Regional Air Quality Working Group Report

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Current Status

- **Three nested-grid domains set up in the standard model (domain definitions on GEOS-Chem website)**
  - **East Asia (10S-50N, 70E-150E)**
  - **North America (10N-70N, 140W-40W)**
  - **Europe (30N-70N; 30W-50E)**
- **Resolutions**
  - **GEOS-5, 0.5x0.667 resolution (2003-onward)**
  - **GEOS-3, 1x1 resolution (now obsolete)**
- **Other nested-grid domains**
  - **Amazon (Michael Barkley) (2004-2009)**
  - **Atlantic ocean (Paul Palmer, ongoing?)**
  - **North Africa (Fangqun Yu, ongoing) (2009-2010)**

Outstanding issues with the model

- **Code v9-01-01, nested-grid East Asia domain, KPP crushes, SMVGEAR works fine**

- **Boundary conditions: may need to increase the size buffer zone**

- **Issues with emission resolution, need to regrid from generic resolution to 0.5x0.667 on the fly (regridding code ready?)**

- **Archive regridding codes/other commonly-used codes online**

- **Planeflight diagnostics (fixed by Michael Barkley)**

Developing Priorities

- **Nested-grid model at 0.25^{o}x 0.3125^{o} resolution**
    - **East Asia domain (Yuxuan Wang);**
    - **Requirement for high-resolution emissions (likely available for EA and NA domain, not sure of EU emissions);**
    - **Make it an option for 0.5x0.667 resolution nested-grid runs to accommodate aerosol microphysics simulations (only needs to regrid met fields)**
    - **Consider more short-lived species in chemistry (relying on community efforts)**
    - **Chemistry and emission time-steps and other parameterized processes to be tested (relying on community efforts)**

Developing Priorities

- **Other types of nested-grid simulations besides full-chemistry**
  - **Hg (code ready; NA by Lyatt Jaegle; EA by Yuxuan Wang)**
  - **CO_2 (code ready; EA by Yuxuan Wang)**
  - **CH_4 (NA by Kevin Wecht, ongoing)**
- **Benchmark simulation with major model version release (East Asia by Yuxuan and Rokjin)**
- **Soil NOx from Rynda Hudman**
- **Update dust simulation with the nested-grid model (East Asia domain by Rokjin)**

Developing Priorities

- **Adjoint capability for the nested-grid model (Zhe Jiang @ U. Toronto for CO; full-chemistry by Daven Henze)**

- **APM capability for nested-grid (almost ready, but further validation needed by SUNY group)**

- **TOMAS for nested-grid (almost ready, but further validation needed by Dalhousie)**

- **Ocean acetone emissions (following global model development, research on going)**

- **Regional climate-chemistry interaction?**

- **Test the idea of two-way nesting (Jintai Lin at PKU)**