

# LMWG updates

## CESM Workshop



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NCAR NATIONAL CENTER FOR ATMOSPHERIC RESEARCH

*Here we value respectful dialogue, please...*



# Land model leadership



# CTSM5.1 Upcoming developments and features

## Atmospheric Fluxes

- Updated PFT reflectance parameters [Keith]
- New urban datasets, parameters of building properties [Keith]
- Biomass heat storage [Sean]

## Hydrology

- Irrigation [Bill & Sean]

## Ecosystems & BGC

- Fire: improved deforestation fires, lightning ignition bug fix [Fang Li]
- LUNA bug fixes [Leah Birch]
- Arctic & boreal phenology & allocation [Leah Birch]
- Matrix-CN [Chris Lu & Yiqi Luo]
- Aerosols: FAN (NH3 emissions) [Julius Vira & Peter Hess]

## Crop model

- Shifting cultivation [Peter]
- Bioenergy crop [Yanyan Cheng & Maoyi Huang]

## Features

- Remove hard coded parameters [Keith]
- SSP-RCP anomaly forcing compsets for land only runs
- No anthro compset, turns off irrigation, crop, urban, LULCC, fire
- Prescribed soil moisture
- Soil and snow layer flexibility + trimming PFTs [Sam Levis]



# LUNA bugs



1. Max day length hard coded to 12 hours, globally.
2. Average daily values need to include day & night.
3. Hard coded initialization of  $V_{cmax}$  and  $J_{max}$  in spring.

