

Sponsor HPCC Annual Proposal Process

High Performance Computing and Communication Annual Proposal Process

- Holds Internal competition
 - Identifies opportunities for advanced technology exploitation and infusion
 - By refreshing the pool of projects each year, HPCC encourages NOAA units to explore and adopt advanced technologies quickly
- Project Characteristics:
 - Projects that entail some level of high risk
 - are the most important for they show us what is possible
 - if they fail, keep NOAA from undertaking a large project with doomed technology
 - Projects that involve a transfer of IT R&D into operations
 - Some are relatively mature and ready for transfer to operational elements
 - Others are at the leading edge of technology and entail high risk



<http://www.pmel.noaa.gov/cnsd/hpcc-nwg/>

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High Performance Computing and Communication Annual Proposal Process

- Proposals are solicited, reviewed and evaluated by the HPCC Network Working Group
- Top rated proposals are considered for funding by HPCC management
- Mid-year status reviews are held
- Proposal Themes:
 1. Remote Usage of NOAA High Performance Computing (HPC)
 2. Advanced Networking Technologies
 3. Technologies for Modeling, Analysis, or Visualization
 4. Disaster Planning, Mitigation, Response and Recovery
 5. HPCC Technology Transfer



HPCC Projects

- [Live Access server](#)
- [GeoModeler](#)
- [GeoModeler WebSIFT](#)
- [ShipTracker](#)
- [Moving Real time WSR-88D Radar Data](#)
- [Digital Network](#)
- [IPv6](#)
- [Next Generation Internet](#)
- [Networking](#)
- [WAN/LAN IP Load Balancing and Web Mirroring](#)



HPCC Funded Projects

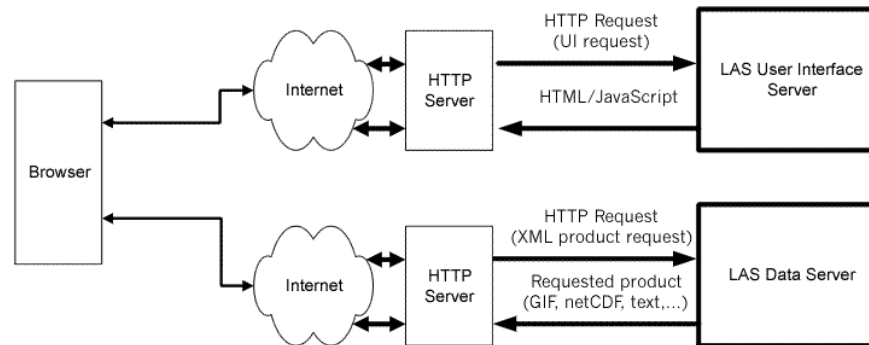
Live Access Server (LAS)

Before HPCC Funding:

- No common approach to discovering and subsetting gridded data

As a Result of HPCC Funding:

- The LiveAccess Server (LAS) is a robust, extensible, collaborative data server for use by providers of gridded data in a variety of disciplines
- In 2000 a proposal was funded to transfer LAS into operations
 - NOAA has benefited from increased access to data and the ability to compare data from remote sites (*Name some users*)
 - The public, particularly the broad research community, has immediate access to an increasing library of data as more servers come on line and interactions between the servers multiply (*what are the interactions between the servers?*)



HPCC Funded Projects

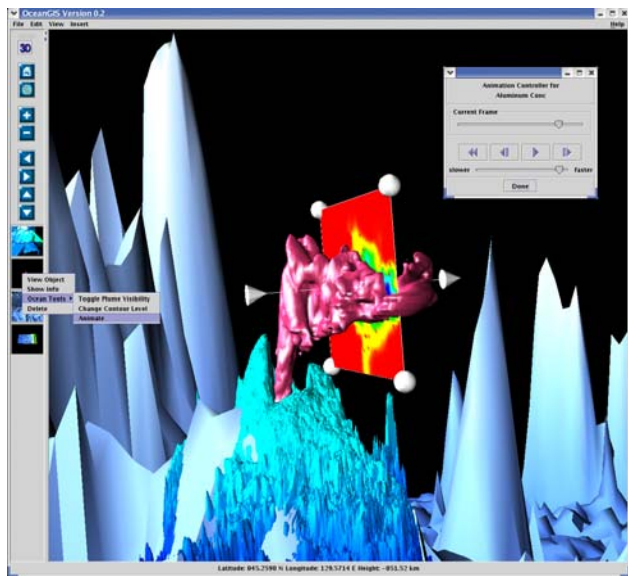
GeoModeler – Direct linking of GIS and scientific models

