HTAP2 runs with C-IFS

MACC contribution

http://www.copernicus-atmosphere.eu/

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The Model: Composition – IFS

- C-IFS is ECMWF's integrated forecasting system (IFS) with modules for atmospheric composition (CY 40R1)
  - ➔ CB05/TM5 gas-phase chemistry scheme (56 species),
  - ➔ Cariolle stratospheric ozone scheme nudged to ERA-Interim ozone analysis (optional)
  - ➔ MACC aerosol scheme (3* SeaSalt, 3*Dust, OC, BC, SO2/SO4)
  - ➔ CO_A_50/25 and PM10/2.5 tracer (**new for htap**)
- Monthly forecasts "relaxed" to ERA-Interim meteorology
- 60 Levels (up to 0.1 hPa, Surface level 15 m) at T255 (80km)
- Emissions: htap anthropogenic + GFAS fires (MODIS FRP) + Megan
- To be run for regional BC and global scenarios

Boundary Condition Output – to be discussed

- Following MACC AQMEII output but (i) with C-IFS CB05 chemistry instead of IFS-MOZART, (ii) higher horizontal resolution and (III) no assimilation apart from stratospheric ozone
- Suggested output specification
  - ➔ O3,NO2,NO,CO,HNO3,PAN,CH2O,C5H8,H2O2,OH,C2H6,SO2, HO2NO2, OLE (BIGENE) , ADL2 (represents mostly CH3CHO) and CO_A
  - ➔ MACC aerosol and PM tracers
  - ➔ T and Surface pressure
- Domain and resolution
  - ➔ North American Bounding Box: 39.5W - 150.0W , 68.5 N - 13.5N
  - ➔ Europe Bounding Domain: 45.0E- 25.0W 80.0N - 25N
  - ➔ Horizontal resolution (up to) 0.7° x 0.7 °, Model top 10 hPa (47 Levels)
  - ➔ 3 hourly
- Distribution via ECMWF ftp, 600 GB per year (depending on resolution)

Status & first preliminary results

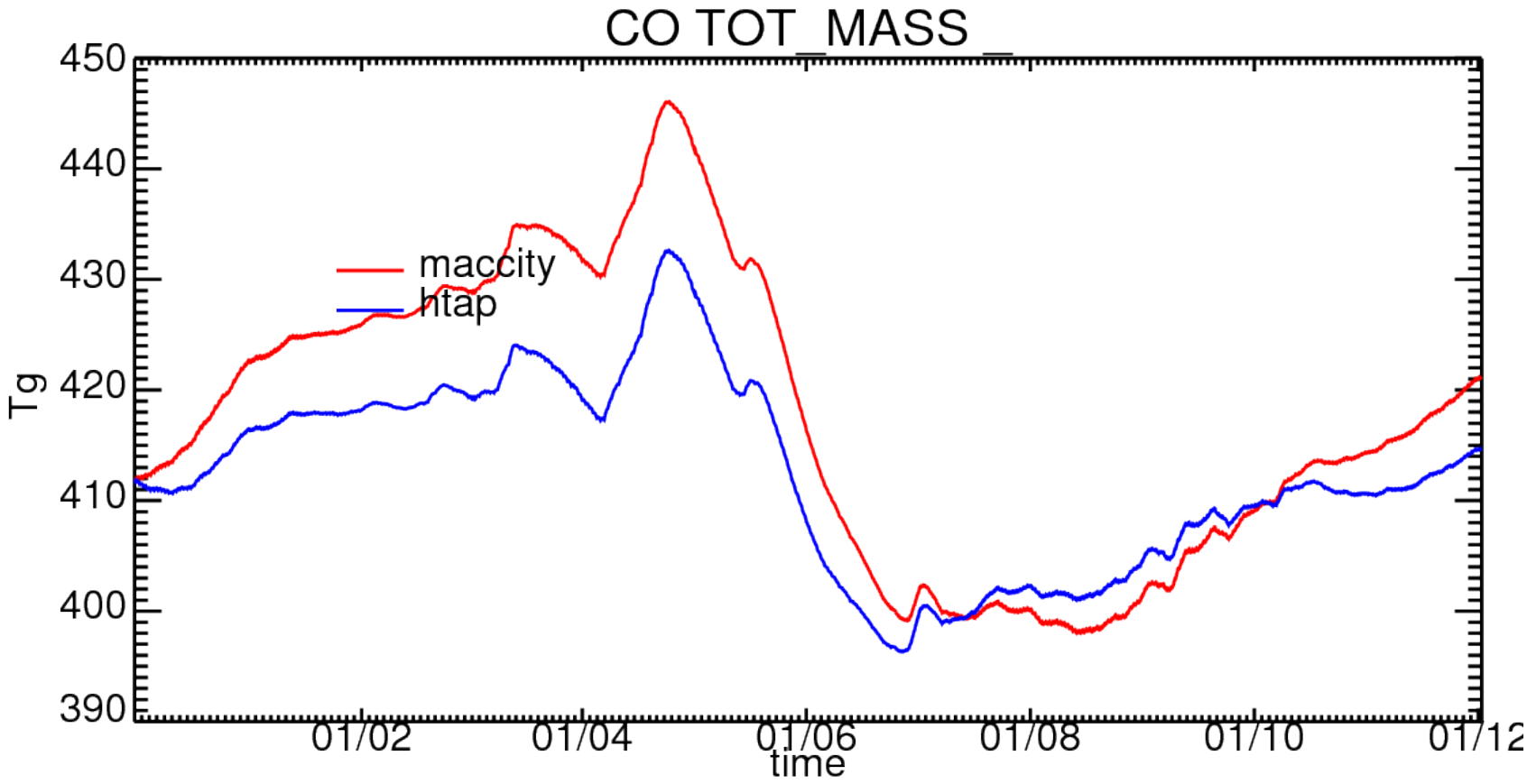
- Technical setup for efficient long simulation C-IFS simulations in place (relaxation) – 2 to 3 day wall clock days per year.
- A (preliminary) 2008 run using htap (chemistry surface) emission completed
- Global budget of maccity (MACC default) and htap emissions (+ GFAS) in Tg/year 2008

