Welcome to the CESM Polar Modeling Workshop August 13-17, 2018

Funded by the National Science Foundation Office of Polar Programs through Grant 1734839 to the University of Colorado

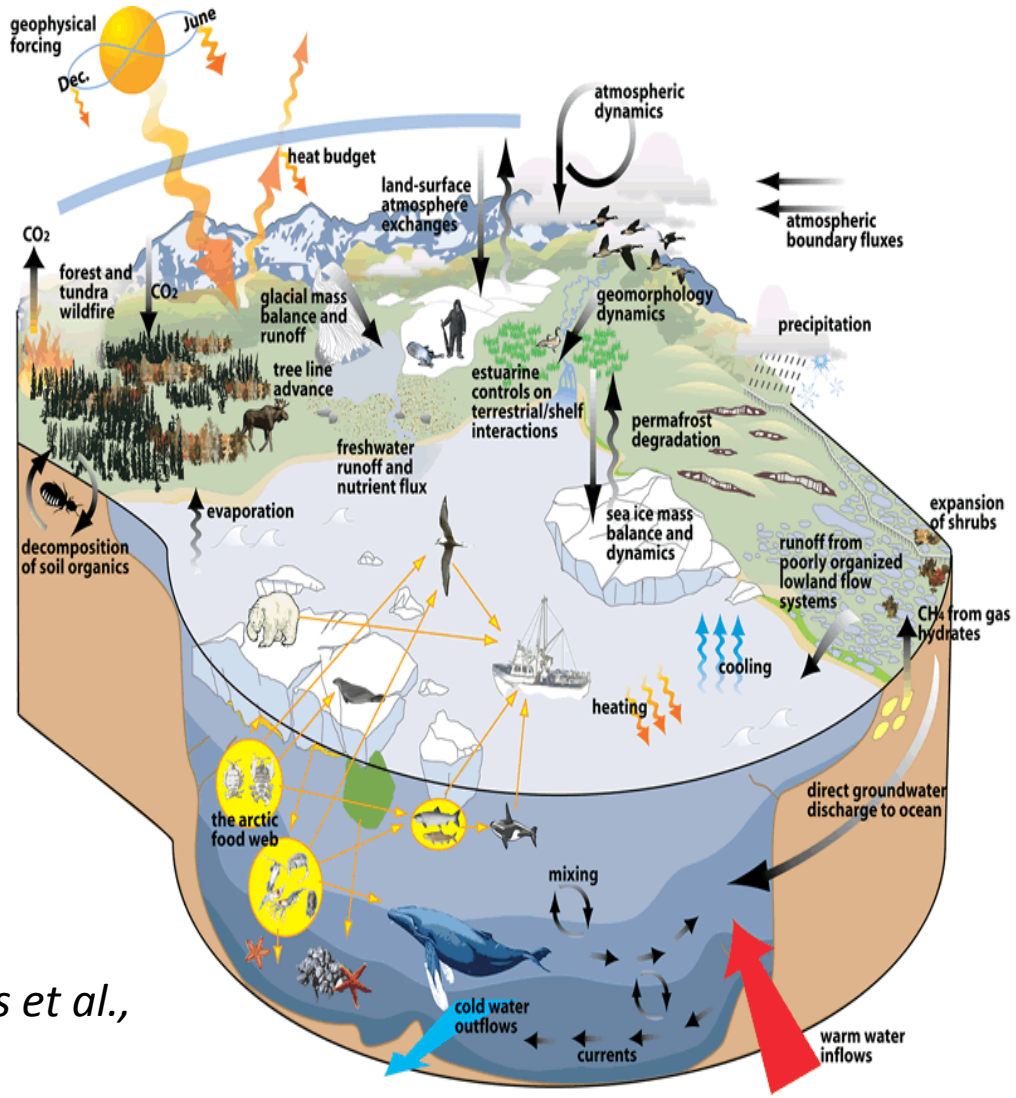
National Science Foundation
WHERE DISCOVERIES BEGIN

Be Boulder.
University of Colorado Boulder

Thank you NCAR for hosting us at the iconic Mesa Lab!!

