

Pathway to regular and sustained delivery of climate forcing datasets workshop: 28-31 October 2024, ECMWF Reading

Session 3: CMIP7 DECK Protocol Development

Chairs: Vaishali Naik, Ben Sanderson

Agenda

- Status of v0 data implementation in models (30 mins)
- Summary of DECK experimental protocol in CMIP6 (12 mins)
- Revisiting piControl/ScenarioMIP protocol (10 mins each)
 - Volcanic baseline time period, vertical extent and scenario specification (Thomas Aubry)
 - Solar baseline period (Bernd Funke)
 - Natural variability embedded in biomass burning emissions (John Fasullo) (Recorded)
 - Natural variability embedded in Ozone (Michaela Hegglin)
- Guidance development including report to CMIP Core Panel (45 mins)

Status of v0 data implementation in GFDL models

Vaishali Naik
NOAA GFDL

A huge thank you to Forcing Data Providers for CMIP6+v0!!

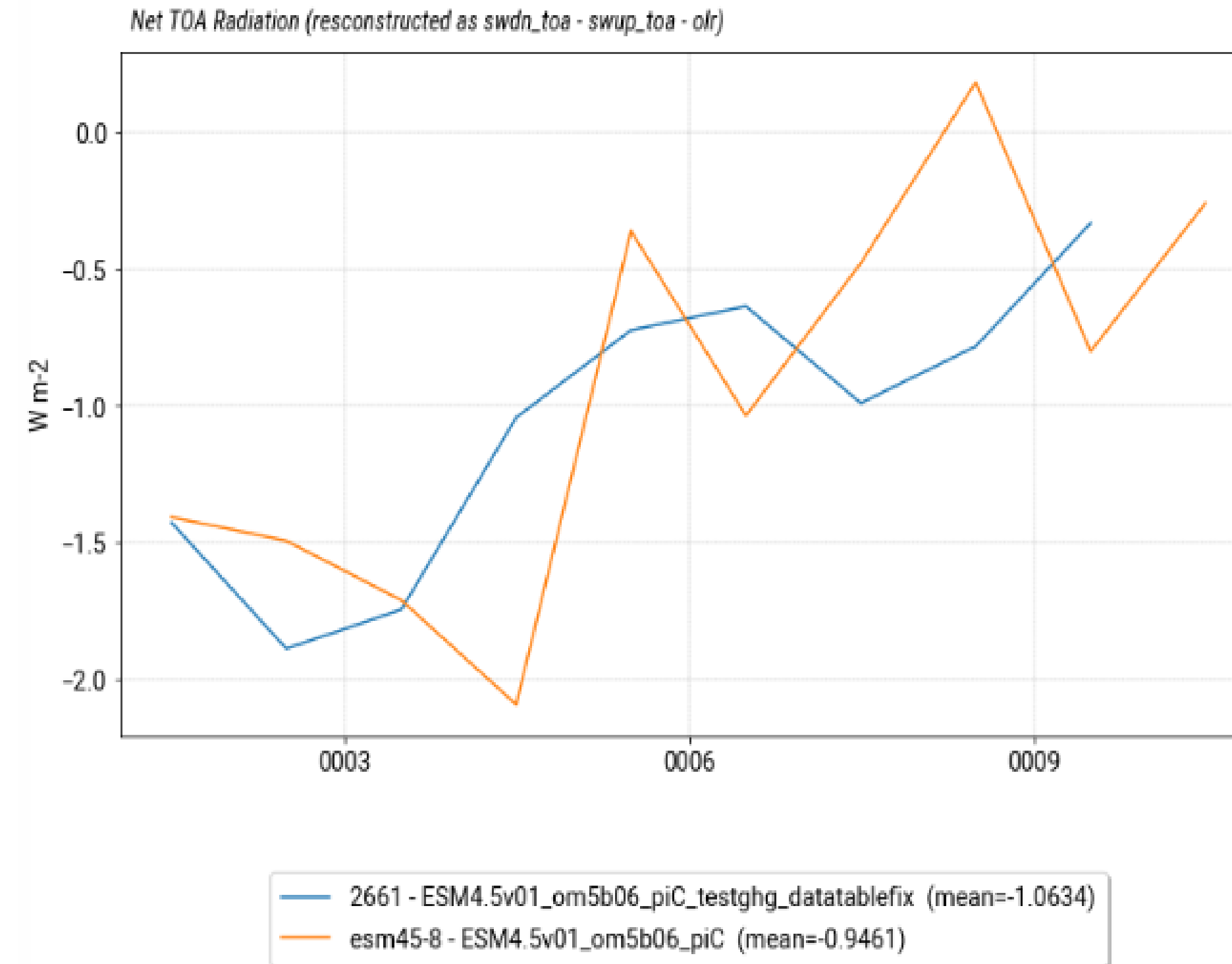
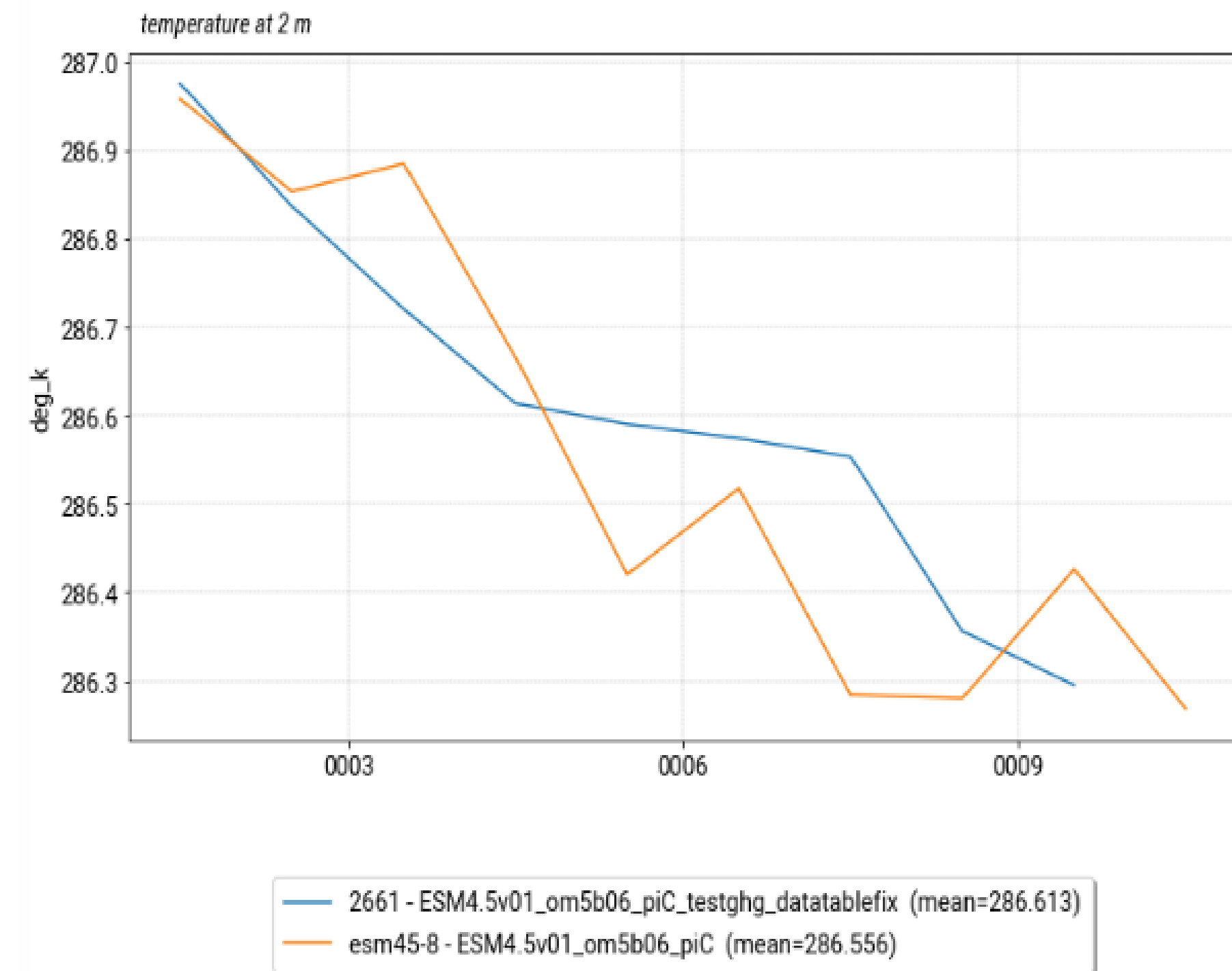
CMIP6+ v0 Forcing Datasets at GFDL

