

CESM Land Model Working Group

NCAR | NATIONAL CENTER FOR
ATMOSPHERIC RESEARCH

Here we value respectful dialogue, please...



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Time	Topic / Title	Speaker
8:30	Welcome, logistics & LMWG overview	Will Wieder
8:42	FATES updates & highlights	Jacquelyn Shuman
8:54	The CLM5 Parameter Perturbation Experiment (PPE)	Daniel Kennedy
9:06	CLM-FATES PPE: First steps in the calibration cascade	Adrianna Foster
9:17	Simulating alpine tundra communities along an environmental gradient with CLM5 at Niwot Ridge LTER	Katya Jay
9:29	A NEON Testbed for High Resolution Climate Data Assessment	Montasir Maruf
9:41	Investigate the global impact of carbon-based logging in FATES	Shijie Shu
9:53	Assessing climate change impacts on live fuel moisture and wildfire risk using a hydrodynamic vegetation model	Chonggang Xu
10:05	Break	
10:10	Virtual Coffee Break in breakout rooms	





LWVG Overview

THE 27th ANNUAL CESM WORKSHOP

Will Wieder & Rosie Fisher

LMVG Co-Chairs

14 JUNE 2022



CTSM 5.1 main development branch has lots of new features

NUOPC coupling infrastructure

CTSM5.1_dev_063

- Replaces mct coupler (cpl7)
- **mct deprecated soon!**
- ESMF library required
- Mesh file replaces domain file
- Control of the datm changes extensively
 - e.g. `user_nl_datm_stream`
- `cpl.log.*` files is now split into `med.log.*` and `drv.log.*`
- Single point cases are simpler!
- Additional documentation still needed

**Marianna presents
Weds 8:30 SEWG**

Atmospheric Fluxes

- Updated [PFT optical properties](#) [Keith Oleson]
- [Biomass heat storage](#) [Sean Swenson]
- [Snow burial](#) of vegetation [Danica Lombardozzi]
- [Surface roughness](#) [Ronnie Meier, Keith Oleson]
- [Dynamic Urban](#)*, new [urban datasets](#), & building property parameterization [Keith Oleson]
- [LUNA Bug fixes](#) [Leah Birch, Erik Kluzek]

Hydrology

- [Irrigation](#) [Bill Sacks & Sean Swenson]

Ecosystems and Biogeochemistry

- [FATESsp](#) configuration [Rosie Fisher & more]
- FATES point and regional configurations [Jackie Shuman, Adrianna Foster, Polly Buotte, Charlie Koven, & others]
- [MIMICS-CN soil bgc model](#) [Will W. & Sam Levis]
- [Ozone impacts on Jmax](#) in LUNA [Stefanie Falk]
- [Fire Model](#): bug fixes, improvements, & tuning [Fang Li]
- [Arctic/Boreal phenology & allocation](#) [Leah Birch]
- [CN-Matrix](#) for biogeochemistry [Chris Lu, Yiqi Luo]

- [Linked items](#) point to github pull requests and issues.
- Highlighted items are outstanding CTSM5.1 milestones
- * Requires updated datasets (CTSM5.2)