NCAR
National Center for Atmospheric Research
Boulder, Colorado

To understand and predict polar change requires a system-wide perspective



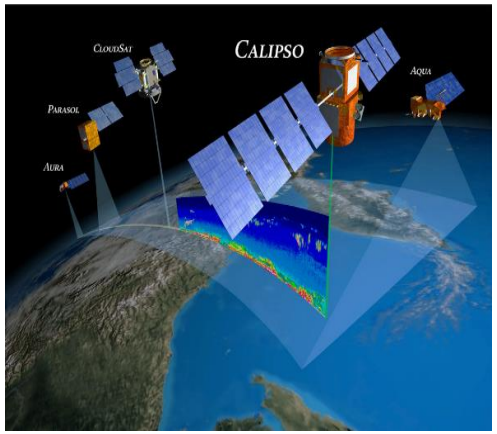
From Roberts et al., 2010

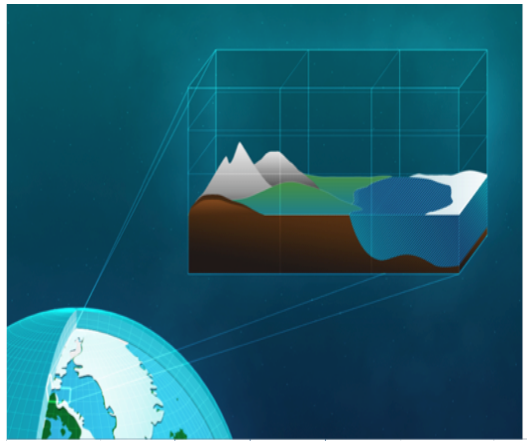
- Insights from different disciplines and perspectives
- Interactions within different Earth system components
- Coupling across components

To understand and predict polar change requires integration of discoveries from observations, models, and theory

Observations at a range of spatial and time scales

- Satellite data
- In situ data
- Paleo-climate proxies





A hierarchy of models with differing complexity and focus

For example:
Process models
Component models
Earth System Models

Polar Modeling Workshop Motivation

- Recent advances in high performance computing are dramatically improving our ability to model polar processes
- Continued success in advancing polar research by leveraging high performance computing requires engaging and involving early career polar scientists in today's Earth system modeling and supercomputing frontiers.

What do HPC (High Performance Computing) advances enable?

- More processes to be represented
- More ensemble members to be run
- Higher vertical and horizontal resolution

Tradeoffs between these three directions…

How can we best advance polar science …???

Big Data Opportunities and Challenges!

Computing advances make it relatively easy to generate lots and lots of data. But … doing meaningful science with big data and archiving big data for a community use can be very challenging.

supercomputer (1970s)
0.5 megabytes (10^6) memory

supercomputer (2010s)
150 terabytes (10^{13}) memory

The primary goals for this workshop are:

- Empower early career polar scientists to use high performance computing and Earth System Modeling in their research
- build capacity and community for conducting polar research using the Community Earth System Model (CESM)

CESM : : COMMUNITY EARTH SYSTEM MODEL

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Introducing…

the organizing committee

Jen Kay, Dave Bailey, Marika Holland,
Alice DuVivier

invited organizers

Cecilia Bitz, Ed Blanchard-Wrigglesworth,
Elizabeth Maroon, Yongfei Zhang

Who are you?

Name, Institution, Research Interests, One goal you have for this week, One fun thing about you

Logistics:

We'll meet in the Damon Room this entire week.

Lunch and Tonight's Big Idea Poster Session will be in the NCAR Mesa Lab Cafeteria.

Bus Schedule from the Boulder Inn to Mesa Lab

Depart Hotel: 8:30 am

Depart Mesa Lab: 6:15 pm Monday, 5 pm other days

NCAR
National Center for Atmospheric Research
Boulder, Colorado

Tuesday Informal Workshop Dinner

Starts at 6:30 pm

2635 Stephens Rd. Boulder CO 80305

Menu = empanadas and salad!

Please bring a drink to share.

What are we going to do this week?

Monday – Introductions, Stage setting, CESM Refresher
Organizers: Dave Bailey (NCAR), Jen Kay (CU)

Tuesday – Predictability and Variability
Organizers: Marika Holland (NCAR), Ed B-W (UW)

Wednesday – Model Hierarchies
Organizers: Alice DuVivier (NCAR), Elizabeth Maroon (CU)

Thursday – Models and Observations Together
Organizers: Cecilia Bitz (UW), Yongfei Zhang (UW), Jen Kay (CU)

Friday – Putting it all together
Organizers: all

Where should I keep code?

