Joint Biogeochemistry-Land-Chemistry Session

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Science Goals for CESM2

• Closing the global CH4 cycle (ocean–LANL has version; wetlands-tuning needed)
• Improving the nitrogen (& C) cycle (land-ocean transfer, trace gases, ammonia from manure, riverine (inorganic N), nutrients going to regional ocean models)
• Trace gas emissions from fires – MVM done- trace gases & aerosols
• Trace gas emissions from urban areas
• Improve biogenic VOCs
  – Reduce differences in MEGAN emissions between active vs prescribed LAI – tune for CN
  – Other biogenic emissions algorithms – Tim Butler, Forrest H, Jeff Chambers (Amazon) – form working group on this
• Ozone feedback on vegetation health-need ozone passed to CLM-what to do with run with no atm chem
• Stomatal resistance in land model is overestimated (needed for ozone dry dep) [MVM found recently]- not easily fixed in the short-run
• Water and carbon isotopes
• {Representation of microbes in land (controlling C & N) }
• Representation of SOM substrate chemistry – next gen.
• Competitive interactions for nutrients (abiotic, microbial, plants)
• Spatial heterogeneity – a focal area for next gen
• Coupling DMS, HCs, OCs, primary&sec. aerosols, et al. ocean->atm
• Dust – nutrient deposition – ACME:ocean part – and erosion (loss from land)
• CICE5 – coupled into CESM with BGC
• Emissions of ice nuclei from land and oceans (e.g., pollen)
Current Development Activities

• Land model fire emissions -> atmosphere gases (CO, NO, VOCs, etc) – Maria Val Martin (CSU/Sheffield)
• Coupling BGC CH4 and NH4 emissions – Peter Hess (Cornell)
• Other biogenic emissions algorithms
• New BGC
  – CLM4.5 (Koven et al. 2013)
• Reactive transport capability
  – CLM4-BeTR (Tang et al. 2013)
  – CLM-PFLOTRAN (Bisht and Riley submitted; Pau et al. in review)
• Watershed-scale hydrology and reactive transport
  – CLM+PAWS (Shen et al. 2013; Riley and Shen 2014, others)
• Leaf level nutrient competition (Ghimire et al.)
  – Coupling with new nutrient competition algorithm
Development Priorities for the next year

• {based on session discussion}
Methane emissions simulated by CLM4 and CLM4.5 – same BGC module

Poster: R. Paudel
Meng, Paudel, Mahowald, Hess, in preparation, 2014