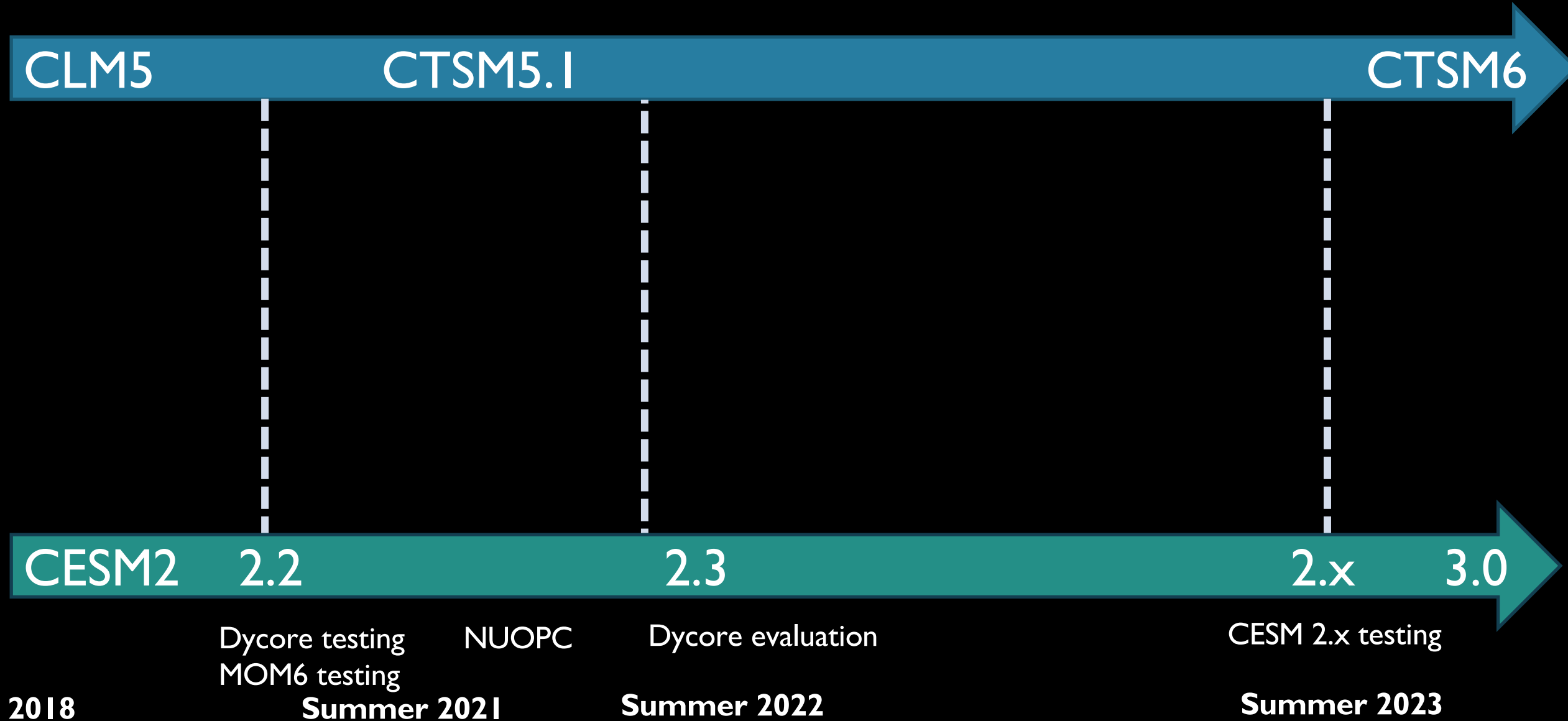
Crop Model

- [Shifting cultivation](#)* [Peter Lawrence]
- [Bioenergy crop](#) [Yanyan Cheng & Maoyi Huang]
- Winter wheat [Yaqiong Lu], implemented but not currently used

Features

- Switch to [NUOPC](#) coupling infrastructure [Mariana, Erik]
- Single point & regional workflow including [NEON](#) simulations, [supported towers](#) & [generic grid cells](#) [Danica L, Negin Sobhani, Will Wieder, Adrianna Foster, Erik]
- [Parameter Perturbation Experiment](#) (PPE) [Daniel, Katie, Dave]
- Moving [hard coded parameters](#) to parameter file [Keith Oleson]
- [WRF-CTSM beta](#) release [Dave Lawrence & more]
- [No anthro compsets](#): turn off irrigation, crop, urban, LULCC, fire
- [Prescribed soil moisture](#) [Sean Swenson]
- Soil and [snow](#) layer flexibility + trimming [land units](#) & [PFTs](#) [Sam Levis & Bill Sacks]
- [SSP-RCP anomaly forcing compsets](#) for land only simulations

LMWG Development Timeline



LMWGW Development Timeline



- Biomass Heat Storage
- Roughness length
- Phenology
- Fire and bug fixes
- FATES-SP
- FATES regional & point
- NEON