- The CMIP6+ v0 data download to our local data archive – Kris Rand
- Datasets processed to create GFDL-model ready data and tested to catch any issues
 - AMIP SST/SIC: Pu Lin
 - GHGs: **Eric Stofferahn**, Ray Menzel
 - Solar, Volcanic optical properties : David Paynter
 - Volcanic SO₂ emissions: **Shipeng Zhang** (ECR)
 - Land-use: **Sergey Malyshev**
 - Biomass Burning emissions: **Arman Pouyaei** (ECR, FeOC)
 - Anthropogenic Emissions: Vaishali Naik, Meiyun Lin
- Provide feedback at https://github.com/PCMDI/input4MIPs_CVs/discussions

CMIP6Plus vs. CMIP6 GHGs in under-development GFDL-ESM4.5

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netrad_toa



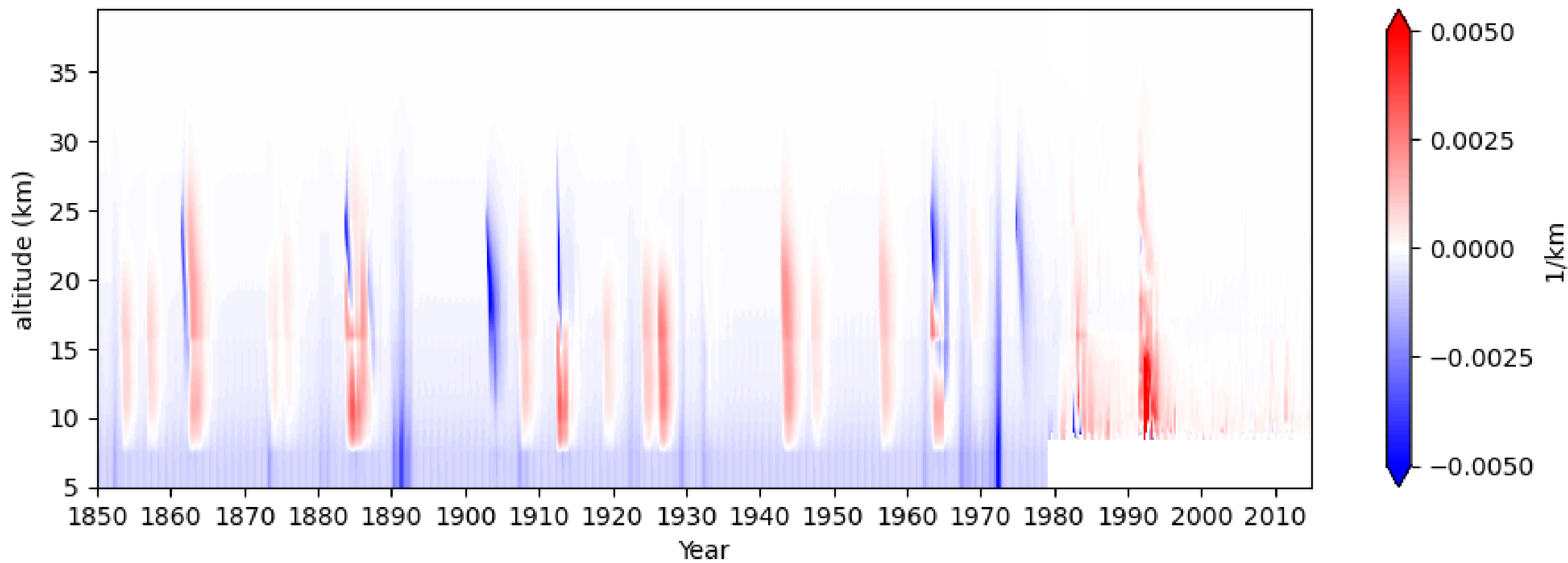
1850 GHG conc.
 CO₂ = 283.7, 284.3 ppm
 CH₄ = 798.7, 808.2 ppb
 N₂O = 272.6, 273.0 ppb

