

# 'Push-button' climate modeling now available

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A popular climate modeling tool used by scientists is now available as a service on the National Science Foundation's TeraGrid research computing network. This version of the Community Climate System Model uses a Web interface and is supported by the computing resources of the TeraGrid. (Purdue News Service image)

A tool used by scientists to create climate models is about to become easier to use and available to a much wider audience.

A new Web-enhanced version of the most commonly used climate modeling system will allow many more scientists - and even curious students - to test theories about the planet's climate.

Matt Huber, an assistant professor of earth and atmospheric sciences at Purdue University, says the Community Climate System Model is

already used by thousands of scientists, and the results from their models often make headlines around the world.

"This new tool makes climate modeling available to a much wider audience," Huber says. "This allows us to get science done at the push of a button. Now we have a 'turn-key' climate model."

The new climate modeling TeraGrid service tool was announced Wednesday (June 6) at the annual meeting of TeraGrid users in Madison, Wis.

Huber says this tool will allow many more people to become involved with climate modeling and to ask "what if?" questions.

"Our hope is to roll this out to a broader community," he says.

"Researchers on the cutting edge of science can use this tool, but so can high school students who want to run their own climate models. They will generate equal output."

The Community Climate System Model, known to many scientists as CCSM, is actually a collection of interconnected modeling systems. The climate system model contains separate climate models using data from the atmosphere, oceans, land surfaces and ice fields and then brings the models together in yet another system known as a coupler.

Carol X. Song, senior research scientist in Purdue's Office of the Vice President for Information Technology and principal investigator for the Purdue TeraGrid project, says researchers currently have to enter climate modeling information using UNIX command lines and know how to optimize the system to get accurate results.

"It can take days or more to get someone up to speed on how to use the modeling system, and that assumes they already know how to enter

instructions in command lines," Song says. "With our new climate portal, that's all Web enabled. All the user has to do is fill in fields on a Web form."

However, even with the easier to use Web interface, most users would be unable to run their models without access to powerful computing resources, which the new portal also provides.

"These simulations are very resource intensive because they require a large amount of computer cycles and data storage," Song says. "We have connected this system to the resources of the National Science Foundation's TeraGrid so that the computing resources will be available."

The simulations are currently being run on an IBM DataStar computer at the San Diego Supercomputing Center. The post-processing of the simulation data is done on Purdue's distributed computing system, known as a Condor pool. Both institutions are part of the NSF TeraGrid.

Huber says climate models can be sensitive to underlying issues related to getting the multiple systems to work together.

"Optimizing the Community Climate System Model is difficult," he says. "It is possible by changing the optimization for the model to show global warming or global cooling when that isn't what the data really shows. Obviously you don't want that because, with climate modeling, everybody cares about the answer. This new system does the optimization for the user, so the modelers can concentrate on their climate models and not on system optimization."

Another benefit to using the new climate modeling portal is that users don't have to be experts at using the TeraGrid.

"One of the problems with doing science on the grid is that sometimes you ask, 'Where did my data go?' Huber says. "With this system you don't have to track it down. This system automates a whole series of steps and also manages and archives the data."

Lan Zhao, a Purdue research scientist and architect of the Purdue earth science portals, including the CCSM portal, says development of additional portals for other scientific disciplines will now be quicker.

"We developed many generic, configurable components for this portal that can be used in other portals, which means new portals can be created rapidly and not from scratch," Zhao says.

Song says she is proud to be a part of the team that developed the new climate modeling tool.

"It's a very nice piece of work, and we're very excited to offer this new resource," she says. "The Rosen Center for Advanced Computing is a computing research group within Information Technology at Purdue, and this is what we are about. We connect the computing hardware with the needs of researchers."

Source: Purdue University

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