CCSI ESM Theme Update

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1 Project Updates

The Biogeochemistry–Climate Feedbacks Scientific Focus Area (SFA) started on October 1, and we expect to receive full funding from BER this year.

2 Personnel Updates

Three postdocs departed ORNL and the Theme since the summer of 2014: **Xia Song**, **Damian Maddalena**, and **Yasemin Ergüner Baytok**. Xia is at the University of Texas–El Paso. Damian is lecturing at the University of North Carolina–Wilmington. Yasemin is working with her former advisor and colleagues back in Istanbul, Turkey.

Two new staff members and a new postdoc in the Computer Science & Mathematics Division (CSMD) recently joined the Theme:

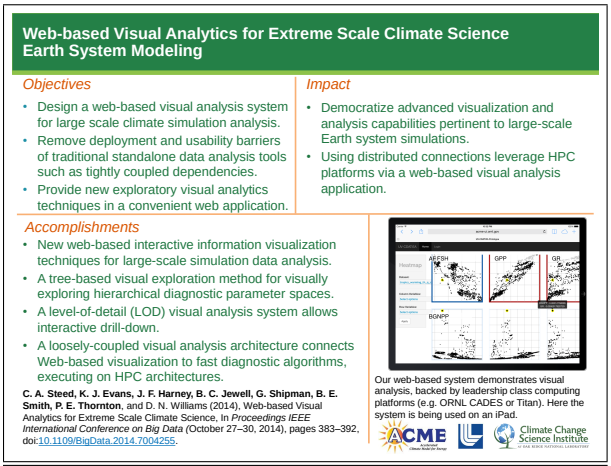
- **Nathan Collier** was formerly a postdoc in the Environmental Sciences Division (ESD) and arrived a little over a year ago from King Abdullah University of Science and Technology (KAUST). With a Ph.D. in Civil Engineering and experience in applied mathematics and computational science, he will continue contributing to the NGEE Arctic project and the fracking LDRD, while transitioning the majority of his effort to the BGC Feedbacks SFA and the ACES4BGC SciDAC-3 project.
- **Min Xu** arrived from the University of Maryland's Earth System Science Interdisciplinary Center (ESSIC) just last week. With a Ph.D. in atmospheric sciences and experience with a wide variety of weather, climate, land surface, radiation transfer, and crop growth models, he will initially focus on canopy processes for the ACES4BGC SciDAC-3 project and data set and metrics development for the BGC Feedbacks SFA.
- **Joe Kennedy** also arrived last week, having recently completed his Ph.D. in physics at the University of Alaska, Fairbanks. His research interests include glacier dynamics, climate and ice sheet feedbacks, and computational physics methods, and he will be performing ice sheet model validation in stand alone and fully coupled model configurations for the PISCEES SciDAC-3 project.

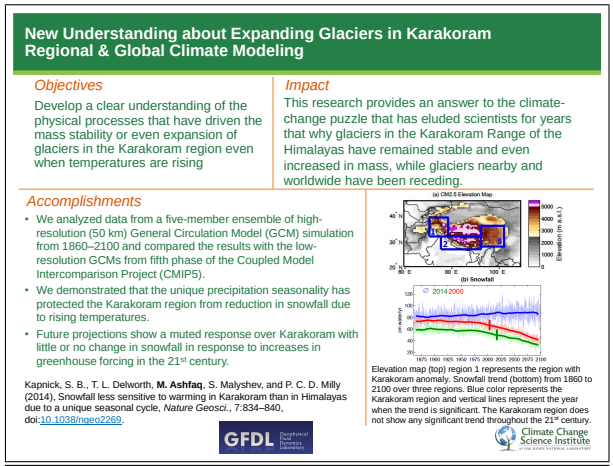
Cheng-en Yang, a graduate student of Joshua Fu at the University of Tennessee, has returned to continue work on the stochastic parameterization LDRD (co-lead by Salil Mahajan and Dan Ricciuto) and on biomass data analysis for model evaluation in the BGC Feedbacks SFA.

