

# *Challenges in Environmental Scientific Visualization*

**Mike Bailey, SDSC**

**Scalable Information Networks for the Environment**

**October 30, 2001**



University of California, San Diego

SAN DIEGO SUPERCOMPUTER CENTER

**SDSC**

## **Visualization is a Bag of Tricks**

*It all depends on:*

- Why you are doing this visualization (finding patterns vs. showing patterns)
- What you want to show
- Who you want to show it to
- How many people at a time you want to show it to
- The background of the people you want to show it to
- Where you want to show it



University of California, San Diego

SAN DIEGO SUPERCOMPUTER CENTER

**SDSC**

# Visualization is a Bag of Tricks

*Here are some of the items in the SDSC bag:*

1. Terrain visualization using single-image stereovision
2. Internet-savvy environmental fly-through and monitoring
3. Visualization physical models
4. Interacting with Direct Volume Rendering
5. Augmented Reality
6. Haptic Interfaces

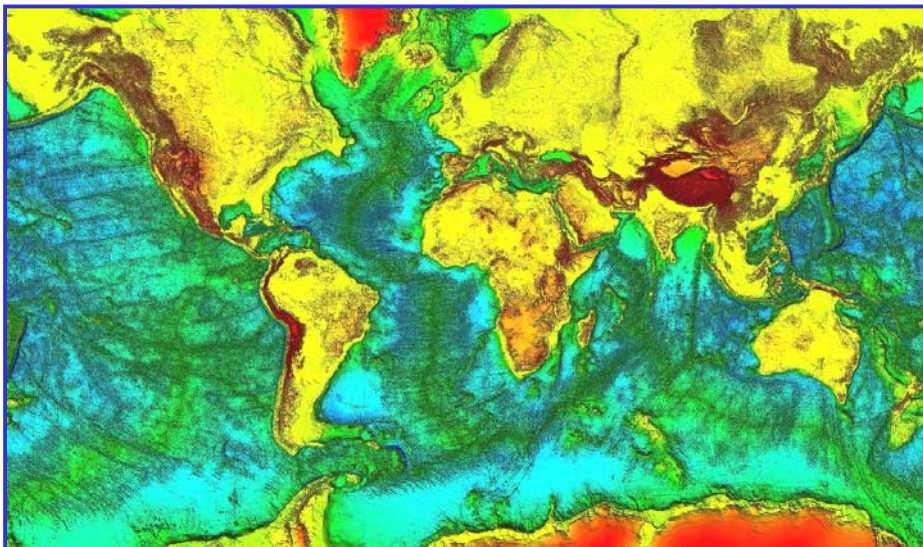


University of California, San Diego

SAN DIEGO SUPERCOMPUTER CENTER

**SDSC**

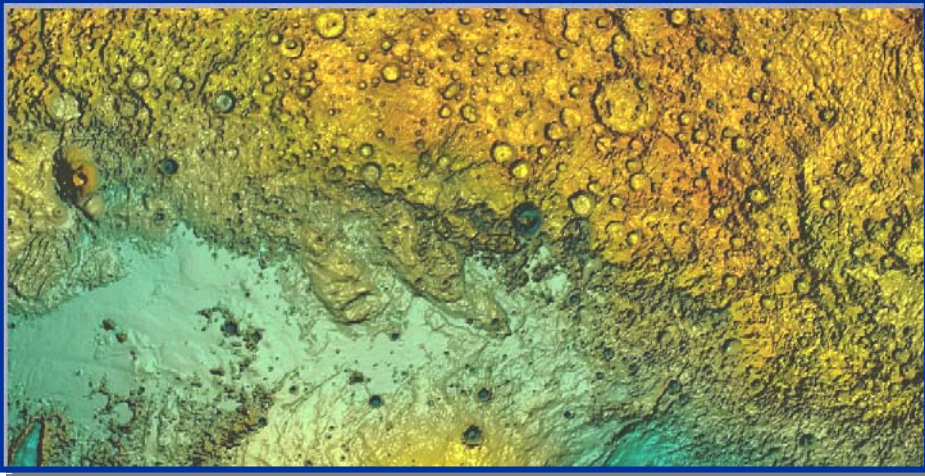
## 1. Terrain visualization using single-image stereovision



