The Visualization of Climate Data in 2 and 3 Dimensions

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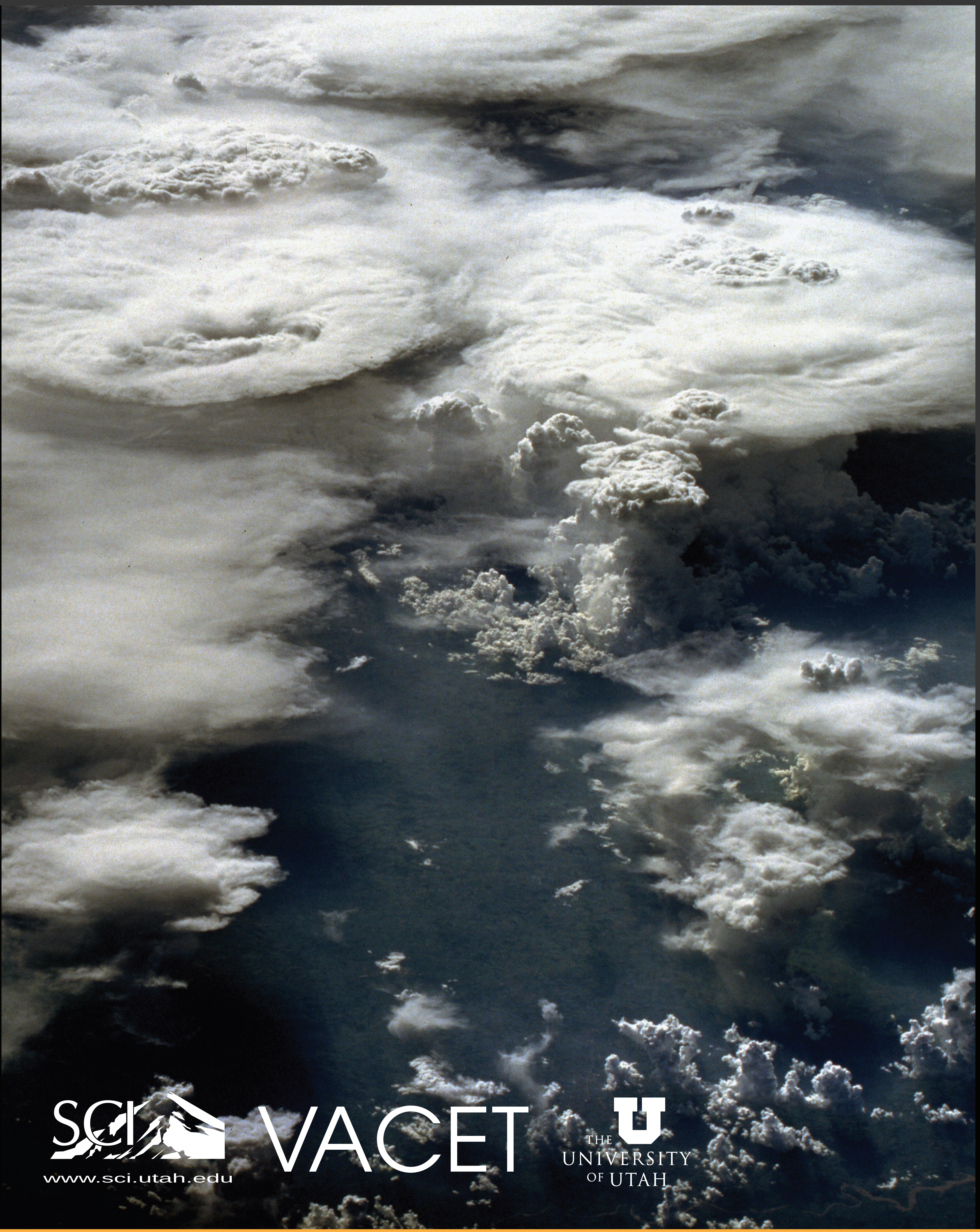
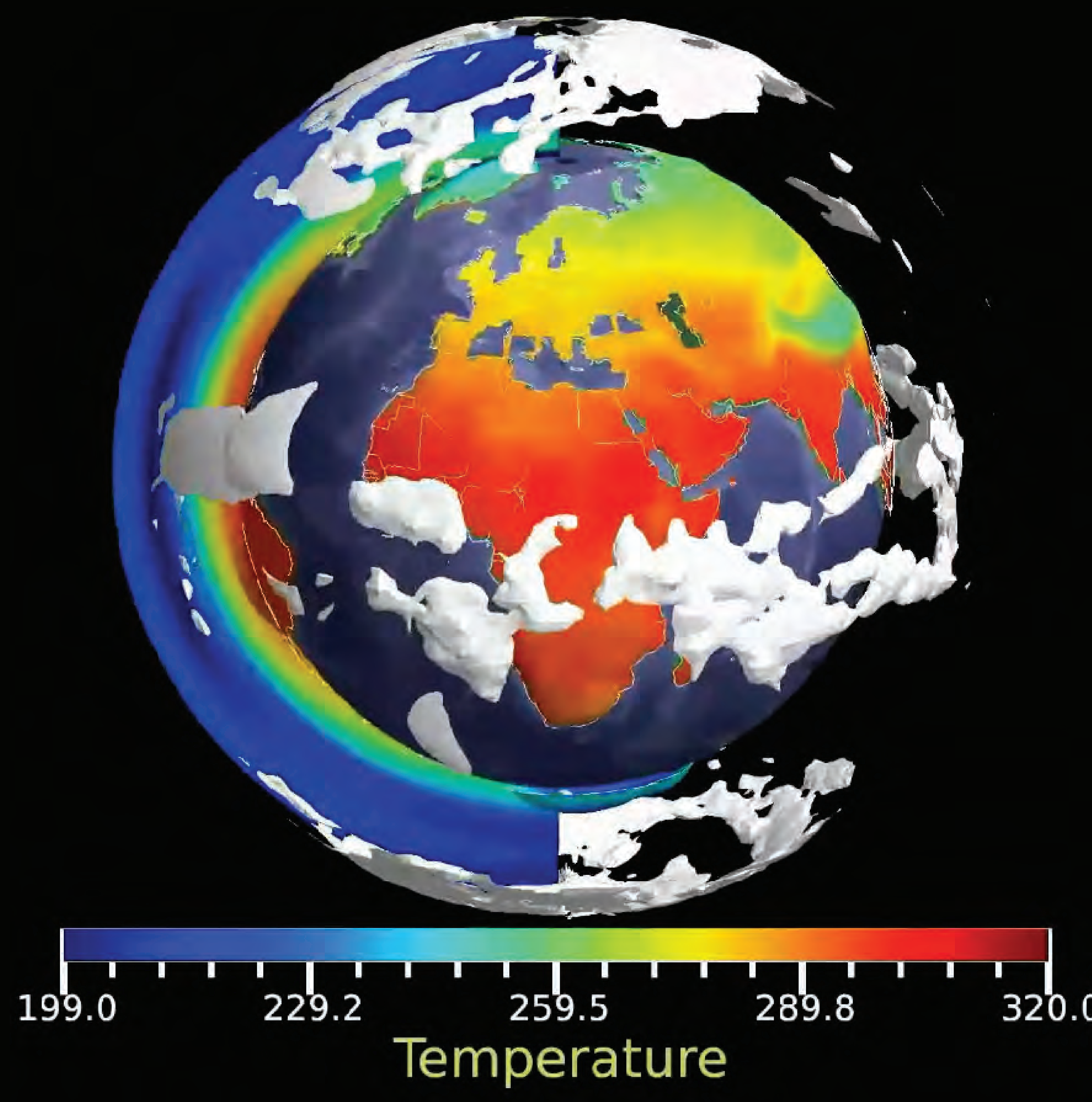


