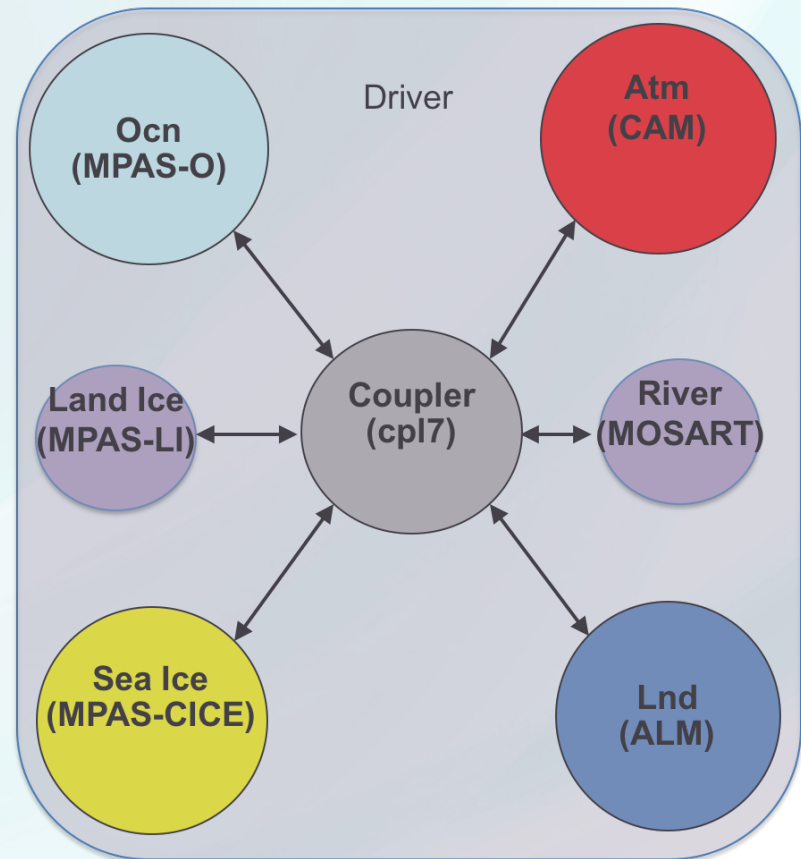


Land Use in E3SM

What is E3SM?

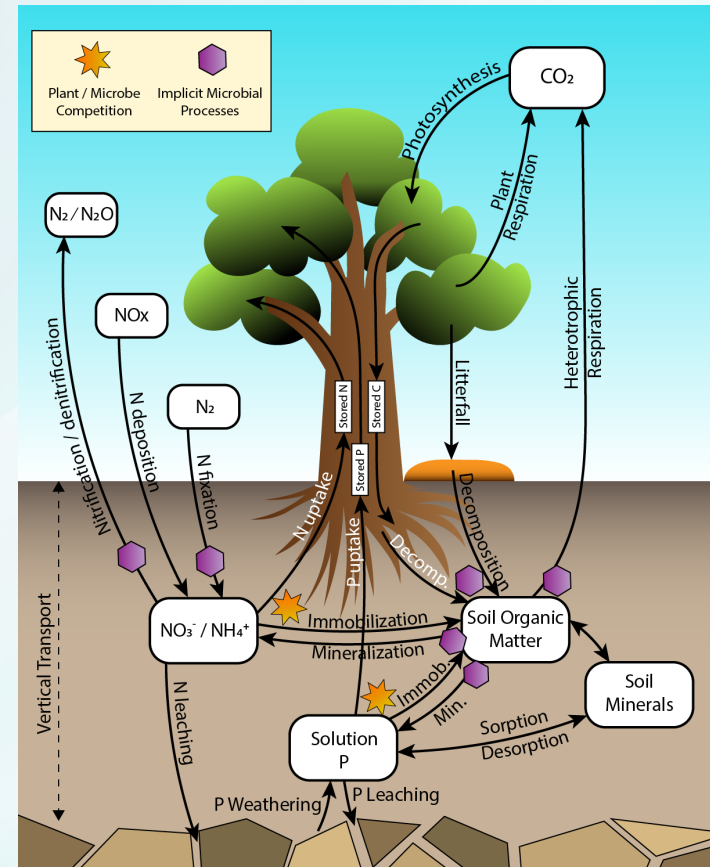
- Energy Exascale Earth System Model
- Branched from CESM ~5 years ago
 - New ocean and ice components
 - Atmosphere started from CAM5
 - Land model started from CLM4.5
- Open development:
 - <https://github.com/E3SM-Project/E3SM>
- More information:
<https://e3sm.org/>



