

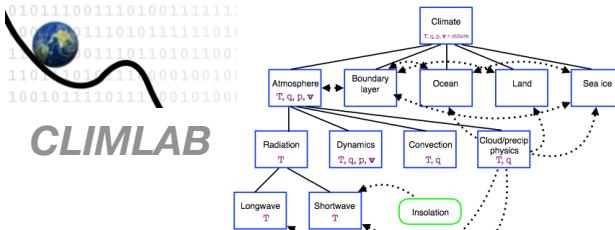


# The Climate Laboratory

*Bringing hands-on interactive climate modeling into the classroom*



Prof. Brian E. J. Rose  
brose@albany.edu



- Software toolkit for building **climate models** from **modular components**
- Enables interactive investigation with **Python code**
- **Free and open-source**
- Created at UAlbany; used in research and education worldwide

JOSS  
The Journal of Open Source Software

CLIMLAB: a Python toolkit for interactive, process-oriented climate modeling

Brian E. J. Rose<sup>1</sup>

1 Department of Atmospheric and Environmental Sciences, University at Albany (State University of New York)

Software

- Review of
- Accepted 17
- Archive 17

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The Climate Laboratory  
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Preamble

1. Recap of the global energy budget

Let's look again at the observations:

2. Tuning radiative fluxes to the observations

Recap of our simple greenhouse model

Last class we introduced a very simple model for the OLR or Outgoing Longwave Radiation to space:

$$OLR = \sigma T_s^4 \quad (1)$$

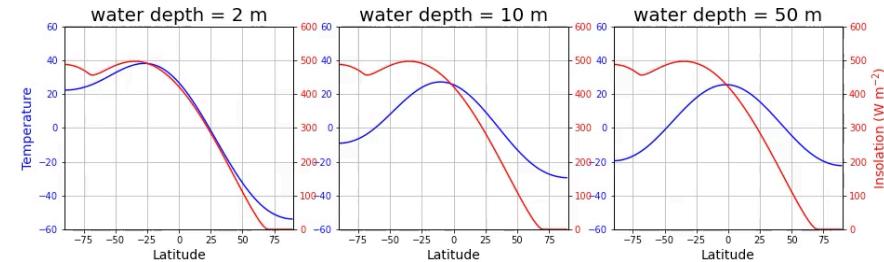
## The Climate Laboratory book <https://brian-rose.github.io/ClimateLaboratoryBook>

- An **online, interactive** textbook on fundamentals of climate science
- Powered by **CLIMLAB** software
- **Free and open-source**



A National Science Foundation-funded project at the intersection of climate science, education, and open-source software.

*What determines the size of seasonal temperature changes?*



<https://brian-rose.github.io/ClimateLaboratoryBook/courseware/seasonal-cycle.html>

We use **CLIMLAB** to build a **toy model** that includes basic building blocks:

- Seasonal changes in sunlight
- Heat storage by the ocean
- Heat transport by the atmosphere

The animation shows resulting **temperature changes and phase shifts** for different amounts of land vs ocean.

