

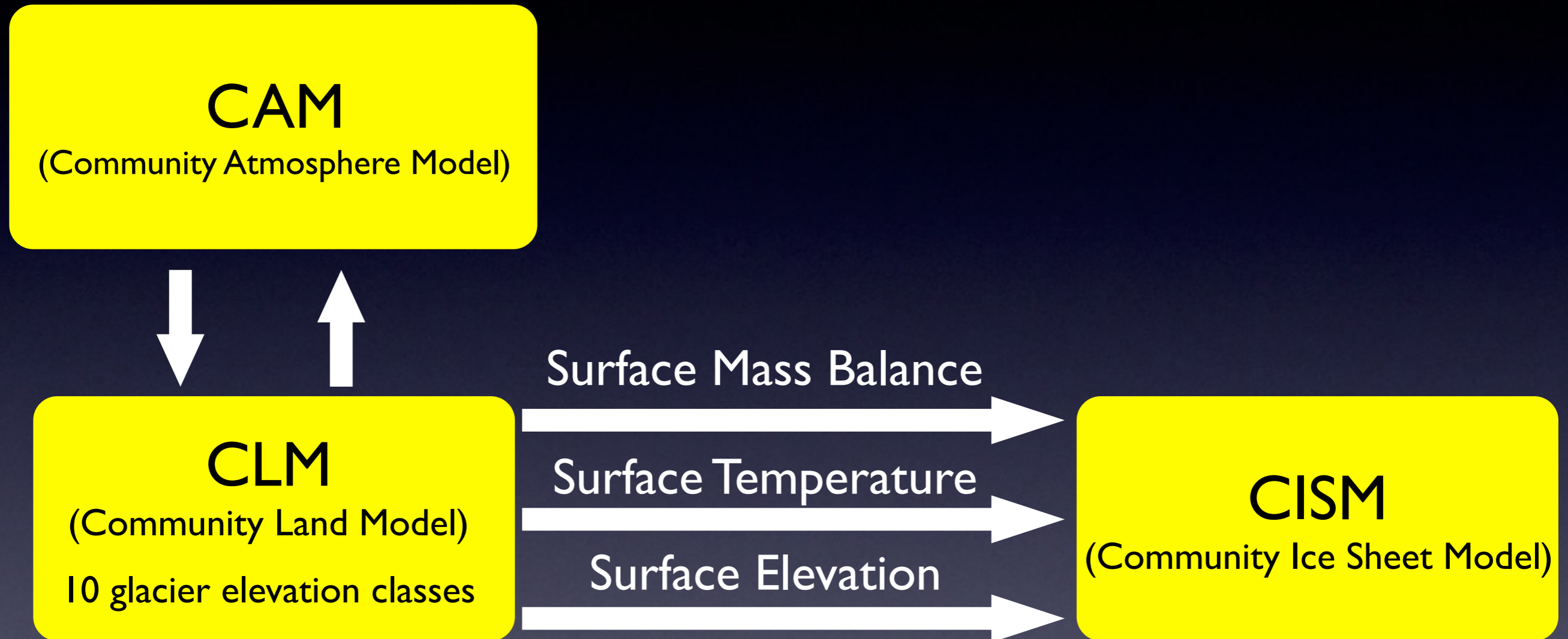
Tutorial: Ice sheet modeling in CESM

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NCAR

CISM in CESM



Compsets with active ice sheet

CESM1.2

- BG (fully coupled)
- FG (CAM, CLM & CISM)
- IG (CLM & CISM)
- TG (CISM only)

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- 1-degree finite volume (f09)
- 2-degree finite volume (f19)
- 3.75-degree spectral (T31)

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CESM2.0

- JG (CLM, CISM, POP, CICE, MOSART, all forced by datm)
- Compsets without active ice sheet will still have diagnostic ice sheet for examining surface mass balance