No significant difference in a 10 year piControl simulation using CMIP6Plus versus CMIP6 GHGs

courtesy Eric Stofferahn

Volcanic Forcings

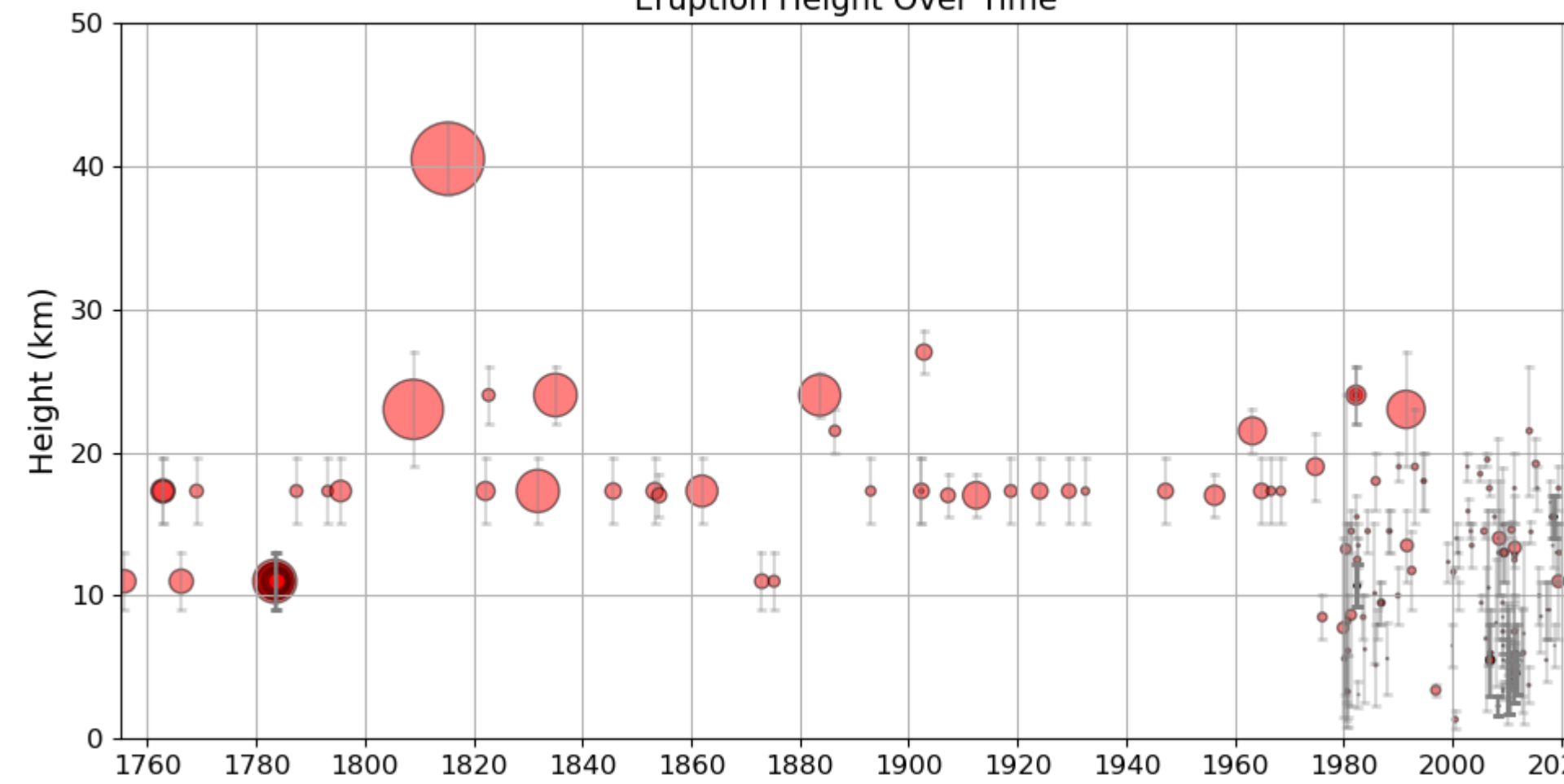
CMIP6Plus – CMIP6 Stratospheric Aerosol Optical Depth



- Clear indication of the tropopause over the satellite era in CMIP6Plus
- Differences in the magnitude vary but generally CMIP6Plus greater than CMIP6
- Consistency between emissions and optical properties

