

Award Number: DE- SC0015647

Program Office: DOE Office of Science – Chicago

Recipient: University Corporation for Atmospheric Research/National Center for Atmospheric Research

Project title: 2016 CESM (Community Earth System Model) Tutorial

Principal investigator: Jean-François Lamarque

Conference papers/proceedings: Web materials for all lectures and practical sessions are available here: <http://www.cesm.ucar.edu/events/tutorials/2016/>

Conference location: National Center for Atmospheric Research, Mesa Lab, Boulder, CO
Dates of conference: August 8-12, 2016

Conference Sponsors: Department of Energy and the National Science Foundation

For the 2016 tutorial, NCAR/CGD requested a total budget of \$70,000 split equally between DOE and NSF. The funds were used to support student participation (travel, lodging, per diem, etc.). Lectures and practical session support was primarily provided by local participants at no additional cost (see list below). The seventh annual Community Earth System Model (CESM) tutorial (2016) for students and early career scientists was held 8 – 12 August 2016. As has been the case over the last few years, this event was extremely successful and there was greater demand than could be met. There was continued interest in support of the NSF's EaSM Infrastructure awards, to train these awardees in the application of the CESM. Based on suggestions from previous tutorial participants, the 2016 tutorial experience again provided direct connection to Yellowstone for each individual participant (rather than pairs), and used the NCAR Mesa Library. The 2016 tutorial included lectures on simulating the climate system and practical sessions on running CESM, modifying components, and analyzing data. These were targeted to the graduate student level. In addition, specific talks ("Application" talks) were introduced this year to provide participants with some in-depth knowledge of some specific aspects of CESM. More information (including all presentations) are preserved in a password-protected website (<http://www.cesm.ucar.edu/events/tutorials/2016/>).

CESM is sponsored by the National Science Foundation (NSF) and the U.S. Department of Energy (DOE). Administration of the CESM is maintained by the Climate and Global Dynamics Laboratory (CGD) at the National Center for Atmospheric Research (NCAR).

The tutorial agenda and list of participants are included with this report.

The following NCAR staff provided lectures, practical sessions and administrative and computer support for this tutorial:

Bailey, David
Ballard, Barbara
Bates, Susan
Bertini, Alice
Coleman, Dani
Deser, Clara
Danabasoglu, Gokhan
Edwards, Jim
Gent, Pter
Hannay, Cecile

Hoffman, Matt (visitor
from LANL)
Jahn, Alexandra
Kelly, Rory
Kluzek, Erik
Lamarque, Jean-Francois
Lawrence, Dave
Lawrence, Peter
Lauritzen, Peter
Lindsay, Keith
Mills, Michael

Moore, Mark
Neale, Richard
Oleson, Keith
Phillips, Adam
Rosenbloom, Nan
Sacks, William
Simpson, Isla
Tabor, Clay
Tilmes, Simone
Van Ruijven, Bas
Wieder, Will

Community Earth System Model (CESM) Tutorial 2016
NCAR Mesa Lab, Boulder, CO
August 8-12, 2016

Main Seminar Room – morning lectures & practical sessions
Damon Room / Library – afternoon practical labs

Monday, August 8

8:30-8:50 Welcome, Intro, Logistics (Phillips, Ballard)
8:50-9:50 Lecture 1: Introduction to the coupled system (Lamarque)
9:50-10:15 Break
10:15-11:05 Lecture 2: Atmosphere Modeling I: Intro & Physics (Neale)
11:05-11:35 Practical Session 1 Intro: Introduction to NCAR computing environment (Kelly)
11:35-1:00 Lunch (*on your own*)
1:00-2:15 Practical Session 1 Intro: Run CESM (Bertini)
2:15-2:30 Break
2:30-5:00 Practical Lab 1
5:00-6:30 Reception: *Mesa Lab Cafeteria*

Tuesday, August 9

8:30-9:20 Lecture 3: Atmosphere Modeling II: Dynamics (Lauritzen)
9:20-9:50 Lecture 4: Atmosphere Modeling III: WACCM (Mills)
9:50-10:10 Break
10:10-10:40 Lecture 5: Atmos. Modeling IV: Chemistry, Aerosols (Tilmes)
10:40-11:00 Break
11:00-11:50 Lecture 6: Land Modeling I: Biogeophysics (D. Lawrence)
11:50-1:00 Lunch (*on your own*)
1:00-1:30 Specialized Talks 1: Chemistry (Tilmes) *Chapman Room*
Simpler Models (Simpson) *Main Seminar Room*
1:30-2:30 Practical Session 2 Intro: Run CESM: Simple Modifications (Bates)
2:30-2:40 Break
2:40-5:00 Practical Lab 2

Wednesday, August 10

8:30-9:20 Lecture 7: Land Modeling II: Biogeochemistry: Ecosystem
Modeling and Land Use (P. Lawrence)
9:20-9:35 Break
9:35-10:25 Lecture 8: Ocean Modeling I (Danabasoglu)
10:25-10:40 Break
10:40-12:00 Applications 1: Short Talks: IAS, Building Energy Demand/CLM (van Ruijven),
Deep Time Paleo (Tabor), High Resolution Simulations (Rosenbloom),
Applying CLM in Site Level Simulations (Wieder)
12:00-1:30 Lunch (*on your own*)
12:45-1:05 Porting Session (Edwards)
1:05-1:30 CESM2: What to expect (Edwards)

1:30-2:30 Practical Session 3 Intro: Diagnostics and Output (Phillips)
 2:30-2:40 Break
 2:40-5:00 Practical Lab 3

Thursday, August 11

8:30-9:20 Lecture 9: Ocean Modeling II (Gent)
 9:20-9:35 Break
 9:35-10:25 Lecture 10: Ocean Biogeochemistry (Lindsay)
 10:25-10:40 Break
 10:40-11:30 Lecture 11: Sea Ice Modeling (Bailey)
 11:35-12:05 Specialized Talks 2: Isotopes (Jahn) *Chapman Room*
 Model Assessment and Tuning (Hannay) *Main Seminar Room*
 12:05-1:30 Lunch
 12:30-1:30 Meet a CESM Scientist (Peter Gent, Bette Otto-Bliesner, Marilyn Raphael,
 Kevin Trenberth, Warren Washington)
 1:30-2:30 Practical Session 4 Intro: Namelist and Code Modifications (Hannay)
 2:30-2:40 Break
 2:40-5:00 Practical Lab 4

Friday, August 12

8:30-9:20 Lecture 12: Land Ice Modeling (Hoffman)
 9:20-9:35 Break
 9:35-10:35 Applications 2: Interpreting model results (Deser)
 10:35-10:45 Closing Remarks and Quiz Recap (Phillips/Hannay)
 10:45 Photo (*meet outside Main Seminar Room*)
 10:50-11:00 Break
 11:00-12:00 Practical Session 5 Intro:
 Breakouts: Ocean/Sea Ice/Land Ice (Truesdale, Bailey, Sacks) *Director's Conf Rm*
 Land/BGC (Oleson, Kluzek, Lindsay) *Main Seminar Room*
 Atmosphere/Chem/WACCM (Coleman, Tilmes, Mills) *Chapman Room*
 12:00-1:00 Lunch
 1:00-3:00 Practical Lab 5

2016 CESM Tutorial Participants

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