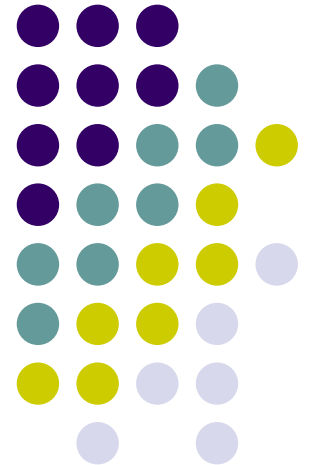
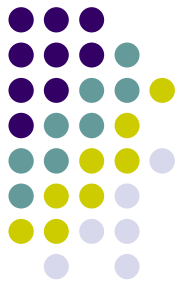


Sea Surface Temperatures and El Niño

John.Kermond@noaa.gov

Dr. John Kermond
Barcelona, June 5, 2004





The Ocean is BOSS!

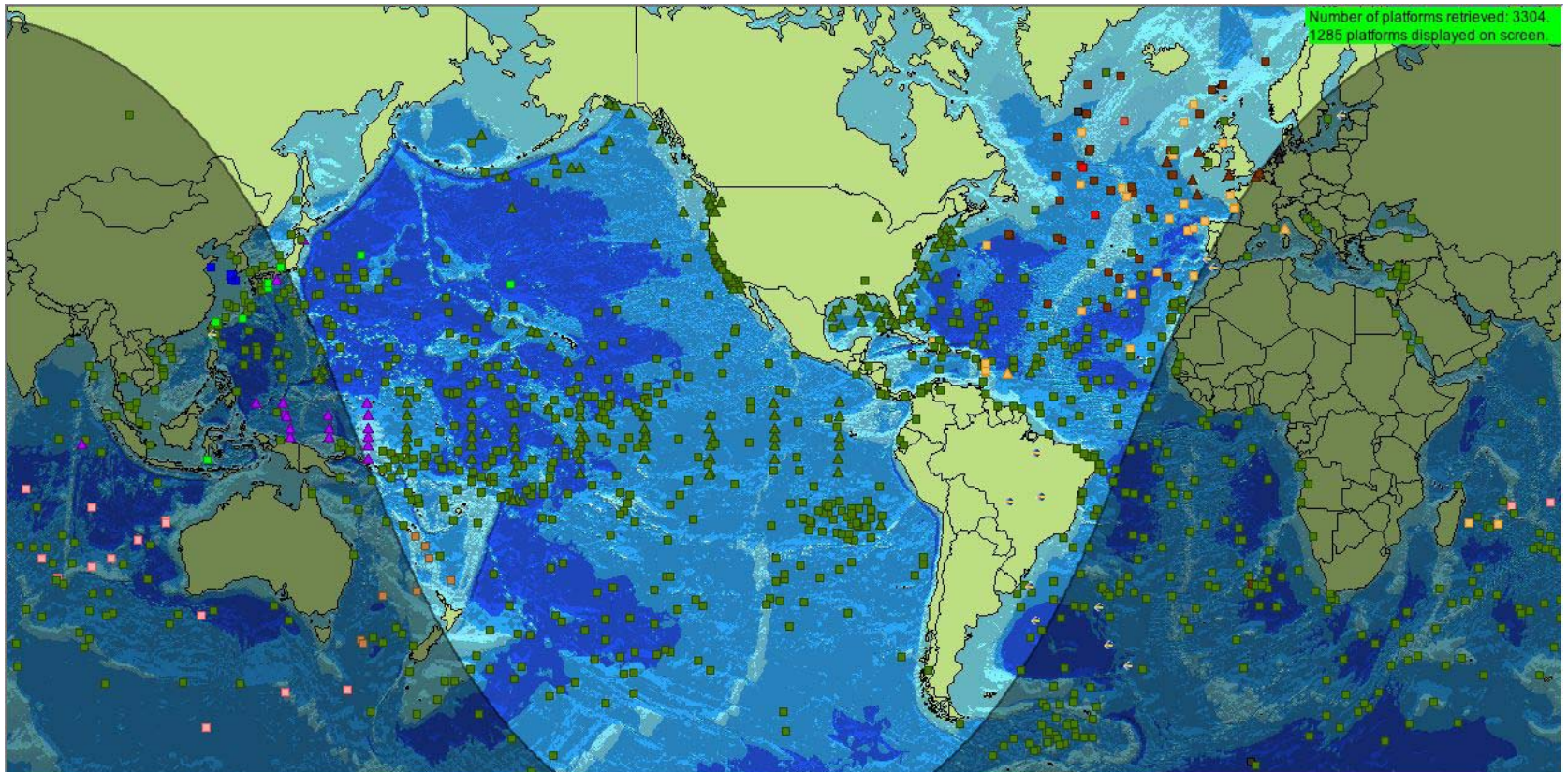
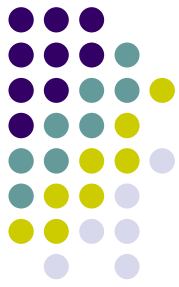
Ocean stores 1000 times more heat than the atmosphere and 50 times more carbon

