AMMA WP 4.1.3 Toulouse meeting, Meteo-France

4th-5th February 2008.
Present: Brice BARRET (CNRM/LA), Idir BOUARAR (SA), Claire DELON (LA), Bruno GUILLAUME (LA), Beatrice JOSSE (CNRM), Kathy LAW (SA), Celine MARI (LA), Vincent-Henri PEUCH (CNRM), Marielle SAUNOIS (LA), Fabien SOLMON (LA), Jason WILLIAMS (KNMI), Xin YANG (UCAM)

Summary

A variety of simulations have been performed for 2000/2003 by various models using the global emission datasets provided by LA. A main finding is that CO is too low in the NH. Therefore it was agreed to redefine the simulations for 2006 in terms of the application of the datasets and the 'baseline' run. The AMMA BB emissions for 2006 will now only be applied over Africa based on the advice from LA. Moreover, it was agreed that the time taken for performing the 2003 simulations could possibly detract from the main aim of focusing on the June-August period in 2006, which coincides with the AMMA measurement campaign. Therefore only one other year (2000) will be used for comparison considering the amount of output generated in each run

Background Emissions

For a good comparison it is important that all models adopt the following emissions for the background conditions otherwise the intercomparison may suffer from complications

Retro 2003 anthropogenic emissions (available from the GEIA or RETRO websites) and GFEDv2 2006 input files for the globe except for over Africa (defined as 20 ◦W – 40◦E, 35◦S – 40◦N). If you need emissions which are segregated by sector then refer to the RETRO website.

Soil NOx emissions: use Yienger and Levy (included in GEIA). For isoprene also use GEIA. Biogenic CO and ocean CO should be also be included to achieve accurate global emission totals.

For the application of burning heights the consensus is that it is model specific due to differences in the vertical resolution. For the application of the heights use the GBA recommendations given on the AMMA emission website. Alternatively use the IPCC conventions.

NB : the 2000 meteorology run has been brought forward to be able to address an outstanding deliverable which is late and therefore must be given priority!!

Expt A LA 2006 emissions for both the biomass burning and fossil/biofuel (JRC corr.), monthly averaged datasets. Meteorology: 2000

Expt B As for Expt A except Meteorology 2006

Expt C LA emissions 2000 (GBA) emissions for both biomass burning and fossil/biofuel monthly averaged with Meteorology 2000

Expt D LA emissions 2006 (JRC corr.) daily, adopt start file from Expt A for May and only run for June-July-August (the AMMA campaign period)

For those models not including the passive tracers in the full chemistry run:

Expt E 5 tracers (20 days lifetime), 5 box zones (see previous description on the KNMI website for a definition of the regions) plus the stratospheric tracer. Meteorology 2006

Expt F As for Expt F except use Meteorology 2000.

2006 output for all experiments (see final page) in NetCDF format except for profiles. Put NaN for interpolations below the ground.

Timeline:

- Experiment(s) A and B (and E) uploaded to the site by May 2008. Also passive tracer fields if these require separate model runs. It should be noted that existing passive tracer experiments for regions 1-5 can be used from old runs if necessary (except for the Stratospheric tracer due to an issue with the method for defining the troposphere – see below).
- Distributed analysis of model output by mid-june where there will be a meeting to discuss findings and strategy. Identify a possible overlap with meso-scale modelers to define strategy and focus for WP 2.4 collaborations (and also 1.1.2).
- Presentations of results from experiment(s) A and B (and E) to be presented at the IGAC meeting in September 2008.
- Experiments B, C, D (and F) to be uploaded at the end of September.
- Distributed analysis of model output by mid-November where there will be a meeting to discuss findings and strategy of all model runs/comparisons (joint meeting with 1.1.2).
- Report/Paper writing: end 2008-spring 2009.

Practical Action points:

- Dissemination of the satellite overpass subroutine to the other groups for both instantaneous and monthly mean output (JW).
- Dissemination of extended ozone sonde station list to address the issue of sampling frequency (JW).
- NetCDF versions of the LA emissions on a 0.5° x 0.5° grid will be uploaded on the LA site (JW will send to BG). Ideally, this ensures that no pre-processing errors occur between groups.

