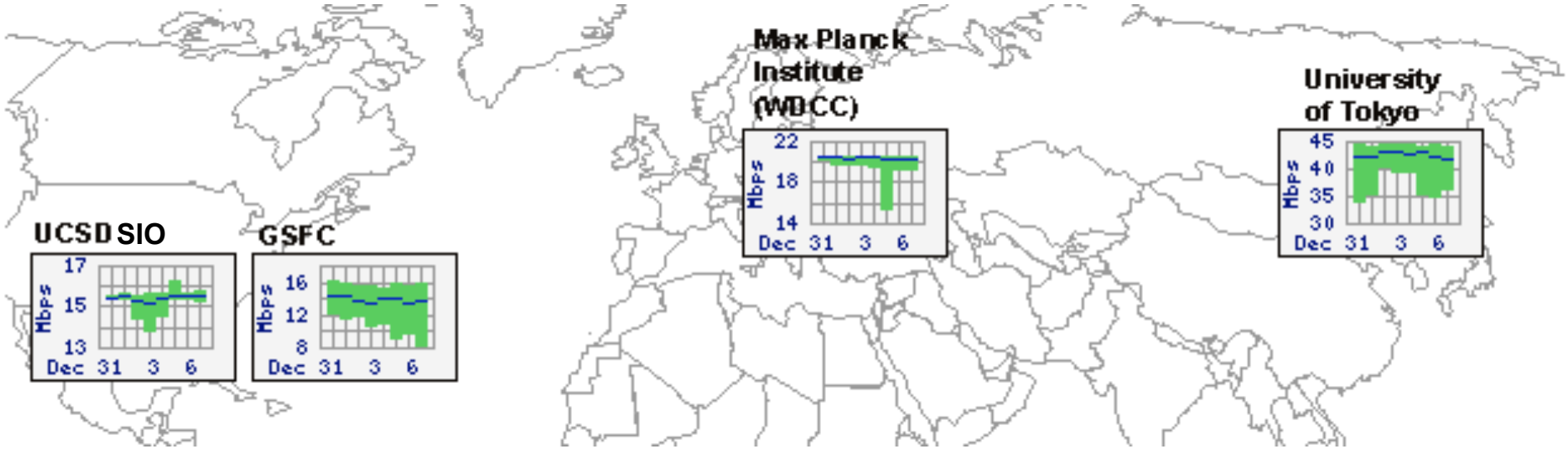
Next Step: OptIPuter, NLR, and Starlight Enabling Coordinated Earth Observing Program (CEOP)

Source: Milt Halem, NASA GSFC

Accessing 300TB's of Observational Data in Tokyo and 100TB's of Model Assimilation Data in MPI in Hamburg -- Analyzing Remote Data Using GRaD-DODS at These Sites Using OptIPuter Technology Over the NLR and Starlight



Note Current Throughput 15-45 Mbps: OptIPuter 2005 Goal is ~10 Gbps!

OptIPuter

http://ensight.eos.nasa.gov/Organizations/ceop/index.shtm

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OptIPuter and NLR will Enable Daily Land Information System Assimilations

- The Challenge:
  - More Than Dozen Parameters at ~ 50 GB per Parameter , Produced Six Times A Day, Need to be Analyzed
- The LambdaGrid Solution:
  - Sending this Amount of Data to NASA Goddard from Project Columbia at NASA Ames for Human Analysis Would Require < 15 Minutes/Day Over NLR
- The Science Result:
  - Making Feasible Running This Land Assimilation System Remotely in Real Time