  ➔CO : 5.3e+02 (maccity) 4.9e+02 (htap)

  ➔NO : 4.57e+01(maccity) 4.64e+01(htap)

  ➔SO_2 : 5.69e+01 (maccity) 6.20e+01(htap)

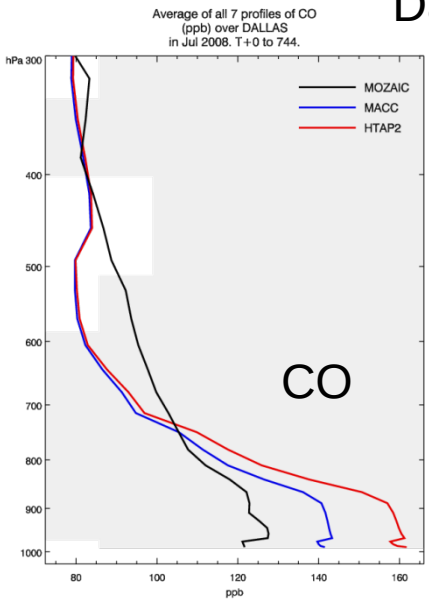
CO global budget 2008 (MACC vs HTAP2)

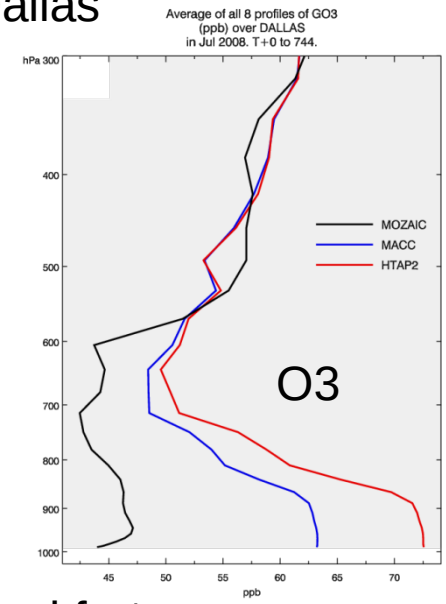


1-11-2007 – 1.12.2008

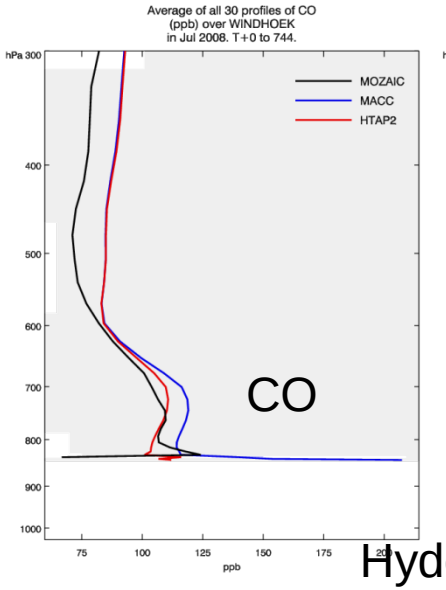
July 2008 CO and O_3 profiles vs. MOZAIC (Dallas, Windhoek, Frankfurt, Hyderabad)

