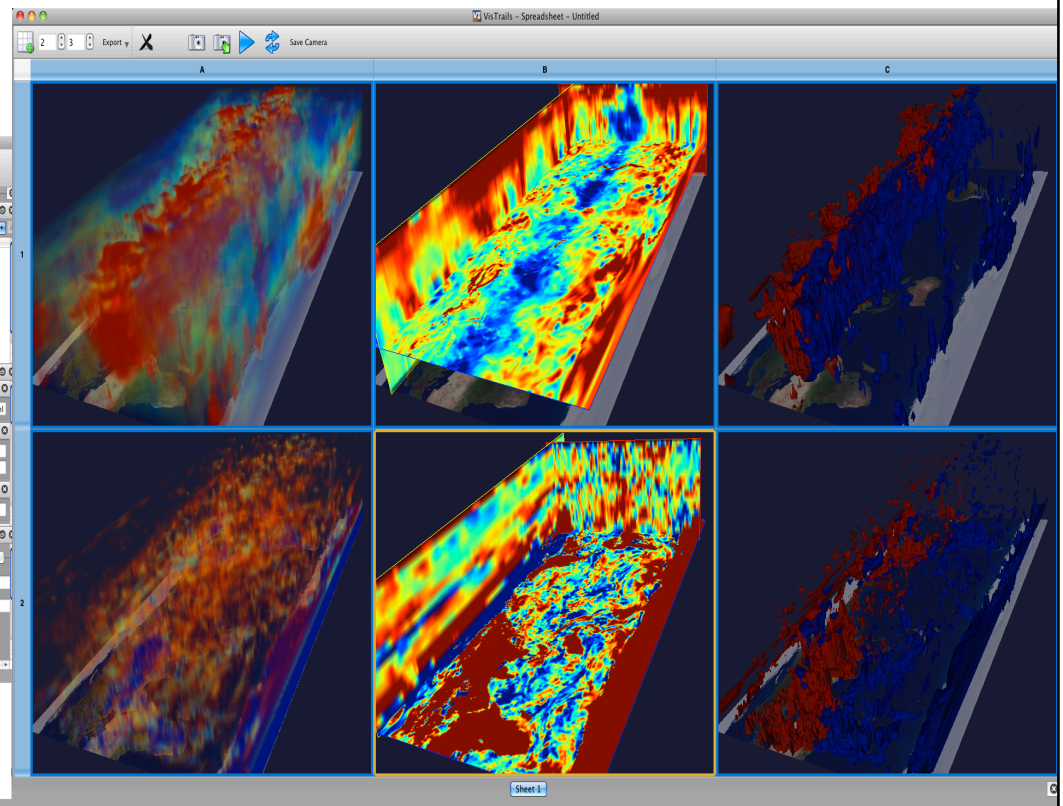
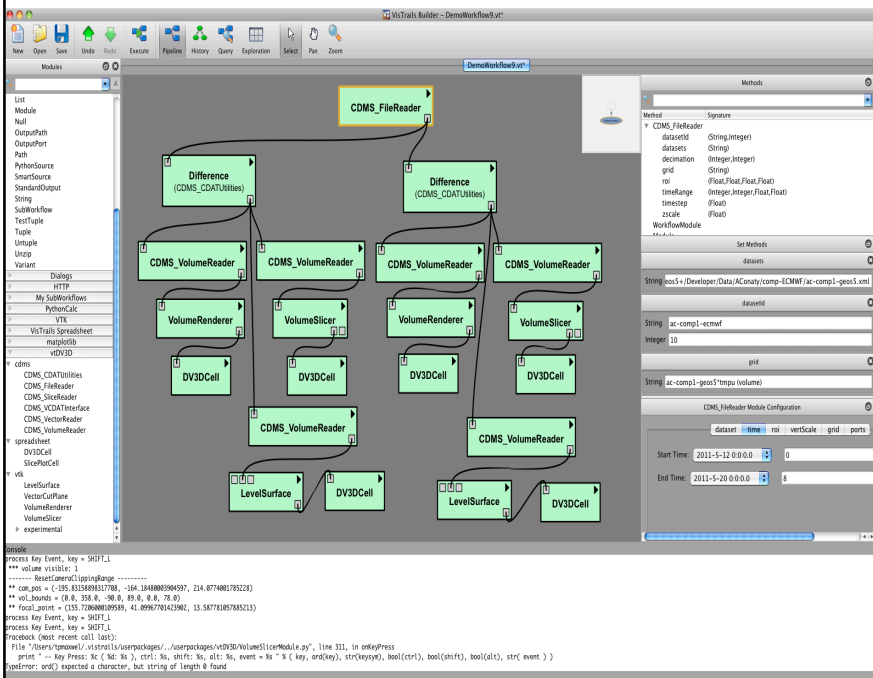

DV3D



DV3D: Interactive 3D Visualization

- Interactive analysis and visualization modules for Vistrails workflows.
- Encapsulates complex VTK visualization operations.
- Custom designed interface for climate scientists.
- Advanced visualization features exploiting current standard GPUs.
- Tight UVCAT integration.