Before HPCC Funding:

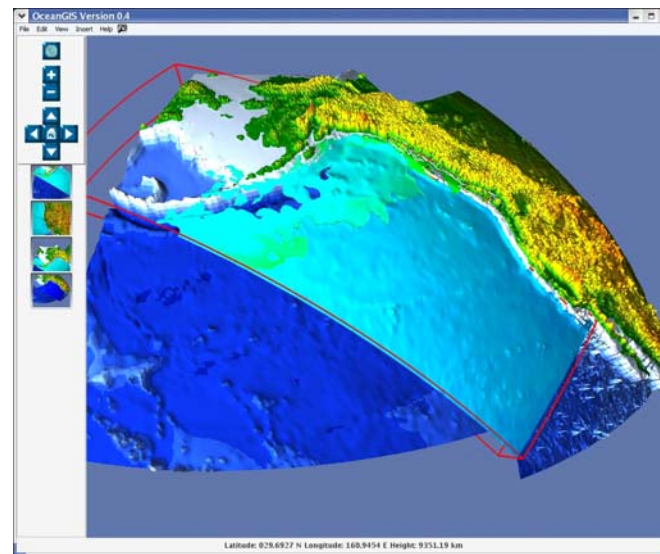
Prior to GeoModeler, a user would use a text editor to create a file of input parameters for the model, run the model and then receive model output. The output is voluminous, detailed, complicated and multi-dimensional. Visualizing and analyzing the data required reformatting them, using a tool such as MATLAB to create two-dimensional slices through the data, and writing code to analyze the results.

As a Result of HPCC Funding:

Now have a prototype which allows the user to set up the model parameters using a graphical user interface (GUI), hands the parameters off to a back-end compute resource to run the models, and then uses a GIS interface to visualize the results in three-dimensions. GeoModeler has been used for circulation models such as the ROMS model output (OAR/PMEL) and particle tracking models for larval fish in the Bering Sea (NMFS/AFSC FOCI program). The GeoModeler interface is being used for a decision support tool developed for the Tsunami program (OAR/PMEL). Future applications may include individual based modeling of fishing boats (NMFS/SEFSC) and integration with the Chesapeake Bay Oyster Larvae Tracker (CBOLT - (http://ekman.csc.noaa.gov/CBOLT_Input/index.htm) program).



Visualization of a hydrothermal vent plume



ROMS model salinity output off the US West Coast⁵

HPCC Funded Projects

ShipTracker – Near real time display of data from NOAA research vessels

Before HPCC Funding:

Prior to this there was no transmission of this data from the ships. The data were gathered by the shipboard computer system (SCS) and brought to shore on tape or CD at the end of the cruise.

As a Result of HPCC Funding:

Improvements based upon HPCC funding were the communications links and the development of a web mapping application. The combination of these tools allowed for prototyping sending and receiving email on the ships; a shore 'presence' while the ships are at sea making their work visible and available to the public and the friends and family of those on the ships; and a test of the transmission of data in near real time for a variety of scientific uses. OMAO has integrated ShipTracker in its operational activities.

NOAA SHIP TRACKER

Show All Ships
Google Maps Version

DJ - David Starr Jordan

Pick a Timeframe
Current Cruise

Pick a Background
Default Image

Observation on:
January 22, 2007 at 13:16

Latitude	32.14
Longitude	-122.08
Speed	6.20 kts
Course	68.00
Wind Speed	15.08 kts
Wind Dir.	2.20 °
Surf. Water Temp.	13.05 °C
Surf. Water Sal.	33.44 PSU
Air Temperature	12.00 °C
Relative Humidity	89.40 %
Barometric Pres.	1023.64 mb
Water Depth	n/a
Cruise Start Date	1/12/2007