Log into Cheyenne

ssh –Y jenkay@cheyenne.ucar.edu

Make a folder in your home directory for this week

mkdir ~/PWS2018

Make a folder for each day

mkdir ~/PWS2018/day1
mkdir ~/PWS2018/day2
mkdir ~/PWS2018/day3
mkdir ~/PWS2018/day4

Copy the materials needed for each day into the appropriate folder:

e.g., cp –R ~jenkay/PWS2018/day1 ~/PWS2018/day1

We have our own project code - UCUB0067

We also have 100 dedicated nodes to use for practical sessions on Cheyenne

Day	Time	Reservation Name
Monday	2:00-5:00 pm	R1602384
Wednesday	10-11:30 am, 2:00-4:00 pm	R1602394
Thursday	1:30-4:00 pm	R1602402

To access the reserved nodes, you use the reservation name in place of the regular PBS queue (i.e. in place of "regular").

You will work in assigned groups

Last Name	First Name	E-mail	Current Institution	Group
Huang	Yiyi	yiyi063@email.arizona.edu	University of Arizona	**Atmosphere #1**
Singh	Hansi	hansi.singh@pnnl.gov	PNNL	**Atmosphere #1**
Peng	Liran	lpeng2@alaska.edu	University of Alaska	**Atmosphere #1**
McGraw	Marie	mmcgraw@atmos.colostate.edu	Colorado State University	**Atmosphere #2**
Szapiro	Nicholas	nick.szapiro@ou.edu	University of Oklahoma	**Atmosphere #2**
Wheeler	Lauren	lwheele@sandia.gov	Sandia	**Atmosphere #2**
Sampath	Akila	asampath@alaska.edu	University of Alaska	**Atmosphere #3**
Pettersen	Claire	claire.pettersen@ssec.wisc.edu	University of Wisconsin	**Atmosphere #3**
Janoski	Tyler	janoski@ldeo.columbia.edu	Columbia University	**Atmosphere #3**
Badgeley	Jessica	badgeley@uw.edu	University of Washington	**Land Ice #1**
VanKampenhout	Leo	L.vanKampenhout@uu.nl	Utrecht University	**Land Ice #1**
Schwans	Emily	eps5217@psu.edu	Penn State	**Land Ice #1**
Osman	Matthew	osmanm@mit.edu	MIT/WHOI	**Land Ice #2**
Ward	Jamie	jamiewa@umich.edu	University of Michigan	**Land Ice #2**
Leguy	Gunter	gunterl@ucar.edu	NCAR	**Land Ice #2**
Ahlert	Abigail	Abigail.Ahlert@Colorado.EDU	University of Colorado	**Ocean/Sea Ice**
Pauling	Andrew	apauling@uw.edu	University of Washington	**Ocean/Sea Ice**
Zanowski	Hannah	zanowski@uw.edu	University of Washington	**Ocean/Sea Ice**
Lombardozzi	Danica	dll@ucar.edu	NCAR	**Land**
Gergel	Diana	gergel@uw.edu	University of Washington	**Land**
Vecellio	Daniel	djvecellio@tamu.edu	Texas A&M	**Land**
Oh	Youmi	oh145@purdue.edu	Purdue	**Land**

Group Project

Jointly develop a project. Assume that the project is funded by NSF Office of Polar Programs.

Work together to Apply for a University Large Allocation Request - https://www2.cisl.ucar.edu/chap/submission

You will need to provide:

A. Project Title

B. Overview of Project (less than 0.5 page)

C. Science Objectives (0.5-1 page)

D. Computational Experiments and Resource Requirements including Cheyenne core-hours, /glade disk space, and HPSS archive space

E. Data Management Plan

F. Accomplishment Report Plan

G. References

Group Project Review

Friday morning you will present your project and computing request to CESM "Experts". They will provide substantive feedback on both the computational and scientific merit of your proposed project. Prepare 3-5 slides to show your "Reviewer". Convince your reviewer that you have everything you need to submit a Large Allocation Request.

Sample Large Allocation Request

Kay "Uncertainty in Antarctic climate change projections and the roles of sea ice, clouds and ocean structure"

Any Questions???

Group Icebreaker Activities

Make a plan for how you are going to get your Group Project done.
Set realistic goals but Get Going !! ☺.