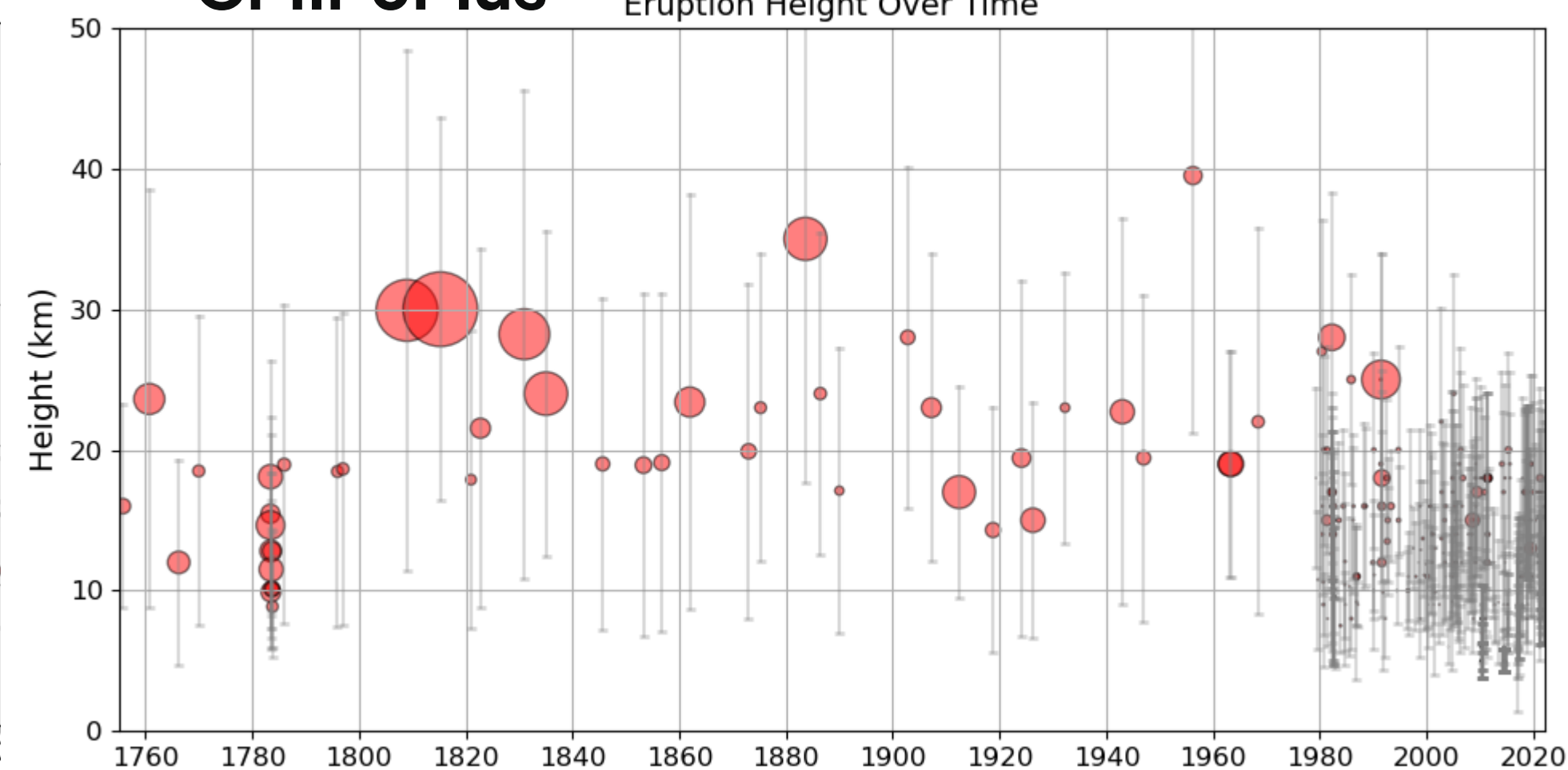
VolcanEESM Neely and Schmidt (2016)