Current Ship Data

Longitude: -125.6643 Latitude: 35.0194

Map Information

Revised August 17, 2006 | Questions, Comments? [Contact Us](#) | [Report Errors on this Page](#) | [Site Information](#) | [Privacy Policy](#)
Marine Operations Center | National Oceanic and Atmospheric Administration, U.S. Department of Commerce
<http://shiptracker.noaa.gov/welcome.html>

HPCC Funded Projects

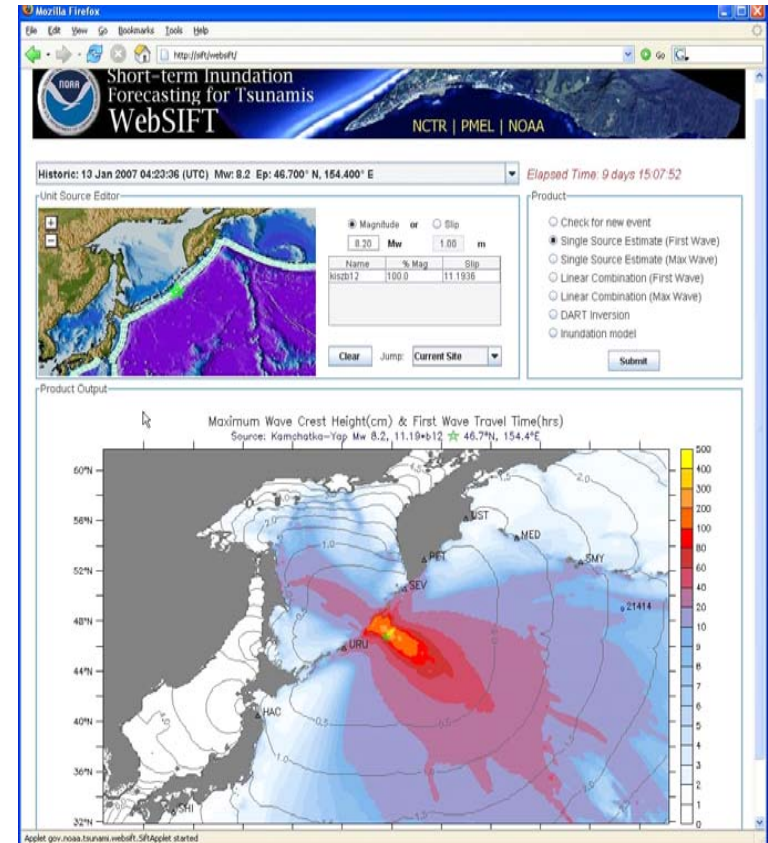
GeoModeler – WebSIFT framework for tsunami inundation forecasting modeling

Before HPCC Funding:

- The Live Access Server (LAS) architecture was used for the Facility for the Analysis and Comparison of Tsunami Simulations (FACTS)
- No ability to easily import LAS data into a GIS environment
- Emergency managers tend to be GIS users.

As a Result of HPCC Funding:

- WebSIFT extends the FACTS LAS server by using the GeoModeler framework (funded by HPCC FY 2005) to launch the standing inundation models that result from various earthquake events.
- The use of the GeoModeler framework allows the WebSIFT application to be based on the THREDDS catalog and the user interface to be tailored for event driven interactions. The framework of GeoModeler is currently being used for a community modeling interface with NOAA partners in Australia, Japan and Indonesia.