OptIPuter

Source: Milt Halem, NASA GSFC

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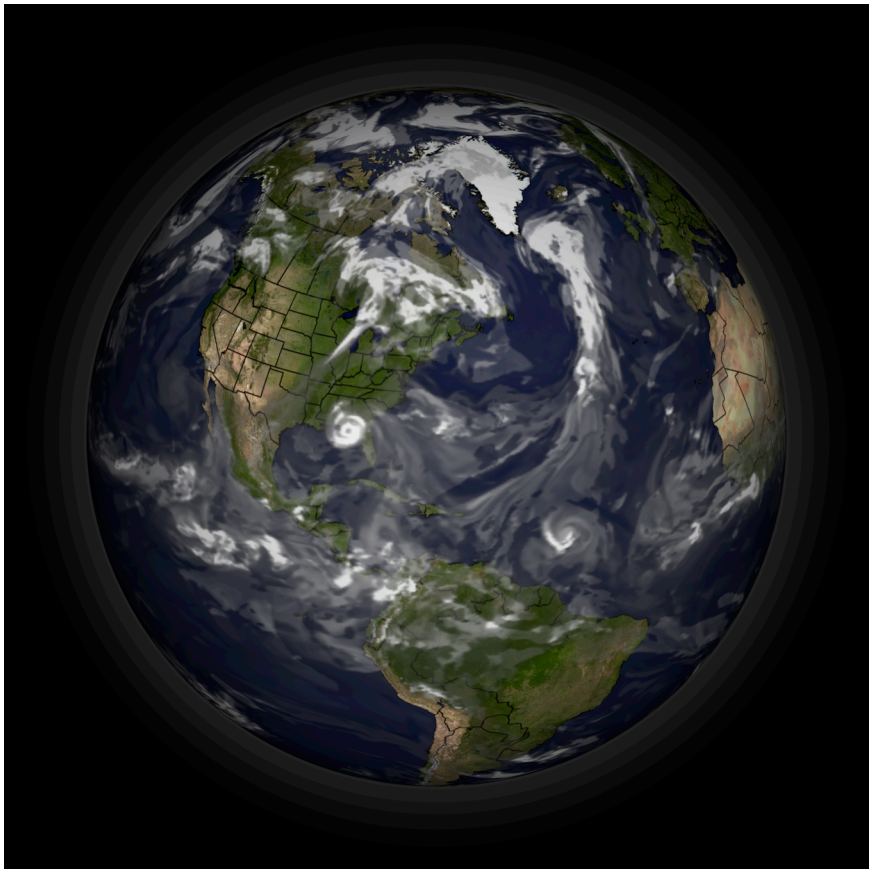
NLR/GSFC Applications: Hurricane Prediction

- The NASA Finite-Volume General Circulation Model (fvGCM) has been producing real-time, high-resolution (~25 km) weather forecasts focused on improving hurricane track and intensity forecasts.
- During the active 2004 Atlantic hurricane season, the fvGCM provided landfall forecasts with an accuracy of ~100 km up to 5 days in advance.
- The 50–100 Mbps throughput available between fvGCM users at GSFC and the Columbia supercomputer at ARC greatly hindered carrying out time-critical simulations of the hurricanes that devastated Florida.
- The 10 Gbps NLR access will enable remote, 3D visualization analysis as soon as forecast variables become available.
- Key Contacts: Ricky Rood, Bob Atlas, Horace Mitchell, GSFC; Chris Henze, ARC.

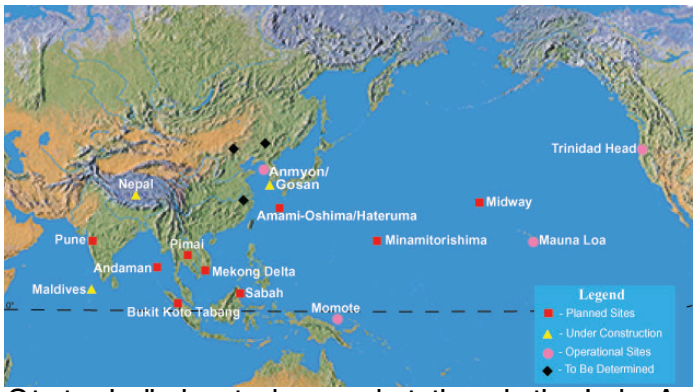


In an fvGCM forecast, Hurricane Frances makes landfall on the Gulf Coast of Florida while Hurricane Ivan intensifies in the tropical Atlantic. Visualization by J. Williams, GST.