$$J_{maxCoef} = J_{maxb1} * ((hourpd / 12.0_{r8}) ** 2.0_{r8}) \dots$$

## Results: Lower Arctic $V_{cmax}$ & productivity

- **Modify parameters,  $j_{maxb1}$  + arctic leafCN &  $slatop$**

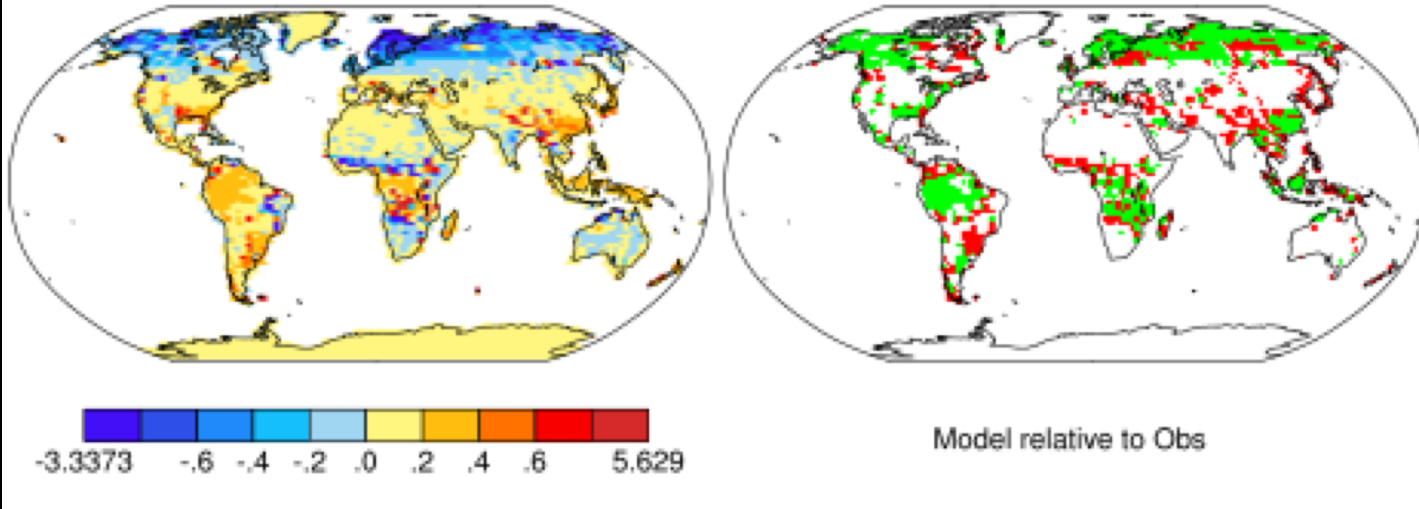
C. Xu

K. Oleson

L. Birch



# GPP Difference, LUNAbugs - CLM5 control



- **Modify parameters, `jmaxb1` + arctic leafCN & `slatop`**

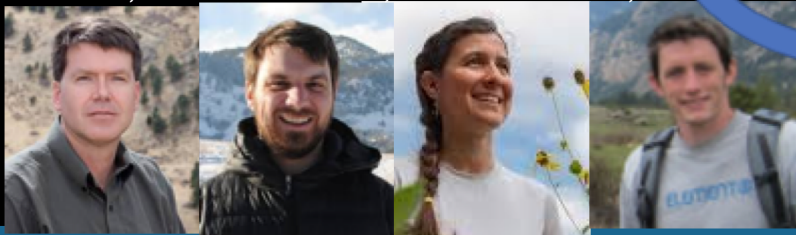
C. Xu    K. Oleson    L. Birch



# NCAR-NEON Cyberinfrastructure & Forecasting



G. Bonan, M. SanClements, D. Lombardozi, D. Durden & B. Dobbins



# LMWG priorities for CESM3

*How do ecosystem function and vulnerabilities transform under climate change?*



S. Swenson, R. Fisher, J. Shuman, C. Koven



*Model components:*  
**Hillslope Hydrology**  
**Ecosystem Assembly**  
**[FATES]**

# LMWG priorities for CESM3

*How do we maintain food and water security in a changing world?*



D. Lombardozi, B. Peng, N. Mizukami



*Model components:*

**Crop model [APSIM]**

**Water & river management**

**[mizuRoute]**



# CTSM6 & CESM3

## Atmospheric Fluxes

- Multilayer canopy [Gordon & Ned Patton]

## Hydrology

- Hillslope hydrology [Sean] & mizuRoute [Naoki, Erik]

## Ecosystems & BGC

- FATES [Rosie, Charlie, Jackie, Ryan & many more]

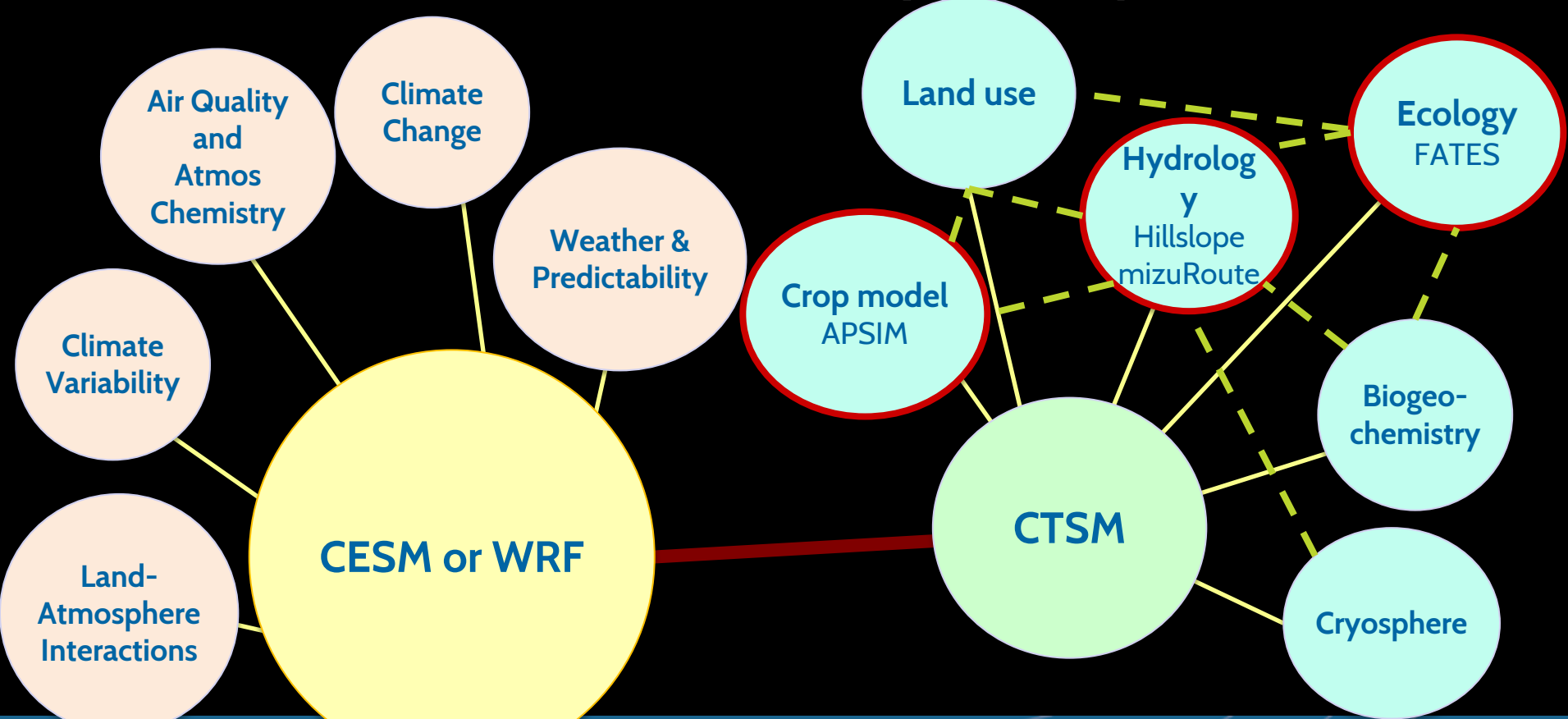
## Crop model

- APSIM crop phenology [Danica & Bin Peng]