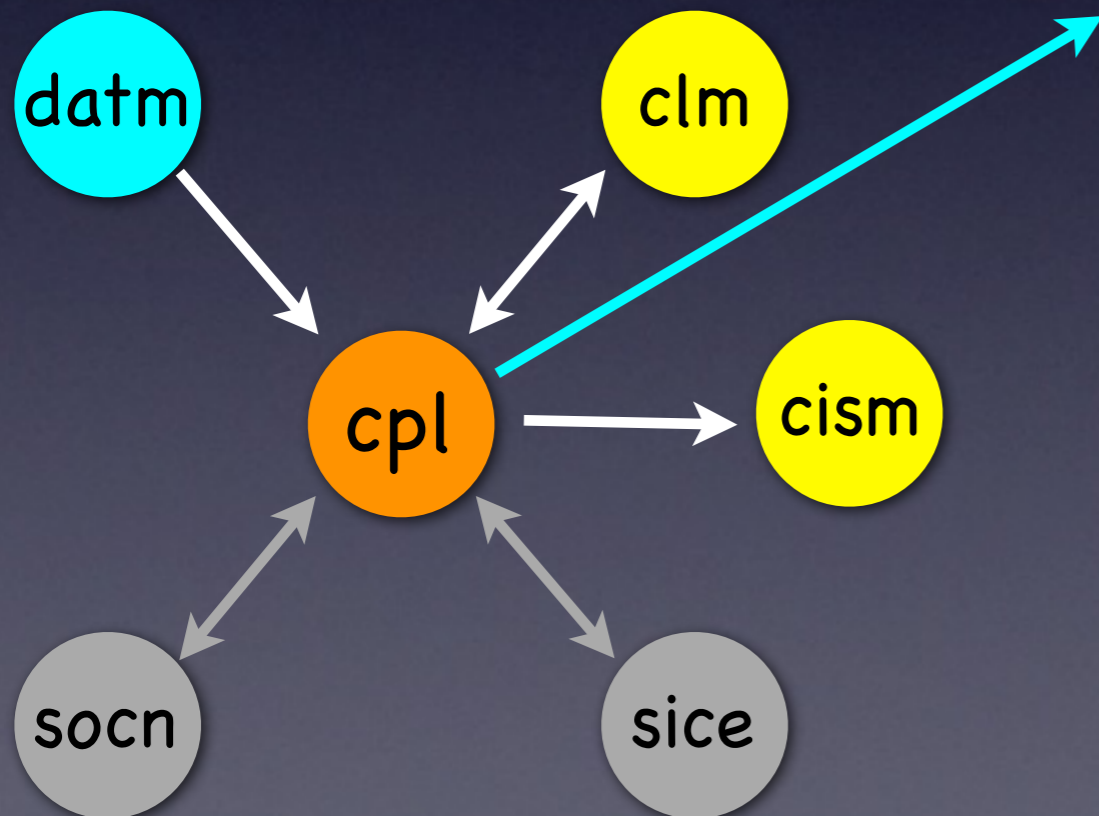
Will be able to run CISM at any atm/land resolution

TG Compset

Key: **active** / **data** / stub model

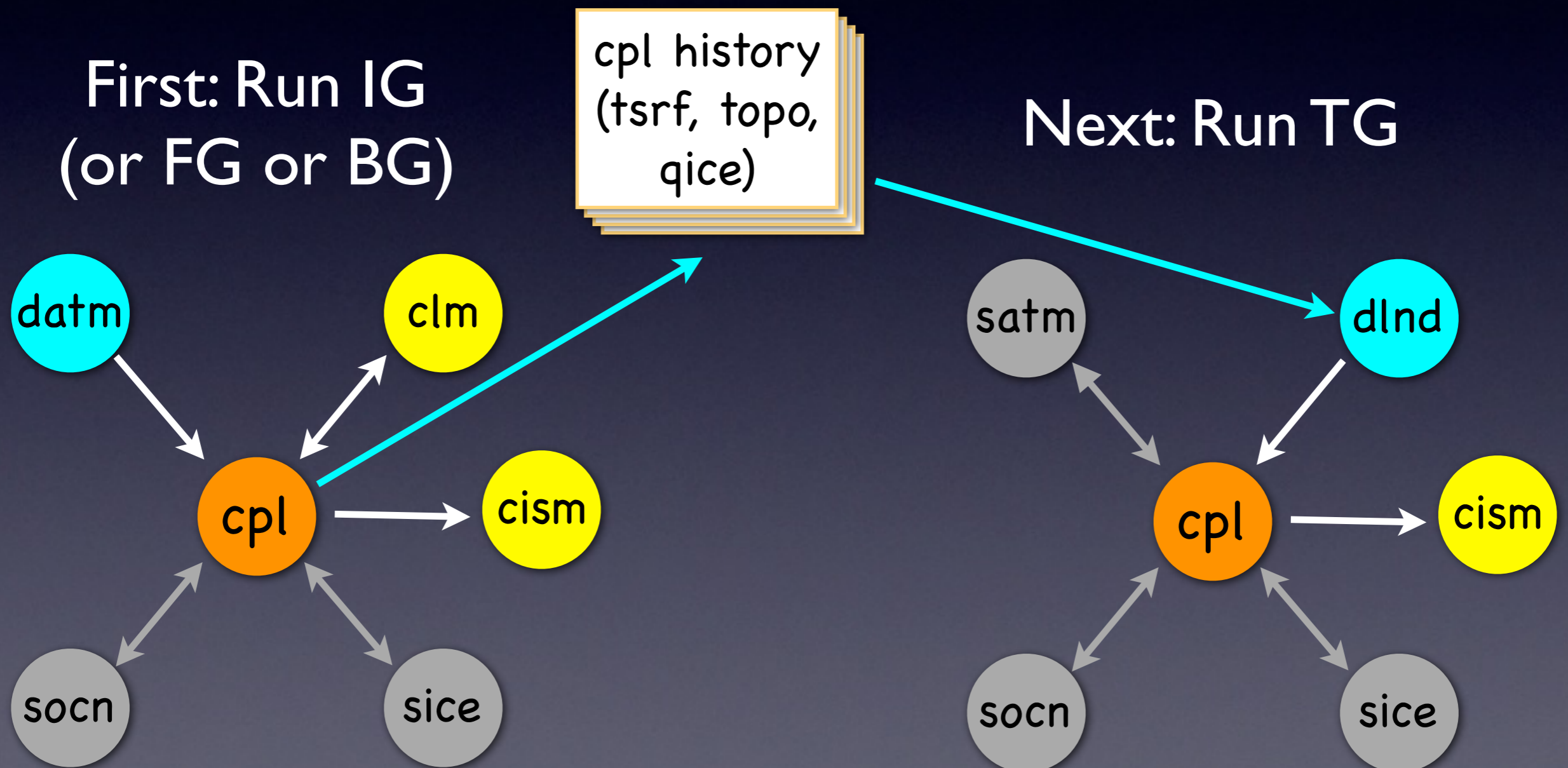
First: Run IG
(or FG or BG)

cpl history
(tsrf, topo,
qice)