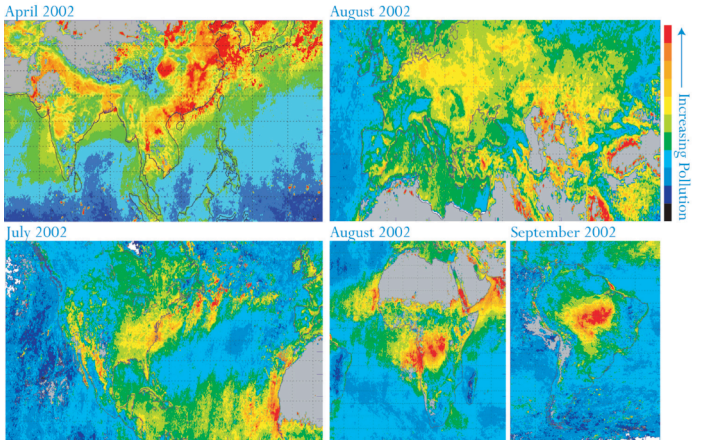
http://fvnwp.gsfc.nasa.gov

NLR/GSFC Applications: Global Aerosols

- Project Atmospheric Brown Clouds (ABC) is an international effort to discover and analyze areas of brown colored atmosphere to learn how dust and pollution particles are transported and what impacts they have on the environment, climate, agricultural cycles, and quality of life.
- GSFC and the Scripps Institution of Oceanography (SIO) are planning a collaboration to predict the flow of aerosols from Asia across the Pacific to the U.S. on timescales of days to a week.
- GSFC will provide an aerosol chemical tracer model (GOCAR) embedded in a high-resolution regional model (MM5) that can assimilate data from Indo-Asian and Pacific ground stations, satellites, and aircraft.
- Remote computing and analysis tools running over the NLR will enable acquisition and assimilation of the Project ABC data.
- Key Contacts: Yoram Kaufman, William Lau, GSFC; V. Ramanathan, Chul Chung, SIO



Strategically located ground stations in the Indo-Asian and Pacific regions monitor atmospheric pollution.

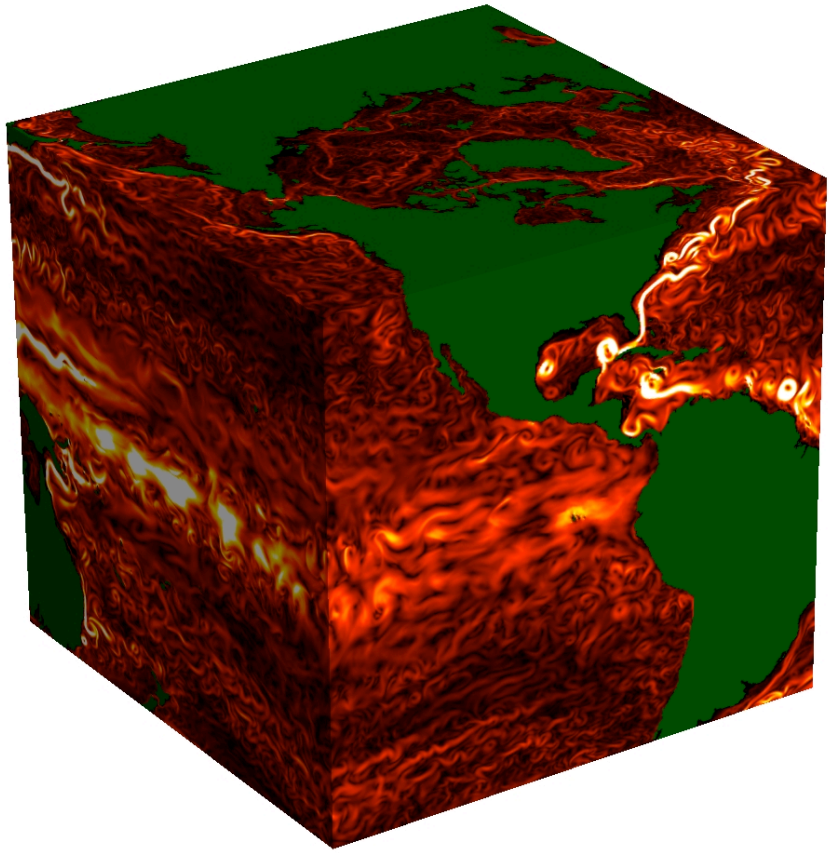


The global nature of brown clouds is apparent in analysis of NASA MODIS Data. Research by V. Ramanathan, C. Corrigan, and M. Ramana, SIO.

http://www-abc-asia.ucsd.edu

NLR/GSFC Applications: Remote Viewing and Manipulation of Large Earth Science Data Sets

- Remote viewing and manipulation of data sets at GSFC and JPL is needed to support EOSDIS and Earth system modeling.
- GSFC's EOSDIS Clearing House (ECHO) and JPL's GENESIS prototype science analysis system (iEarth) will become connected over the NLR. The link will enable comparison of hundreds of terabytes of data, generating large, multi-year climate records.
- Initial work will focus on the Estimating the Circulation and Climate of the Ocean (ECCO) modeling team. Besides ready access to the NLR, the team will need versatile subsetting and other data manipulation functions to reduce compute and bandwidth requirements as well as a set of Grid-accessible statistical analysis and modeling operators to refine and validate the ECCO models.
- Key Contacts: ECHO metadata gateway team, GSFC; GENESIS team, led by Tom Yunck, JPL.