Eruption Height Over Time



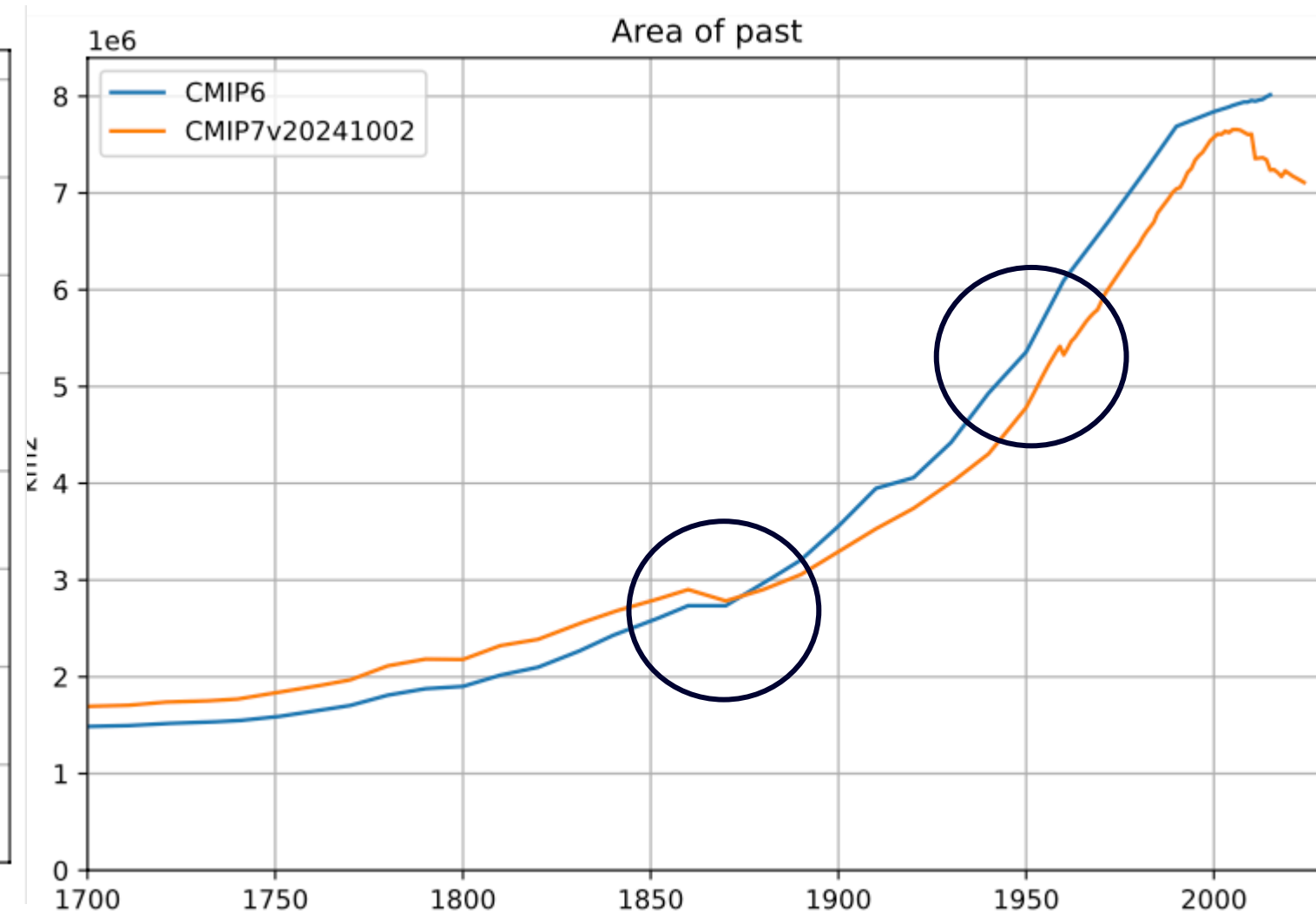
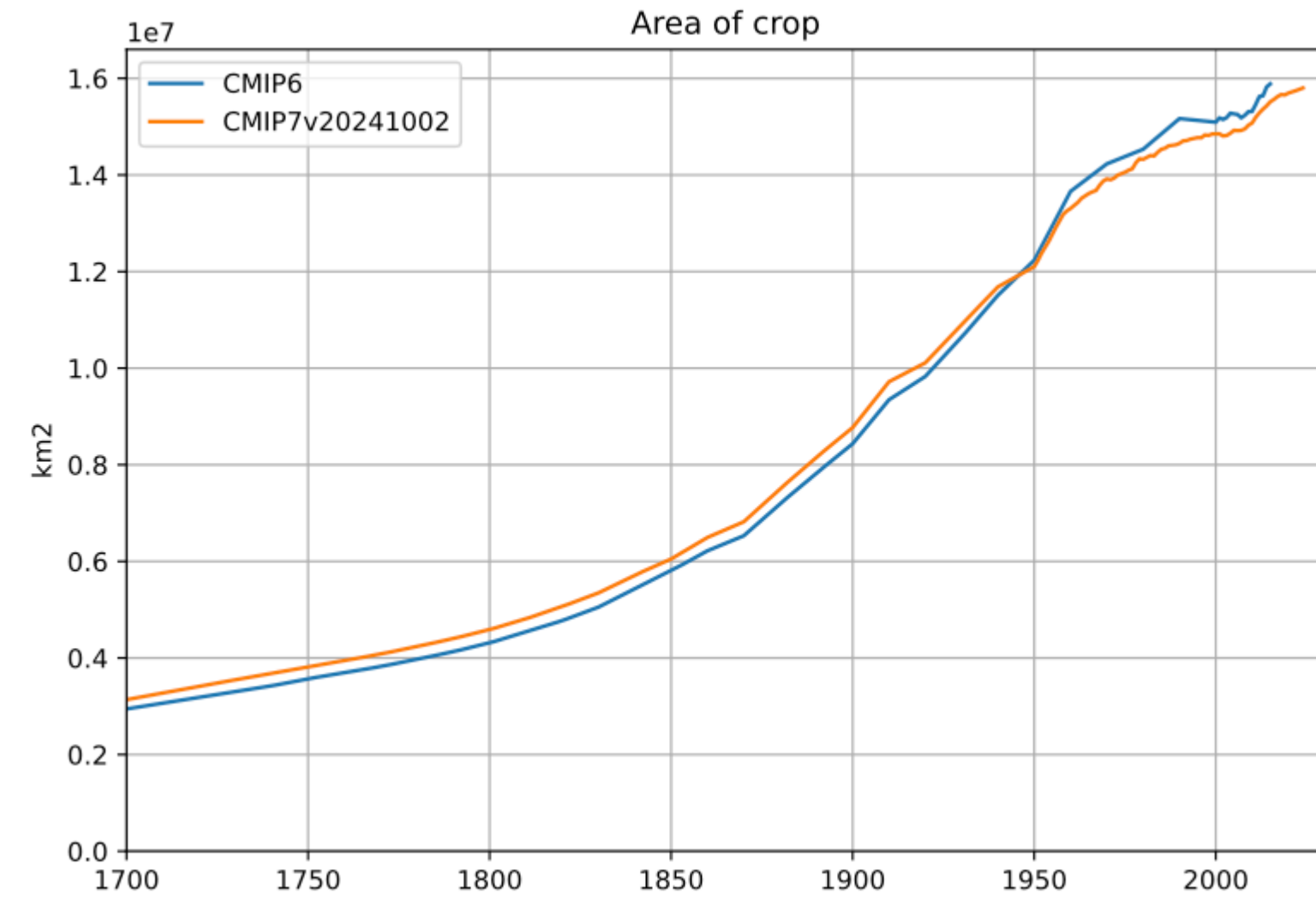
CMIP6Plus

