

# Nucleating a New Generation of Earth System Models

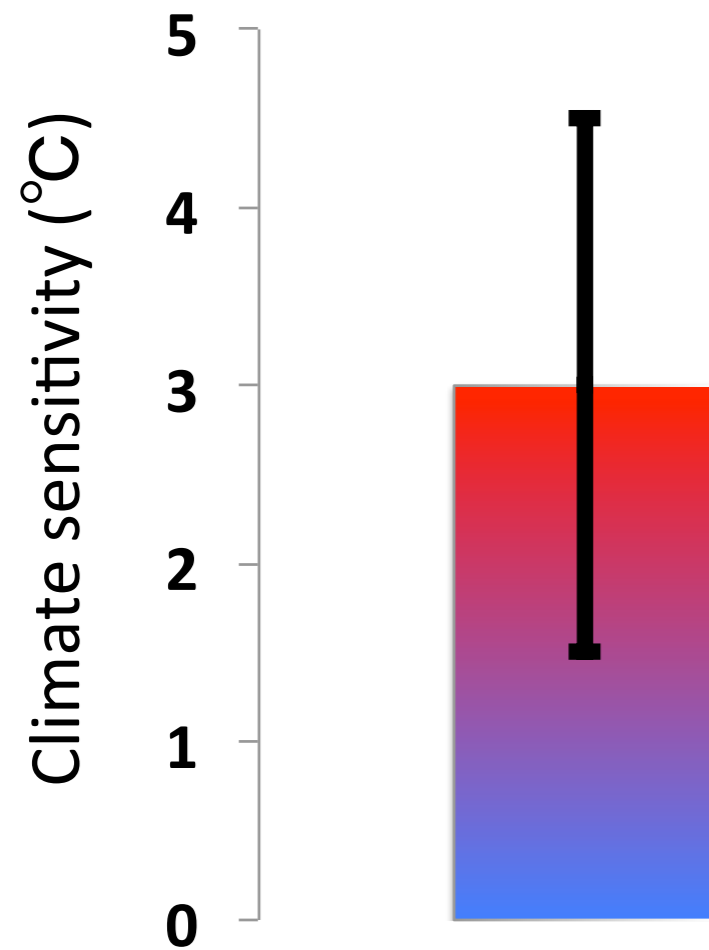
## Workshop 3



**Caltech**

The Caltech logo is the word "Caltech" in a bold, orange, sans-serif font.