## Features

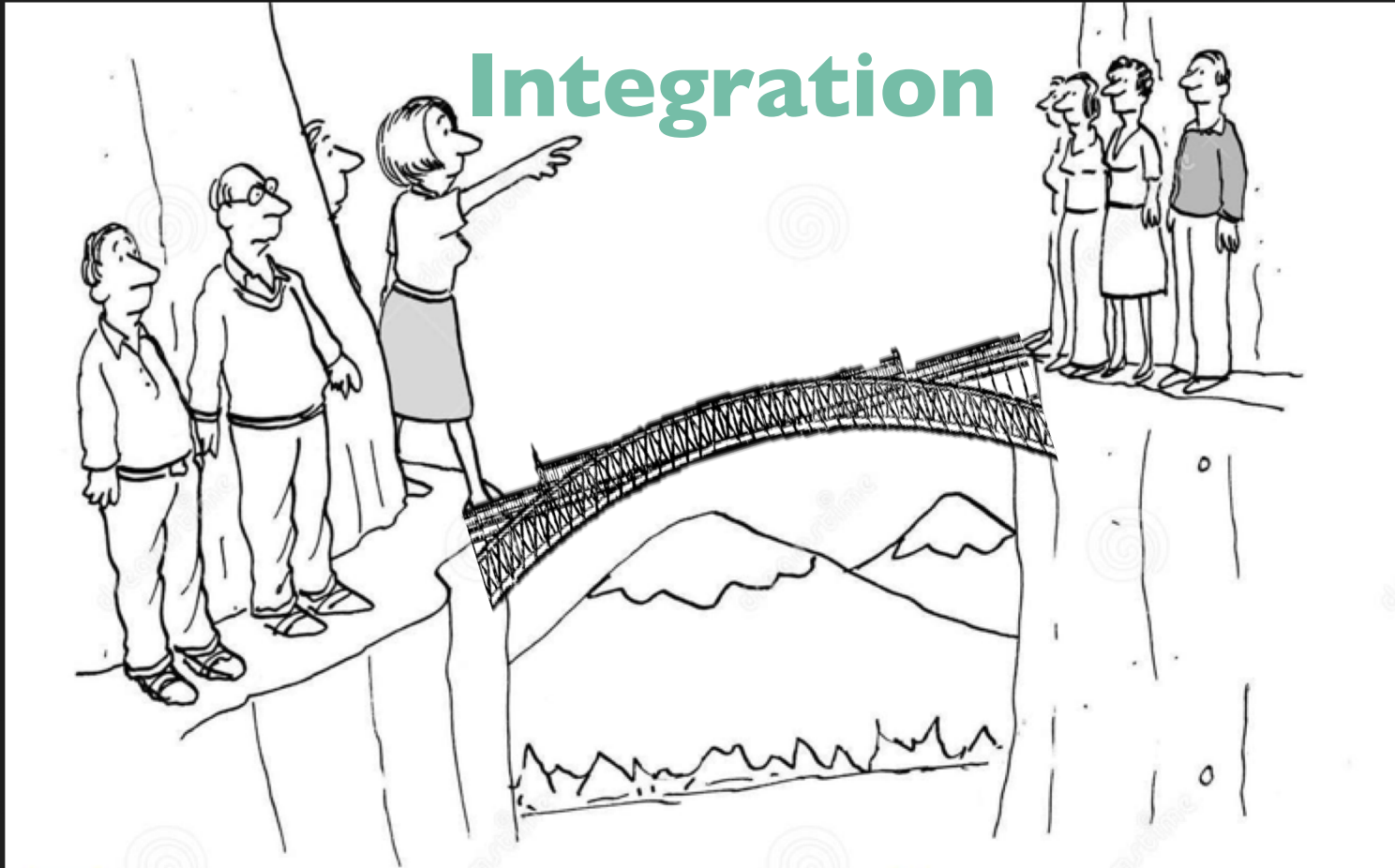
- CTSM & LILAC [Dave & many more]

# Land models for Earth System prediction



# CTSM-FATES

## Integration



**Goal:** To run CMIP-compatible, fully transient historical simulations of CTSM-FATES by summer 2021.

**Discussion Aims:** In this meeting we aim to prioritize needs, identify specific tasks & interested people to implement CTSM-FATES integration.