85% of the precipitation that waters our earth comes directly from the ocean

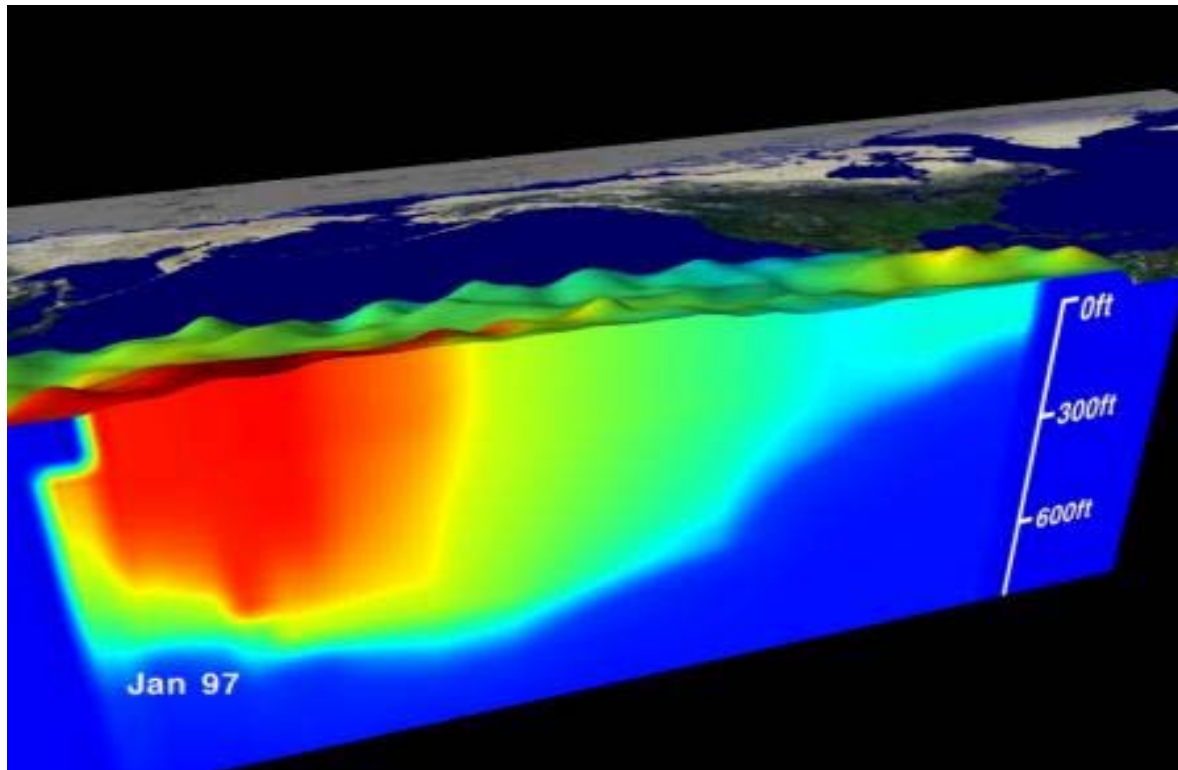
Ocean is the memory of the climate system

Ocean is second only to the sun in effecting variability in the seasons and long-term climate change