# Climate projections were uncertain in 1979



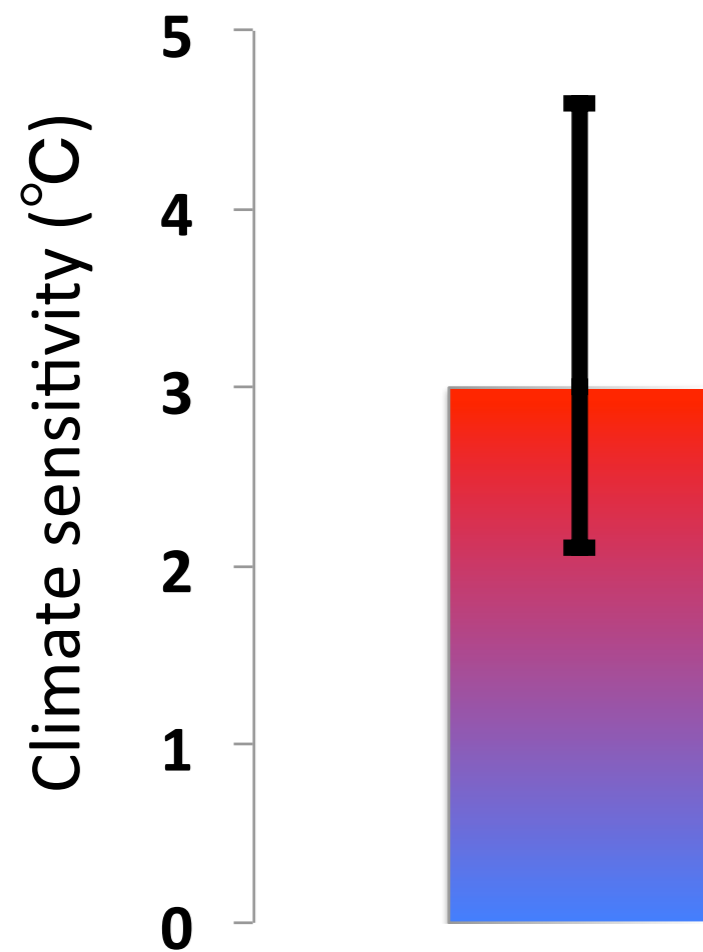
<http://webmuseum.mit.edu>



<http://archive.computerhistory.org>

... and they still are uncertain in 2018

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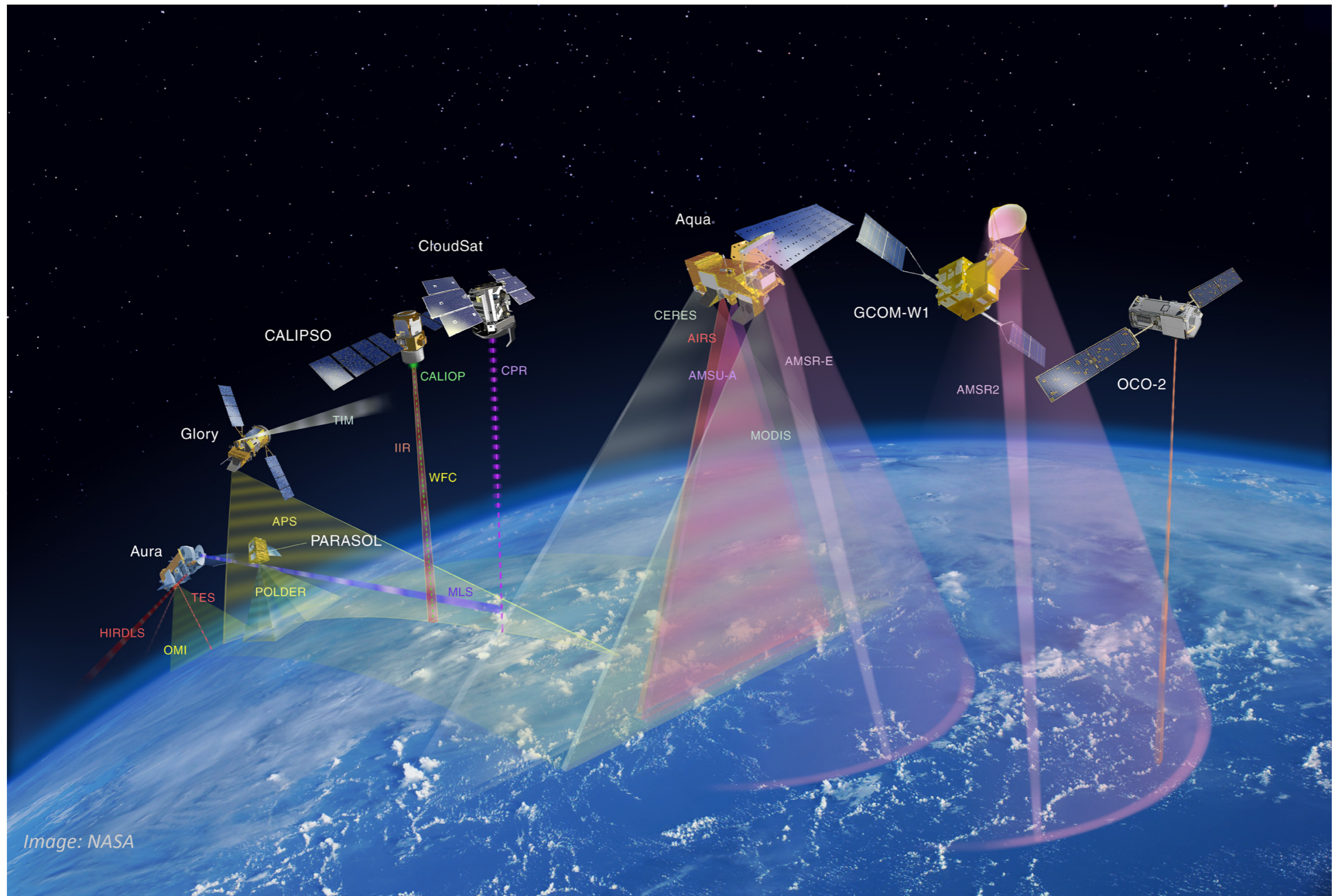