- Transient Urban
- Shifting Cultivation



Dycore testing
MOM6 testing
Summer 2021

NUOPC
Summer 2021

Dycore evaluation
Summer 2022

CESM 2.x testing
Summer 2023

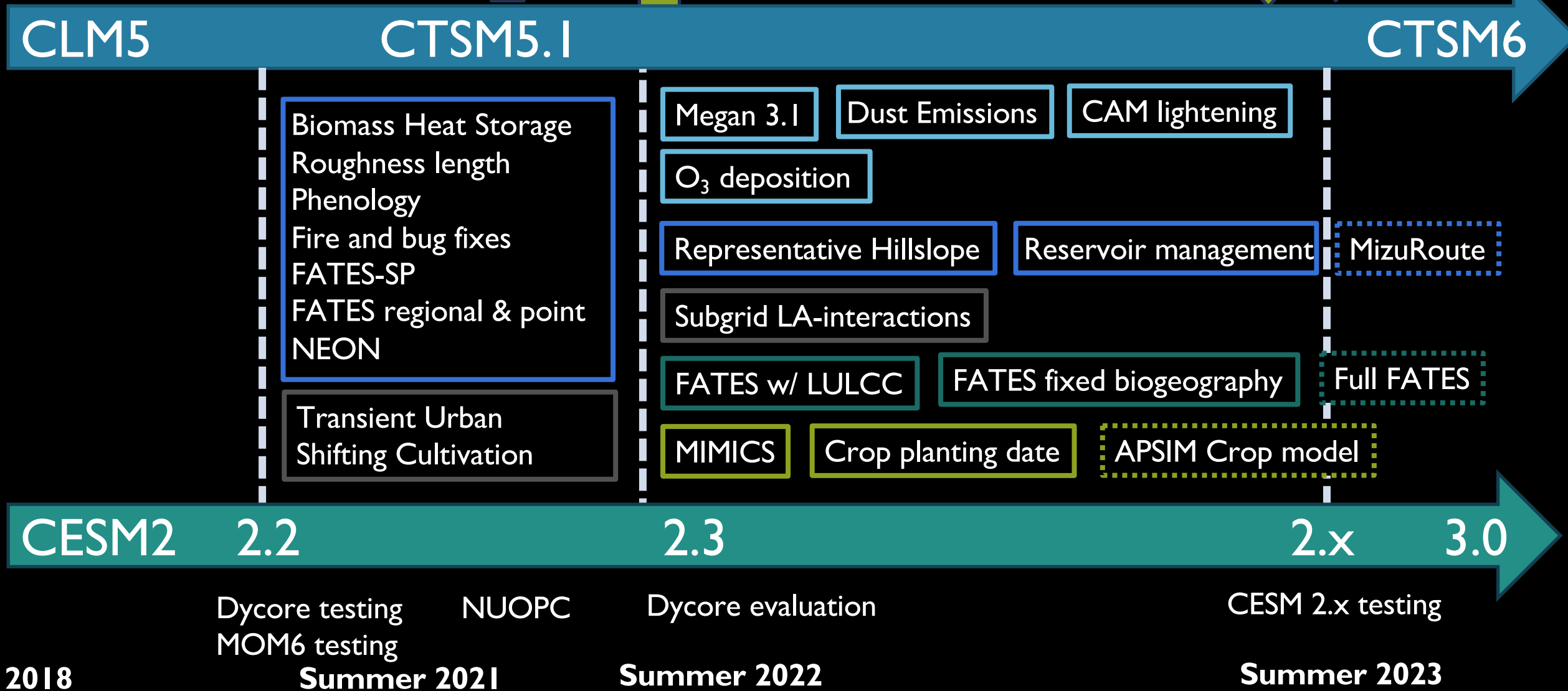
2018

Summer 2021

Summer 2022

Summer 2023

LMWG Development Timeline



Surface Data CTSM5.2_dev

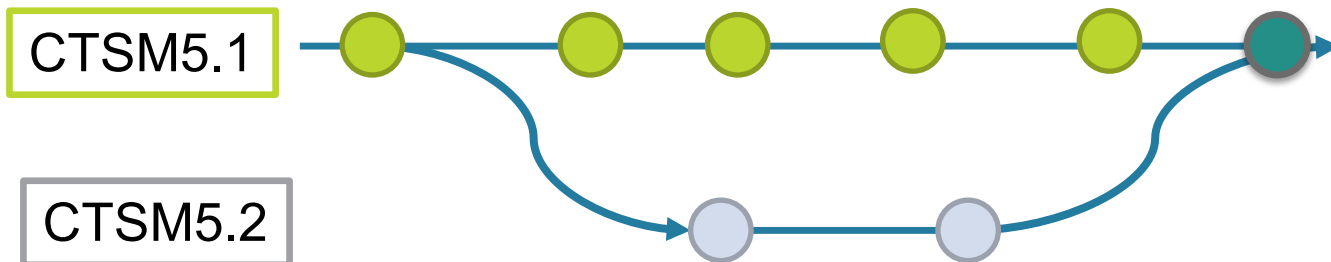
Method: mksurfddata ESMF

[Marianna & Sam]

- parallel version of mksurfddata that uses ESMF regridding directly in mksurfddata so that offline mapping files don't have to be created as a separate step.
- Facilitates creation of variable mesh and high resolution grids

New Input data

- Transient urban
- Gross unrepresented land use transition
- Dynamic lakes
- Soil properties from WISE 30 minute
- Irrigation methods
- Update glacier
- Soil color and LAI
- ...