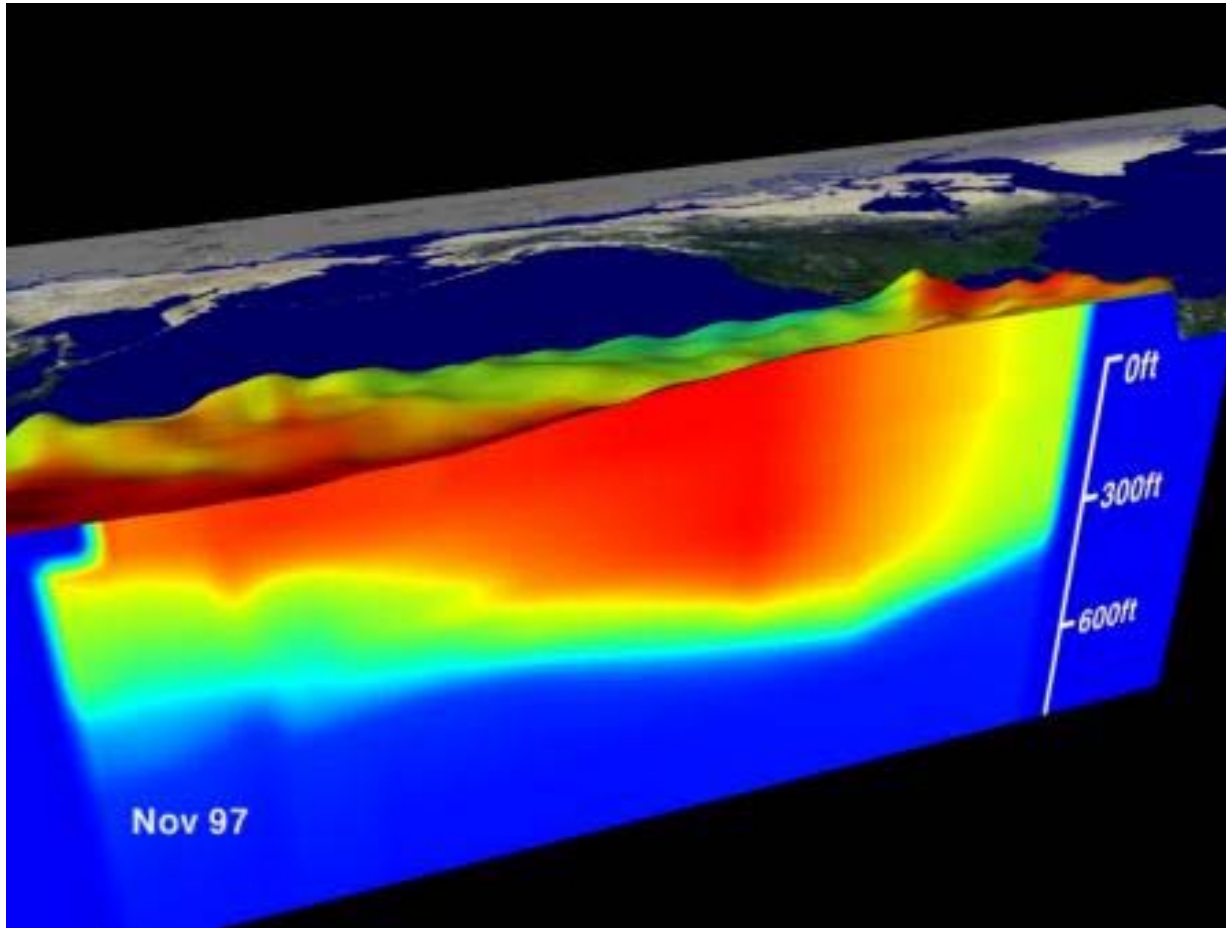
One World.....One Ocean



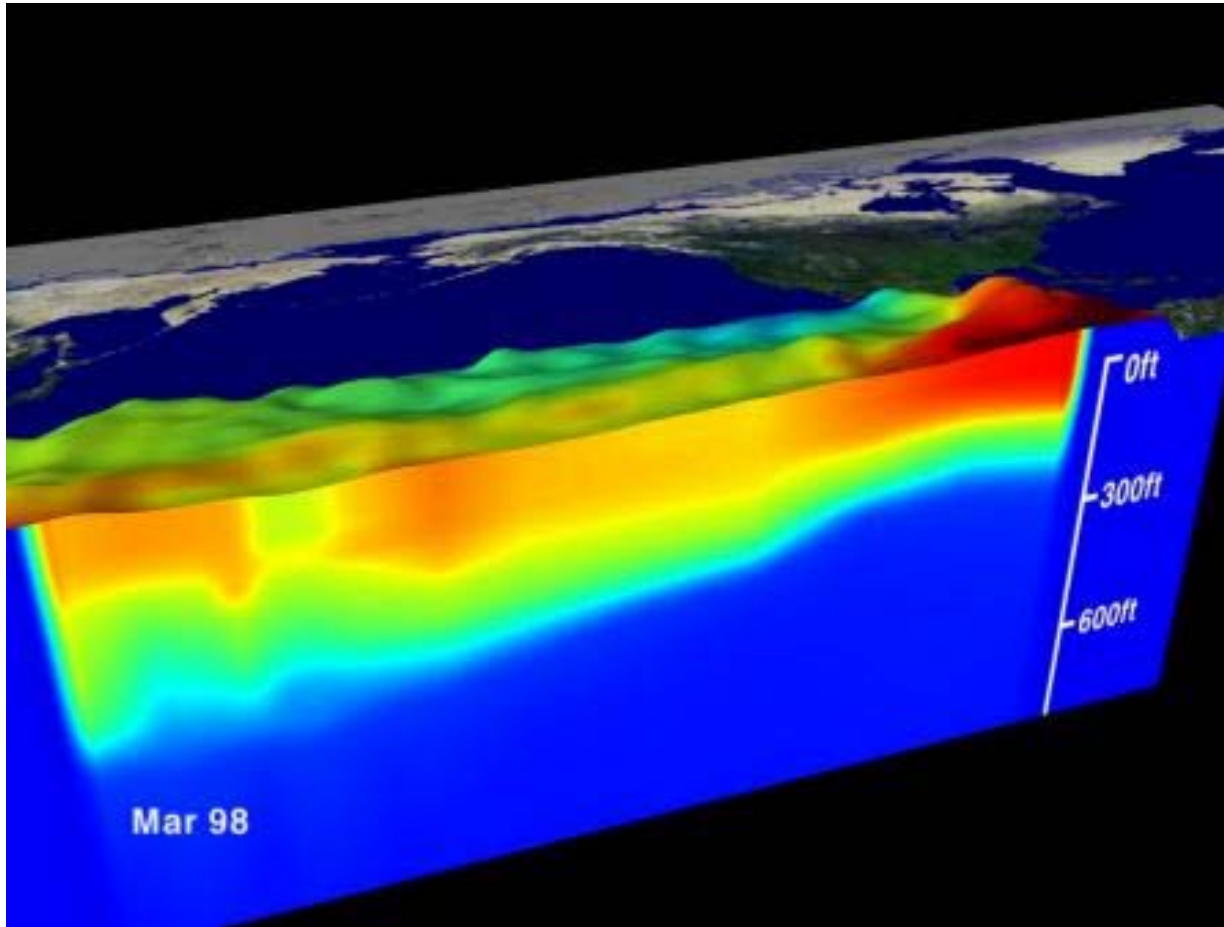
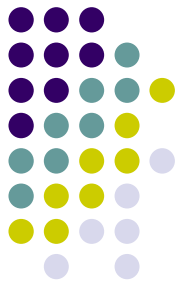
Ocean and Atmosphere -- the big dance, with the beat of the music being ocean temperature