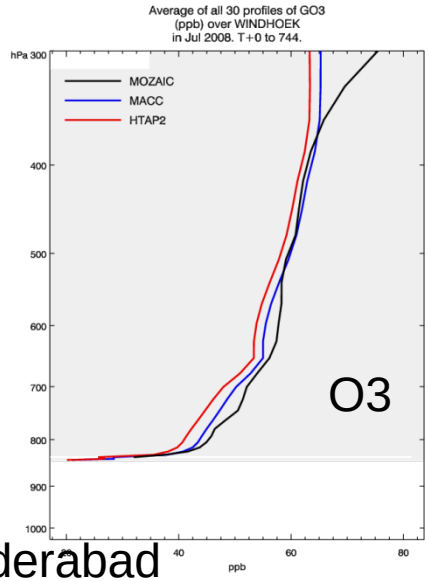
Dallas



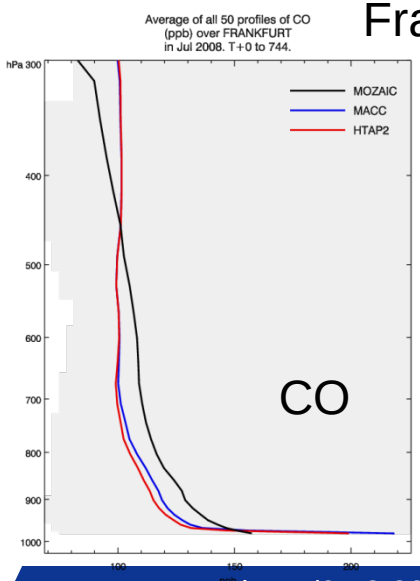


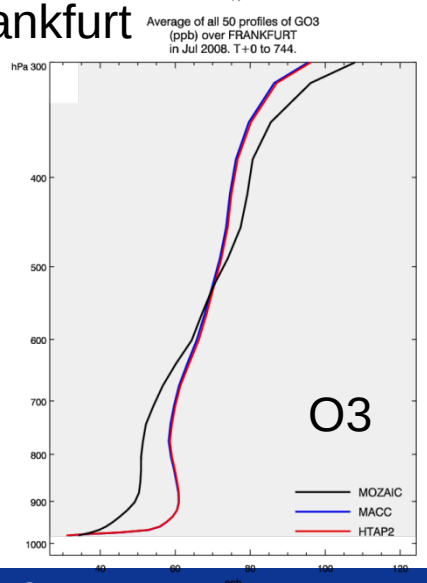
Windhoek



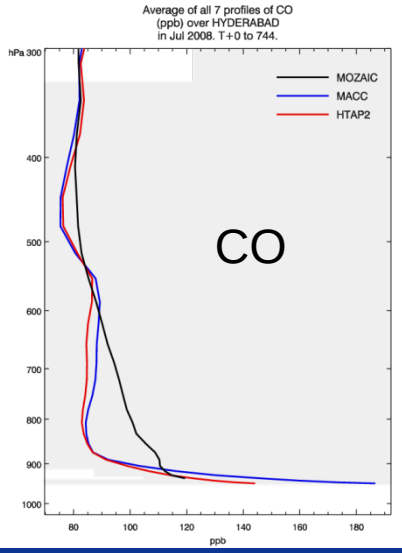