Modular
Extensible
Repeatable
System independent
More frequent engagement



Search this book...

GETTING STARTED

Tutorial 0a: *CTSM, CESM-Lab, & Git*
Tutorial 0b: *CTSM Simulations at NEON Tower Sites*

GLOBAL SIMULATION

Tutorial 1a: *Global Simulations*
Tutorial 1b: *Global Visualizations*

GENERIC SINGLE POINT

Welcome to the 2022 CTSM mini-tutorial

JupyterBook passing

license MIT Made with Jupyter Last commit june Contributors

The materials and notebooks in this tutorial is published as a Jupyter book here.

This repository includes materials for the [Community Terrestrial Systems Model \(CTSM\) Spring 2022 mini-tutorial \(link to agenda and resources\)](#).

These tutorials are designed as an introduction to running the Community Terrestrial Systems Model (CTSM). We will go through three configurations that include running a:

1. Supported NEON tower site,
2. Global FATES simulation, and
3. Generic single point simulation.



- directory
- Resources
- Questions
- Acknowledgements

CESM-Lab

<https://github.com/NCAR/CTSM-Tutorial-2022>



These tutorials are designed as an introduction to running CTSM. We will go through three configurations that include running a:

1. Supported NEON tower site,
2. Global FATES-SP simulation, and
3. Generic single point simulation.

We'll also learn how to:

- Visualize results,
- Analyze model output, and
- Make simple code modifications.

Examples using NUOPC

[CTSM/tools/site_and_regional/](#)

- run_neon
- subset_data

Please request additional topics

<https://github.com/NCAR/CTSM-Tutorial-2022>



LMWG Development Goals for CTSM6 & CESM3 [short]

Atmospheric Fluxes

- [Dust emissions](#) [Longlei Li & Danny Leung]
- [BVOC emissions from MEGANv3.1](#) [Hui Wang]
- [Ozone deposition](#) [Danica Lombardozzi & others]
- [Lightning fluxes from CAM?](#) [Dave Lawrence]
- [Surface roughness](#) [Ronnie Meier, Keith Oleson]
- [Dynamic Urban, datasets](#), & parameterization [Keith Oleson]

Hydrology

- [Representative Hillslope model](#) [Sean Swenson]
- [mizuRoute](#) [Naoki Mizukami & Erik Kluzek]

Ecosystems & Biogeochemistry

- FATES fixed biogeography [Rosie Fisher, Charlie Koven, Jackie Shuman, Adrianna Foster & more]
- [MIMICS soil BGC model](#) [Will Wieder, Sam Levis]

Crop Model

- [Shifting cultivation](#) [Peter Lawrence]
- [Crop planting dates](#) [Sam Rabin]
- APSIM crop phenology [Bin Peng & Bill Sacks]

Features

- Perturbed Parameter Experiment [Daniel Kennedy, Dave Lawrence, & Katie Dagon]
- [Simple Land Model](#), SLIM [Marysa Lague, Erik K.]
- Updated surface dataset [Many contributors]
- CLASP [Meg Fowler]?
- Simplified enthalpy fluxes [Dave, Keith, Sean]?

Notes

- Projects are relatively independent
- Some features may be available for particular compsets.

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10:30	Attribution of climate: CO2: fire suppression: and harvest on densification and composition shifts in Sierra Nevada mixed conifer forests	Polly Buotte
10:42	Tree crown damage and its effects on carbon cycling in a tropical forest	Jessica Needham
10:54	Canopy rainfall interception	Pierre Gentine
11:06	New features and enhancements in CTSM-SNICAR snow albedo scheme	Cenlin He
11:18	A new approach to soil initialization for studying sub-seasonal land-atmosphere interactions	Yelin Jiang
11:30	Reduced terrestrial evaporation leads to increased water vapor over land	Marysa Lague
11:42	Soil moisture modulates land-use change impact under global warming	Arshdeep Singh
11:54	Implementing a dynamic urban scheme in the Community Earth System Model (CESM)	Bowen Fang
12:06	Applying the Data Assimilation Research Testbed (DART) towards improved CLM simulations of Earth System Carbon: Water and Energy Cycling	Brett Raczka
12:20	Adjourn	