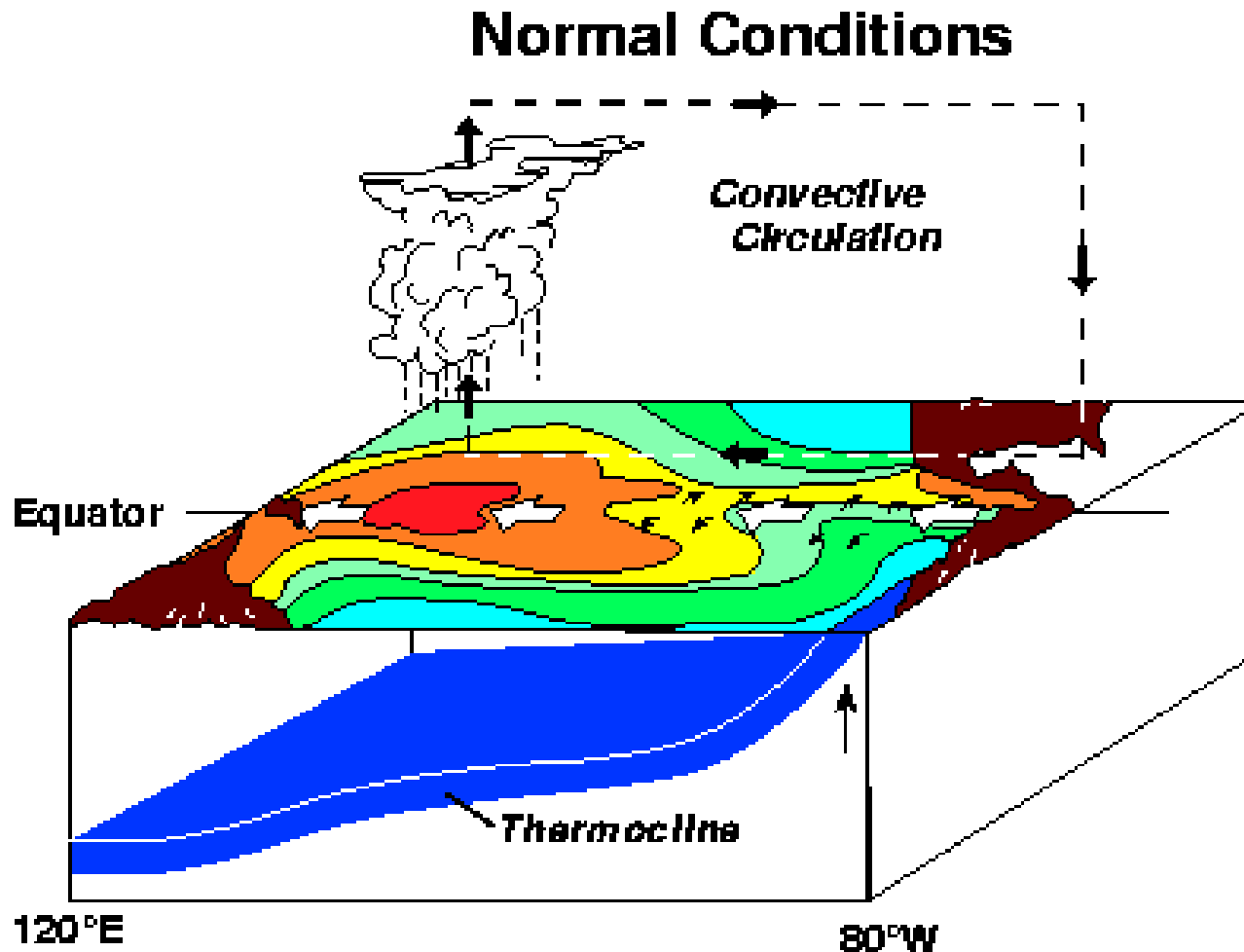
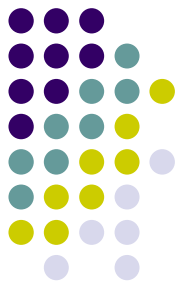
1997/98 ENSO event