UCSD

SAN DIEGO SUPERCOMPUTER CENTER

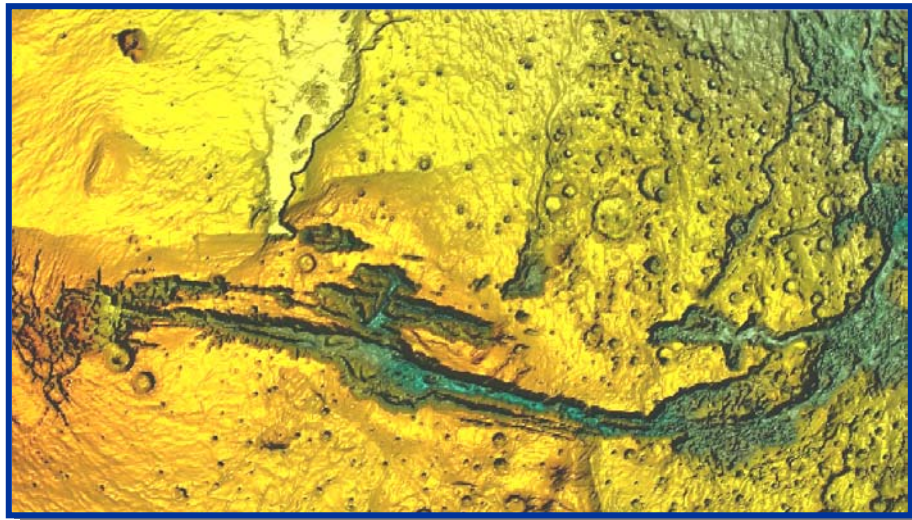
**SDSC**



University of California, San Diego

SAN DIEGO SUPERCOMPUTER CENTER

**SDSC**

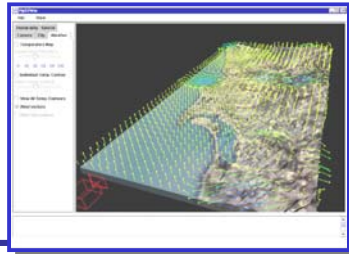
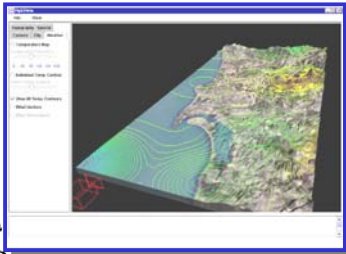
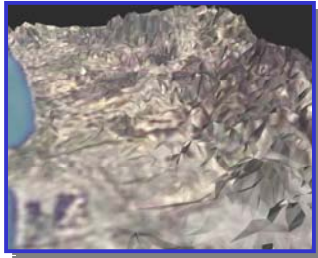


University of California, San Diego

SAN DIEGO SUPERCOMPUTER CENTER

**SDSC**

## 2. Internet-savvy environmental fly-through and monitoring



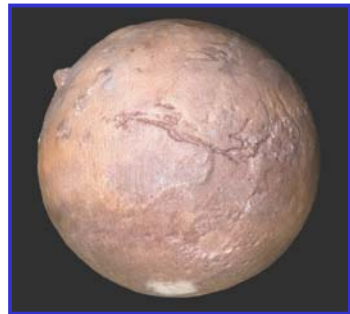
SAN DIEGO SUPERCOMPUTER CENTER



## 3. Visualization Physical Models



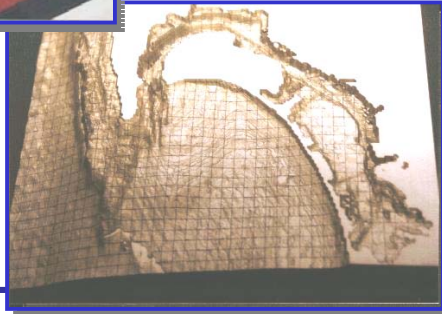
SDSC's visualization prototype tools have been released to the web. These tools build model files from raw data, preview them, and fix flaws. They run on UNIX, PCs, and Macs.