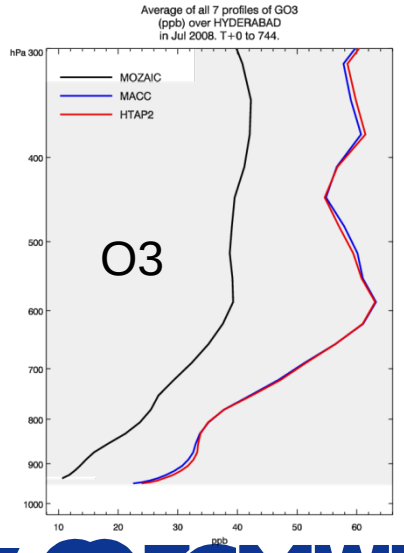
Frankfurt





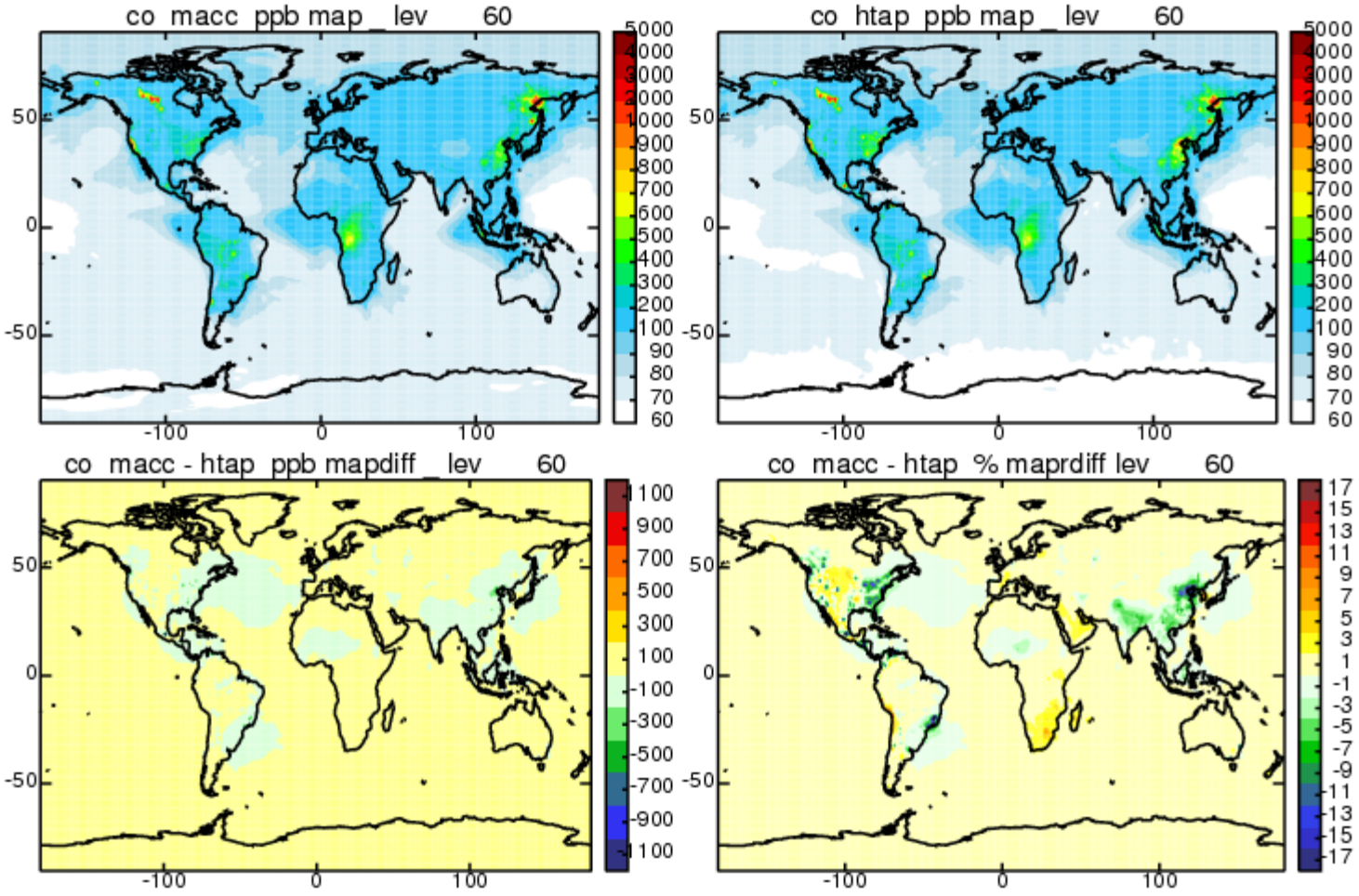
Hyderabad





ECMWF

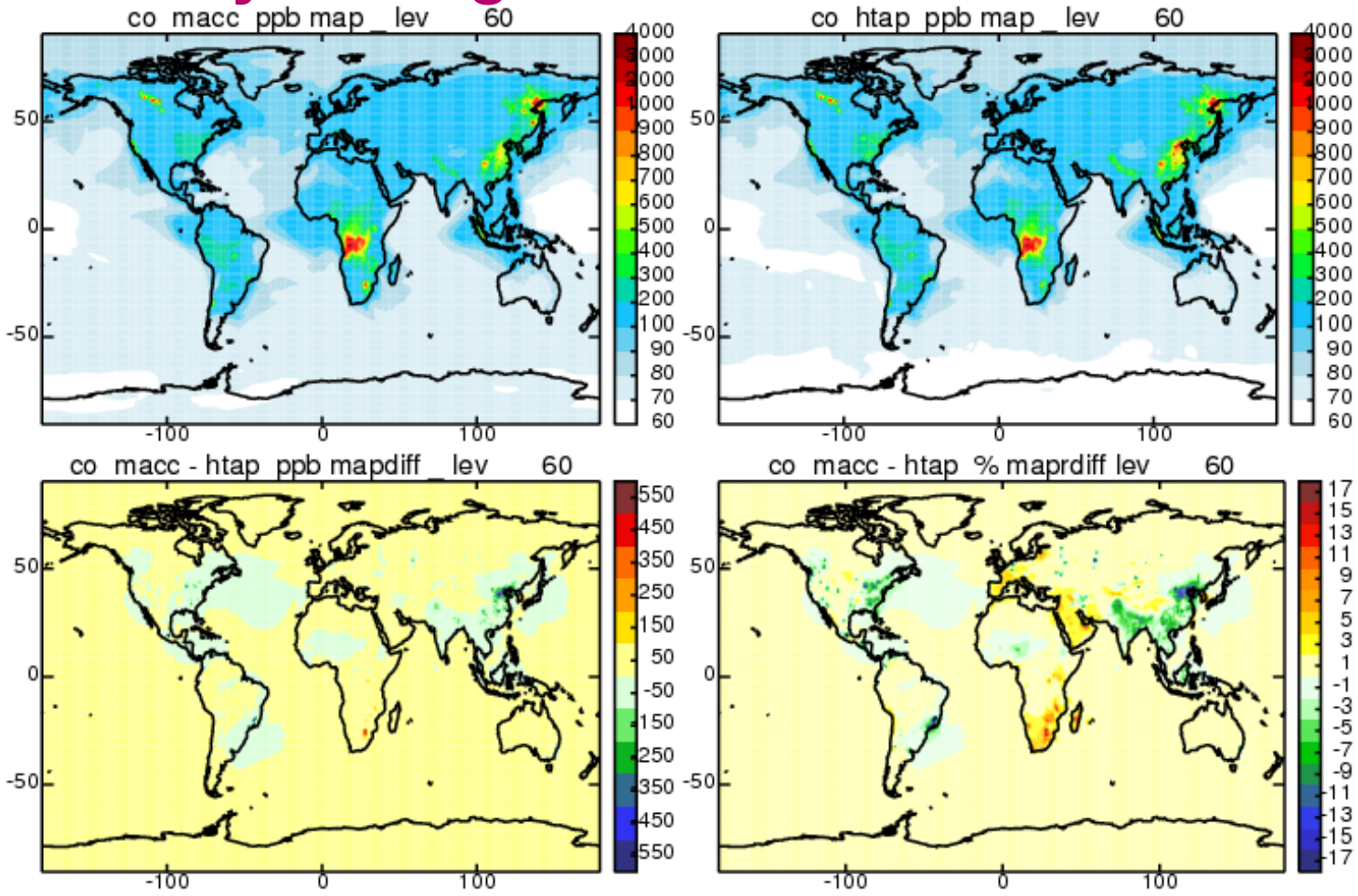
