



**LSMS 2022**  
LAND SURFACE MODELLING SUMMIT

**Eleanor Blyth and David Lawrence**

***Steering Committee: Aaron Boone, Simon Dadson, Rosie Fisher,  
Martin de Kauwe, Julia Pongratz, Kei Yoshimura***

***Administrative Support: Victoria Barlow, Marcia Spencer***





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# LSMS 2022

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## Land and Earth System models are increasingly being asked to provide information on societally-relevant impacts and adaptation associated with climate and environmental change

- Ecosystem vulnerability and impacts on carbon cycle and ecosystem services
- Water and food security in context of climate variability, change, and extreme weather
- Land-based mitigation solutions (net-zero targets); Impacts of land use and land-use change on climate, carbon, water, and extremes
- Hazard prediction (drought, floods, fire, heat waves, etc) under a changing climate
- *Understand and exploit sources of predictability from land processes, Earth System prediction*



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EDITORIAL | 16 August 2022

## We must get a grip on forest science – before it's too late

Trees are one of our biggest carbon hopes. Supporting the scientists studying them should be a much higher priority.



**Perspectives on the Future of Land Surface Models and the Challenges of Representing Complex Terrestrial Systems**

Rosie A. Fisher, Charles D. Koven ✉

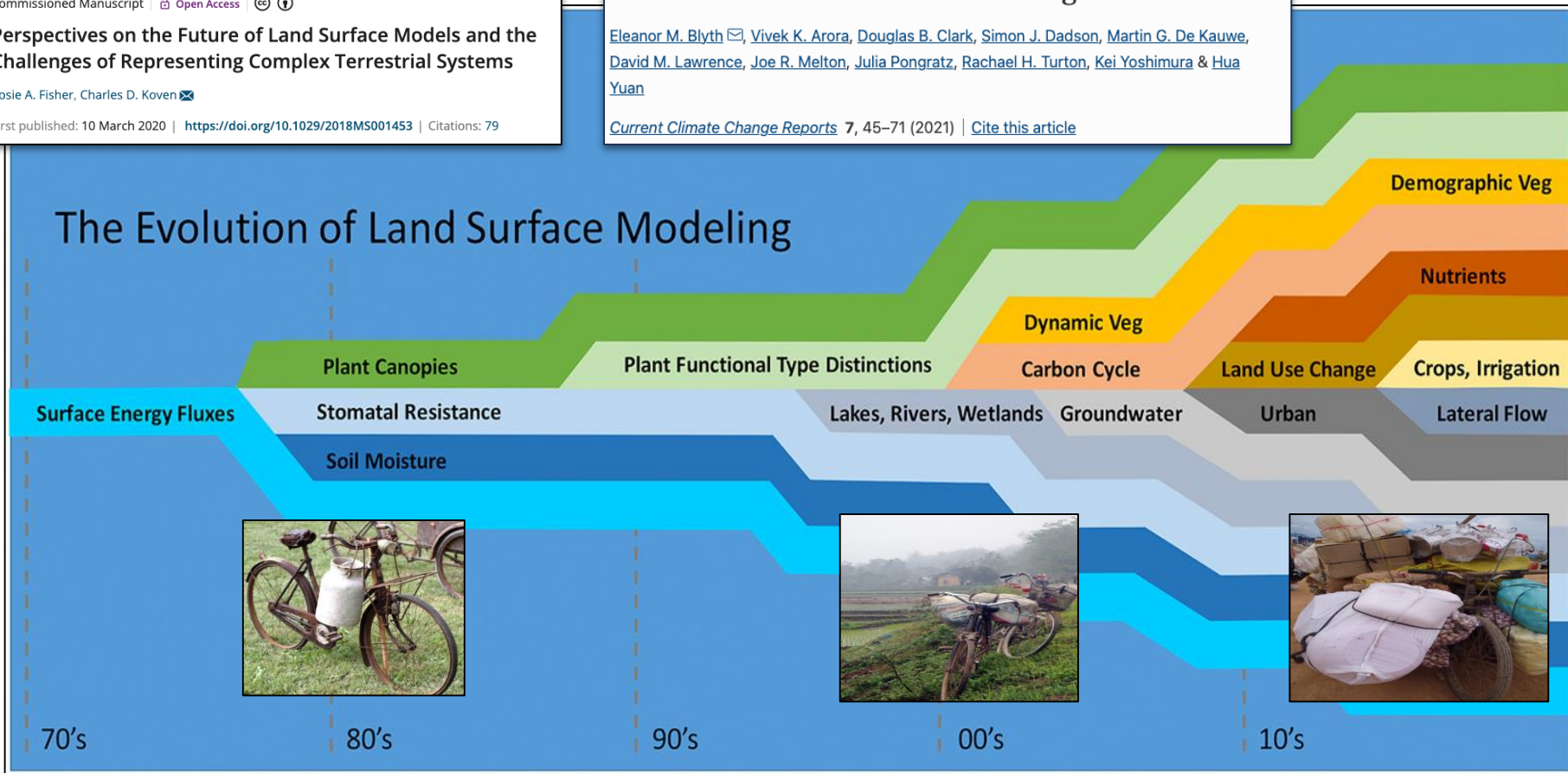
First published: 10 March 2020 | <https://doi.org/10.1029/2018MS001453> | Citations: 79