Climate modelers generate vast amounts of simulation data. Analyzing such large data sets is a challenging task, and doing so in an empirically sound manner is even harder. Visualizing data helps us with both the analysis and understanding of the results. Our research aims to develop visualization tools for climate scientists by combining the 2D visualization and analysis capabilities of CDAT (Climate Data Analysis Tool) with cutting edge 3D technologies developed in the ViSUS project. ViSUS is developed using C++, OpenGL, and Python and is based on multithreaded, streaming, out-of-core algorithms, allowing for flexible and rapid access of large datasets.

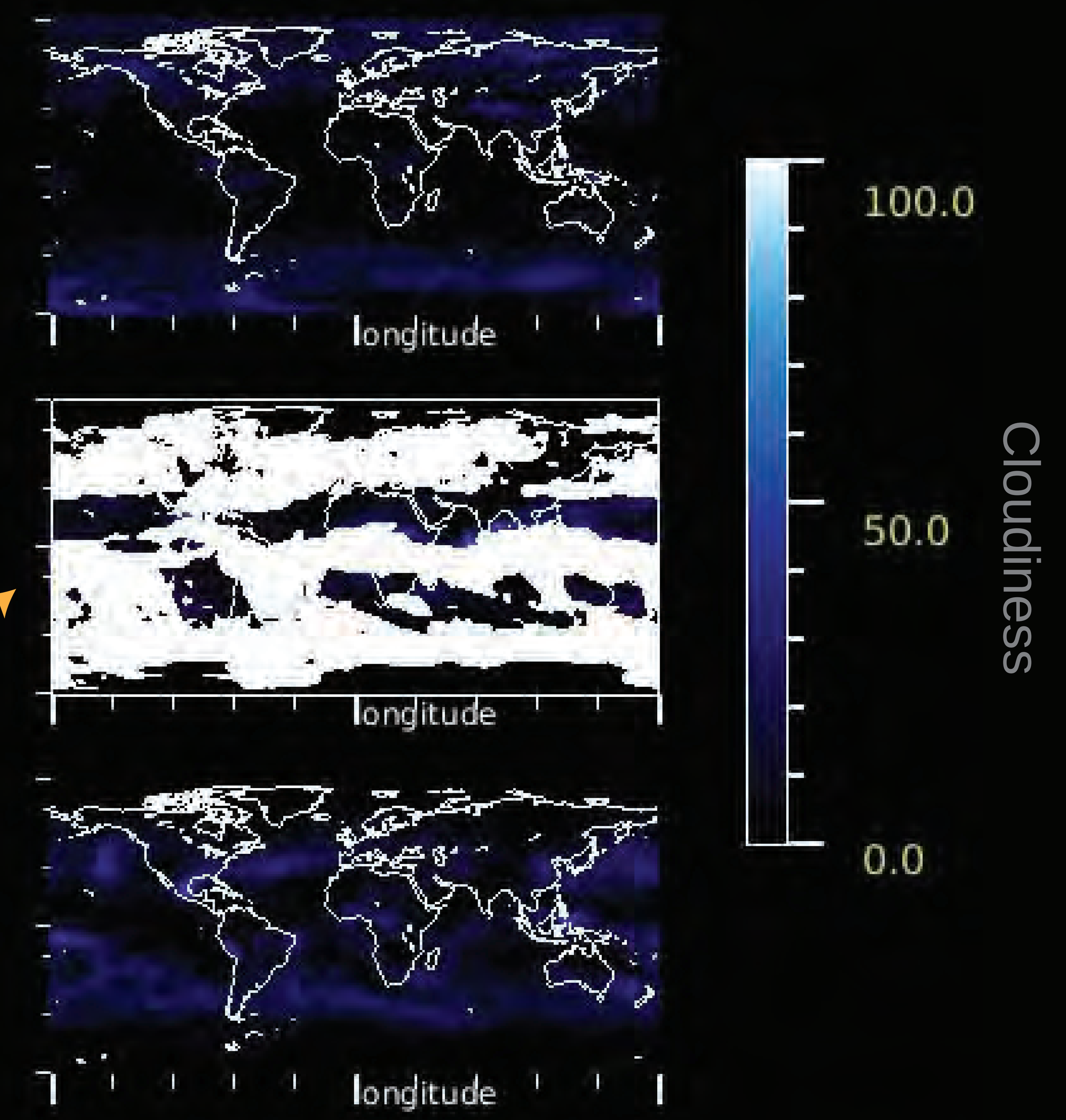
ViSUS combined with CDAT provides a suite of tools in both two and three dimensions which can summarize the large amounts of data as well as allow for the investigation of individual models and variables. In 2D, it provides advanced labeling, colormapping, continental outline, contouring. and masking, all of which are important in making a full visualization. In 3D, it can draw isosurfaces which provide a compelling visualization of cloud cover and height fields which give an excellent way to visualize the terrain. The resulting system combines traditional visualization accustomed by the climate modelers, but also compelling 3D visualizations.



3D Visualization provides a succinct summarization of multiple models as well as allowing for the presentation of many variables in a single setting.

Cloudiness shown at 3 different elevation levels

Iso-surfacing provides a compelling visualization of cloud cover.



2D visualizations provide direct inspection of specific variables.

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