E3SM Land Model

- v1 development has focused on nutrient limitations, specifically representing P limits
- Ongoing work on irrigation, crops, and dynamic vegetation, but not included in v1

ELM v1 CNP dynamics in vegetation and soil



Using LUH2 in E3SM

LUH2 Data

c3ann
c3nfx
c3per
c4ann
c4per

pastr
range

primf
primn

secdf
secdn

urban

LUH1 Format

crop

past

prim

secd

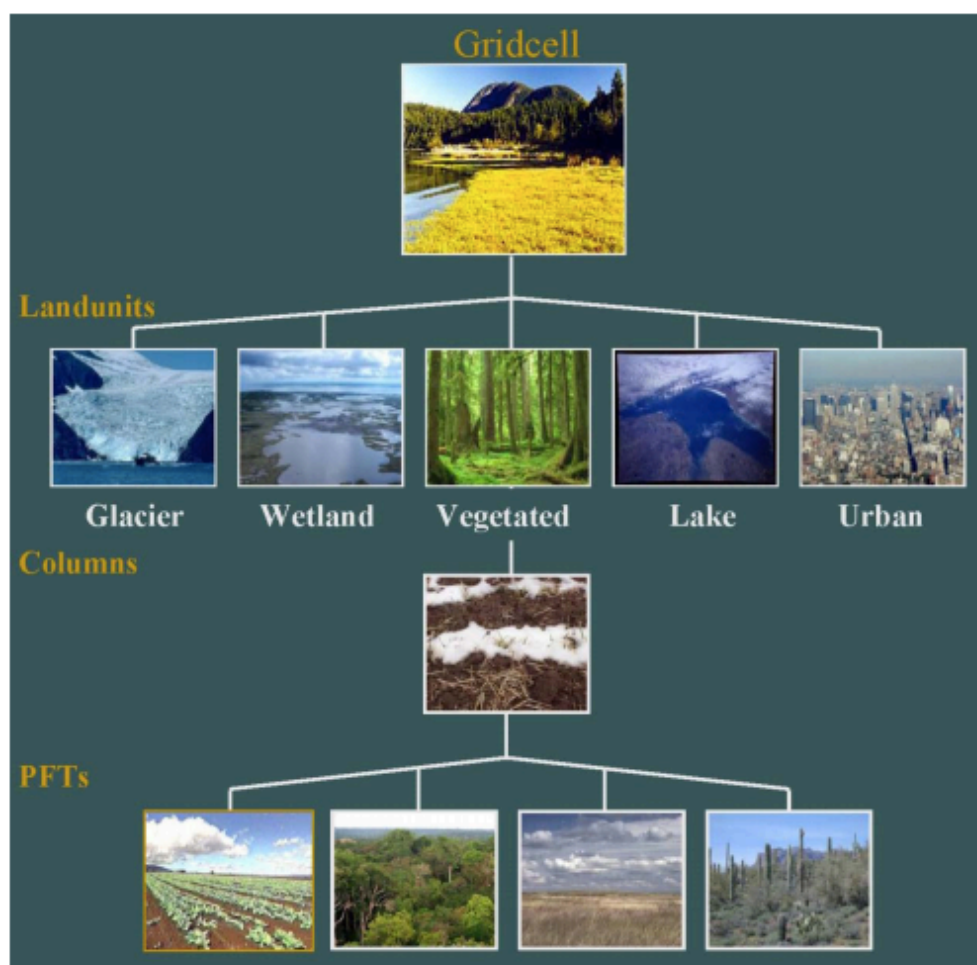
urban

Land Use
Translator

ELM PFTs

- 1 - needleleaf_evergreen_temperate_tree
- 2 - needleleaf_evergreen_boreal_tree
- 3 - needleleaf_deciduous_boreal_tree
- 4 - broadleaf_evergreen_tropical_tree
- 5 - broadleaf_evergreen_temperate_tree
- 6 - broadleaf_deciduous_tropical_tree
- 7 - broadleaf_deciduous_temperate_tree
- 8 - broadleaf_deciduous_boreal_tree
- 9 - broadleaf_evergreen_shrub
- 10 - broadleaf_deciduous_temperate_shr
- 11 - broadleaf_deciduous_boreal_shrub
- 12 - c3_arctic_grass
- 13 - c3_non-arctic_grass
- 14 - c4_grass
- 15 - crop