1997/98 ENSO event



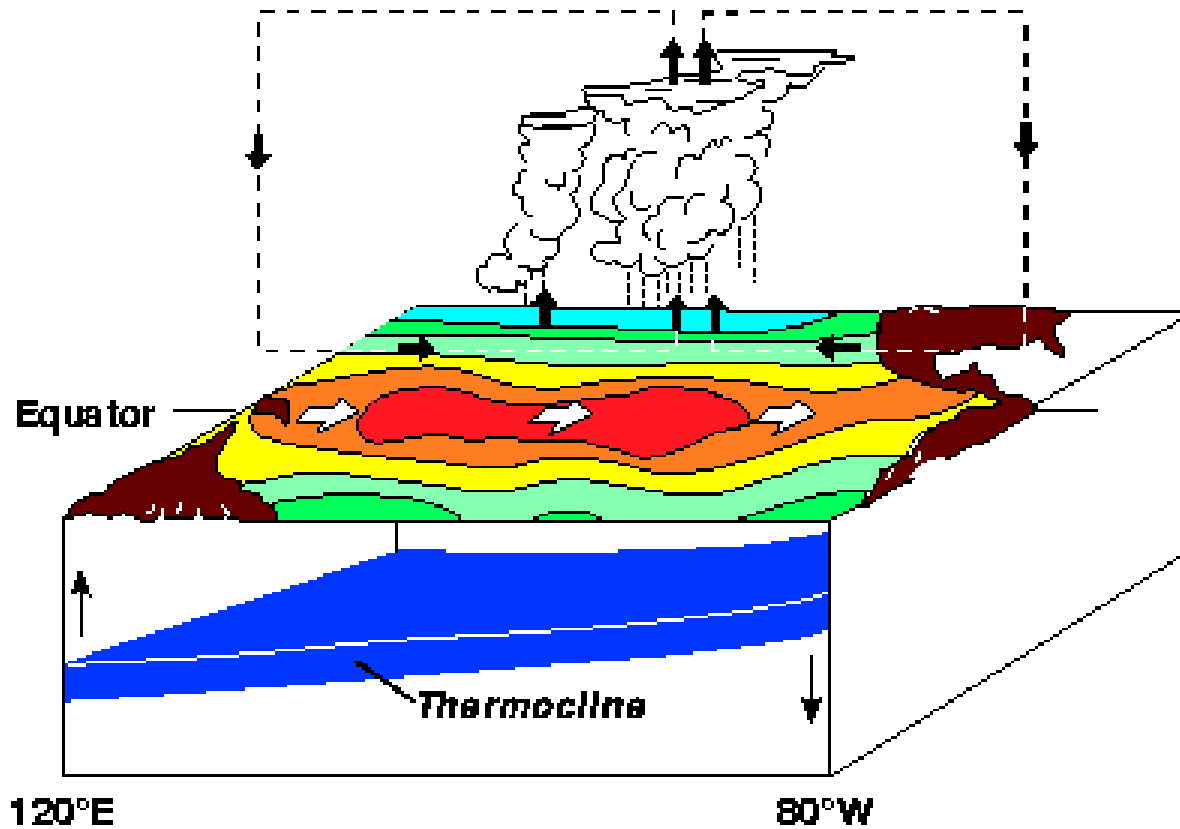
ENSO: El Niño and La Niña Fundamentals



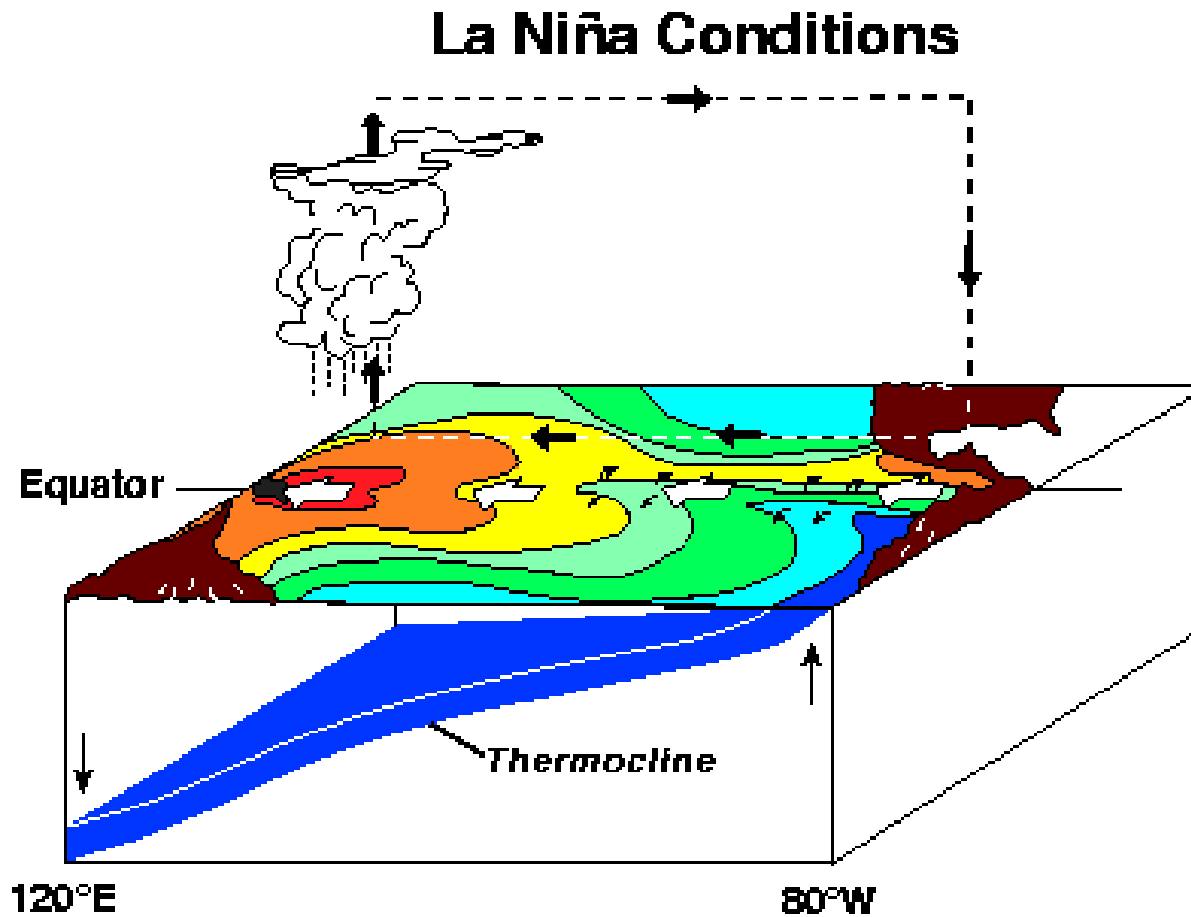
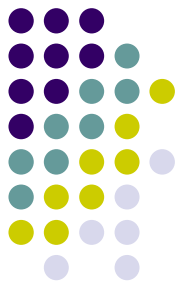
ENSO continued