CO 7/2008 surface concentrations macc vs htap 12 UTC



Difference

Difference in percent

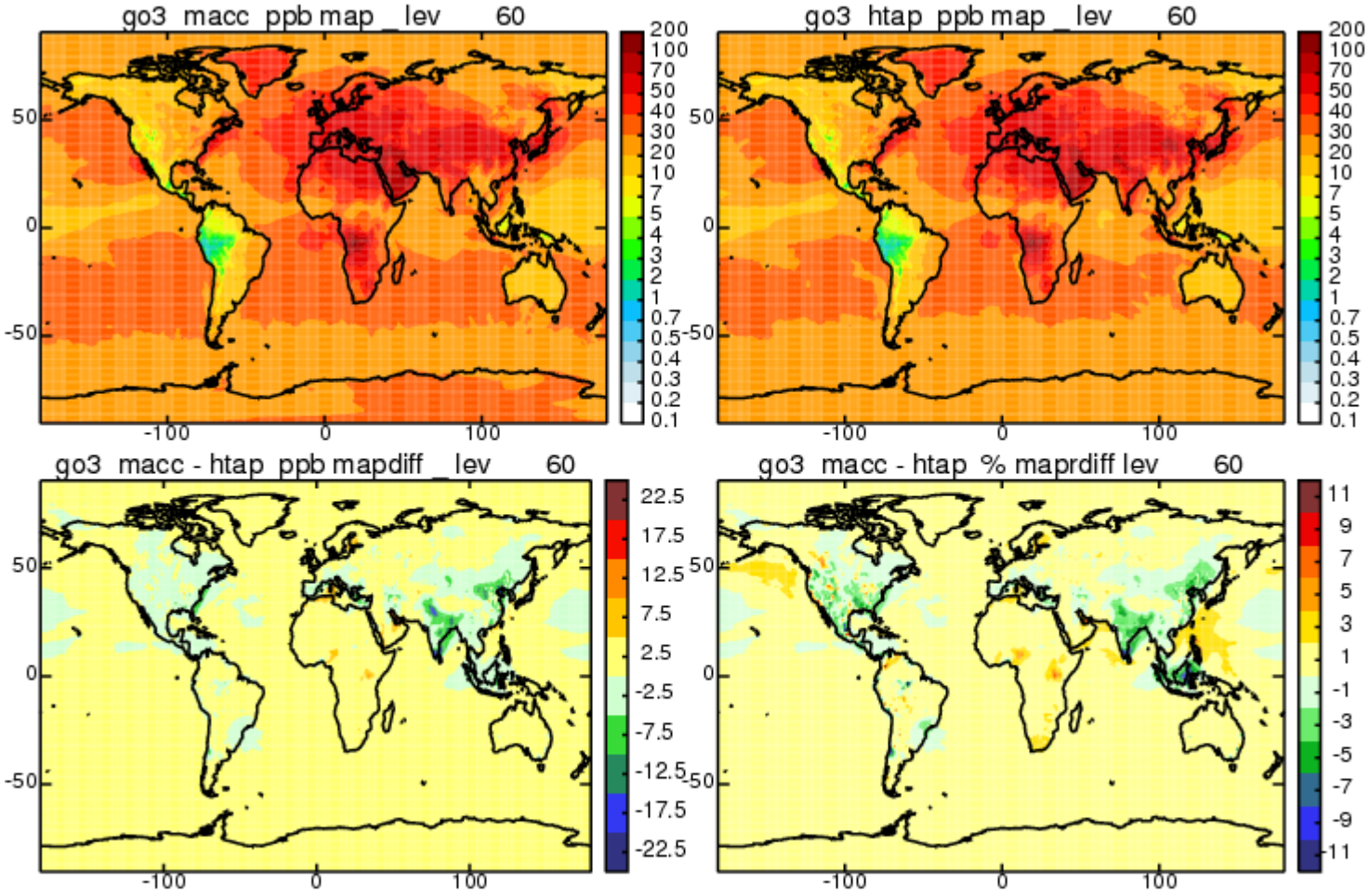
CO 7/2008 surface concentrations macc vs htap Monthly average