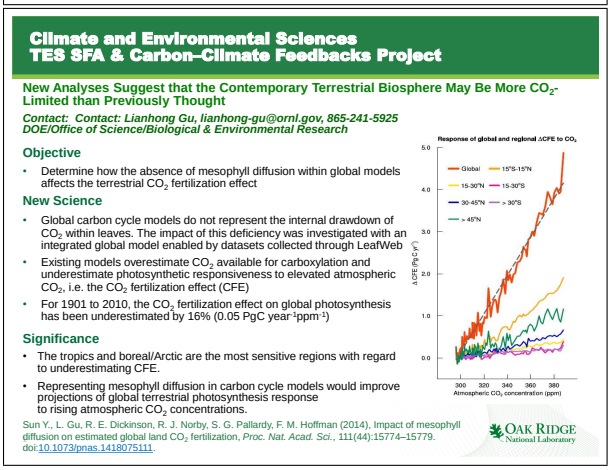
Sam Feldman and **Kaleb Nelson**, both local high school students, are doing their semester academy projects in CCSI with Kate Evans. Sam is focusing on important metrics for ice sheet model evaluation and Kaleb is investigating large scale atmospheric conditions that spawn tornadoes.

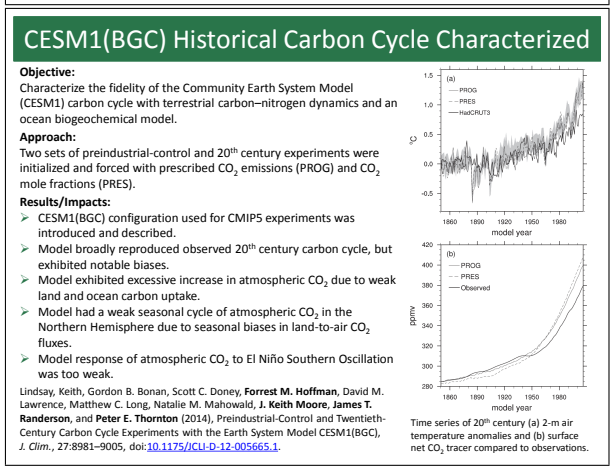
3 Highlights

The following are highlight slides provided by ESM Theme members.









3.1 Papers

- **Kao, S. C.**, **M. Sale**, **M. Ashfaq**, **R. U. Martinez**, **D. Kaiser**, **Y. Wei**, and N. S. Diffenbaugh (2014), Projecting Changes in Annual Hydropower Generation using Regional Runoff Data: An Assessment of the United States Federal Hydropower Plants, *Energy*, accepted.

- **Rui, M.**, **M. Ashfaq**, **D. Rastogi**, L. R. Leung, and F. Dominguez (2015), Dominating Controls for Wetter South Asian Summer Monsoon in the 21st Century, *J. Clim.*, accepted.

- **Touma, D.**, **M. Ashfaq**, M. A. Nayak, **S. C. Kao**, and N. S. Diffenbaugh (2015), A Multi-model and Multi-index Evaluation of Drought Characteristics in the 21st Century, *J. Hydrol.*, in press, doi:10.1016/j.jhydrol.2014.12.011.

- Lindsay, Keith, Gordon B. Bonan, Scott C. Doney, **Forrest M. Hoffman**, David M. Lawrence, Matthew C. Long, Natalie M. Mahowald, J. Keith Moore, James T. Randerson, and **Peter E. Thornton** (2014), Preindustrial-Control and Twentieth-Century Carbon Cycle Experiments with the Earth System Model CESM1(BGC), *J. Clim.*, 27(24):8981–9005, doi:10.1175/JCLI-D-12-00565.1.

- Sun, Ying, **Lianhong Gu**, Robert E. Dickinson, **Richard J. Norby**, Stephen G. Pallardy, and **Forrest M. Hoffman** (2014), Impact of Mesophyll Diffusion on Estimated Global Land CO_2 Fertilization, *Proc. Nat. Acad. Sci.*, 111(44):15774–15779, doi:10.1073/pnas.1418075111.

- Kapnick, S. B., T. L. Delworth, **M. Ashfaq**, S. Malyshev, and P. C. D. Milly (2014), Snowfall Less Sensitive to Warming in Karakoram than in Himalayas Due to a Unique Seasonal Cycle, *Nature Geosci.*, 7:834–840, doi:10.1038/ngeo2269.

