Visualization of Global Climate Data

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Abstract

This visualization project involves producing scientific visualizations to help researchers have a better visual understanding of the data that they have discovered through their research. Additionally, people who may be unfamiliar with science will have a better understanding of the concepts of the data and learn why this research is important to them. The visualizations will be presented on ORNL's Exploratory Visualization Environment for REsearch in Science and Technology (EVEREST), a massive, high-scale screen that is 30 feet wide and 8 feet high, consisting of 27 individual screens 1280 by 1024 pixels, resulting in a 11,520 by 3072 pixel screen. The presentation will deal with global climate simulation and will use 3D graphics software such as Maya, which is widely used for film and video games; and VisIt, a visualization tool used specifically for science, to produce them.

Fig 1. Globe Model: Rendered in Maya. High resolution textures taken from NASA.

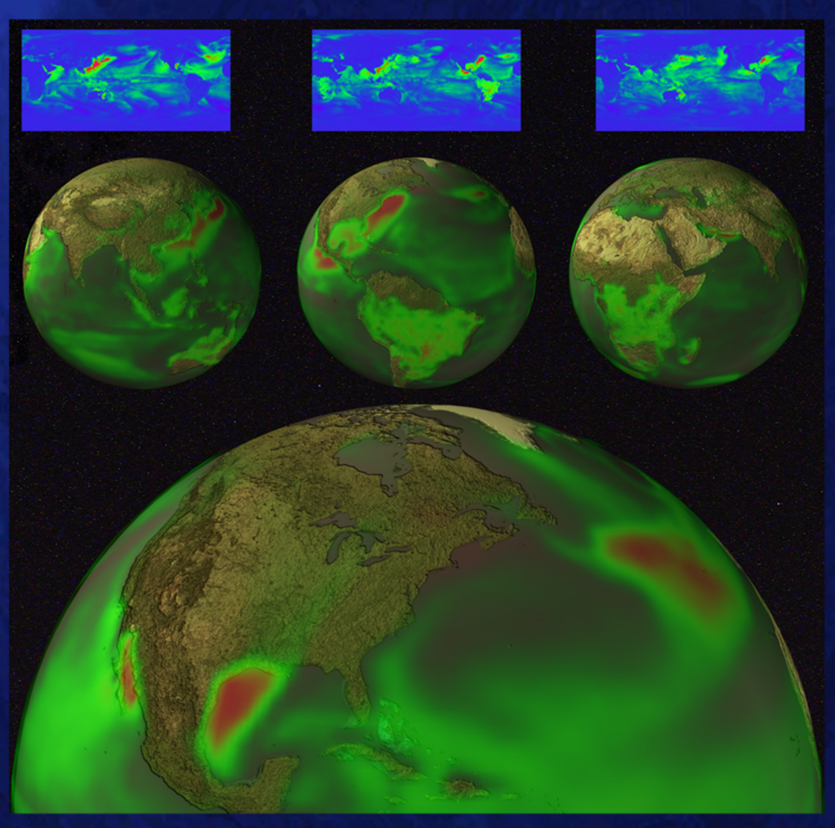

Fig 2. Heat Flux: Simulations of heat fluctuations in the Earth's surface in the 21st century using multiple frames of the results.

Goals

- Convert research results into 3D images
- Leverage VisIt and Maya software packages
- Discover interesting results within the data sets
- Visualize results from simulations of global climate data including heat fluctuation throughout the Earth's surface (Fig. 2) and carbon dioxide in the Earth's atmosphere (Fig. 3)

Collecting Climate Data

- High performance computers used to collect and archive raw data
- Scientists implement algorithms and models based on results to simulate and predict climate patterns
- Simulation results are output as either numerical data or 2D images

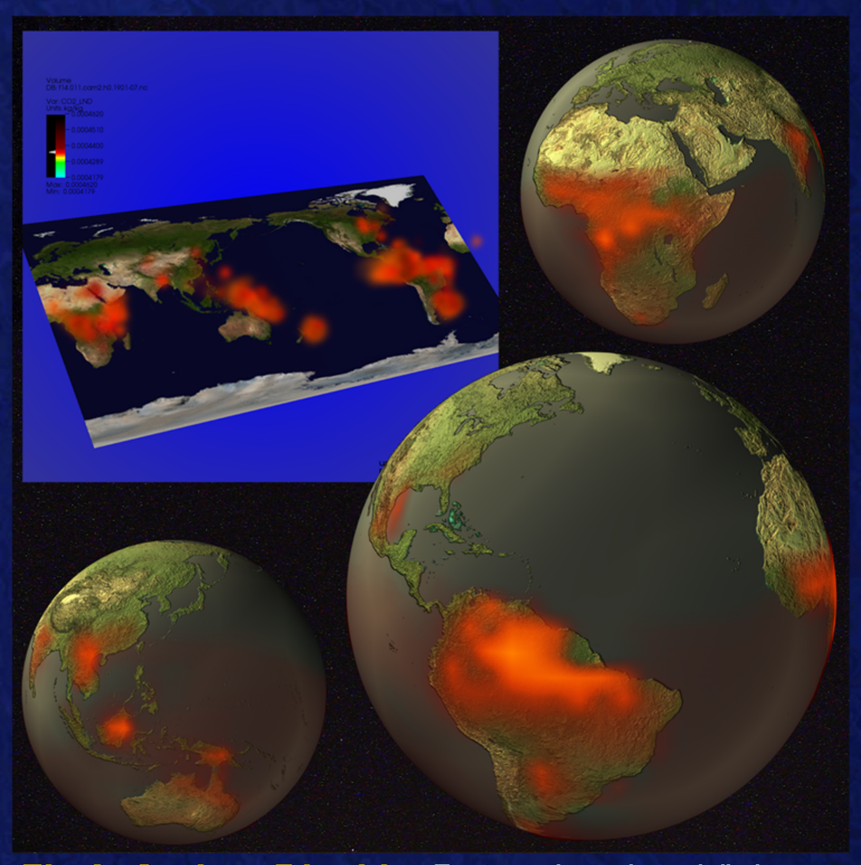

Fig 3. Carbon Dioxide: Data taken into VisIt, then converted into 3D using Maya.

Visualization Purposes

- Transforming mathematical data into images that can be better understood
- Make it easier to discover patterns in the data
- Good for educational purposes
- Can make science more attractive to the common person and help them better understand these scientific issues

The Research Alliance in Math and Science program is sponsored by the Mathematical, Information, and Computational Sciences Division, Office of Advanced Scientific Computing Research, U.S. Department of Energy. The work was performed at the Oak Ridge National Laboratory, which is managed by UT-Battelle, LLC under Contract No. De-AC05-00OR22725.

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U.S. DEPARTMENT OF ENERGY

The author would like to thank Sean Ahern and Jamison Daniel for the opportunity to work on this project, Judy Burns who provided administrative support, and Debbie McCoy who made provisions for this research experience.