3rd HEPPA model data inter-comparison workshop

Agenda:

15:30 – 15:35   Introduction

15:35 – 16:30   Model presentations (approx. 5-7 min each)

16:30 – 17:45   Presentation and discussion of inter-comparison results

17:45 – 18:00   Concluding discussion, publication of results, future actions

MIPAS data:

- Temp. + Species: NO_2, O_3, N_2O, N_2O_5, HNO_3, HNO_4, ClO, $ClONO_2$, $HOCl$, H_2O, CH_4, CO, new: NO and NOx

Temporal coverage: 26/10/2003 – 30/11/2003, new: missing days now processed

Models:

Baseline: use of AIMOS ion rates (only proton forcing, exception KASIMA_MW, others?)

- WACCM_MW
- HAMMONIA_MW
- SOCOL_MW
- KASIMA_MW
- KASIMA ("own" ion rates)
- CAO_MW
- FinROSE_MW
- B2dCTM(_MW)
- B3dCTM(_MW)

Intercomparison method:

1) Averaging of daily MIPAS data within latitude bins (40-90N with 5 deg incr.)
- all data
- ascending (10 pm)
- descending (10 am)

2) Averaging of model data:
- Interpolation to mean lat. of MIPAS bins
  - all data per day
  - data within 9-11 am per day
  - data within 9-11 pm per day
- Application of averaging kernels

3) Calculations of data and model means for full latitude range (all: 70-90N, pm and am: 40-90N). New: area-conserving averages

Identified problems:
- Partially erroneous Ak's for N2O
- Time shift in SOCOL data (+2 days)
- Upper model limit of B3dCTM and FinROSE below 0.01 hPa (now masked)

T:

•Free-running higher than nudged below 1 hPa.

NOx:

•Good agreement during proton forcing.

•Generally overestimated in the 25-35 km range. Ion rates?

•Spread of model results in the subsequent days (free-running lower than nudged)
    meridional transport (redistribution)? T-dependence of N4S+O2?
    (unlikely, since less pronounced during p-forcing)

O3:

•Good agreement wrt HOx related losses.

•Mid-term NOx related losses overestimated by nudged models, underestimated by
  free-running. T effect (NO+O3) and/or NOx differences.

N2O:

•NO2+O included in HAMMONIA, SOCOL, KASIMA. But all overestimated.
  Branching ratio (N2O+O vs N2+O2)?

N2O5, HNO3, HNO4:

- Instantaneous HNO3 increase: only FinROSE includes ion-ion recombination, but over-estimation
- N2O5-> HNO3 conversion (mid-term): KASIMA produces higher HNO3/N2O5 ratio than other models. Inclusion of water ion clusters (de Zafra)? Fits better to MIPAS. HNO3+2N2O5 lower for free-running models (except WACCM??). T-dependence of NO2+O3? Should be investigated in more detail.
- All models produce HNO4 around 30 km, but MIPAS not. Too high HO2 (NO2+HO2+M)? -> Ion rates?

ClONO2, HOCl, ClO:

- ClONO2: generally underestimated (except FinROSE). What's missing here?
- HOCl: generally good agreement, except FinROSE and B2dCTM (additional ion reactions?), HOCl enhancements seems to be understood.
- ClO: strong scatter in MIPAS data, enhancements seems not to be correlated with p-forcing.

Tracer (H2O, CH4, CO):

- Overestimated descent, particularly KASIMA (H2O and CO)