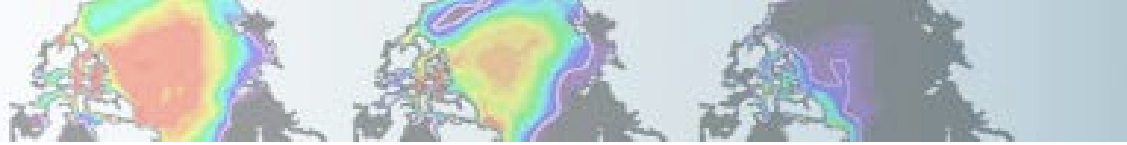

Chemistry/Biogeochemistry
in CESM1.5 and planned for CESM2

Louisa Emmons - Chemistry

Keith Lindsay – BGC

Chemistry updates included in CESM1.5

- MEGAN corrections in CLM4.5 (get CO_2 from atm, not namelist; correct LAI average for last 10 days; correct gamma_CO2)
- Gas and aerosol emissions from CLM fire model, with vertical distribution applied in CAM
- VBS framework for secondary organic aerosol (SOA), using expanded tropospheric chemistry mechanism

Planned for CESM2

CAM-chem additions desired, but not clear we have resources to implement:

- Update photolysis scheme with FAST-J/CLOUD-J (or TUV)
- Include nitrate aerosol in MAM

Refine SOA-VBS through further evaluation and updated reaction rates

Test couplings of land, biogeochemistry and atmospheric chemistry (after CLM has been frozen), including:

- methane
- biogenic VOCs
- fire emissions

Test chemical representation in CAM6/CLUBB at 1-degree

Ocean BGC Scientific Developments in CESM 1.2

- Riverine inputs of BGC constituents
- Burial of sinking matter to sediments
- Parameterization changes to reduce biases in Oxygen Minimum Zone extent, surface Chl & nutrients
- Improved representation of DOM pools
- Generalization of functional group implementation

Ocean BGC Scientific Developments now on CESM trunk (since CESM 1.2)

- Treatment of light under sea ice categories
- Parameterization changes to reduce biases in Oxygen Minimum Zone extent, surface Chl & nutrients
- Improved representation of DOM pools
- Hydothermal Iron Source
- ^{13}C, ^{14}C Isotopes

Ocean BGC Infrastructure Developments

- Support for offline tracer tools

- Modularized BGC core
  - MARBL project (SciDAC funded)
- Infrastructure for Newton-Krylov based fast tracer spinup

Ocean BGC Scientific Developments to Come

color denotes coupling to non-ocean components

- H_20, C, N Isotopes
- NH emissions to atmosphere
- Use prognostic atmospheric dep of dust/iron
- Optional Phaeocystis functional group
- DMS module (air-sea flux)
- Methane module (air-sea flux)