Postdoctoral position in petascale expansion of superparameterized climate simulation for understanding low cloud / climate feedbacks

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I’m looking for a computationally talented postdoc to join an exciting new effort to better understand global low-cloud climate feedbacks using petascale computers. Low clouds have been a decades-long parameterization challenge for global climate models, and low cloud feedbacks are a primary source of uncertainty in climate projections for the 21st century.

You would join a new team - spanning UCI / UW / Stony Brook & PNNL - that has envisioned a way to simulate low clouds globally with minimal approximations. Our strategy hinges on re-engineering a multi-scale (superparameterized) climate model to take advantage of the huge power at the GPU-accelerated petascale on DOE’s newest supercomputer systems. By exploiting this technology we think it’s already possible to make a global model that heterogeneously resolves the small (250-m) scale turbulent eddies that form boundary-layer clouds and that this would lead to more robust simulations of low cloud-climate interaction physics than has been possible.

The successful applicant would lead an effort at UCI to add a petascale-capable MPI parallel decomposition scaffold to the SuperParameterized Community Atmosphere Model v.5 (SPCAM5) so it can scale to over fifty thousand processors. Only by running at these scales can our project make the extreme computational demands of global low cloud physics explicitly tractable over the entire planet. I would help closely with the software engineering and design plan. Other responsibilities will include optimizing the representation of simulated low clouds in the new model against observations and applying it to learn about the physics of global low cloud-climate feedbacks and aerosol indirect effects on climate change.

As a central part of the team there will be leadership opportunities for coordination and scientific interaction with expert collaborators at the University of Washington (Chris Bretherton’s group), Stony Brook University (Marat Khairoutdinov’s group) and the Pacific Northwest National Lab (PNNL; Minghuai Wang & Balwinder Singh) who are working on complementary software engineering activities including graphical co-processor acceleration with GPUs and physics algorithm efficiency gains.

The term of appointment is for one year at first but with expected renewal for as many as two more pending approval. Start dates are flexible. Due to the computational needs of this project, strong software fluency in Fortran90, MPI parallelization, standard UNIX scripting languages and experience working in high performance computing environments are required. Experience with the Community Atmosphere Model is desired but not essential. Salary will be commensurate with experience and competitiveness.
Please submit electronically: (1) a curriculum vitae, (2) a publication list, (3) a brief cover letter (no more than 1 page) describing research interests and technical background, and (4) the names of four individuals who can provide a letter of reference. Applications or informal inquiries can be sent directly to me at mspritch@uci.edu.

Thanks!

Mike Pritchard.