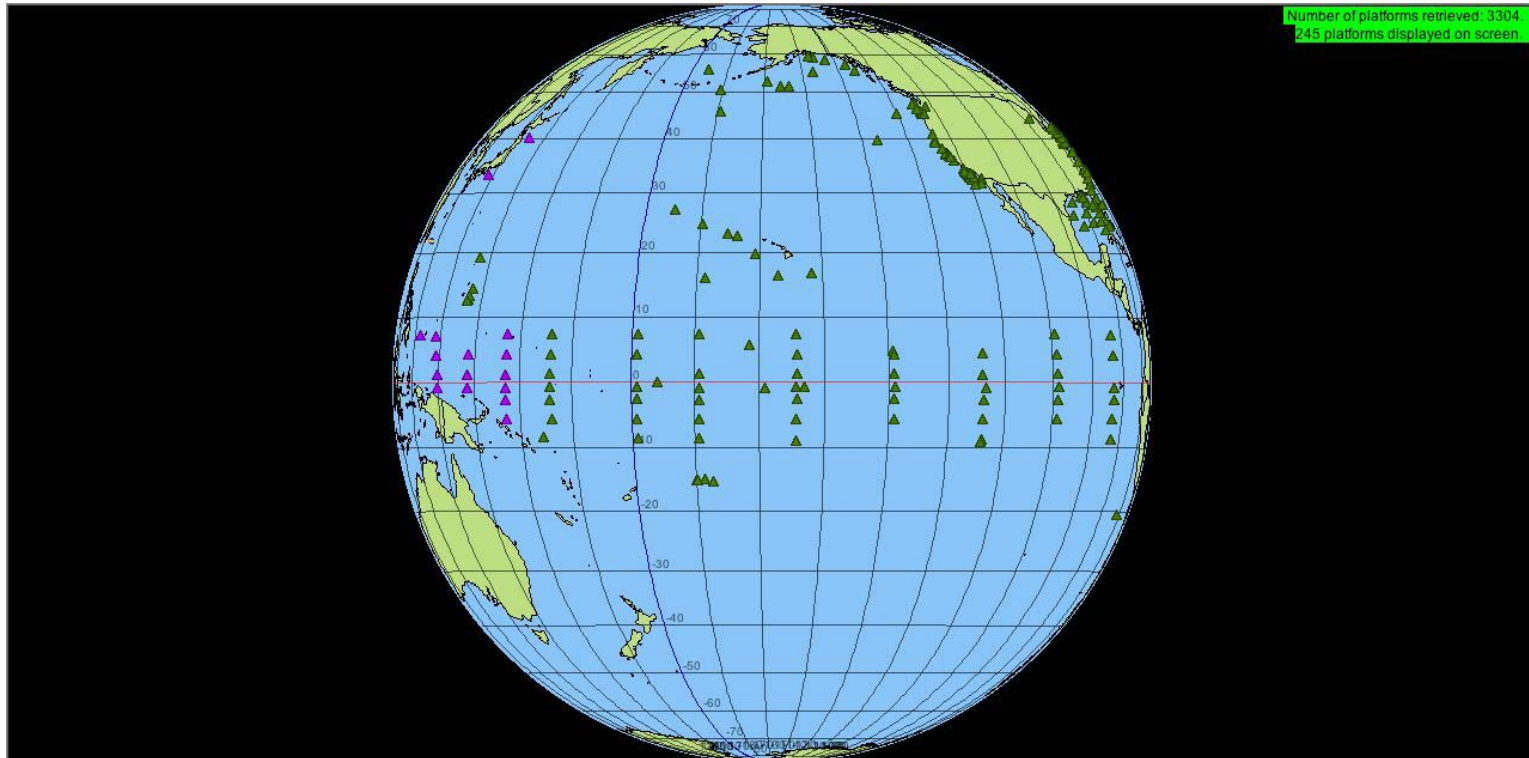
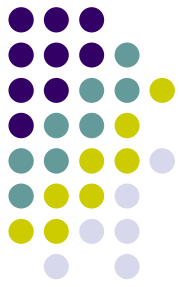
El Niño Conditions