**Advances in Land Surface Modelling**

[Eleanor M. Blyth](#) ✉, [Vivek K. Arora](#), [Douglas B. Clark](#), [Simon J. Dadson](#), [Martin G. De Kauwe](#), [David M. Lawrence](#), [Joe R. Melton](#), [Julia Pongratz](#), [Rachael H. Turton](#), [Kei Yoshimura](#) & [Hua Yuan](#)

*Current Climate Change Reports* 7, 45–71 (2021) | [Cite this article](#)

**The Evolution of Land Surface Modeling**

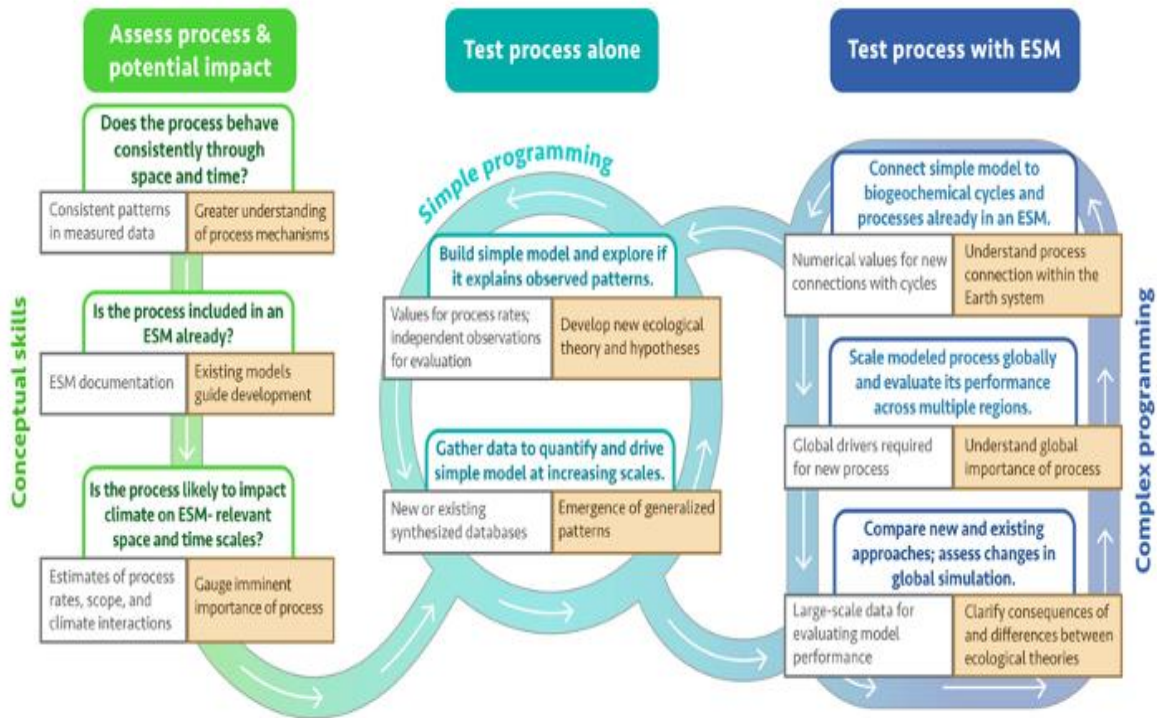




The Illusion:



The Reality:



**Global Change Biology**

REPORT | [Open Access](#) |

**Increasing the spatial and temporal impact of ecological research: A roadmap for integrating a novel terrestrial process into an Earth system model**