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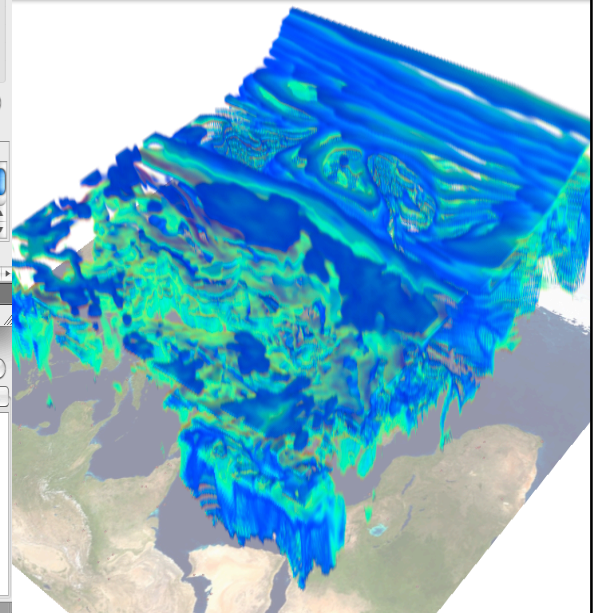
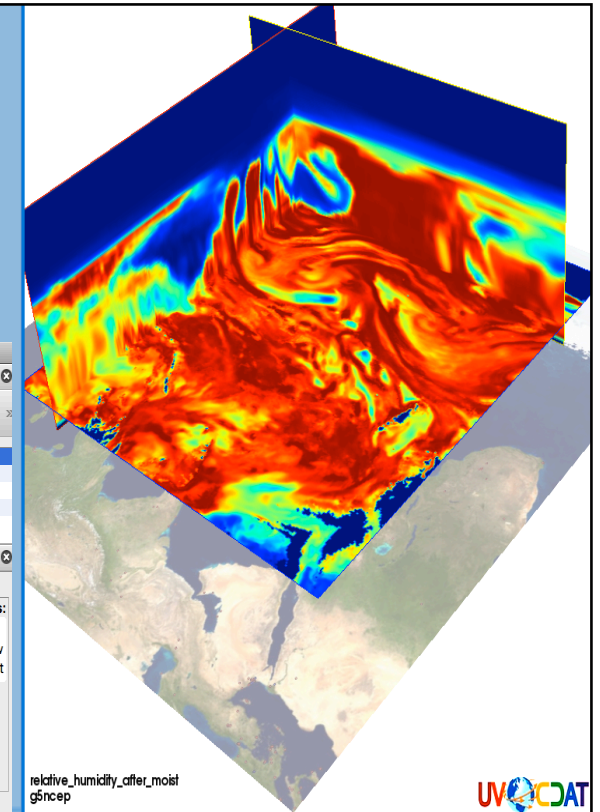
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DV3D in UVCDAT GUI