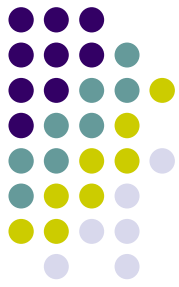


ENSO continued



The TAO Array -- World's largest antenna





TAO ARRAY

- Uplinks data to the Polar-orbiting Operational Environmental Satellite (POES)
- Sea surface temperature; wind speed & direction; relative humidity; solar radiation; rainfall; & temperatures down to 500 meters

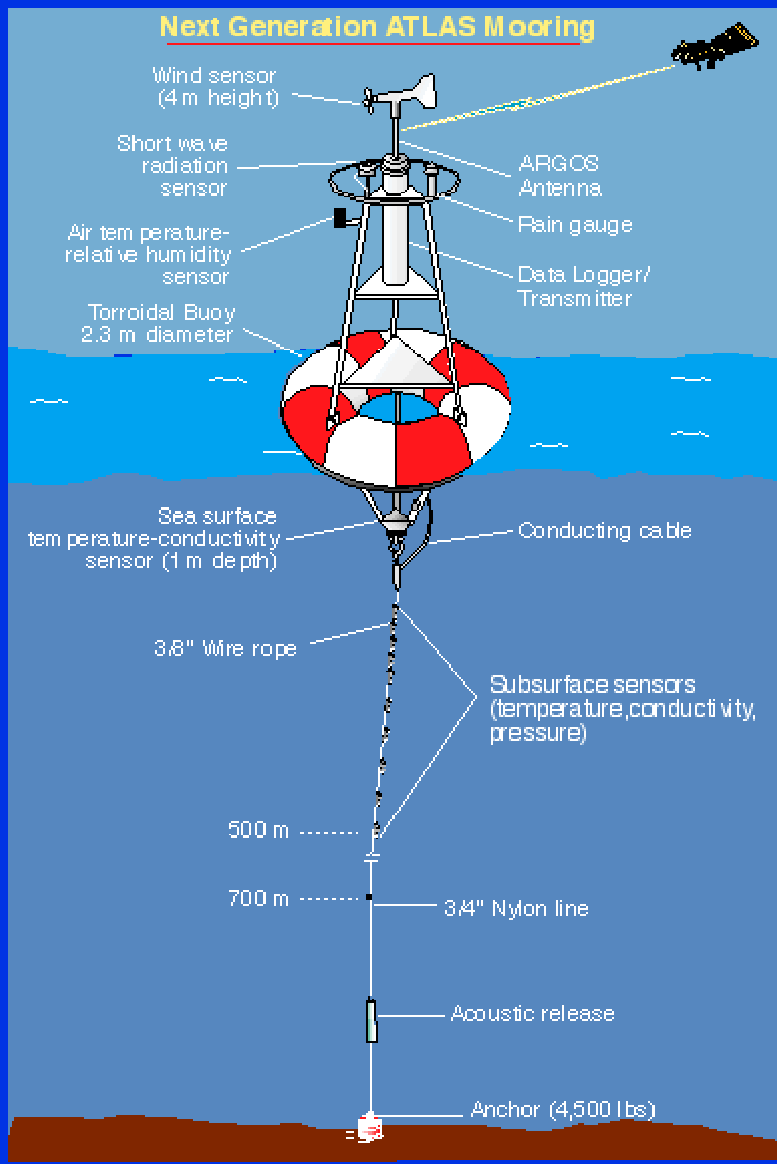


Triangle Trans-ocean buoy Network

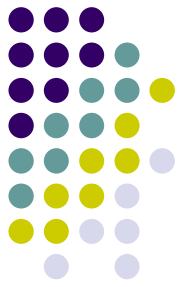




Next Generation ATLAS Mooring

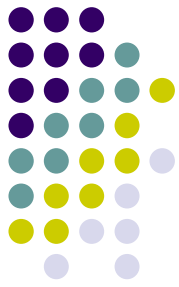


Next Generation Observation Earth System



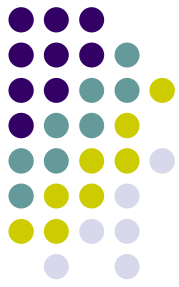
- Fully converged POES and DMSP
- Six high priority Environmental Data Records
 1. Atmospheric vertical moisture profile
 2. Atmospheric vertical temp. profile
 3. Cloud & ice imagery
 4. Sea surface temperature
 5. Sea surface winds (speed & direction)
 6. Soil moisture

Next Generation Earth Observing System, continued



- National Polar-orbiting Operational Satellite System (NPOESS)
 1. Data rates two orders of magnitude greater than present instruments carried on POES or DMSP
 2. 77% of the global (daily averaged) data will be transmitted to Centrals within 15 minutes

Next Generation Earth Observing System, continued



3. 95% of the data (daily average) within 28 minutes from the time of on-orbit collection [current data latency is approx 120-180 minutes]

4. U.S Centrals

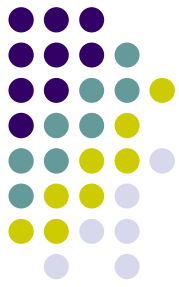
NOAA/NESDIS

Air Force Weather Agency (AFWA)

