Norwegian
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met.no MSC-W

The future (unsolved problems, fields for cooperation,...)

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Future improvements

- The EMEP MSC-W model is now being used on:
  - scales ranging from global to 1x1 km2 national studies.
  - In hindcast mode, but also for emergencies (met.no) and forecasts
  - Pollutants typically are acid deposition, ozone and PM
  - But some links to SLCF (e.g. AOD calculations)
  - Can be easily modified with e.g. tracers or other chemical schemes
  -
- There is much to do....

Improvements (wish-list)? Chemistry

- Revise chemical scheme – closer to CRI
- Release GenChem as open-source
- Improve photolysis scheme (FAST-J, other?)
- Have more chemical schemes as options
- Test other numerical solvers (KPP-like)
- Many other chemical processes could be tackled (e.g. marine, DMS, HCl, ….)

Improvements (wish-list), meteorology

- Explore use of other parameters from ECWMF
  - – e.g. Hmix, Kz, …..
- Improve links to WRF
  - Needs proper testing of WRF in different locations (c.f. UK work)
- Other NWPs, RCMs, GCMs?
- Improved evaluation needed for several aspects
  - Dispersion (Kz, Hmix)
  - Stability (L, u*)
  - Convection

Improvements (wish-list), ..

- Evaluation
  - Routine data
  - Intensive campaigns, research data
  - Spatial patterns
  - Trends
  - Vertical profiles? (satellite, aircraft)
- Main issues?
  - NOy balance
  - OA
  - Vertical profiles

Improvements (wish-list), emissions

- Evaluation of emissions (garbage-in problem?)
  - e.g. EC, OA
  - Rest of world
  - Dust
- Better treatment of point sources (LPS)
- Temporal distributions
- Biogenic emissions (BVOC, NOx, NH3, DMS)
  - Global and/or local
- Dynamic emissions?
- Effects of climate change

Improvements (wish-list), sub-grid

- How can we cope with sub-grid effects?
  - Plume models?
  - More advanced mosaic calculations
  -
- City-delta problem
  - Can we do better for urban areas, population exposure?

… , sub-grid, cont.

- Deposition?
  - Better/different schemes
  - Different landcover?
  - Problem with evaluation! What should deposition rates be?

… , sub-grid, cont.

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- Why 90m? Can we do better?
  - Analytically
  - Explicitly
  - Sub-grid modelling

Aerosols?

- Better size-distributions?
  - Dynamics
  - Emissions
  - Evaluation
  - Radiative effects
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- Aerosol deposition
  - Better schemes?
  - Can we account for flux-divergence? (e.g. NH4NO3)
  - Serious problems with measurements as basis for theory and/or evaluation

IT issues?

- GUI
- Graphics
- Evaluation software
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Improvements (wish-list), super-grid

- How to cope with larger scales
  - Links to GCMs?
  - Links to ecossytem models
  - Earth System models
  - Can we keep these systems/couplings managable (can we keep the model useful?!)

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- How to cope with larger scales
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  - Can we keep these systems/couplings managable (can we keep the model useful?!)
- What would Einstein do? (we are moving in the opposite direction to simple as possible...)

Finally

- The EMEP model aims to be useful to policy makers, but also to interested scientists.
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- Suggestions for improvement welcome!
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- Contributions welcome!
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- Cooperation very welcome!