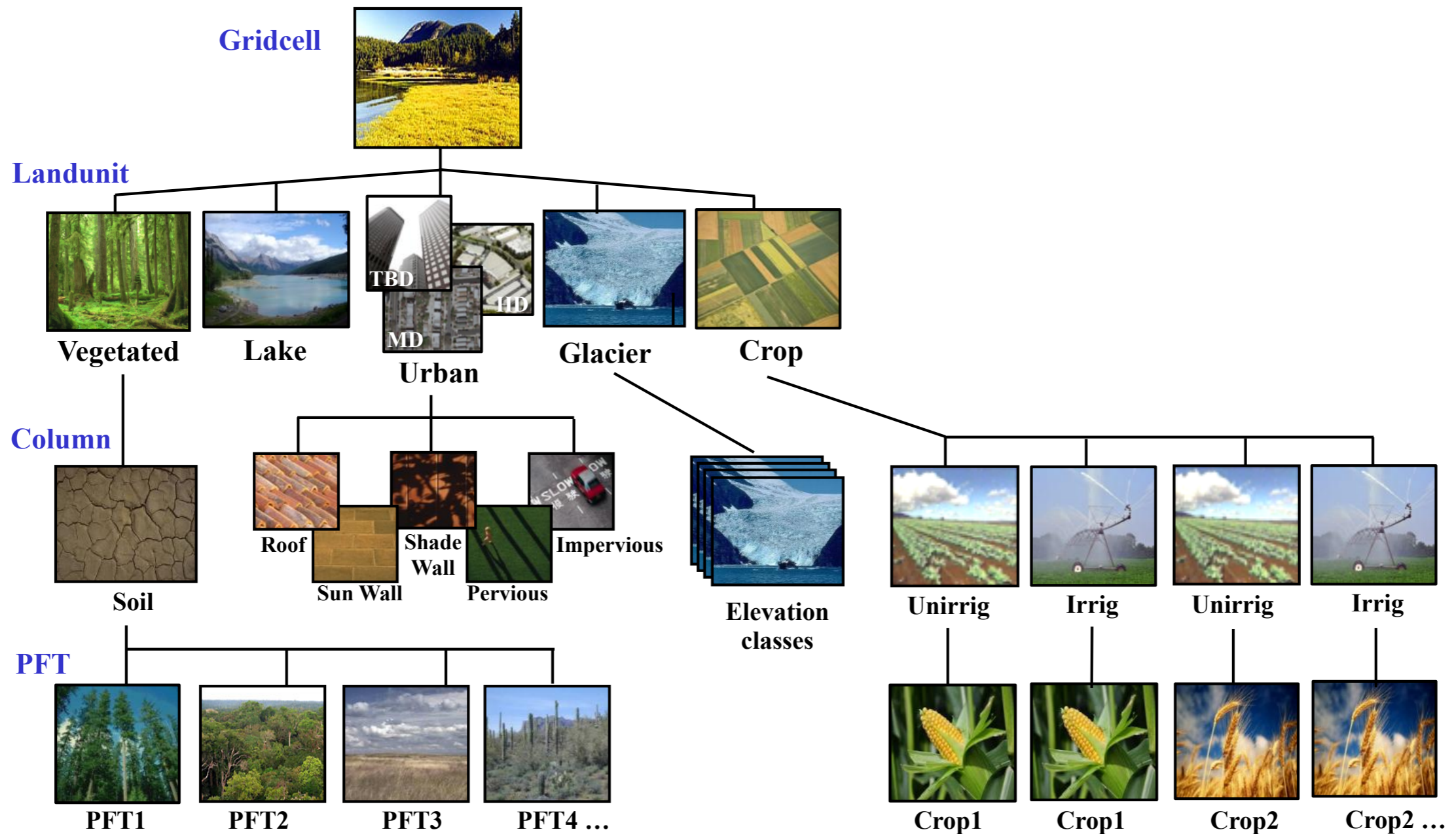


TG Compset

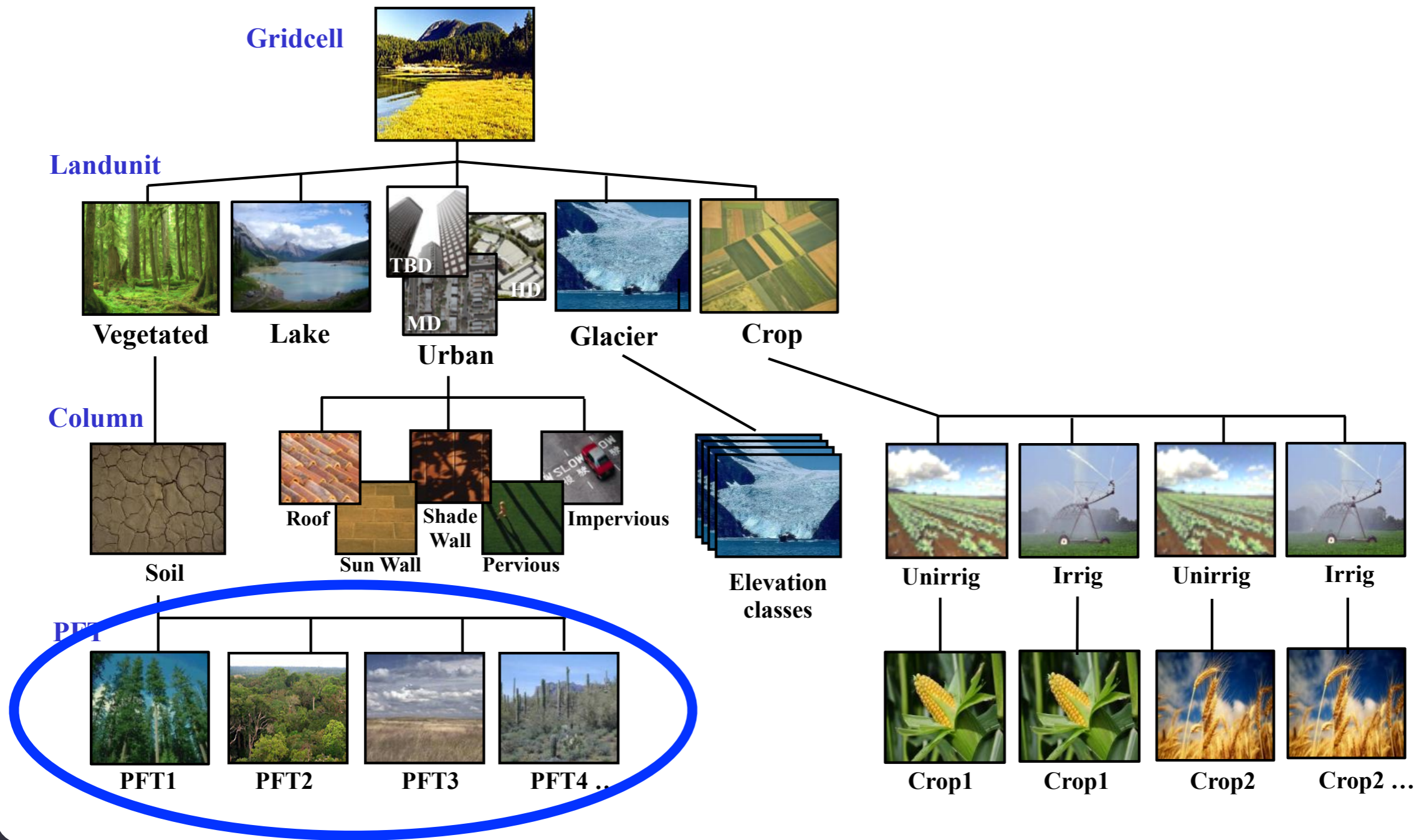