- Bruno will also upload a distribution map for Africa (for each month??) so that users can check implemetation (BG).
- PV subroutine will be disseminated to all groups that need it (BJ)
- Xin will converse with Peter regarding an updated definition of the tropopause with respect to the stratospheric tracer. (XW)
- Dissemination of separate soil NOx, biogenic CO and ocean CO to Xin (JW) – **These are available on the GEIA website under the POET inventory**.

Optional inclusions to runs:

These can either be bundled into the other experiments or conducted separately although priority should be given to the inter-comparison experiments.

- Tagged CO tracers from Africa to quantify outflow (BB will define regions)
- New tracer from Asia and/or India to investigate inflow (BB will define regions)
- Scaling of emissions by +- 20% to investigate effect of global O3 budget.
- Use of LA 2030 african datasets for future runs.

Overlap with WP 1.1.2 and 2.4.4

WP 4.1.3 needs to strengthen ties with other WP's as written in the project. This takes the form of either convection studies or global transport of precursors/O3/CO etc.

For WP 1.1.2 the passive tracer results (with additional tracers as listed in the optional inclusions) will be exploited to investigate the long-range transport issue.

If there is direction given by the meso-scale modelers in WP 2.4.4 then additional passive tracers (with shorter lifetimes) could be included for the AMMA period as in the meso-scale models. Members will be invited to the June meeting to discuss overlap/ideas and define a strategy as to how this can work.

The subject of Lightning NOx could be focal point (as the CTM's use a variety of methods for this).

Scientific focus

The uploaded data will be used to focus on a number of scientific questions. One group/participant will take the lead on one of the following aspects.

(i) Regional effects over West Africa (vs extensive suite of in-situ measurements) for 2006 – sub topics of interest are :
   (a) Role of convection, LiNOx etc, comparison with Flight data (Idir/Kathy)
   (b) Biogenics/Isoprene effects (Jason)
   (c) Wet Deposition – IDAF (Fabian)

(ii) Import/Export from the African Continent (vs e.g. global ozone sondes, satellite data) (Brice)

(iii) Tropospheric O3 comparisons with OMI to determine a seasonal signal (Vincent-Henri, Beatrice)
(iv) Transport diagnostics using the passive tracers (Xin)

Focus by Bruno/Kathy Lio. ?? BC and OC comparisons ?? (please indicate a topic of interest).

Output

- A **3-hourly** meridional vertical cross section (emphasis placed on June_July_August 2006). If your model can do the averaging online then output for entire 2000 and 2006 runs. It should be noted that if the publication and analysis of results requires the 3hrly diagnostic and no output is available **participation may be limited.**
  - between 20 S and 40 N (or shorter if your model has a more limited latitudinal domain)
  - representative of (averaged over) 2W-6E (covering the aircraft flights)
  - mixing ratios for AT, ST, CO, isoprene, HCOH, O3, NOx (NO+NO2), HNO3, PAN, H2O2, and OH, all aerosol concentrations & optical depths

  This corresponds to the "cross"-output of the AMMA MIP for dynamical models, see http://amma-mip.lmd.jussieu.fr/
  This can be provided on pressure or model levels. In case of model levels please also provide the pressure variable.
- A monthly mean 6-hourly horizontal map at the surface/lowest model level
  For 2006 6 hourly output surface maps (not monthly averaged).

Additional output for 2006:

- Chemical constituents at the locations of the aircraft (time resolution: every whole minute) for point-to-point comparisons.
  Files with aircraft location (longitude (degr E), latitude (degr N), pressure (hPa) and time (hours & minutes UT) are already available for the DLR Falcon and the French ATR and Falcon aircraft, **the Geophysicae** and the British BAE aircraft at http://www.knmi.nl/samenw/campaign_support/AMMA/TRACKDATA/index.html
  It is planned that these files are complemented with T (K), U-wind (m/s), V-wind (m/s), water vapour mixing ratio (ppmv) or RH (%), so that the representativity of the model simulated meteorological fields can be assessed. These fields can also be used to define the troposphere during post-processing.
  Requested model output at these points: date+UT (minutes), T(K), U, V, RH, H2O, O3, NO2, NO, HNO3, OH, CO, AT, ST, isoprene, …
  Add the output as extra columns to the aircraft location files.
- Daily tropospheric columns 2D-field of NO2, and HCHO at the local overpass time of Sciamachy (10h00 LT) and OMI (13h30 LT) – output netcdf
- Monthly mean tropospheric columns 2D-field of O3 to compare to OMI-MLS product. There are several such products – the best is likely the one produced by Mark Schoeberl. **He will be contacted by KNMI.**