Difference

Difference in percent

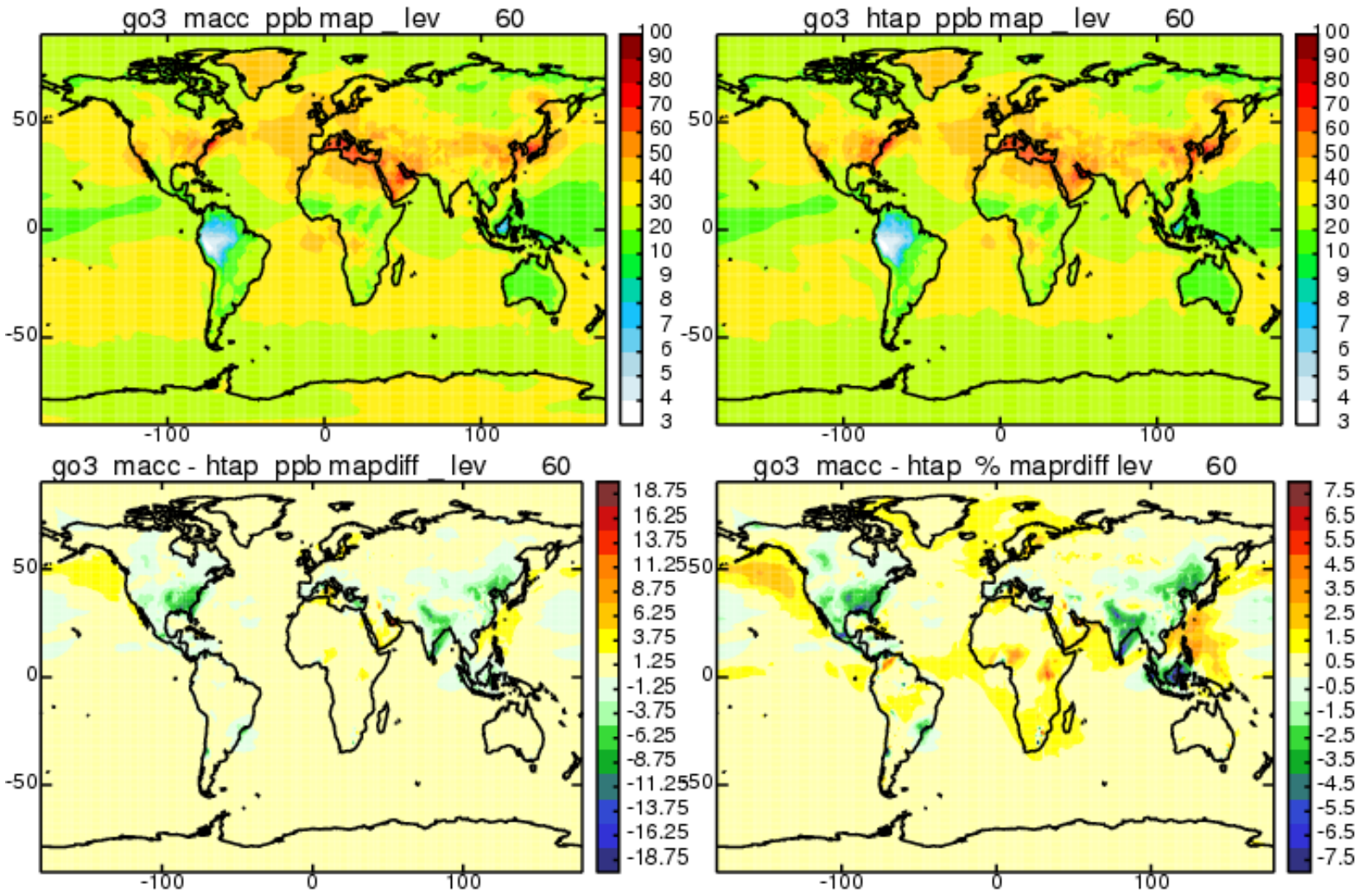
O_3 7/2008 surface concentrations macc vs htap 12 UTC