University of California, San Diego

SAN DIEGO SUPERCOMPUTER CENTER





University of California, San Diego



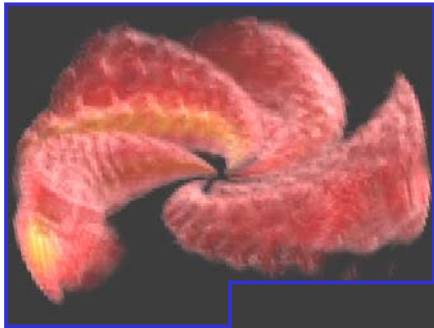
UCSD

San Diego

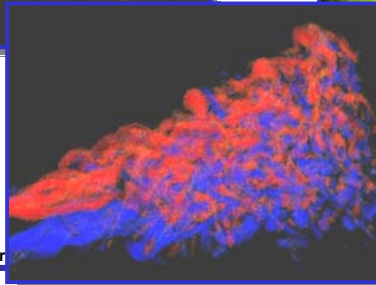
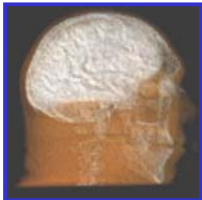
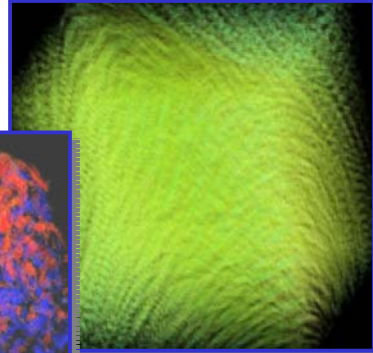
SAN DIEGO SUPERCOMPUTER CENTER

SDSC

## 4. Interacting with Direct Volume Rendering



SDSC vx software has been released to the web. It uses the Mitsubishi Volume Pro 500 (and soon the 1000) Volume Rendering Accelerator.

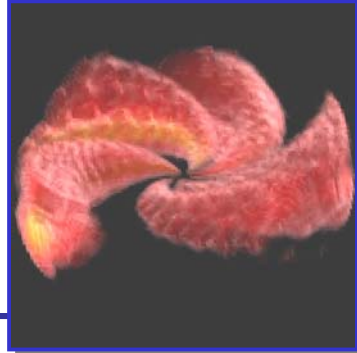
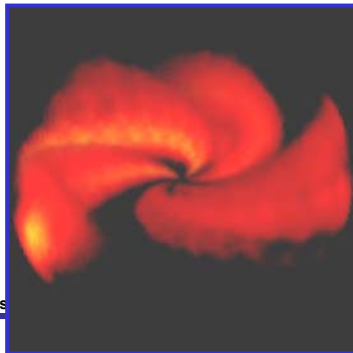
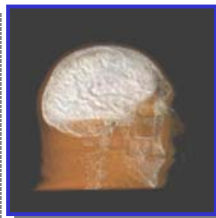