- AT and CO output fields at 700, 850, 500, 350 hPa (at 10h30 LT) for comparison with MOPITT- output netcdf
- Ozone, CO, AT and ST profiles at Windhoek (about 17.5 E, 22.5 S) for comparison to MOZAIC Air Namibia flights. Store twice daily profiles at about 18h20 UT and at about 6h15 UT. Please also include pressure (hPa) in the output. Put all profiles for a month in 1 file (ascii or netcdf).
- Ozone, AT and ST profiles at Cotonou (6.21 N, 2.23 E), Nairobi (1.27 S, 36.8 E) and Malindi (2.99 S, 40.19 E). All 3 stations are also part of the SHADOZ network: http://croc.gsfc.nasa.gov/shadoz/
  Please include also pressure (hPa) in the model output!
  - For Malindi there is presently only 1 sounding available (20060104 9h52 UT).
  - The date list for Nairobi is available as: http://www.knmi.nl/samenw/campaign_support/AMMA/WP413/nairobi.txt
  - The date list for Cotonou is available as: http://www.knmi.nl/samenw/campaign_support/AMMA/WP413/cotonou.txt
    Background information about the Cotonou soundings was provided by Valerie Thouret, see http://www.knmi.nl/samenw/campaign_support/AMMA/WP413/INSTRUMENT-RSO3_COTONOU.pdf
    It has been agreed that the number of stations needs to be expanded to avoid statistical problems introduced when using only a few soundings.
- Gas concentrations and wet deposition output at 9 IDAF sites:
  - Banizoumbou (13.05N,2.06E in Niger)
  - Katibougou (10.86N, -7.58E in Mali)
  - Lamto (6.21N, -5.03E in Ivory Coast)
  - Djougou (9.66 N, 1.91E in Benin)
  - Zoétélé (3.16N,11.96E in Cameroon)
  - Louis Trachardt (-23N, 29.81E in South Africa)
  - Amersfoort (-27.13N, 29.81E in South Africa)
  - Cape Point (-34.36N, 18.83E in South Africa)
  - Kruger National Park (-25N, 31.6E in South Africa)

  A table with detailed information per station was provided by Fabien Solmon. See http://www.knmi.nl/samenw/campaign_support/AMMA/WP413/IDAFsite.pdf\

For CTM with AEROSOLS:

- Daily aerosol optical depth to compare to MODIS instruments on the TERRA (overpass time 10h30 LT) and AQUA (overpass time 13h30 LT) satellite – output netcdf

- At Nangatchori (9.647 N, 1.741 E, 415 m) : daily (12 UT) surface concentrations of NOx, O3, CO, BC, and OC (µg/m3).
  For aerosol models nephelometer data and GRIMM aerosol size data are also available at Nangatchori. See datelist of observations (excel) provided by Cathy

Liousse: http://www.knmi.nl/samenw/campaign_support/AMMA/WP413/EOP-chemNangatchori.xls

- Aerosol optical depth at 12h UT at AERONET sites
  - Agoufou (15.34N, 1.48W) in Mali
  - Capo Verde (16.73N, 22.93W)
  - Banizoumbou (13.54N,2.66E) in Niger
  - Dahkla (23.71N,15.95W) in Morocco
  - Dakar (14.39N,16.96W) in Senegal
  - Djougou (9.66 N, 1.91E) in Benin
  - IER-Cinzana (13.28N,5.93W) in Mali
  - Illorin (8.32N, 4.34E) in Nigeria
  - Ouagadougou (12.20N, 1.40W) in Burkina Faso
  - For 2006 Lamto has to be added (6.21N, 5.03W) in Ivory Coast

  Central Africa station?
  For 2000/2003 a reduction of the number of sites is possible.
- 2006: aerosol extinction and SSA profiles at 12h? at the lidar location at Banizoumbou (13.54N, 2.66E) and Djougou (9.66 N, 1.91E?). (**Cathy informs about Djougou & Peter will ask Beatrice about lidar transect**)
  Investigate what optical properties are used to make this calculation in the models.

- 3-hourly chemical boundary conditions for regional models from 1 global model (ORISAM-TM4 – Bruno Guillaume) for selected periods in 2006.