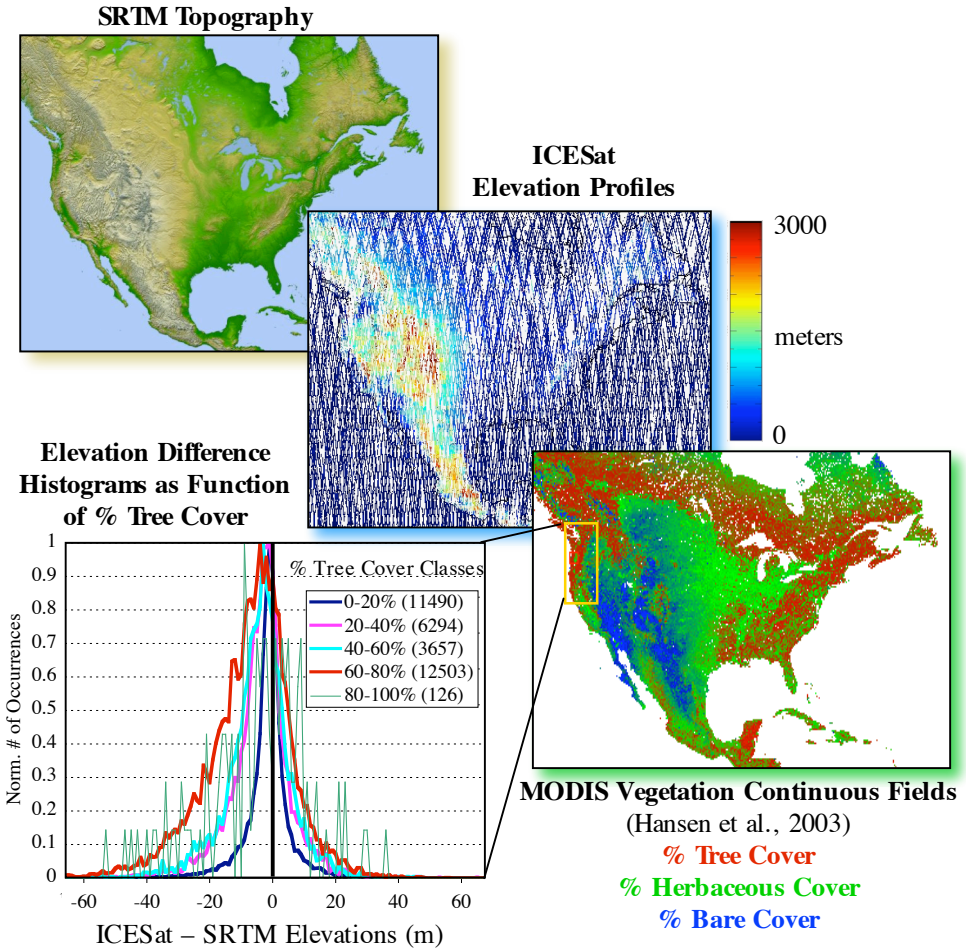


Near-surface (15-m) ocean current speed from an eddy-permitting integration of the cubed-sphere ECCO ocean circulation model. Research by JPL and MIT. Visualization by C. Henze, Ames.

http://www.ecco-group.org

NLR/GSFC Applications: Integration of Laser and Radar Topographic Data with Land Cover Data

- NASA has executed two advanced missions to create an accurate high-resolution topographic model of the Earth: the Shuttle Radar Topography Mission (SRTM) and ICESat, with its Geoscience Laser Altimeter System (GLAS).
- The agency now has the opportunity to merge the two data sets, using SRTM to achieve good coverage and GLAS to generate calibrated profiles. Proper interpretation requires extracting land cover information from Landsat, MODIS, ASTER, and other data archived in multiple DAACs.
- Use of the NLR and local data mining and subsetting tools will permit systematic fusion of global data sets, which are not possible with current bandwidth.
- Key Contacts: Bernard Minster, SIO; Tom Yunck, JPL; Dave Harding, Claudia Carabajal, GSFC.



http://icesat.gsfc.nasa.gov
http://www2.jpl.nasa.gov/srtm
http://glcf.umiacs.umd.edu/data/modis/vcf