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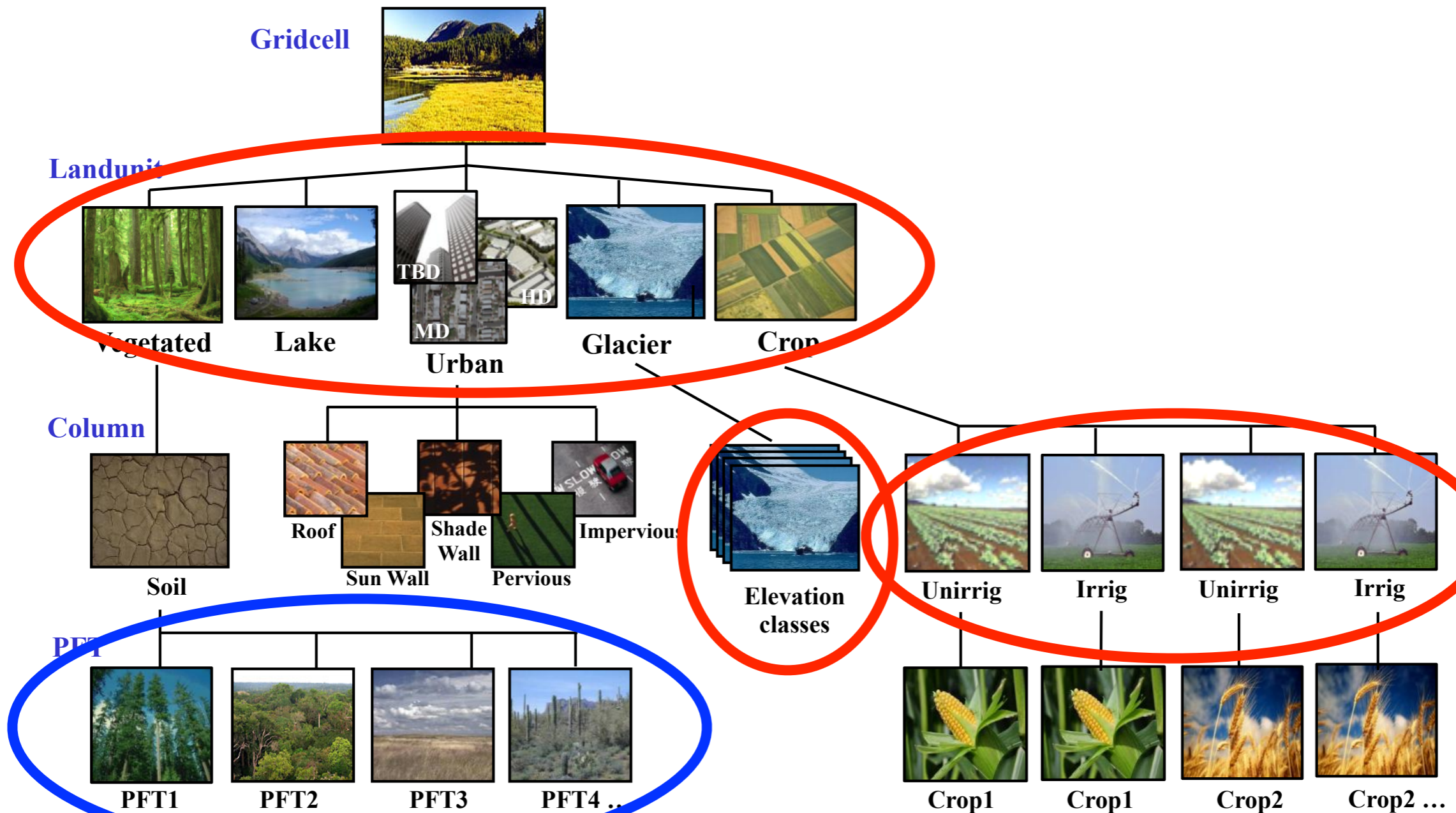
CESM2: Dynamic Landunits in CLM