**ipcc**  
INTERGOVERNMENTAL PANEL ON  
climate change

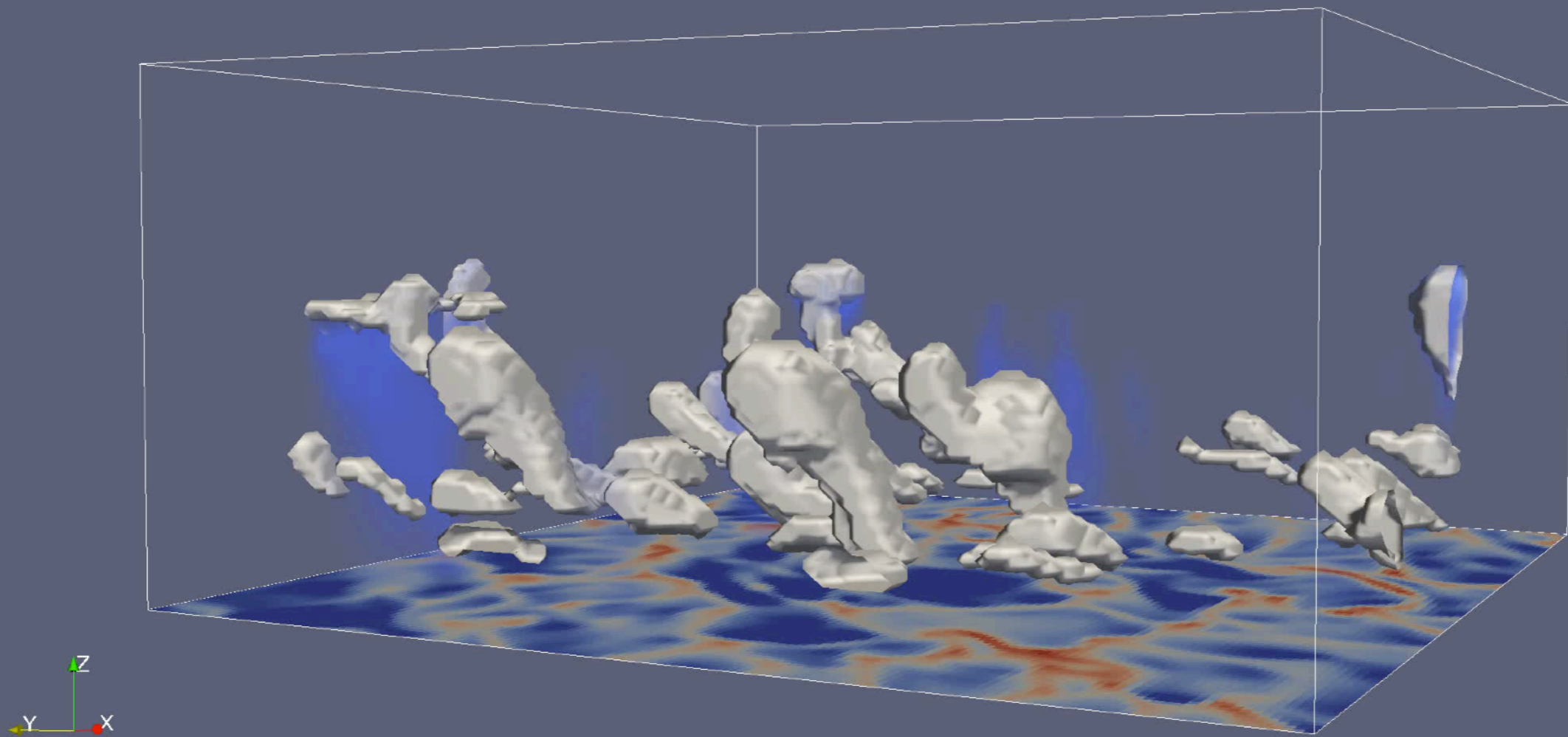


Caltech GPS supercomputer

What we have now are coordinated measurements of uncertain processes, which can inform global models



