Visualization of Climate Simulation Data – State of the Art

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Besides statistical analysis, visualization is essential for understanding and communicating relevant information contained in scientific simulation data. Climate data sets are typically quite large, time varying, and consist of many different variables that are sampled on different types of underlying geo-referenced grids. Today, coupled models of the entire Earth system are regularly used to simulate the climate developments on time scales up to many thousands of years. These models are comprised of subsystem model components such as the physics of the atmosphere, the physics of the ocean, marine biogeochemical processes and the land biosphere.

A variety of more or less domain-specific visualization software is available for 2D and 3D visualization and analysis of the abstract numerical data.

For post-processing, analysis and visualization of simulation data, the German Climate Computing Center (DKRZ) provides to its users a selection of different visualization packages on a dedicated visualization partition of its supercomputer. Amongst others, the software stack includes ParaView, Avizo, Vapor, Python, and NCL, as well as CDO and NCO for preprocessing of the data. Each software package has its own strengths and weaknesses regarding the users' requirements and visualization goals.

This PICO presentation will show many examples created using different visualization tools – among them ParaView, Vapor, Avizo, Python, and NCL - demonstrating their potential to analyze and visualize the same data sets. This PICO interactively shows that, depending on the visualization tool used, not only different visualizations are created, but also different visualization stories can be told.