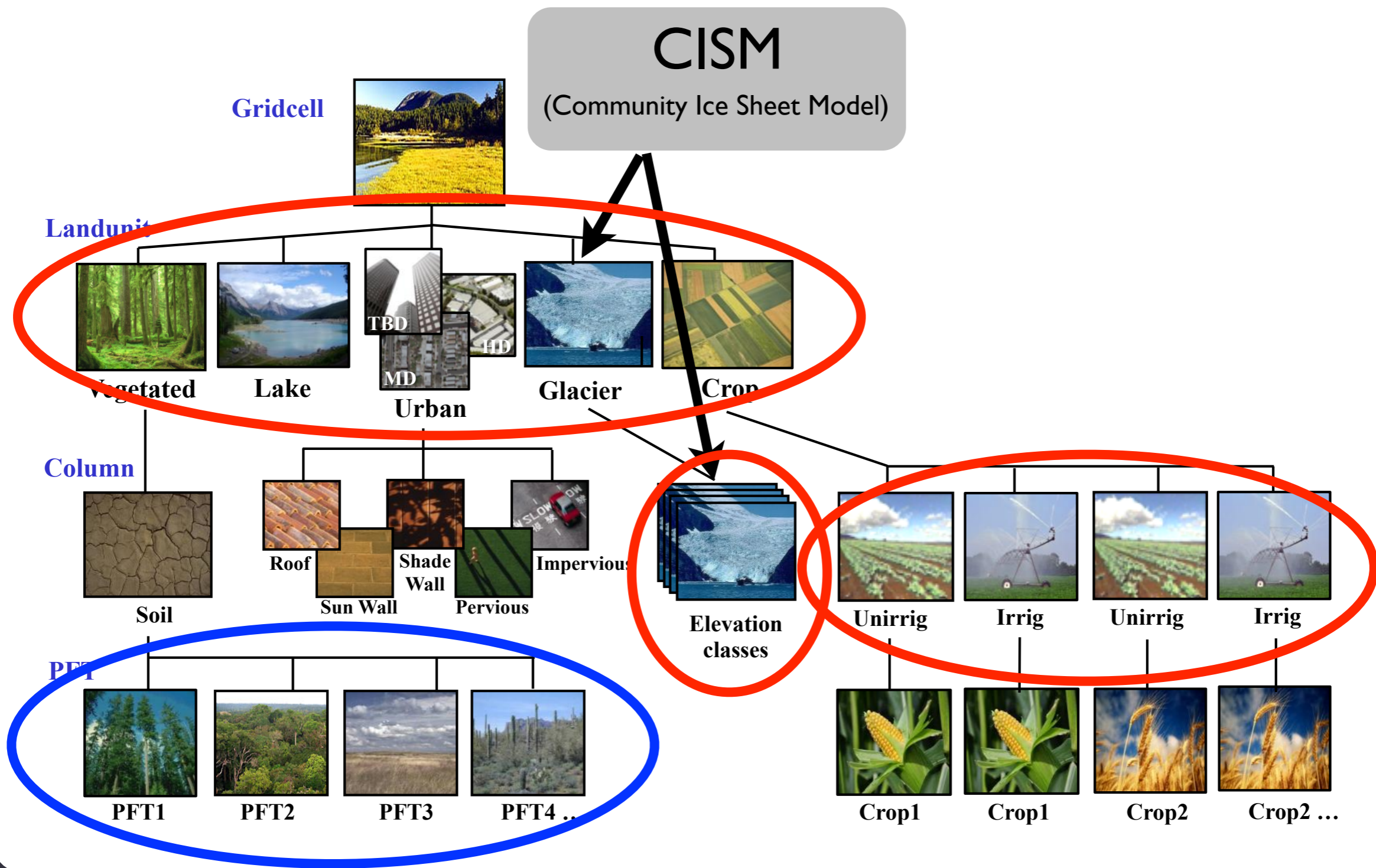
CESM2: Dynamic Landunits in CLM



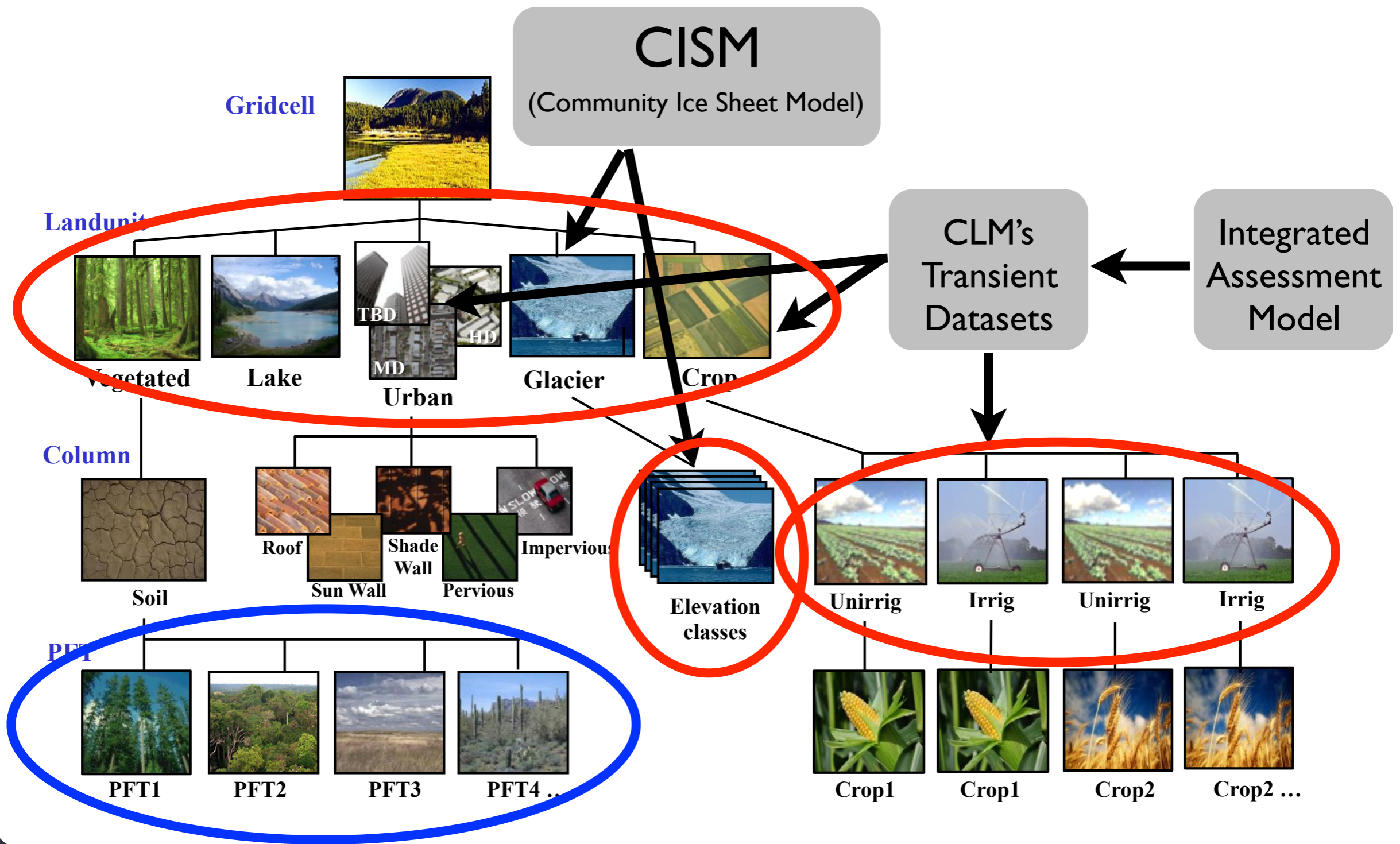
CESM2: Dynamic Landunits in CLM



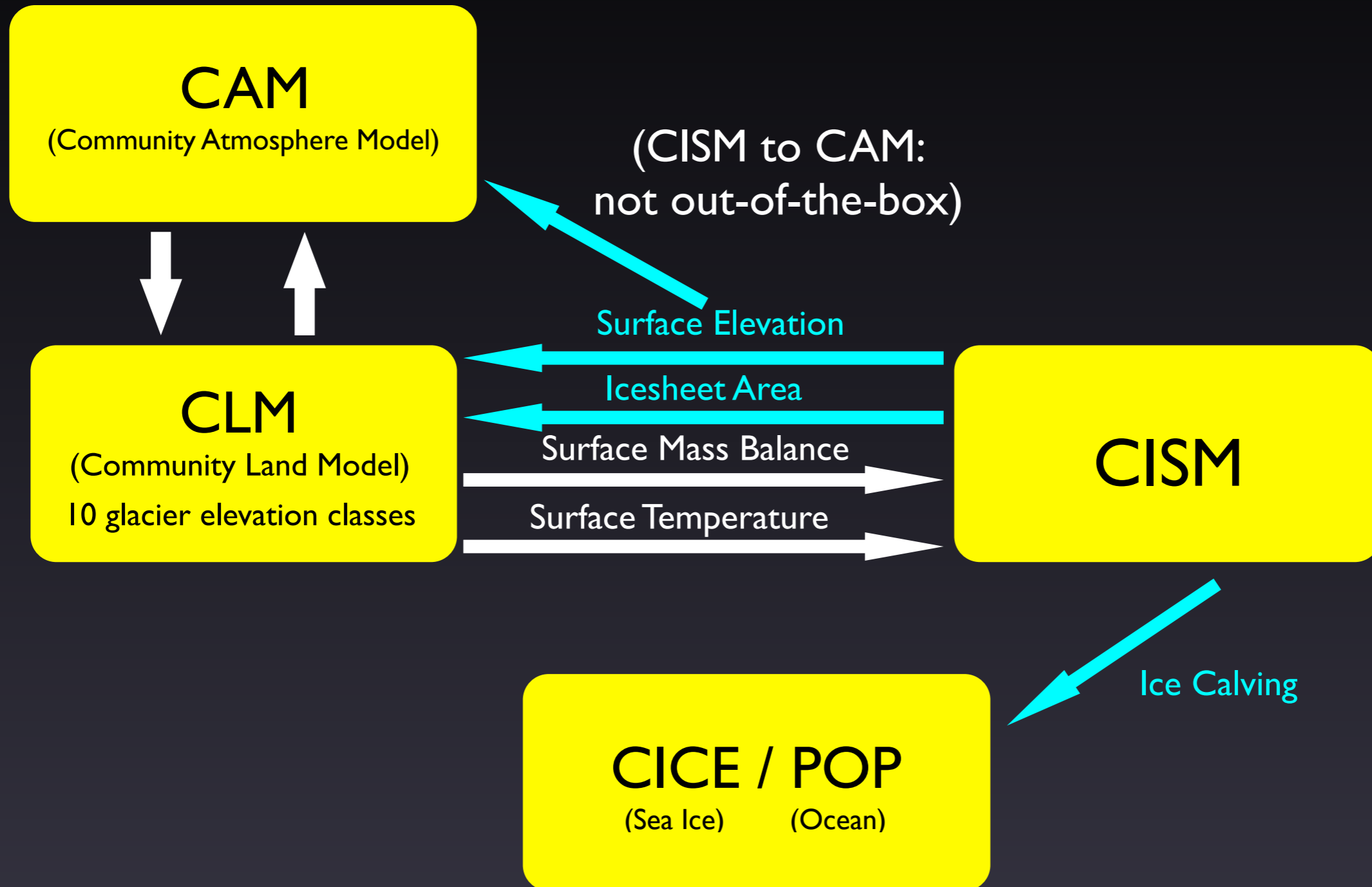
CESM2: Dynamic Landunits in CLM



CESM2: Dynamic Landunits in CLM



CESM2: Other Feedbacks from CISM



Other Significant Changes in CESM2

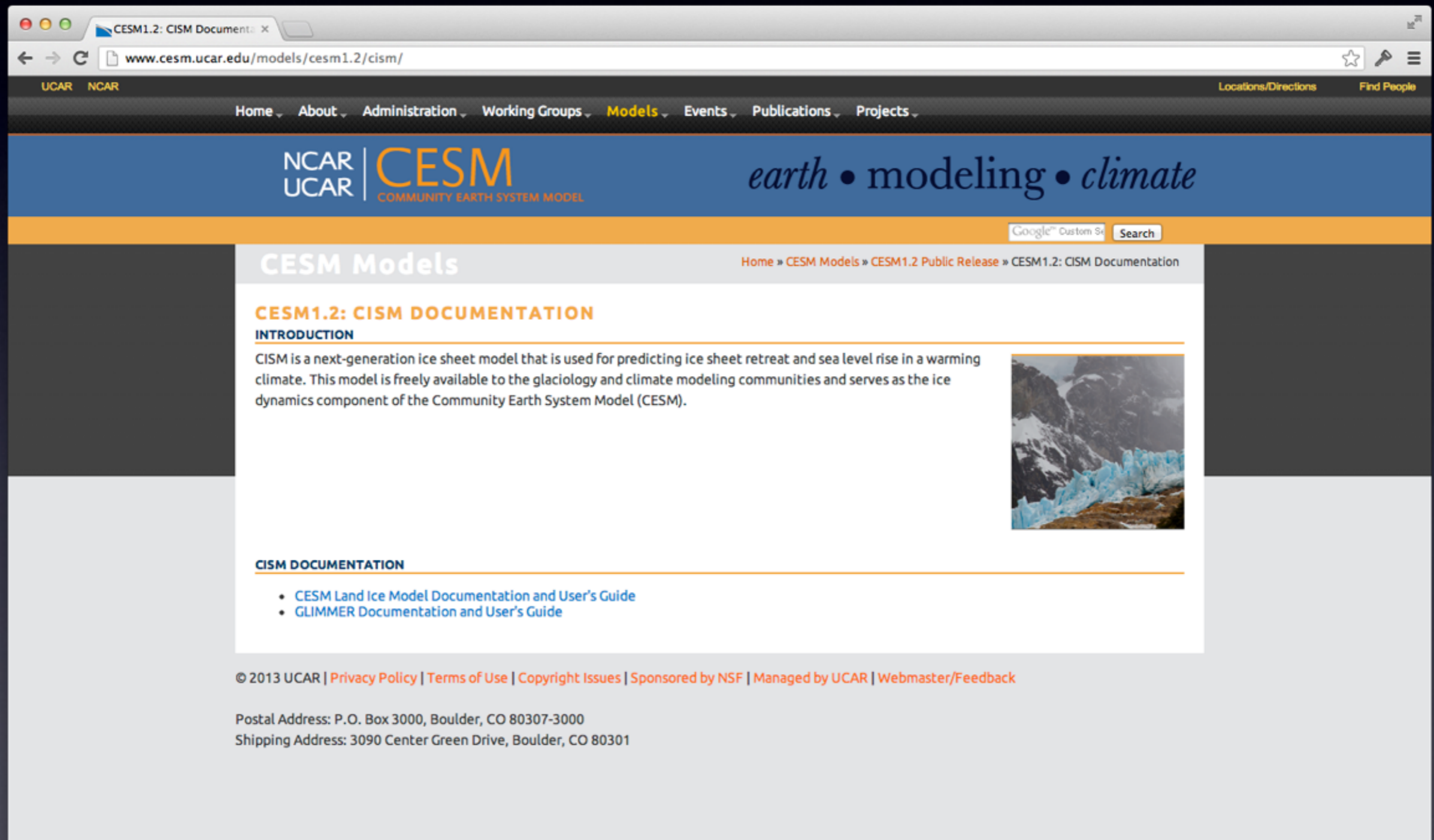
- Parallel, higher-order dynamics
 - ▶ *glissade* dynamical core replaces old *glide* (serial, shallow-ice approximation)
 - glide SIA still available as an option
 - ▶ Depth-integrated viscosity approximation (DIVA; Goldberg 2011) gives 10x speedup over other higher-order ice sheet models
- Substantially improved snow physics in CLM

Hands-on overview: CESM IG run