E3SM Land Model



E3SM Versions

- E3SM1.0 – uses satellite phenology, results from DECK already posted to CMIP6 ESGF
- E3SM1.1 – uses the default biogeochemistry scheme, includes ocean/ice biogeochemistry, many C4MIP and LS3MIP simulations complete, results should be posted to CMIP6 ESGF soon
- E3SM1.1-ECA – uses an alternative biogeochemistry scheme, many C4MIP simulations complete, results should be posted to CMIP6 ESGF soon

E3SM Outputs

Hosted by



Department of Energy
Lawrence Livermore National Laboratory

Powered by



Welcome, **Guest**. | [Login](#) | [Create Account](#)



[Home](#) [About Us](#) [Resources](#) [Contact Us](#) [Data Nodes Status](#)

You are at the [ESGF@DOE/LLNL](#) node

[Technical Support](#)

E3SM

[Home](#)

Visitors

- [List All News](#)
- [List ESGF Data Groups](#)

Energy Exascale Earth System Model

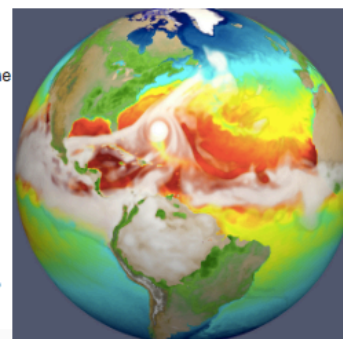
Search & Download Data ?

 [More search options](#)

The **Energy Exascale Earth System Model (E3SM)**, formerly known as **Accelerated Climate Modeling for Energy (ACME)** project is an ongoing, state-of-the-science Earth system modeling, simulation, and prediction project, sponsored by the U.S. Department of Energy's (DOE's) Office of Biological and Environmental Research (BER), that optimizes the use of DOE laboratory resources to meet the science needs of the nation and the mission needs of DOE.

A major motivation for the E3SM project is the coming paradigm shift in computing architectures and their related programming models as capability moves into the exascale era. The E3SM model simulates the fully coupled climate system at high-resolution (15-25km) and will include coupling with energy systems, it has a unique capability for variable resolution modeling using unstructured grids in all its earth system component models.

The E3SM model is publicly available (see [References](#) below), it has an open source code, and the data from all major simulations will be made publicly accessible by publishing to ESGF as the simulations conclude.



Data in E3SM project on ESGF is published in raw / native model output format on native grid for each component (atmosphere, ocean, ice, land and river components), as well as reprojected to lat-lon grid, with calculated climatologies and raw variables as time-series over the

Federated ESGF-CoG Nodes

CoG-CU
ESGF@CEDA
ESGF@DKRZ
ESGF@IPSL
ESGF@NASA/NCCS
ESGF@NCI
ESGF@NOAA/GFDL
ESGF@NSC/LIU
ESGF@PIK

Browse Projects

[This](#) [All](#) [My](#) [Tags](#)

Parent projects (1)

ESGF-LLNL

Peer projects (1)

ACME-LLNL

Child projects (0)

Enter Tag

Start typing, or use the 'Delete' key to show all available tags.