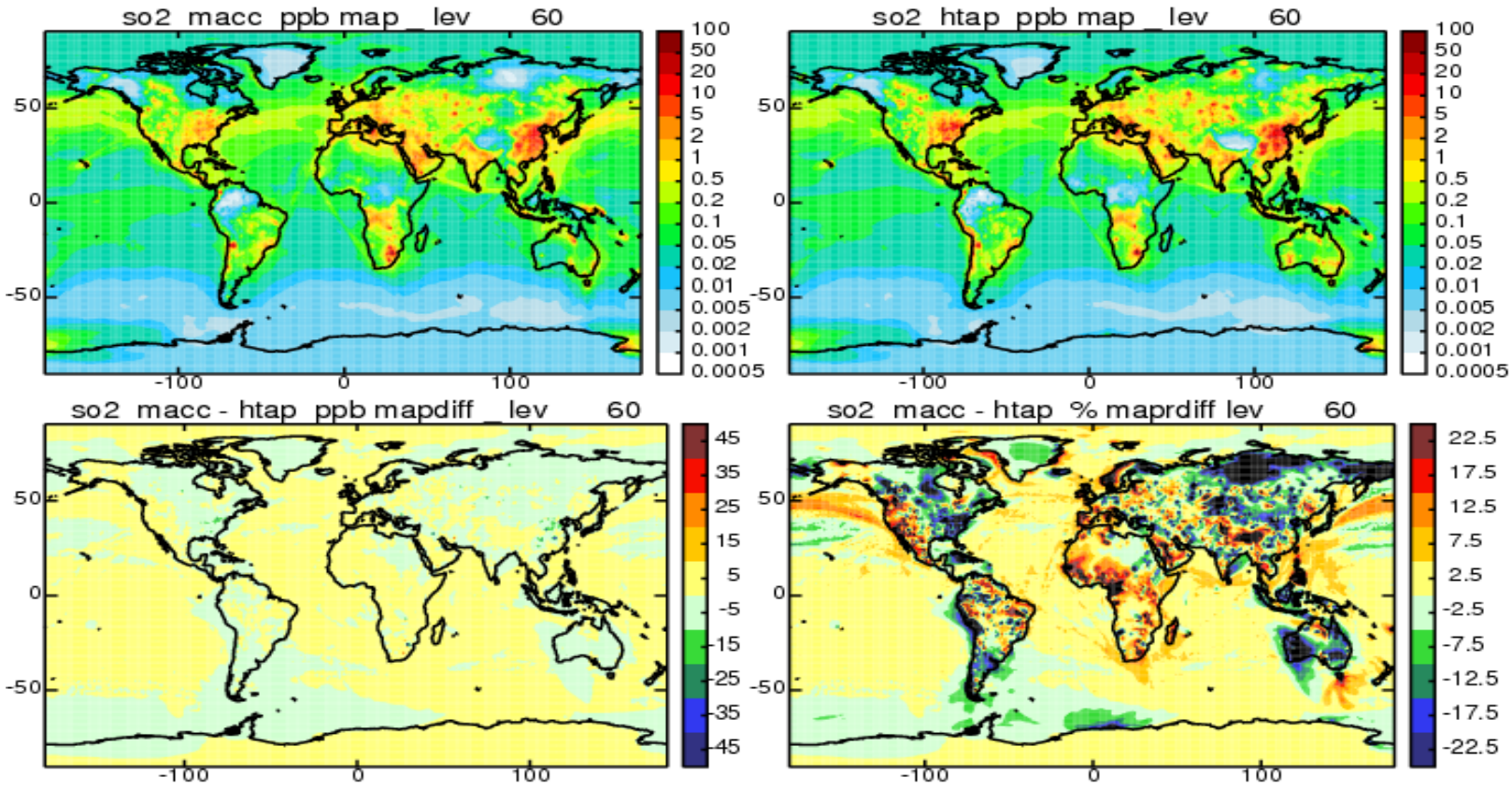
Difference

Difference in percent

O_3 7/2008 surface concentrations macc vs htap: monthly average



SO_2 7/2008 surface concentrations macc vs htap monthly average