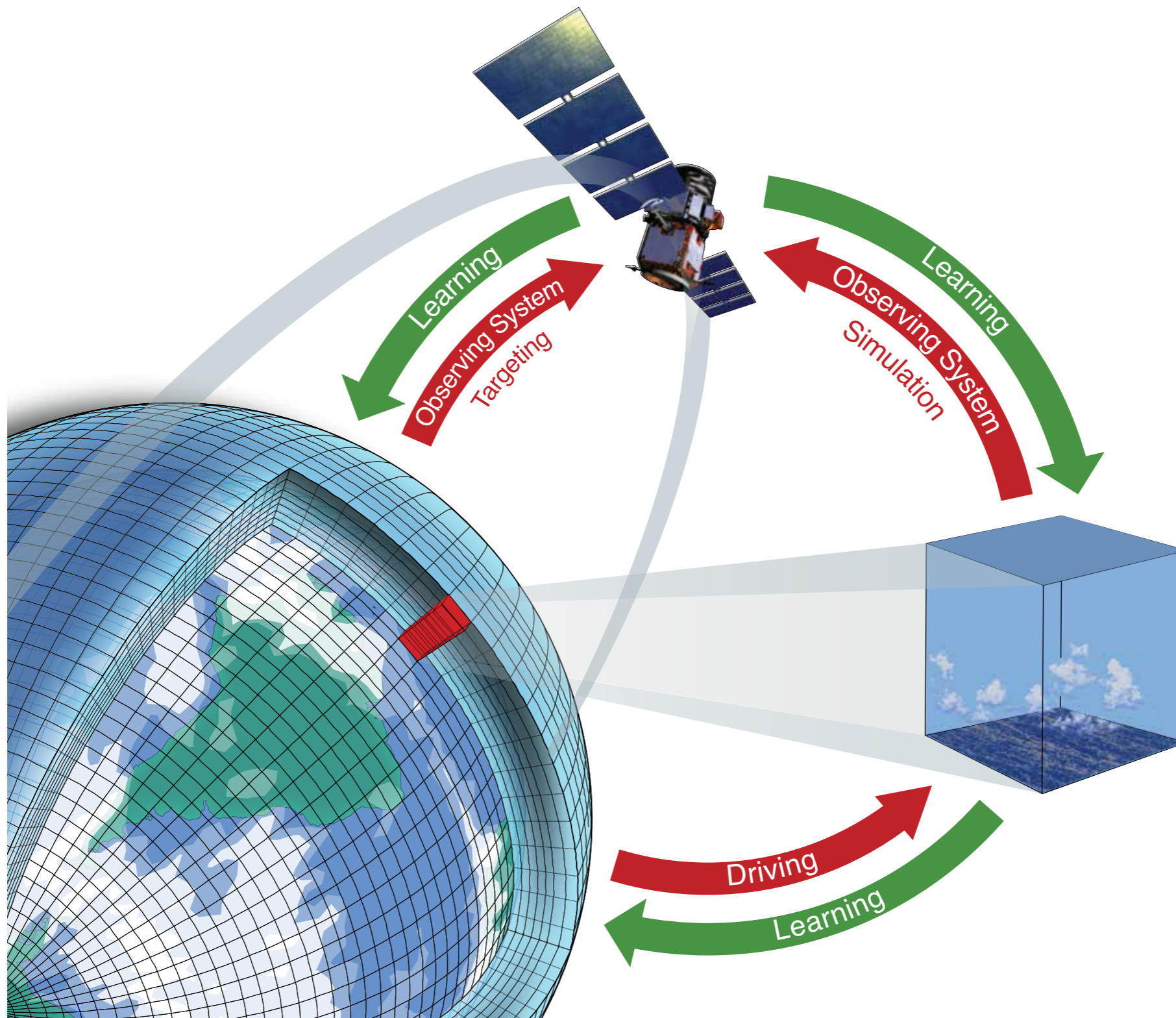
Faithful high-resolution simulations of some small-scale processes in limited areas likewise can inform global models



*Large-eddy simulation of tropical cumulus*

The key opportunity for improving models lies in exploiting the new observational and computational tools systematically

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# We wanted to explore how to harness the new tools in a series of workshops

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Charles Trimble



- First workshop in November 2017, focused on dynamical cores and overall design of climate models
- Second workshop in March 2018, focused on land and biosphere models
- Fourth workshop in fall 2018, likely focused on cryosphere models

# Workshop structure

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- **Presentations:** 20 minutes + 5 minutes Q&A
- **Discussion sections** anchored by presenters' brief responses to other talks (~20-30 minutes), followed by open discussion
- **Objectives**
  - collect lessons learned at centers worldwide;
  - ask how one would design an Earth system model now if one had complete freedom in doing so;
  - identify key remaining challenges to overcome in realizing a data-informed ESM platform.
- **Deliverable:** Planning papers (to be published) summarizing the workshop outcomes.