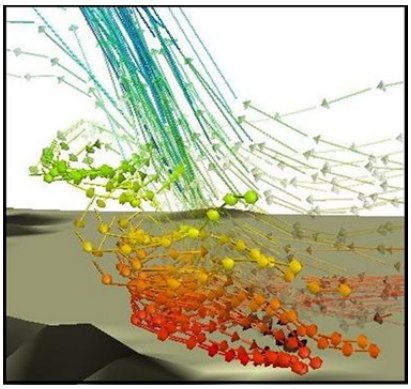
Highlights

State-of-the-Art Virtual Reality System is Key to Medical Discovery

Credit: Electronic Visualization Laboratory
University of Illinois at Chicago

A team of neurosurgeons from the College of Medicine at the University of Illinois at Chicago (UIC) recently stepped into CAVE2 – a next-generation, large-scale, virtual environment – to solve a vexing problem that presented itself in the arteries of the brain of a real patient. For years, the team had painstakingly used laptop and desktop computers to create three-dimensional, full-brain models that physiologically mirrored the brains of individual patients. These models were used for a patient whose cerebrovascular system they were trying to accurately model. But because of the limited image spatial-resolution of even today's best-quality computers, there was something the neurosurgeons couldn't see. That is, until they stepped into an automatic virtual environment, also known as a "CAVE" – a room in which images are seamlessly displayed so as to immerse an observer in a cyber-world of 3-D data. CAVE2 helped the team discover quickly that their model was "inconsistent with anatomy" – and with that revelation, their model could be corrected. The use of UIC's virtual reality system to make the discovery could help change the way surgeons are trained and greatly improve patient care – and the method could someday benefit hundreds of thousands of Americans who fall victim to brain aneurysms and strokes, the third leading cause of death in the United States. CAVE2 is funded through NSF's Major Research Instrumentation program and the Department of Energy.

Improving Tropical Cyclone Forecasts



Credit: Wallace Hogsett and Da-Lin Zhang
University of Maryland

Accurate tropical cyclone forecasts require prediction of tropical weather over vast tropical oceans; however, predicting cyclone formation is difficult due to the lack of direct observations in the formation regions and deficiencies in current models. The Weather Research and Forecasting (WRF) numerical model has captured the formation of a tropical cyclone within an area of disturbed weather associated with the Madden-Julian Oscillation (MJO) – a variable pattern of wind, rain, ocean temperature and cloudiness in the tropics. Results from the WRF research may lead the way to better modeling of tropical disturbances and improved forecasts to alert those in the tropics of potential cyclones. University of Maryland researchers have demonstrated that high-resolution models can describe slowly-evolving tropical weather patterns such as the MJO. Moreover, their results suggest that transient and small-scale weather phenomena such as tropical cyclones which develop within the disturbed weather associated with the MJO may be predictable.