[Correction\(s\) for this article](#)

Emily Kyker-Snowman Danica L. Lombardozzi, Gordon B. Bonan, Susan J. Cheng, Jeffrey S. Dukes, Serita D. Frey, Elin M. Jacobs, Risa McNellis, Joshua M. Rady, Nicholas G. Smith ... [See all authors](#)

First published: 20 September 2021 | <https://doi.org/10.1111/gcb.15894> | Citations: 2

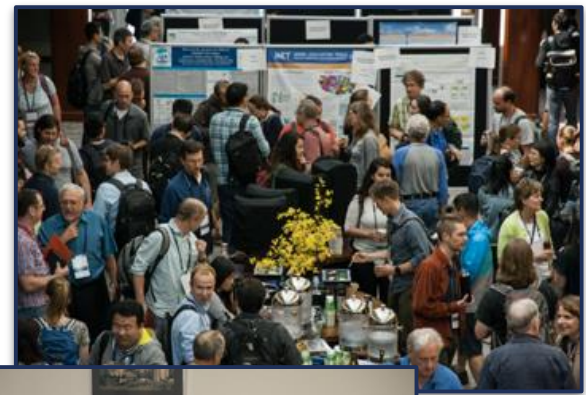
*GH*



# LSMS 2022

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- Growing partnerships between modeling centers and academic and stakeholder communities are proving fruitful
- At same time, these partnerships put strains on modeling centers and expose limitations of current modeling systems



The screenshot shows the GitHub repository for ESCOMP / CTSM. The repository is public and has 6,780 commits. It includes a table of files and folders with their descriptions and last update times. The 'About' section provides a link to the model's website and lists related topics like ecosystem, climate, land, hydrology, ncar, clm, cesm, and land-surface-model.

File/Folder	Description	Last Update
.github	Point to CTSM-specific forums	10 months ago
bld	If fates_sp is turned on, make the default for soil_decomp_method to...	8 days ago
cime_config	Add LILAC test to the expected fails list	4 days ago
doc	Update ChangeLog	4 days ago

**About**  
Community Terrestrial Systems Model (includes the Community Land Model of CESM)  
[www.cesm.ucar.edu/models/cesm2.0/...](http://www.cesm.ucar.edu/models/cesm2.0/)  
ecosystem climate land hydrology  
ncar clm cesm  
land-surface-model



# Goals of the Summit

## Formal

- Collectively create a Road Map to address the challenges to improve land models so that they are fit for purpose to address scientific and societal needs associated with anthropogenically and naturally-driven environmental change
- Produce overview and technical reports, peer reviewed manuscripts, and/or plans for follow up meetings and working groups, which can be used as basis for modeling groups and collaborative partners to solicit funding to support development activities and to build a community effort to accelerate progress

## Informal

- Develop a shared understanding of the ‘pain points’ in modern land model development and application
- Foster collaborative relationships to address these challenges







# Goals of the Summit

## Modeling groups represented

- JULES
- ORCHIDEE
- JSBACH
- LPJ-GUESS
- TESSEL
- CABLE
- CLM
- ELM
- GFDL-LM
- Matsiro
- GISS-LM
- *CoLM*
- *CLASSIC*

Q: Are there any lessons to be learned from the CICE or NEMO consortiums?







## Breakout Sessions

- New approaches for subgrid heterogeneity
- Managing model complexity
- Towards sharing of modules across LSMs
- Input and forcing datasets
- Crop modeling and forestry
- Water and land management
- Coupling external models to LSMs
- Fire and humans
- Land model benchmarking
- Machine learning approaches and LSMs
- Parameter estimation and uncertainty
- Summit attendees choice!

Breakout Session Mini-Talk signup sheet	
Mini-talks should be informal, just a few slides, and < 5 mins in length	
Please provide name and brief title	
<i>Example:</i>	<i>David Lawrence - Representative hillslopes to capture subgrid lateral flow in CLM</i>
<b>Breakout Session 1 - Tuesday 13th September 2022</b>	
<b>New approaches for subgrid heterogeneity</b>	<b>Managing model complexity</b>
<b>Breakout Session 2 - Wednesday 14th September 2022</b>	
<b>Crop modeling and forestry</b>	<b>Water and land management</b>

Goal of breakouts is to identify collaborative steps or activities that could be taken to accelerate progress



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**We thank everyone for coming and are looking forward to an  
invigorating, open, and collaborative summit!**