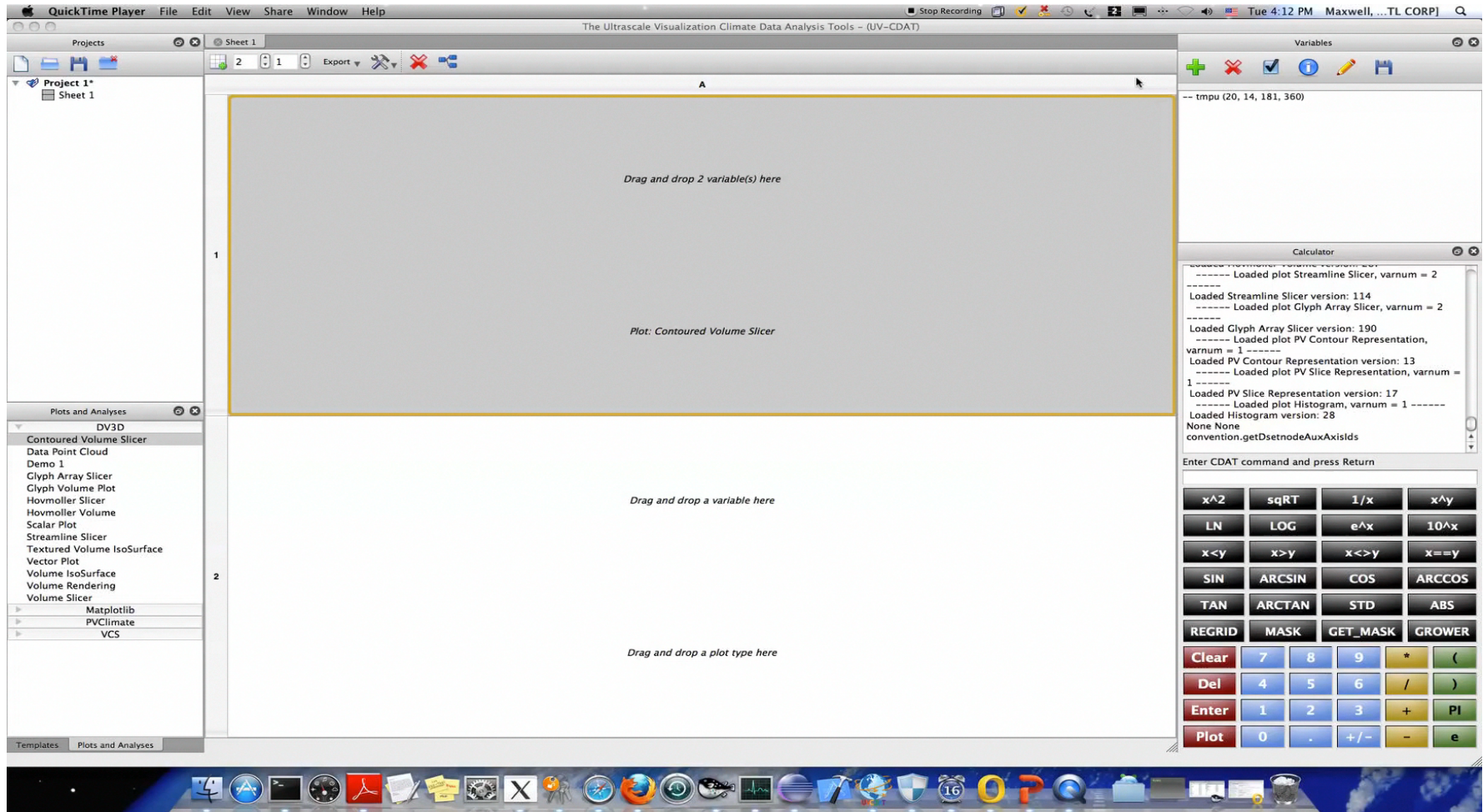
- Tightly integrated into the UVCDAT GUI.
- Inherits the Vistrails workflow and provenance support.

The screenshot displays the UVCDAT GUI interface. The main window is titled "The Ultrascale Visualization Climate Data Analysis Tools - (UV-CDAT)". It features a "Projects" panel on the left showing a project named "Project 1*" with a "Sheet 1" containing several "untitled*" files. The main workspace is divided into four quadrants (A, B, C, D) showing different 3D visualizations of climate data. The top-left quadrant (A) shows a cross-section of a volume with a color scale from blue to red. The top-right quadrant (B) shows a 3D surface plot of the same data. The bottom-left quadrant (C) shows a cross-section with a different color scale. The bottom-right quadrant (D) shows a 3D surface plot with a different color scale. To the right of the main workspace is a "Variables" panel listing variables like "01 wwnd (20, 14, 181, 360)", "uwnd (20, 14, 181, 360)", "tmpu (20, 14, 181, 360)", and "sphu (20, 14, 181, 360)". Below this is a "Visualization Properties" panel with "Configuration Commands" and "Options" sections. The "Active Plots" section lists "A1: VolumeSlicer", "A2: VolumeRenderer", "B1: LevelSurface", and "B2: StreamlineCutPlane". At the bottom of the screenshot is a workflow diagram showing a sequence of modules: "CDMS_FileReader" -> "CDMSVariable" -> "CDMS_FileReader" -> "CDMSVariable" -> "CDMS_VolumeReader" -> "CDMS_VolumeReader" -> "LevelSurface" -> "MapCell3D".



DV3D Interactive Visualization and Analysis

- Drag-and-drop variable and plots to create visualizations.
- Each plot has many user-friendly configuration options.



