**JP3.49**

Interactive 4D Visualization and Analysis

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Decision Makers, Researchers, and Operational Centers are being provided exponentially increasing information. Growth in sensor data is rapidly increasing with new instruments. However the impact is even greater because of growth in analysis, reanalysis and model data which is increasing even more rapidly. There are not enough experts in one place to be able to examine, understand, and take responsible action on such a large amount of data and analysis with scope ranging from global to regional to local in actions and impacts. Long distance or distributed collaborations are being recognized as the future of all major research and analysis functions for the earth sciences. Raytheon and JPL scientists and engineers collaborated on a project that has developed new integrated visualization and data analysis capabilities to display environmental & weather data across a distributed system. JPL supplied hurricane data (Hurricane Helene a category 3 hurricane during the 2006 season) from both observations (GHRSST, QuickScat, TRMM) and model (Weather Research and Forecasting – WRF) in HDF5 data format. Raytheon supplied Vis and DIAG (Data, Instrument, and Analysis GUI) and Hurricane Katrina PNG data. 3D visualization of rainfall, vector winds, sea surface temperature, multi-spectral visible/IR images, and earth topography/bathymetry are simultaneously visualized in Vis. Vis allows gaming type control of pan, zoom, rotate functions to view data, and advanced controls such as toggling between data sets, opacity selection of data sets and discrete timestepping. It also allows continuously variable time rates. DIAG provides capability to create plots and graphs such as histograms, footprint locations of observations, difference plots of model vs. observed data and allows for interactive selection of parameters while running. DIAG and Vis are synchronized so that DIAG plots update with changing data being visualized by Vis. This presentation will demonstrate the results of the Raytheon/JPL collaboration.
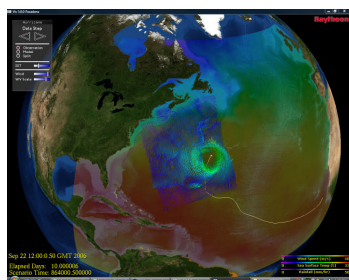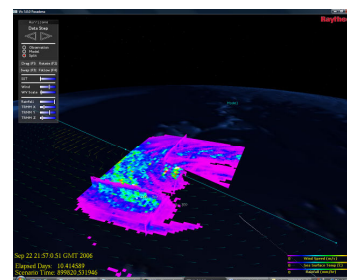

SST and QuickSCAT data, the Data Step Arrows, and SST, Wind and Wind Vector (WV) Scale sliders controlling opacity.
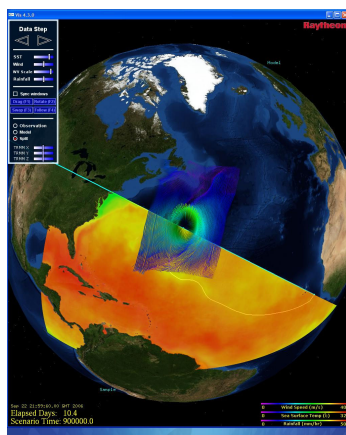

Zoom of the split function
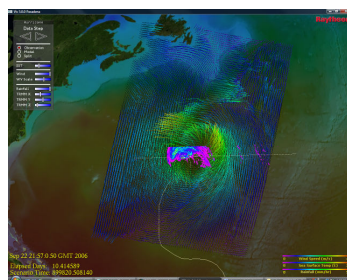
Hurricane Visualization of the SST, QuickSCAT wind data, and Tropical Rainfall TRMM data with the dynamic GUI Interface displaying additional controls for the Rainfall data.


Hurricane Visualization of the 3D Tropical Rainfall TRMM Split between the Observation and Model data (notice the Split red active radio button on the GUI interface). Rotate interface was used to sweep between Observation and Model.
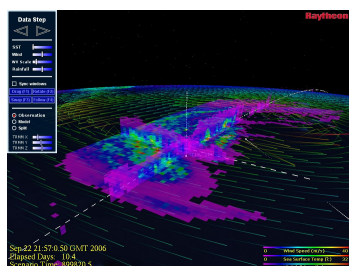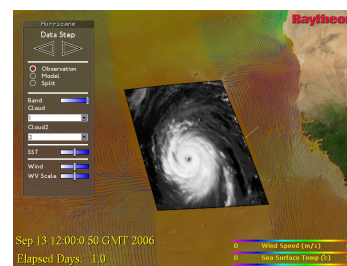

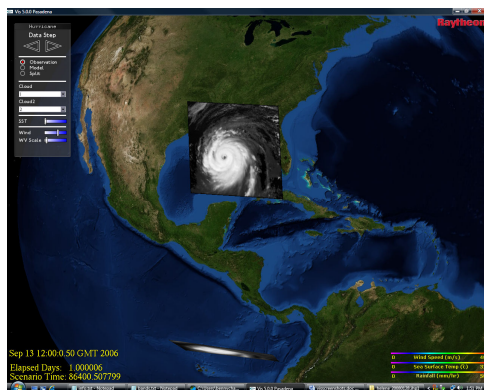Visualization of Hurricane Helene showing 3D TRMM rainfall data.
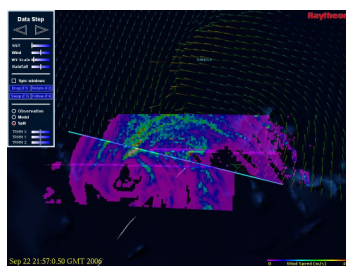
Visualization of Hurricane Helene showing 3D rainfall data (top) vs. modeled data (bottom) with the interactive slider.
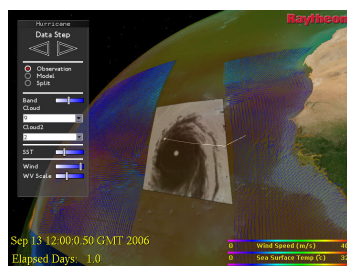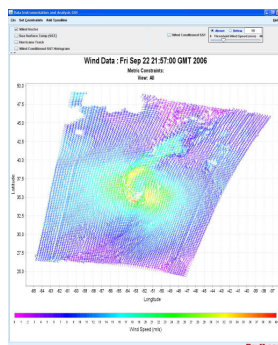

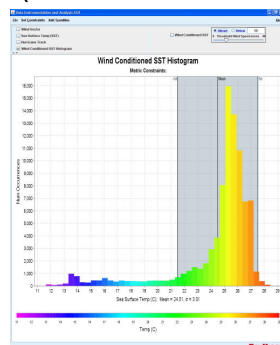RIMS-C PNG file of Hurricane Katrina overlaid with Hurricane Helene SST and QuickSCAT wind data.

DIAG (Data Instrumentation and Analysis GUI) plots
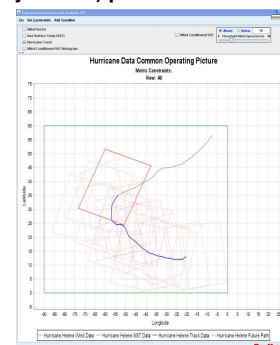

RIMS-C PNG image for Cloud Band 1 for Katrina

Wind vectors for Helene

Histogram of SST correlated with wind velocity

Operational plot showing footprints of SST, wind vector observations and hurricane path