HPCC Funded Projects

A digital network for transmitting mobile mesoscale weather observations

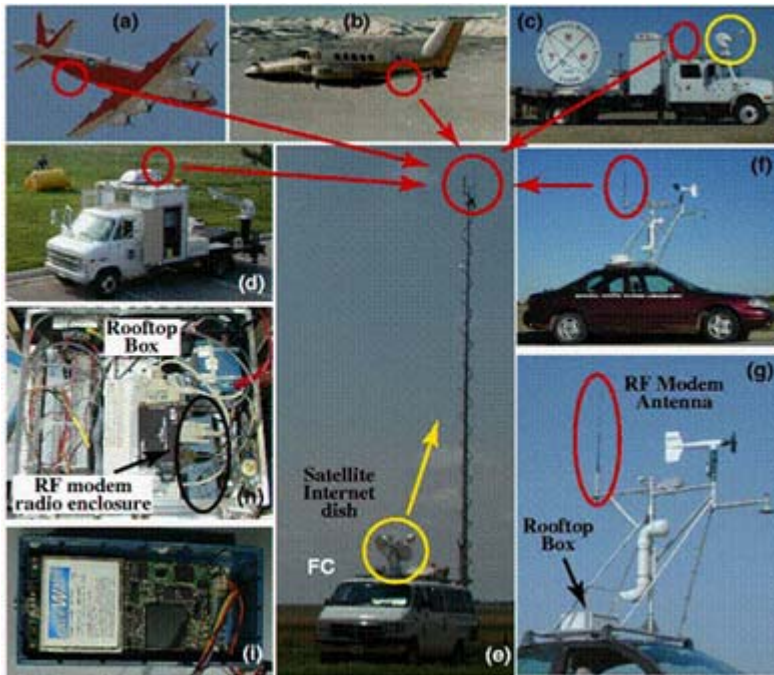
Before HPCC Funding:

Attempt to use other technologies that allowed mobile field units to communicate with a centralized Mobile Field Command and Control system were unreliable (e.g., cell phone technology) or require the mobile units to be stationary (e.g., broadband satellite technology). There was no real time component to data sharing via the Internet. Data were collected in the field, brought back to the laboratory, and transferred to laboratory computers for post analysis.

As a Result of HPCC Funding:

This project developed a wireless digital network for communication of mobile weather observations in mesoscale field experiments. The mobile digital network utilizes 900 MHz radio frequency modem technology, enabling real-time digital communications at up to 115 kilobit s⁻¹ across a domain of about 40 km on a side. After gathering data from mobile observing platforms at a centrally located mobile command post, both image products and data are then uplinked via geostationary satellite at about 80 kilobit s⁻¹ and served to the Internet. The first application of the mobile digital network was to mobile field observations obtained during the International H₂O Project (IHOP).

This technology could also prove useful if applied fixed-base in post-disaster recovery operations (e.g., after hurricane landfall) in which conventional land-based communications infrastructure has been eliminated.



Platforms and instrumentation of the mobile digital network (MDN) during IHOP. (a) NRL P-3; (b) University of Wyoming King Air; (c) SMART radar (SR-1); (d) mobile CLASS sounding vehicle; (e) field coordination (FC) vehicle; (f) mobile mesonet (MM). Panel (g): close-up view of rooftop instrument rack on MM, featuring RF modem antenna and rooftop box containing data processing hardware and RF modem. Panel (h): close-up view of interior of MM's rooftop box, featuring RF modem board-level radio enclosure. Panel (i): close-up view of interior of RF modem board-level radio enclosure as located in panel (h). Red arrows indicate direction of data transfer via the 900 MHz radio frequency modems, while red circles indicate the location of 900 MHz antennas. Yellow circles and arrow indicate a broadband geostationary satellite Internet dish system and uplink, respectively. The installation of a satellite Internet dish system to transmit SR-1 radar files to National Weather Service forecast offices, denoted in panel (c), is the most recent MDN upgrade. For 900 MHz transmission, ground vehicles employ either bracket- or puck-mounted whip antennas, while aircraft employ external blade antennas.



HPCC Funded Projects

IPv6

As a Result of HPCC Funding:

- NOAA was able to acquire a block of IPv6 addresses
- Eight NOAA sites installed state-of-the-art routing hardware compatible with IPv6
- Provided the impetus for building a consistent routing infrastructure for NOAA
- Facilitated the implementation of cooperative NOAA wide advanced network applications such as private IP VPNs and reliable multicast service
- Provided the catalyst for network engineers from each of the eight NOAA sites to develop a coherent strategy for the implementation of IPv6
- Provided NOAA with the facility to utilize a reliable multicast network application for such things as redistribution of real-time radar data and the dissemination of large-scale weather models



HPCC Funded Projects

Implementing NGI Connections

As a Result of HPCC Funding:

- Obtained corporate memberships for NOAA with UCAID and Abilene
- Funded infrastructure requirements to support I2 connectivity at:
 - Boulder
 - Norman
 - NOAA Facilities in the Washington DC Metro area
 - Seattle