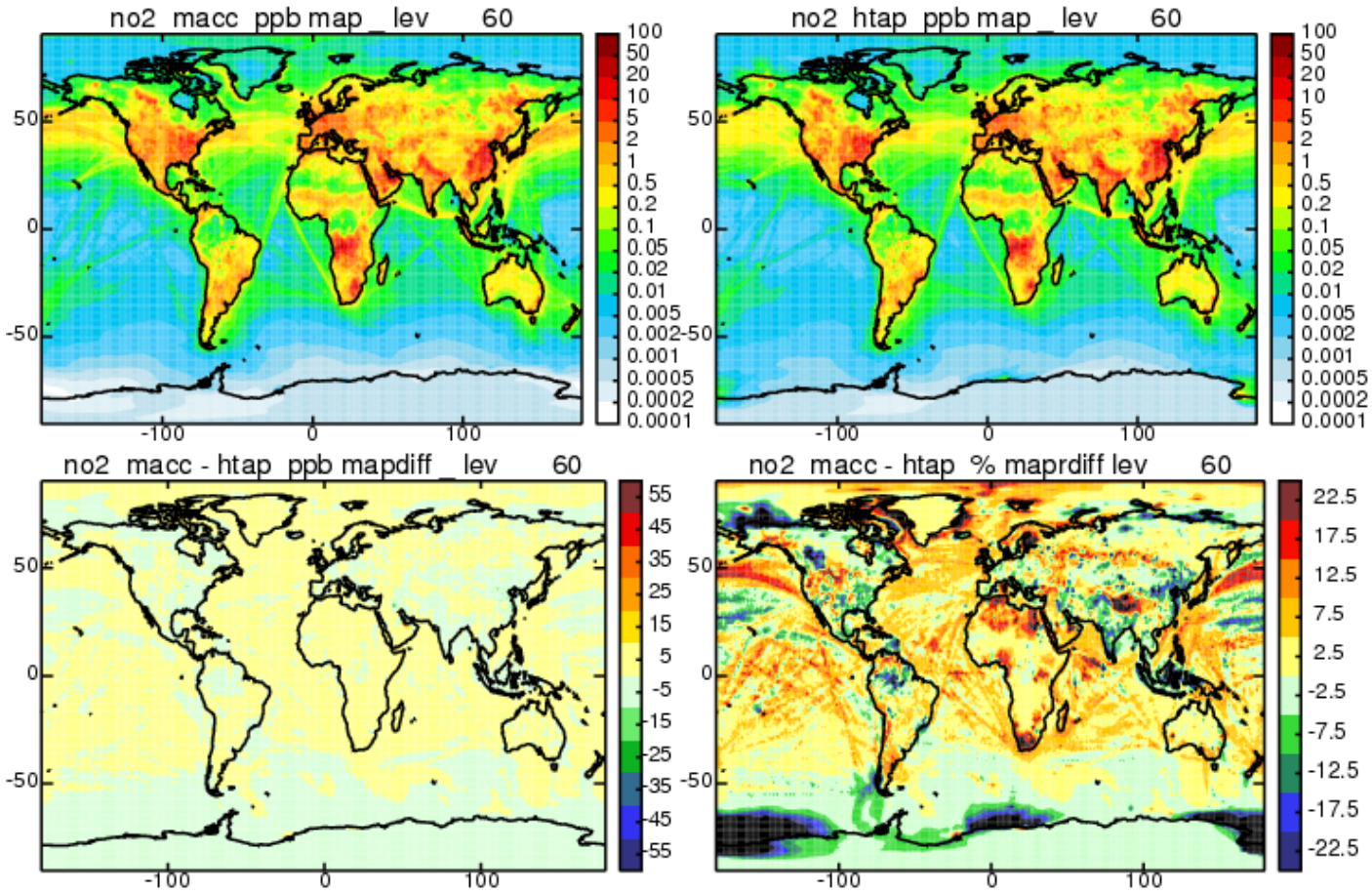


Difference

Difference in percent

ECMWF

NO_2 7/2008 surface concentrations macc vs htap



Difference

Difference in percent