcano minus no volcano

Pressure (hPa)

EL Chichon
1982 1983 1984 1985 1986

Mt. Pinatubo
1991 1992 1993 1994 1995

ppmv
−20 −1 −0.6 −0.2 0.2 0.6 1 20

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