



**OLCF**  
OAK RIDGE LEADERSHIP COMPUTING FACILITY  
**SNAPSHOT**

For the Week of October 19, 2009



U.S. DEPARTMENT OF  
**ENERGY**



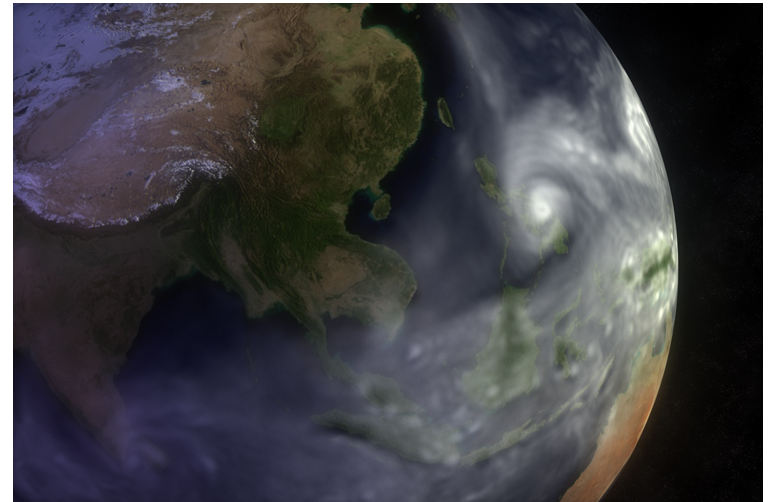
**OAK RIDGE NATIONAL LABORATORY**

MANAGED BY UT-BATTELLE FOR THE DEPARTMENT OF ENERGY

# Scientists Develop New Method to Quantify Climate Modeling Uncertainty

*Flux of temperature might play greater role than expected*

- A team of researchers using the computing resources of the OLCF has identified a new method for quantifying uncertainty, suggesting the range of uncertainty may be greater than assumed.
- The team compared model outcomes with historical climate data, using statistical methods to develop a range of temperature variance for each of three scenarios, based on departure from actual historical data.
- Findings reinforce the IPCC's call for greater focus on regional climate studies in an effort to understand specific impacts and develop strategies for mitigation of and adaptation to climate change.



Researchers use the OLCF's Jaguar and the Community Climate System Model version 3 (CCSM3) to study various climate change scenarios. Visualization credit: Jamison Daniel and Eddie Bright, ORNL

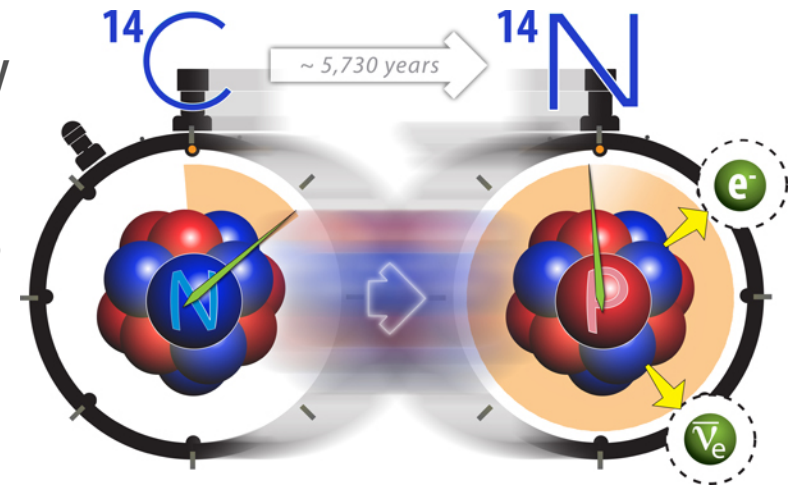
"We found that the uncertainties obtained when we compare model simulations with observations are significantly larger than what the ensemble bounds would appear to suggest."

– ORNL's Auroop R. Ganguly

# Life and Its Half-Life

## Physicists explore what makes carbon-14 tick

- Carbon-14, by existing in all living things and decaying at a steady rate, gives researchers the ability to look at a long-abandoned community, tool, or other artifact and determine its age.
- Using the unprecedented computing power of ORNL's petascale Jaguar supercomputer to examine the carbon-14 nucleus, a team lead by David Dean and Hai Ah Nam (ORNL) is looking into the mysteries of carbon-14's long half-life.
- Using an approach known as the nuclear shell model to describe the carbon-14 nucleus, the team hopes to come closer to an understanding of the atom's nucleus.



Carbon-14 decays through beta decay, in which the nucleus emits an electron and an anti-neutrino and becomes a nitrogen-14 nucleus. Visualization credit: Hai Ah Nam and Andrew Sproles, ORNL

“These types of calculations for carbon-14 were previously not possible because it's a memory-intensive calculation. Accounting for the three-nucleon force amounts to storing tens of trillions of elements ... that's hundreds of terabytes of information.”

– Hai Ah Nam of ORNL

# ORNL Project Director Speaks at 2009 Computing in Atmospheric Sciences Workshop

*Bland discusses challenges facing HPC centers*

- OLCF Project Director Buddy Bland recently spoke at the Computing in Atmospheric Sciences Workshop in Annecy, France.
- The workshop serves as a forum for international specialists to discuss advances in information technology and the evolving infrastructures that allow scientists to explore atmospheric issues as part of the Earth system model.
- Bland's presentation at the workshop focused on challenges facing high performance computing facilities such as the OLCF, including the forces that drive the power requirements of high performance systems, the demands placed on the facilities that house these systems, and how ORNL is dealing with both of these issues.



Buddy Bland - OLCF Project Director

# 2009 Hex-Core Workshop Announced

*Event to focus on recent upgrades to ORNL's Jaguar and Kraken*

- A workshop to help users understand and take advantage of the new hex-core architecture will be held at ORNL on December 7-9, 2009.
- The OLCF and NICS will jointly sponsor the 3 day workshop covering important issues in obtaining increased performance, including: XT5 architecture, the AMD hex-core CPU, and programming effectively for the XT5.
- This workshop will present lectures from the OLCF, NICS and Cray staff as well as hands-on sessions, where the staff will be available to work with users on their applications.



Users of the Cray XT5 systems at the OLCF and NICS will have the opportunity to learn more about the upgraded machines at the workshop in December.