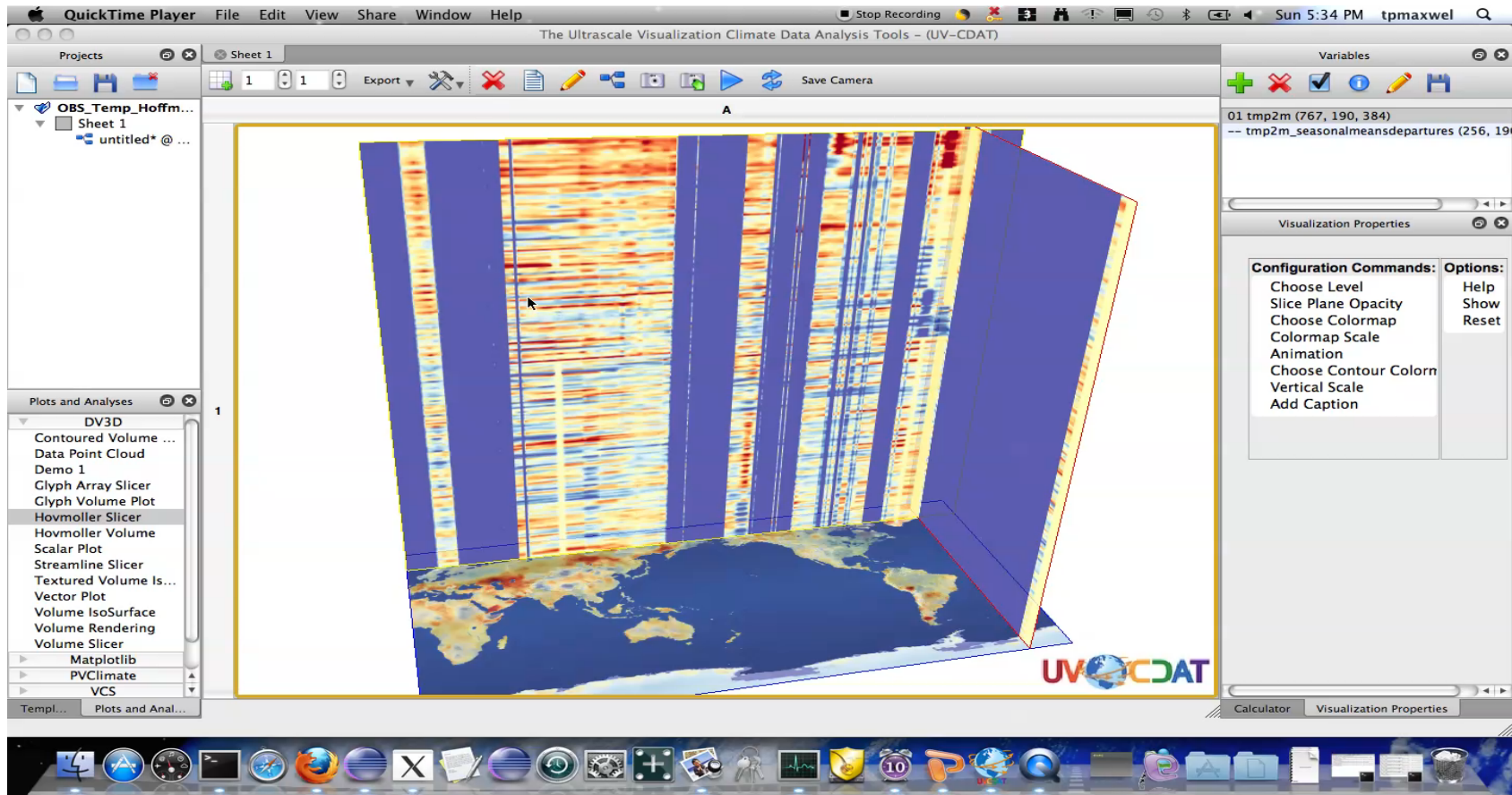
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Hoffmuller Viewer

- Plots time in the vertical dimension, lat-lon in the horizontal dimension
- Easily browse spatial time series
- Discover features that would be very difficult to find using current methods