UCSD

PERCOMPUTER CENTER

SDSC

## Lighting in Direct Volume Renderings



UCSD

Univers

C

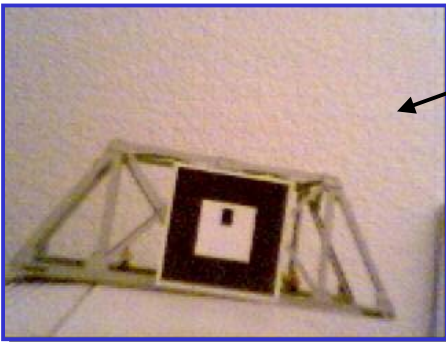
## 5. Augmented Reality



Sony i-phone +  
Ascension 3D tracker +  
video camera

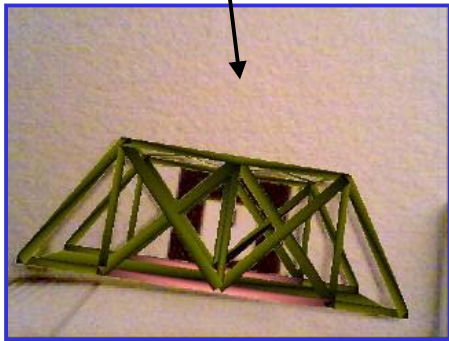


SAN DIEGO SUPERCOMPUTER CENTER



Bridge before AR turned on

Bridge after AR turned on to  
show stress distribution

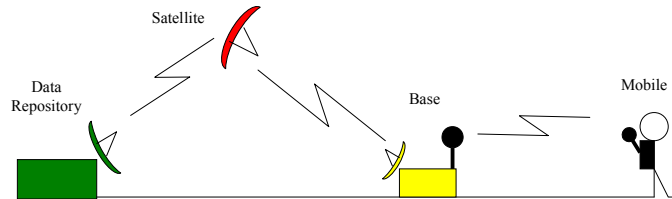


University of California, San Diego

SAN DIEGO SUPERCOMPUTER CENTER



## Augmented Reality in the Field (ARF): Hierarchical and Adaptive Wireless Communications



University of California, San Diego

SAN DIEGO SUPERCOMPUTER CENTER

**SDSC**

## ARF: Structural Integrity



University of California, San Diego

**SC**



## ARF: Ecology of Land Management

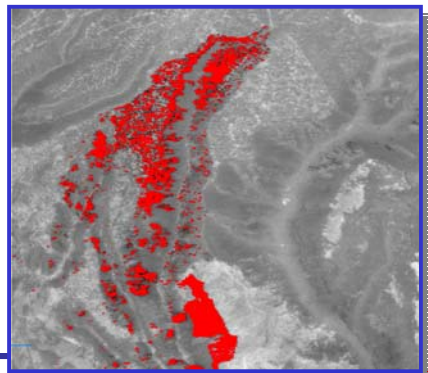
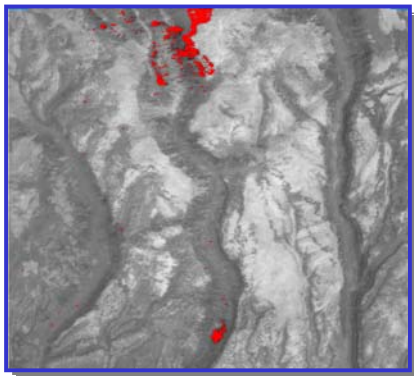


University of California, San Diego

SAN DIEGO SUPERCOMPUTER CENTER

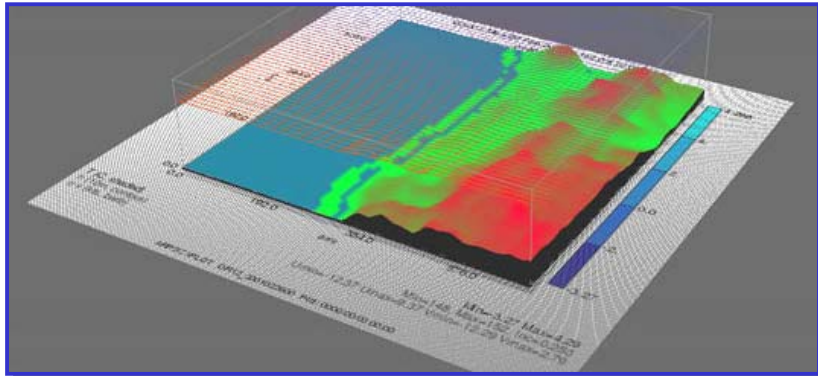
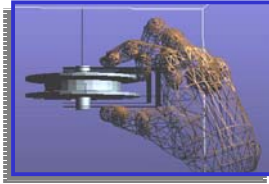
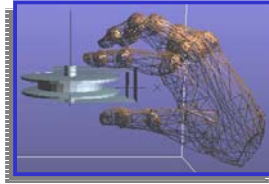
**SDSC**

## ARF: Wildfire-scale Firefighting



University of California, San Diego

## 6. Haptic Interfaces



# *Challenges in Environmental Scientific Visualization*

**Mike Bailey, SDSC**

**Scalable Information Networks for the Environment**

**October 30, 2001**



University of California, San Diego

SAN DIEGO SUPERCOMPUTER CENTER

**SDSC**

**And, one other great discovery ...**



University of California, San Diego

SAN DIEGO SUPERCOMPUTER CENTER

**SDSC**