Eruption Height Over Time

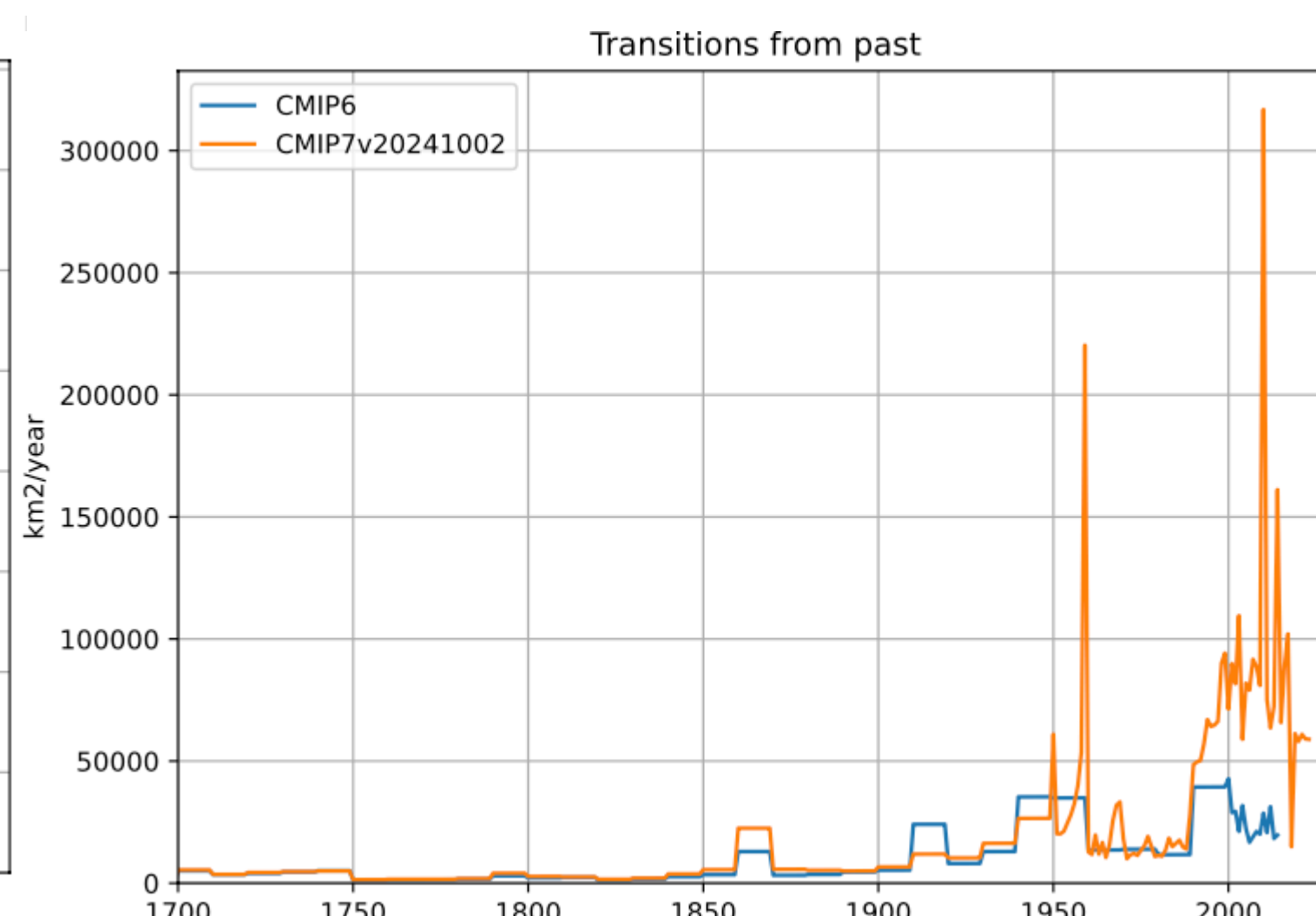
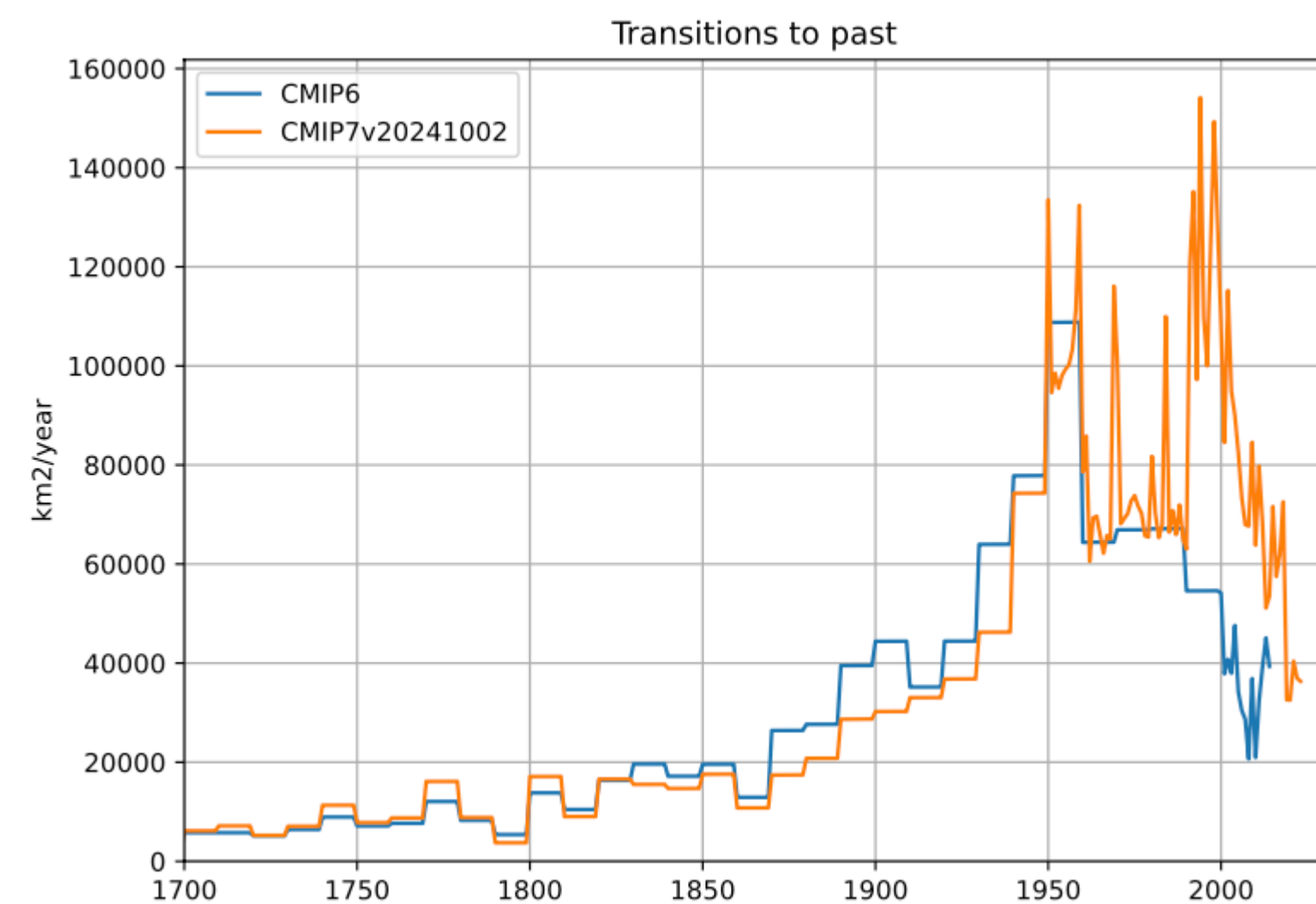