- **C. A. Steed**, **K. J. Evans**, **J. F. Harney**, **B. C. Jewell**, **G. Shipman**, **B. E. Smith**, **P. E. Thornton**, and D. N. Williams (2014), Web-based Visual Analytics for Extreme Scale Climate Science, In *Proceedings IEEE International Conference on Big Data* (October 27–30, 2014), pages 383–392, doi:10.1109/BigData.2014.7004255.

- Singh D., D. E. Horton, M. Tsiang, M. Haugen, **M. Ashfaq**, **R. Mei**, **D. Rastogi**, N. C. Johnson, A. Charland, B. Rajaratnam, N. S. Diffenbaugh (2014), Severe Flooding in Northern India in June 2013: Causes, Historical Context, and Changes in Likelihood, in "Explaining Extremes of 2013 from a Climate Perspective," a special supplement to the *Bull. Amer. Meteor. Soc.*, 95(9):S58–S61.

3.2 Data Sets

Ben Mayer reported the following data sets were recently published.

- ACME version 0, T341 FAMIP ensemble, 28 years, published on the Earth System Grid Federation.

- ACME version 0, ne30 B1850 with CAM5, 200 years, published on the Earth System Grid Federation.

3.3 Software

- Nate Collier reports that Thermal-Hydrology (TH) mode of PFLOTRAN is working and released to a small community for experimentation.

3.4 Conference/Workshop Presentations

NOAA/DoD EPSC-AOLI Program Meeting (November in Boulder, CO)
Valentine Anantharaj presented a talk.

Naval Research Laboratory (December in Monterey, CA)
Valentine Anantharaj presented a talk.

American Geophysical Union Fall Meeting (December 15–19, 2014)
ESM Theme members organized or co-organized at least 5 sessions and were presenting-authors for 3 oral (1 invited) and 6 poster (1 invited) presentations and co-authors for 11 oral (6 invited) and 17 poster (1 invited) (non-unique) presentations.

- **Valentine Anatharaj:** presenting-author for 1 poster.
- **Rick Archibald:** presenting-author for 1 poster (1 invited).
- **Moet Ashfaq:** presenting-author for 1 oral, co-author for 1 oral and 1 poster.
- **Nate Collier:** presenting-author for 1 poster, co-author for 2 posters.
- **Kate Evans:** presenting-author for 1 oral, co-author for 2 posters.
- **Forrest Hoffman:** presenting-author for 1 oral (1 invited) and 1 poster, and co-author for 5 oral (4 invited) and 9 posters.
- **Tianyu Jiang:** presenting-author for 1 poster, and co-author for 1 oral.
- **Dan Lu:** presenting-author for 1 poster, and co-author for 2 oral (2 invited) and 1 poster (1 invited).
- **Salil Mahajan:** co-author for 1 poster.
- **Rui Mei:** co-author for 2 oral and 1 poster.

95th American Meteorological Society (AMS) Annual Meeting (January 4–8, 2015)
ESM Theme members were presenting-authors for 2 posters and co-authors for 4 (non-unique) posters.

- **Moet Ashfaq:** presenting-author for 1 poster, co-author for 2 posters.
- **Rui Mei:** presenting-author for 1 poster, co-author for 2 posters.

4 Upcoming Events

- The BGC Feedbacks SFA and the University of Tennessee–Knoxville (UTK) Baker Center are jointly sponsoring a visit by Robert Dickinson and Rong Fu, both at the University of Texas–Austin, during February 9–13. Robert and Rong will give seminars and meet with groups of CCSI personnel

Monday through Wednesday, and they will meet with faculty, department heads, and deans at UTK Thursday and Friday. Robert will be the speaker for the Baker Center Forum Lecture on Thursday. We expect to discuss continued collaboration with Robert and his graduate students, and explore opportunities for collaborating with Rong on land–atmosphere interactions research. Forrest Hoffman is developing agendas for Robert and Rong's time at ORNL. Please contact him to arrange meetings or join lunch or dinner meetings with Robert and Rong.

- The ESM Theme is planning a workshop in early June to share our research with CCSI staff and leadership, ORNL management, new students, and interested colleagues. We expect to present research in developing next generation general circulation models, biogeochemical and energy feedbacks, and implications for climate change. Suggestions for structuring the program are welcome. Kate Evans is organizing the workshop.