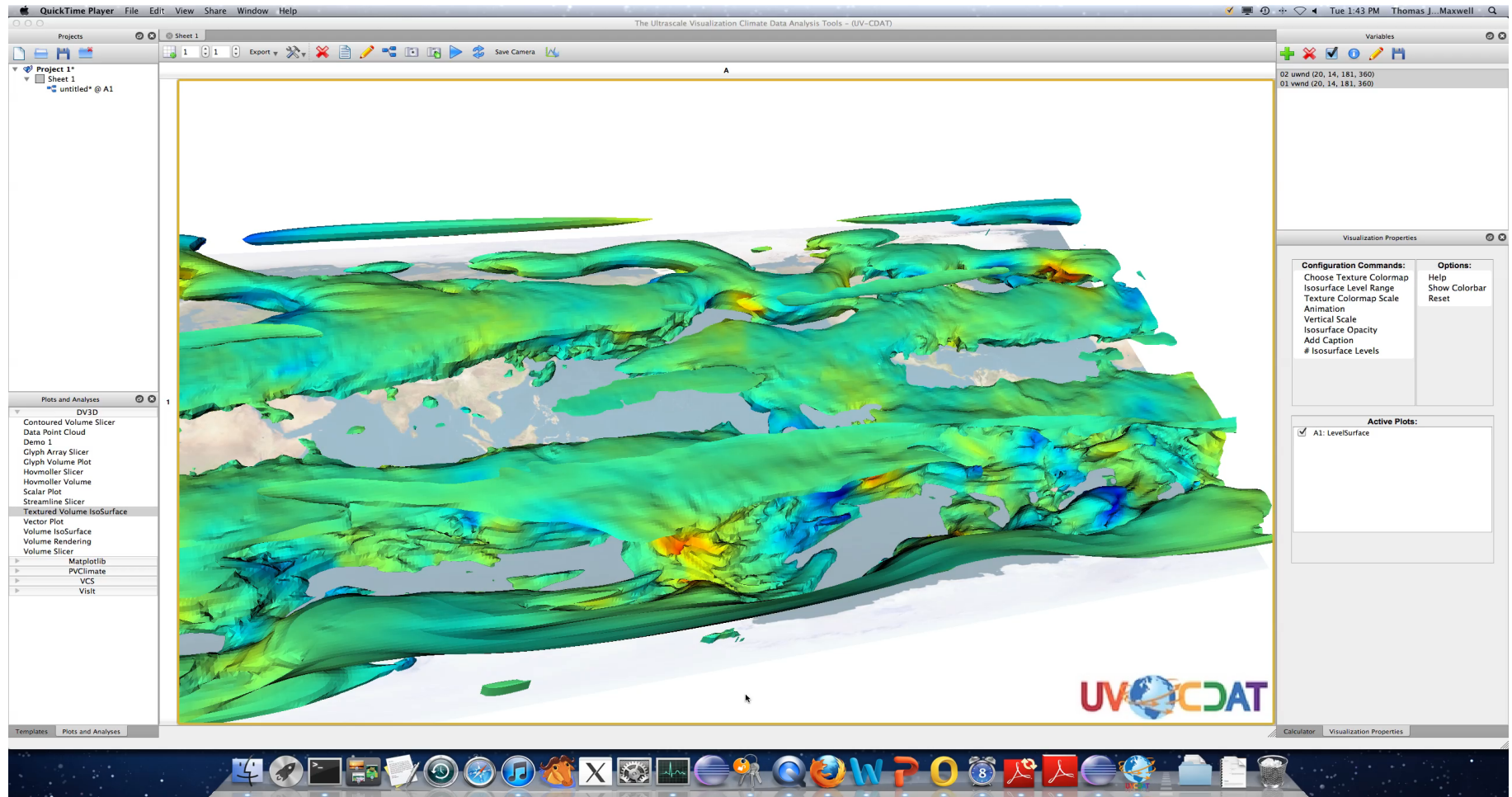
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Textured Isosurface Viewer

- Generates an isosurface for one variable with texture computed from a second variable.
- Easily compare 3D variables.



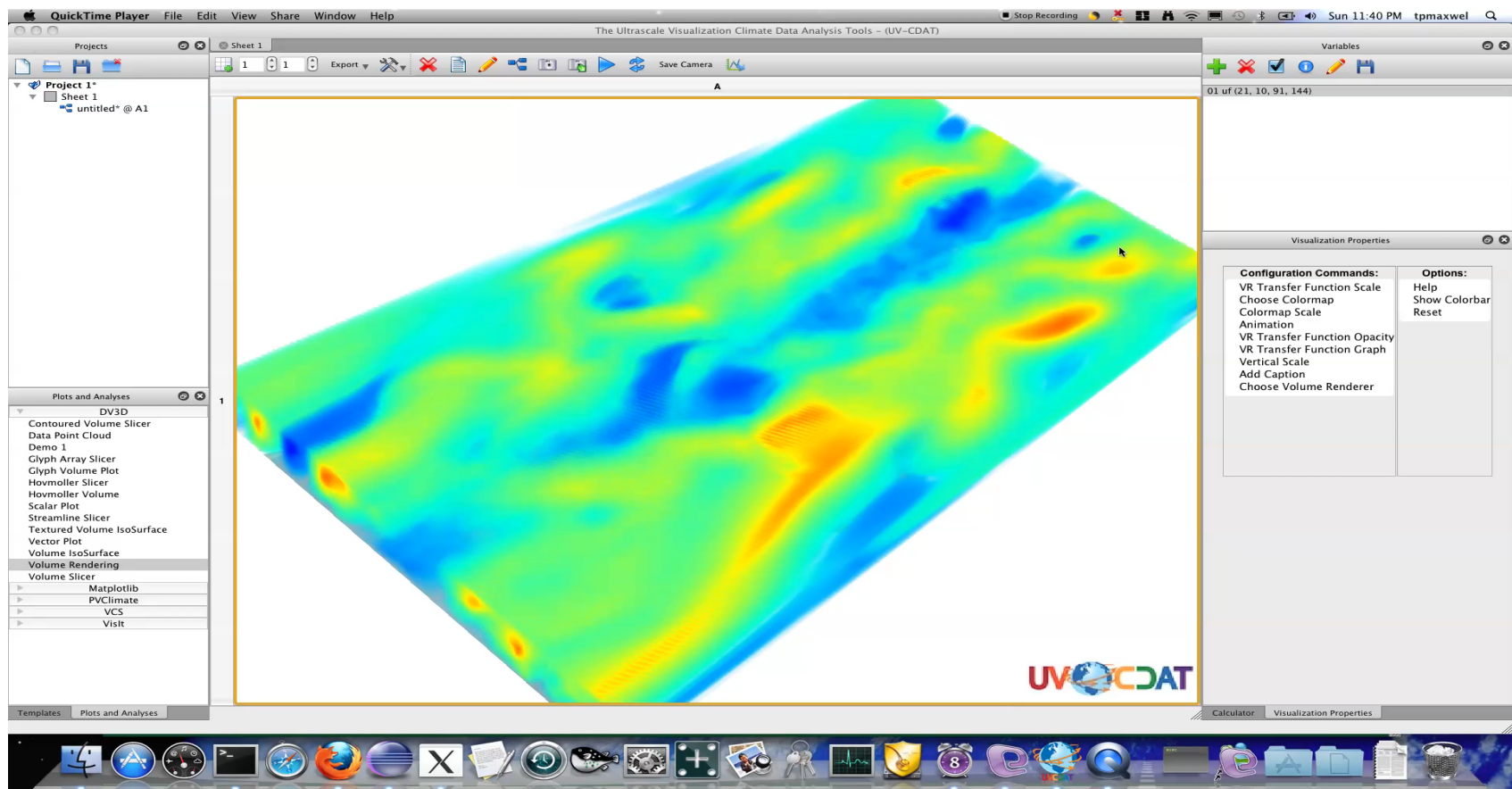
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Volume Render Viewer