- IG compset
- Simple CLM source code modification to simulate global warming / cooling over ice sheets
- Look at how this affects the Greenland surface mass balance over a few years

For more information

<http://www.cesm.ucar.edu/models/cesm1.2/cism/>



The image shows a screenshot of a web browser displaying the CESM1.2 CISM Documentation page. The browser's address bar shows the URL www.cesm.ucar.edu/models/cesm1.2/cism/. The page features a navigation menu with links for Home, About, Administration, Working Groups, Models, Events, Publications, and Projects. The main header includes the NCAR UCAR logo, the CESM logo (Community Earth System Model), and the tagline "earth • modeling • climate". A search bar is located on the right side of the header. The main content area is titled "CESM Models" and includes a breadcrumb trail: Home » CESM Models » CESM1.2 Public Release » CESM1.2: CISM Documentation. The primary heading is "CESM1.2: CISM DOCUMENTATION" followed by an "INTRODUCTION" section. The text describes CISM as a next-generation ice sheet model used for predicting ice sheet retreat and sea level rise. To the right of the text is a photograph of a glacier. Below the introduction is a "CISM DOCUMENTATION" section with two bullet points: "CESM Land Ice Model Documentation and User's Guide" and "GLIMMER Documentation and User's Guide". The footer contains copyright information for 2013 UCAR, links to Privacy Policy, Terms of Use, Copyright Issues, and information about NSF sponsorship, UCAR management, and a Webmaster/Feedback link. It also provides postal and shipping addresses in Boulder, CO.

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CESM1.2: CISM DOCUMENTATION

INTRODUCTION

CISM is a next-generation ice sheet model that is used for predicting ice sheet retreat and sea level rise in a warming climate. This model is freely available to the glaciology and climate modeling communities and serves as the ice dynamics component of the Community Earth System Model (CESM).



CISM DOCUMENTATION

- [CESM Land Ice Model Documentation and User's Guide](#)
- [GLIMMER Documentation and User's Guide](#)

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