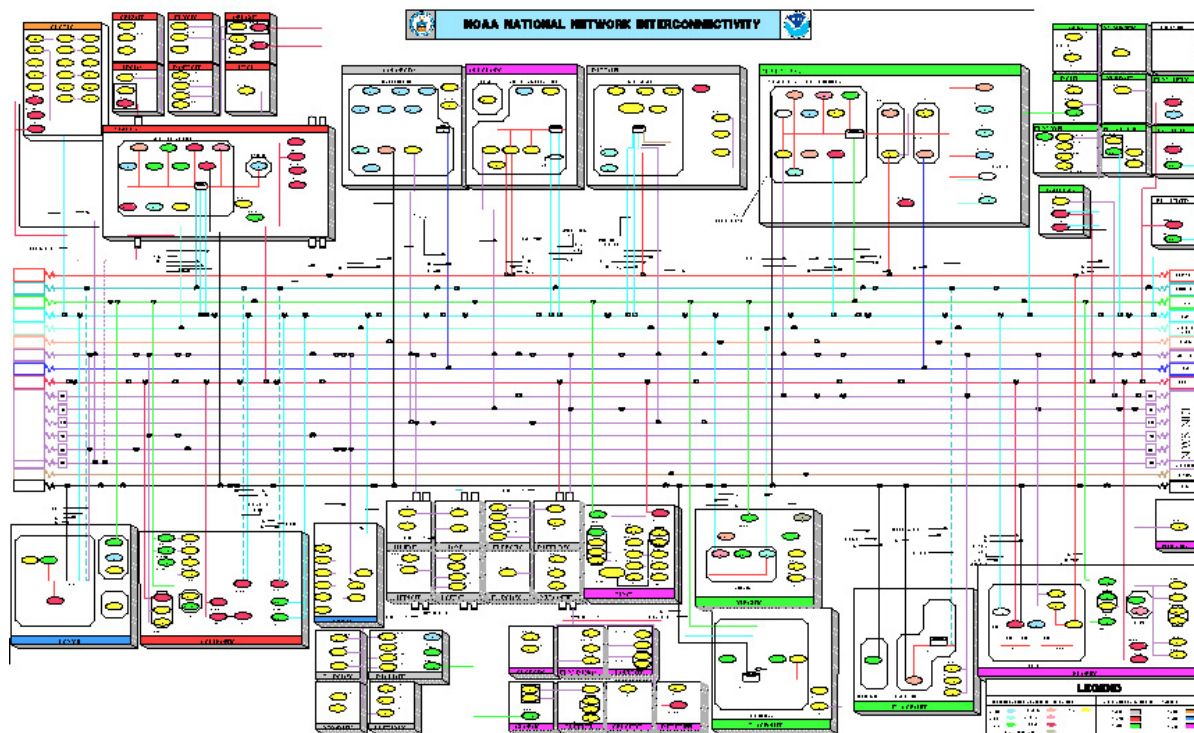
This has benefited multiple NOAA Line Office activities

HPCC Funded Projects

Networking

Before HPCC Funding:

- LO approach to networking
- No integrated or comprehensive view of NOAA networks or points of presence



As a Result of HPCC Funding:

Over the years HPCC has funded many networking related projects:

- Above is a diagram that was created several years ago to identify all of NOAA's WAN connections
- Identify many opportunities for consolidating and sharing network connections
- Led to NOAAnet concept

HPCC Funded Projects

WAN/LAN IP Load Balancing and Web Mirroring

Before HPCC Funding:

- National Hurricane Center issued hurricane warnings was via a single webserver connected to a T-1 communications line to the Washington DC Metropolitan network.
- During hurricane events these resources became quickly saturated.

As a Result of HPCC Funding:

A two pronged approach was implemented in 1999 to alleviate this problem.

- WAN load balancing devices were installed in NOAA facilities in Suitland, MD and Boulder, CO providing redundancy and failover
- NHC website was mirrored across NOAA web servers in Seattle, Boulder, Norman, and Silver Spring
- It is still in operational use today and has undergone significant technology upgrades.
- Weather service has adopted this approach for all critical weather events

The graphic to the right shows that 12.46 TB of data were provided from Feb 2006 – Jan 2007