- Maps variable values to color and opacity.
- User can easily modify transfer functions using mouse drags.
- Gives an overview of the 3D structure of data
- Traditional methods would require mental integration of many 2D images.



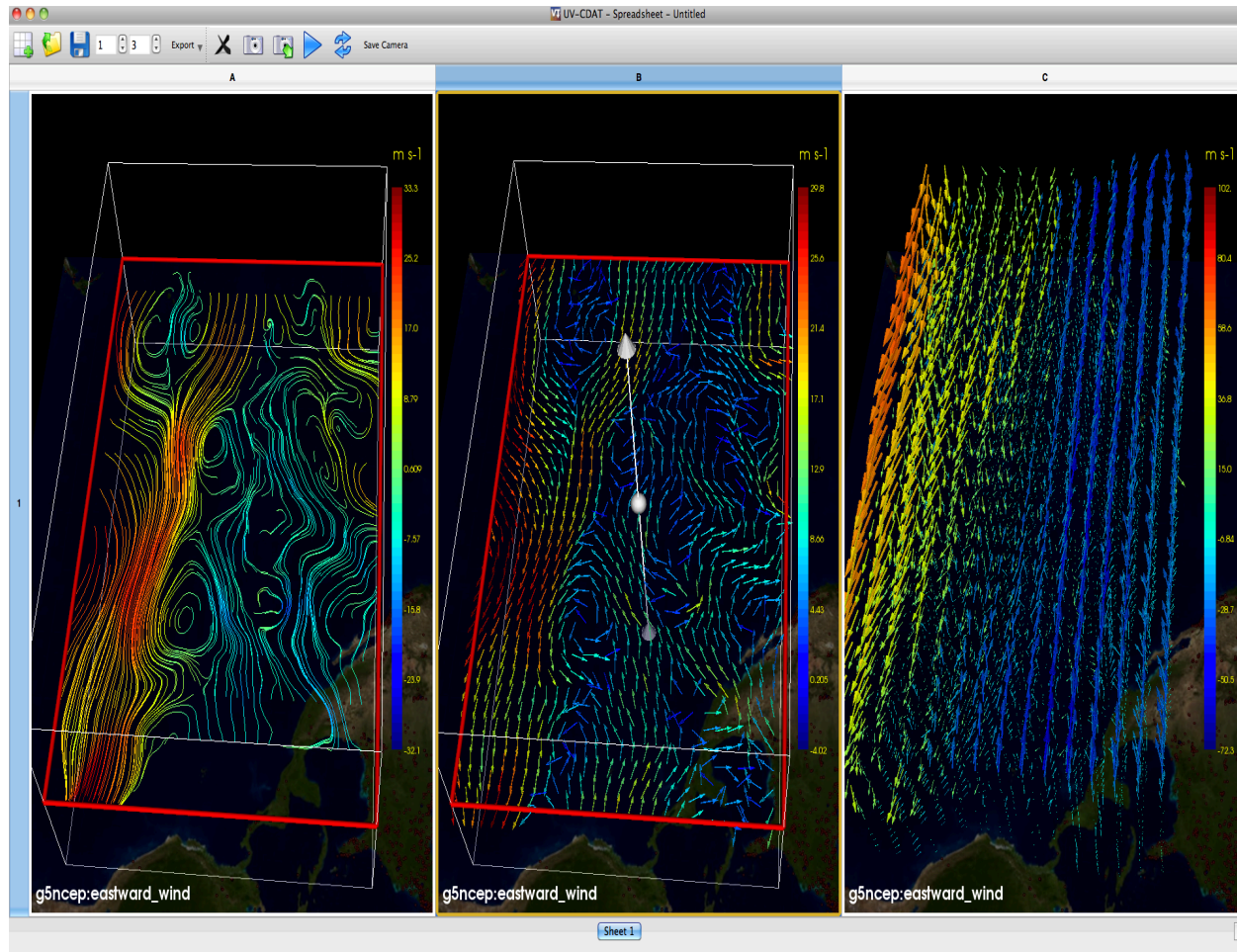
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Vector Plots