- CMIP6plus exhibits greater variability in injection heights
- CMIP6plus includes eruptions that were missing from earlier versions of the dataset
- More eruptions are included in the post-1970 satellite era in CMIP6plus.

Land-Use

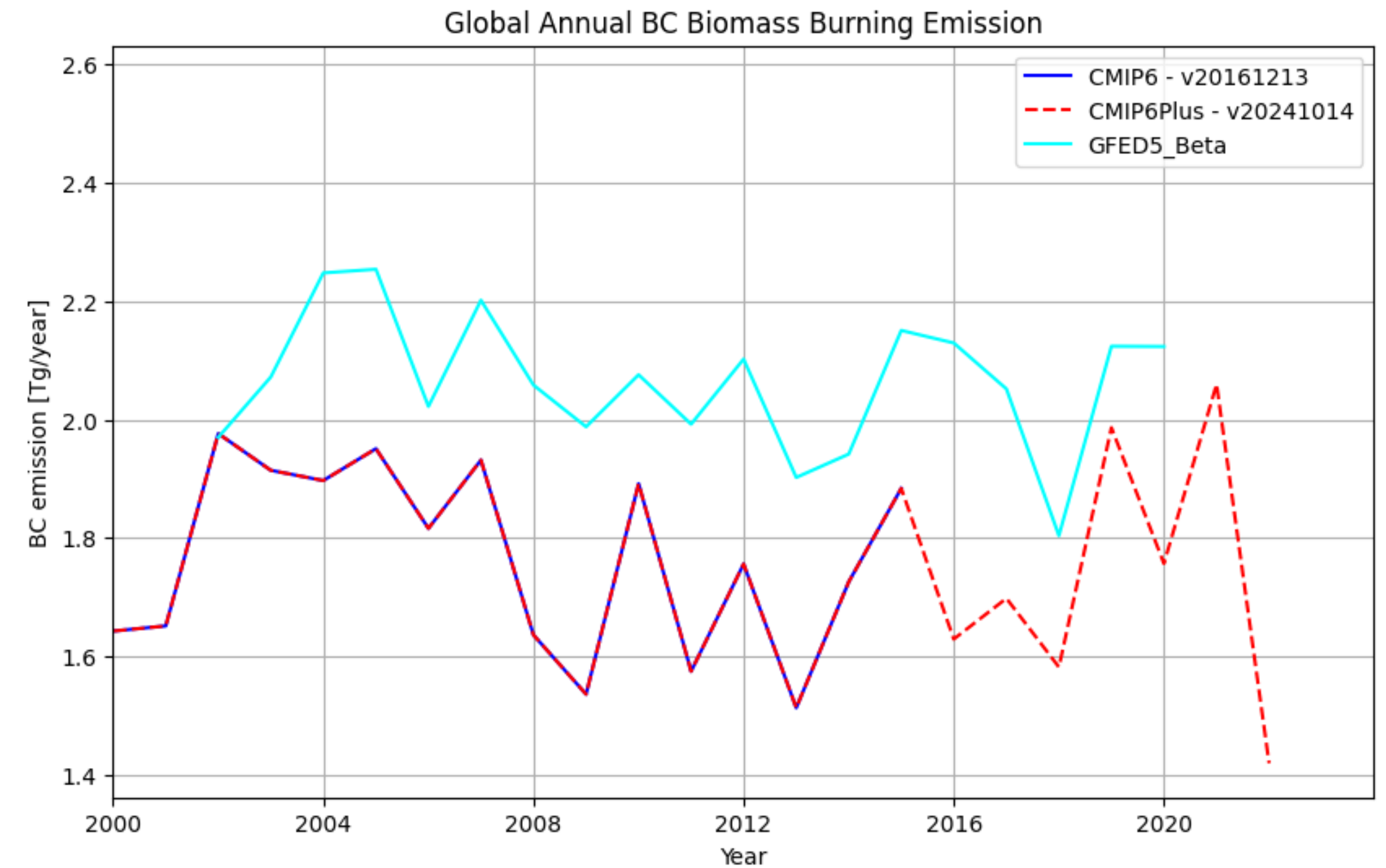
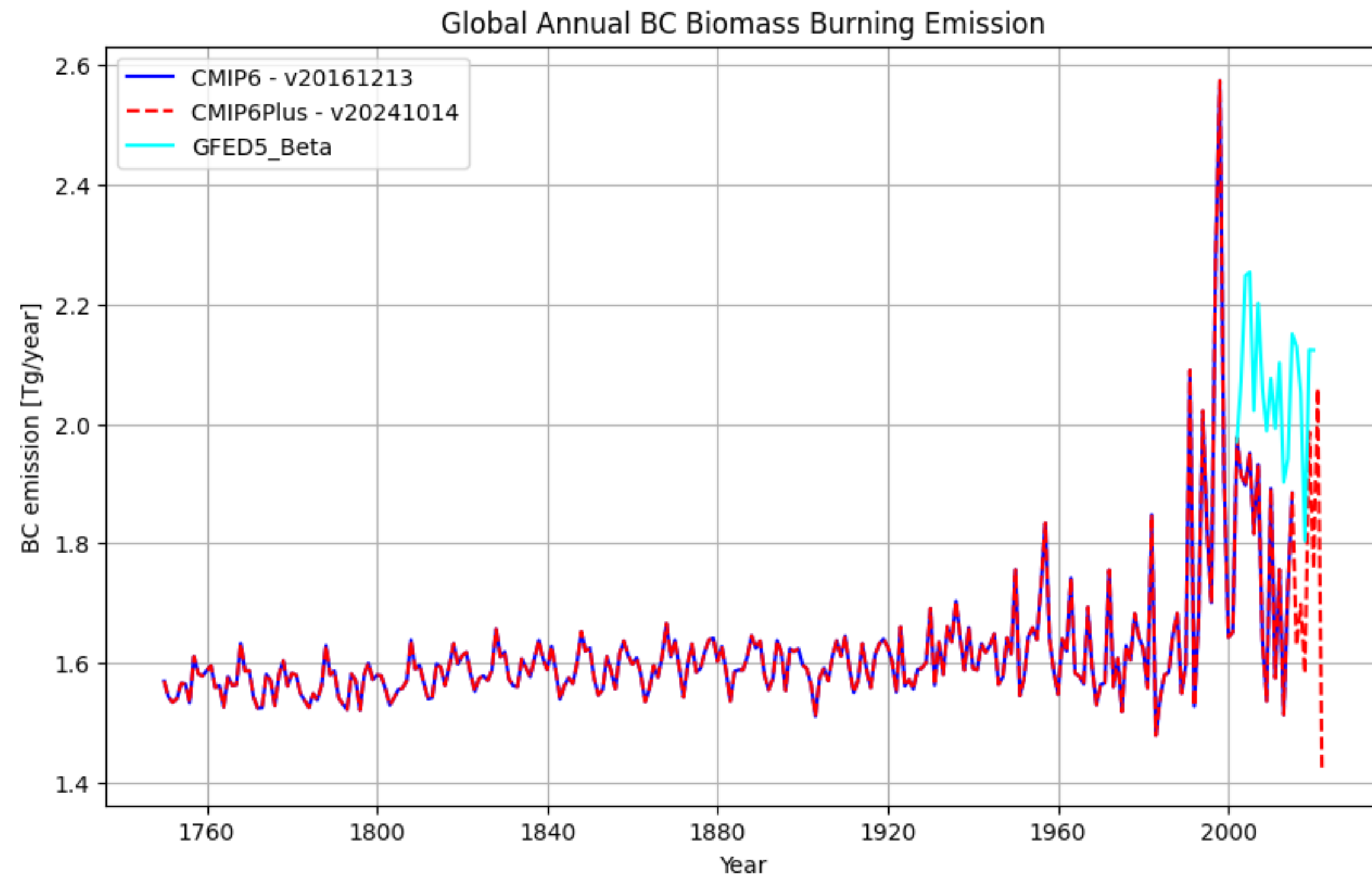


- Overall CMIP6Plus consistent with CMIP6, some unexplained peculiarities



- Globally-integrated transition rates among different land use types in CMIP6Plus significantly different from CMIP6.
- CMIP6Plus has higher rates and time variability after 1990.

Biomass Burning Emissions



- CMIP6plus extends CMIP6 emissions covering 1750–2022 period, using GFED4.1s
- CMIP6Plus emissions are lower than those in GFED5_beta
- Strong interannual variability persists in the satellite era

Requests

- File formats as noted on https://github.com/PCMDI/input4MIPs_CVs/discussions
- Technical documentation to better understand the datasets

Status update from NCAR

Update courtesy of Dave Lawrence:

- Awaiting the SLCF dataset as most important.
- Have not initiated testing of available v0 datasets as yet.
- Organisation to start pulling datasets into beta model version will begin next week.

Status update from CSIRO

Update courtesy of Tilo Ziehn:

- Focused on finalizing CMIP7 model configuration.
- Anticipate processing CMIP6Plus forcings data for model towards the end of the year.

Thank You