

X-Core

Visualization of marine geology and geophysics data sets

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Abstract

For many years, earth scientist have been shown GIS as a tool for visualization what breaks data into a layer cake of data layers. Most visualization systems make handling these layers a cumbersome process. I have designed a software package known as X-Core that simplifies the process of building and visualizing 3D models of gravity, magnetics, topography, and drill core data. This system is in active use at the Scripps Institution of Oceanography and had recently been used on a research cruise from New Zealand to Antarctica. The system is designed to be lightweight and as such works well on a wide variety of systems from laptops to the SIO Onyx3 based VizCenter (Kent et al., 2002).

Exposition

The system is based around a suite of more than 30 small programs that convert all of the common data formats found on research ships into ASCII Open Inventor/VRML. X-Core makes two critical changes to the Open Inventor (Werneck, 1994) ivview program provide the 3D renderer known as xcore-ivview. The first is to allow touch sensors based on creating a new URL called "switch." The SoWWWAnchor with this URL allows the user to turn off data layers within a 3D model by clicking on a button within the 3D World. When picked, the SoWWWAnchor node controls a SoSwitch node located below that toggles between sub-scene graphs. If there are two sub-scene graphs, one empty and one with a visualization of some data, this functions as an on/off switch. The second change to the ivview is to add a "shell:" URL SoWWWAnchor. With this change, scene graphs can contain objects that, when clicked, will run an arbitrary shell command.

X-Core takes advantage of the shell URL to create a hyperlinked world for the scientist to explore. The scientist is first presented with a 3D model of the world with markers for each field site in the database (Figure 1). When she clicks on one of the markers, the shell URL is used to invoke another xcore-ivview program with the model representing that field area. For example, clicking on the northern coast of California brings up a model of Humboldt, CA and the near-shore bathymetry (Figure 2). From there the user can click on particular sediment cores collected in the area and drill down to the level of the data that she would like to view (Figure 3). In this case, the user has access to individual microscope photos and magnetics data from 2 cm sediment cubes.

Combining the X-Core tools with realtime display and analysis capabilities of the Viz system developed at NASA Ames (Nguyen et al., 2001) will allow scientists easy and intuitive access to ship-board data in a way never before accomplished.

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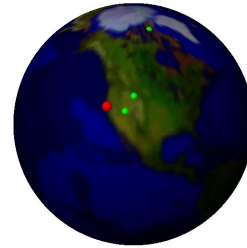


Figure 1. The world as the top level of the database.

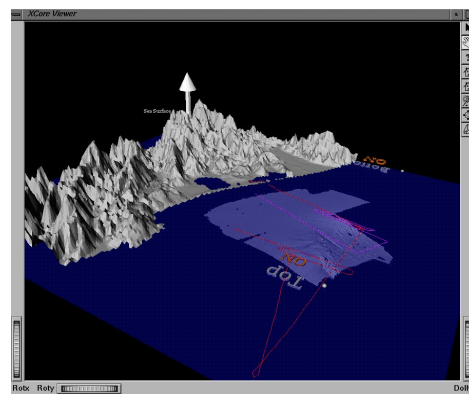


Figure 2. USGS DEM and marine sonar data of Humboldt, CA with alpha blended ocean surface.

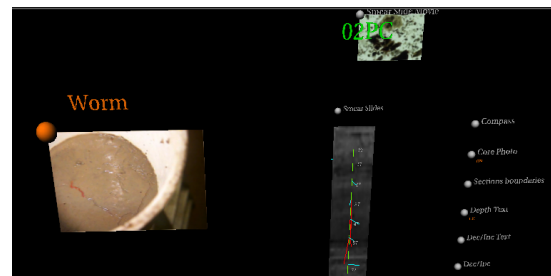


Figure 3. Closeup of sediment core with microscope picture on the top and data selection switched on the right.

References

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