- Facilitates the visualization of 3D vector fields
- Utilizes streamlines on slices, glyphs on slices, or glyph volumes



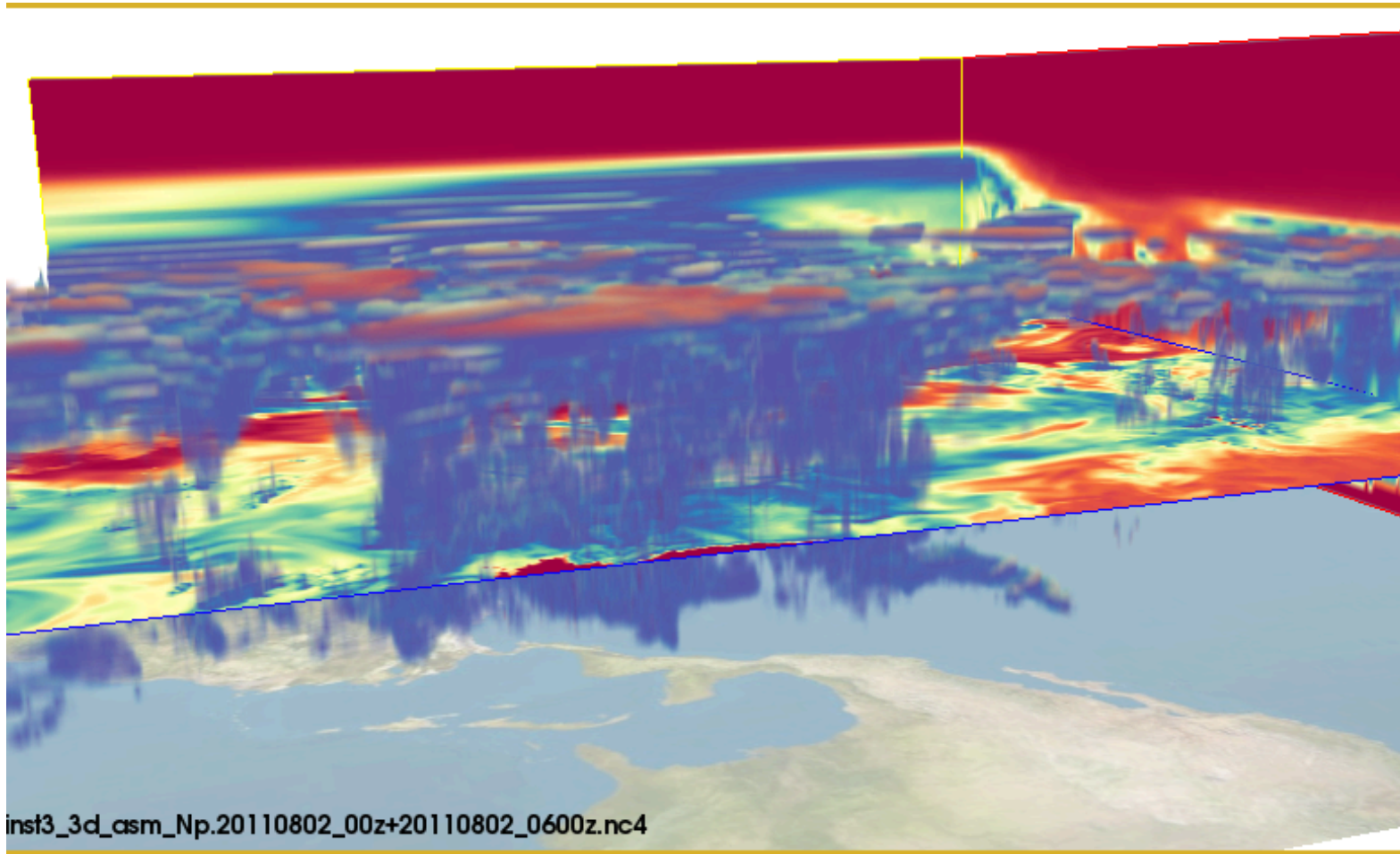
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Multiple Plots in a Single Cell