E3SM Tags: None

Effects of LULCC in ELMv1.1

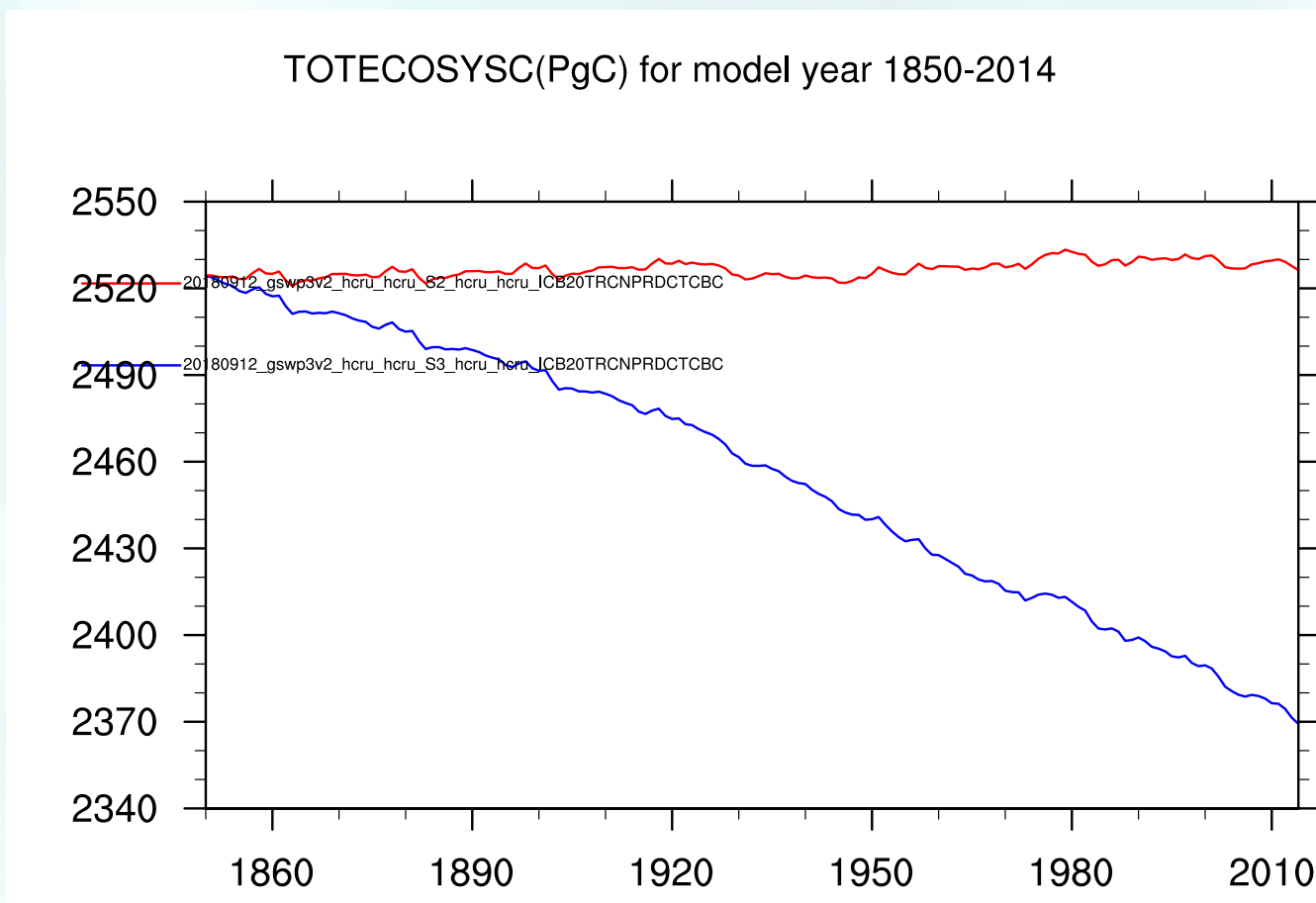
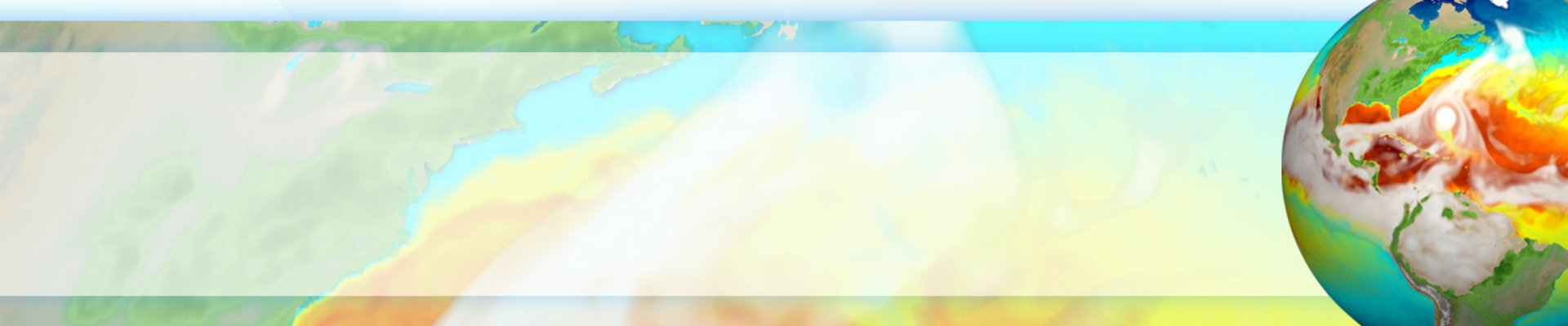


Figure from Jiafu Mao (ORNL)



Thank you!