- DV3D plots can be overlaid for additional visualization possibilities
- This image shows an overlaid Volume Renderer and Volume Slicer



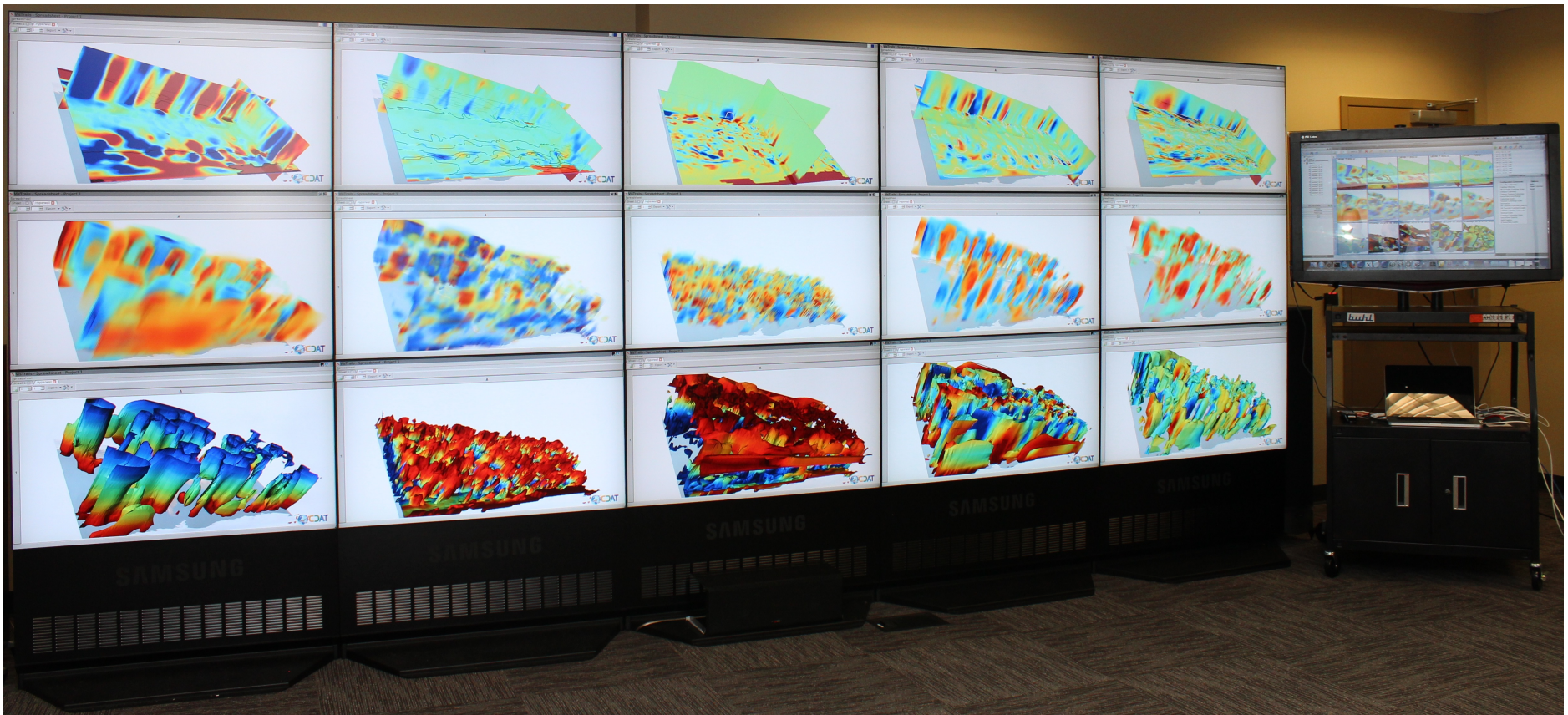
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Interactive Hyperwall Visualization

- Uses parallelism to address data complexity
- UVCDAT runs on each display node (full-res 1-cell hyperwall display)
- UVCDAT runs on control node (low-res 15-cell touchscreen display)
- Control node interactions broadcast to all hyperwall nodes



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Using UV-CDAT's 2D and 3D Capabilities to Explore Explore Time Series Data

- Demo using DV3D to examine 2-meter temperature from MERRA reanalysis
 - Use of a “3D Hovmöller” to explore anomalies
 - Basic attribution of extreme heat waves
 - Use of 250 mb meridional wind anomaly to identify stationary Rossby Waves
 - Identification of possible new planetary wave
- Demo of 3D slicer to examine Hurricane Sandy (October 2012)