**Fleet Numerical Meteorology and
Oceanography Center (FNMOC)**

**Naval Oceanographic Office
(NAV-OCEANO)**

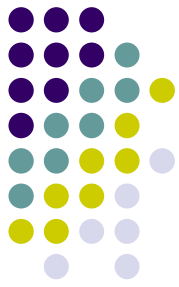
Next Generation Earth Observing System, concluded



5. NPOESS will simultaneously broadcast two continuous real-time data streams (at high and low rates)

6. Global distribution network will include: Anchorage, Alaska; Honolulu, Hawaii; San Diego, California; Orlando, Florida; Santiago, Chile; Sao Paulo, Brazil; Johannesburg, South Africa; Frankfurt, Germany; Svalbard, Norway; Bombay, India; Seoul, Korea; Melbourne, Australia; McMurdo Station, Antarctica; Auckland, New Zealand; and Guam.

Ocean Observation for Climate -- the new paradigm



[Home](#)
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General Users

[Deployment Info](#)

Deployment Maps
Ocean: Year:

Performance Plots
WMO Number:
Trajectory-Sections:

Float Array

Last 12 days Last 2 days
[Global](#) [Global](#)
[Atlantic](#) [Atlantic](#)
[Indian](#) [Indian](#)
[Pacific](#) [Pacific](#)

Trajectories

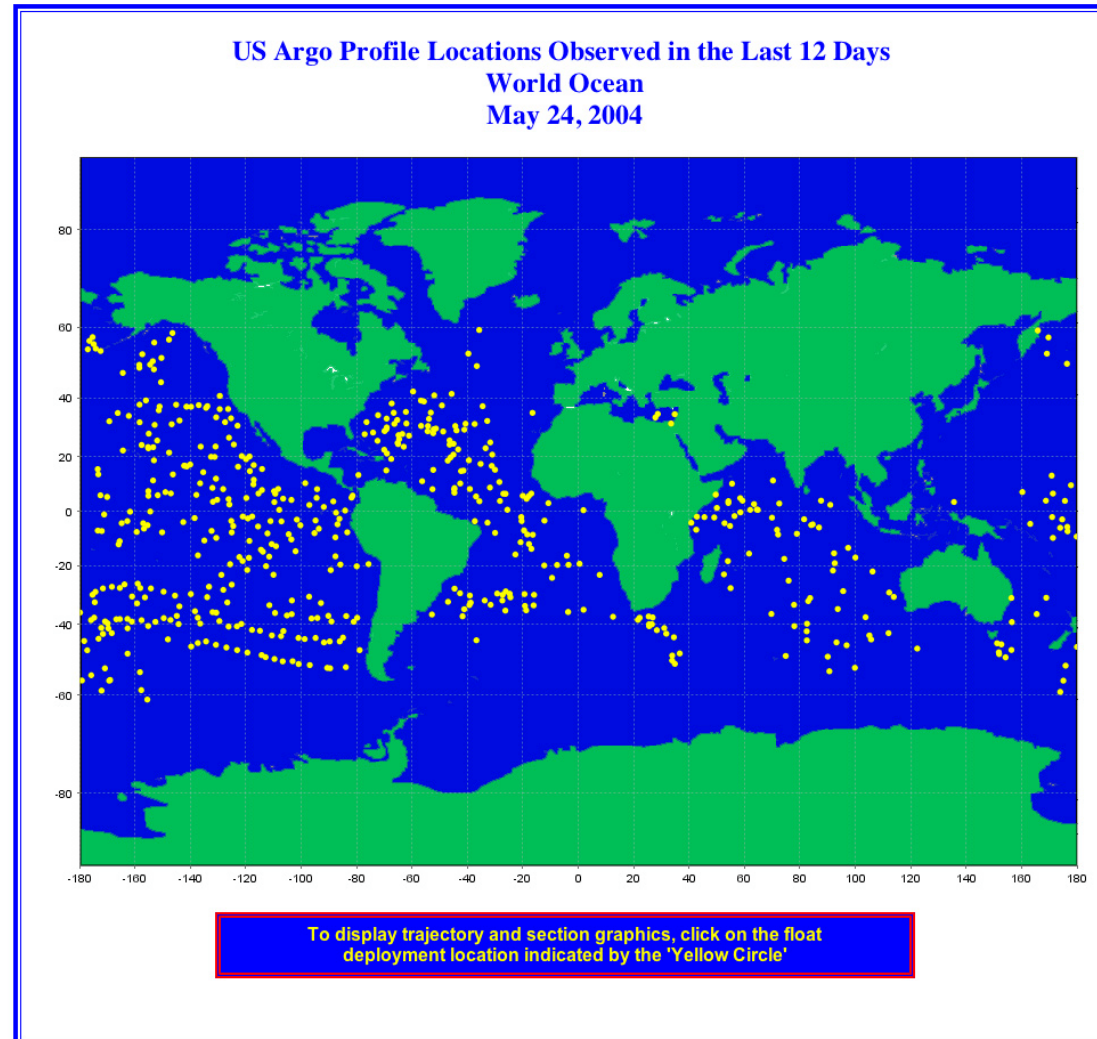
[Global](#)
[Atlantic](#)
[Indian](#)
[Pacific](#)

[North Atlantic](#)
[South Atlantic](#)
[North Pacific](#)
[South Pacific](#)

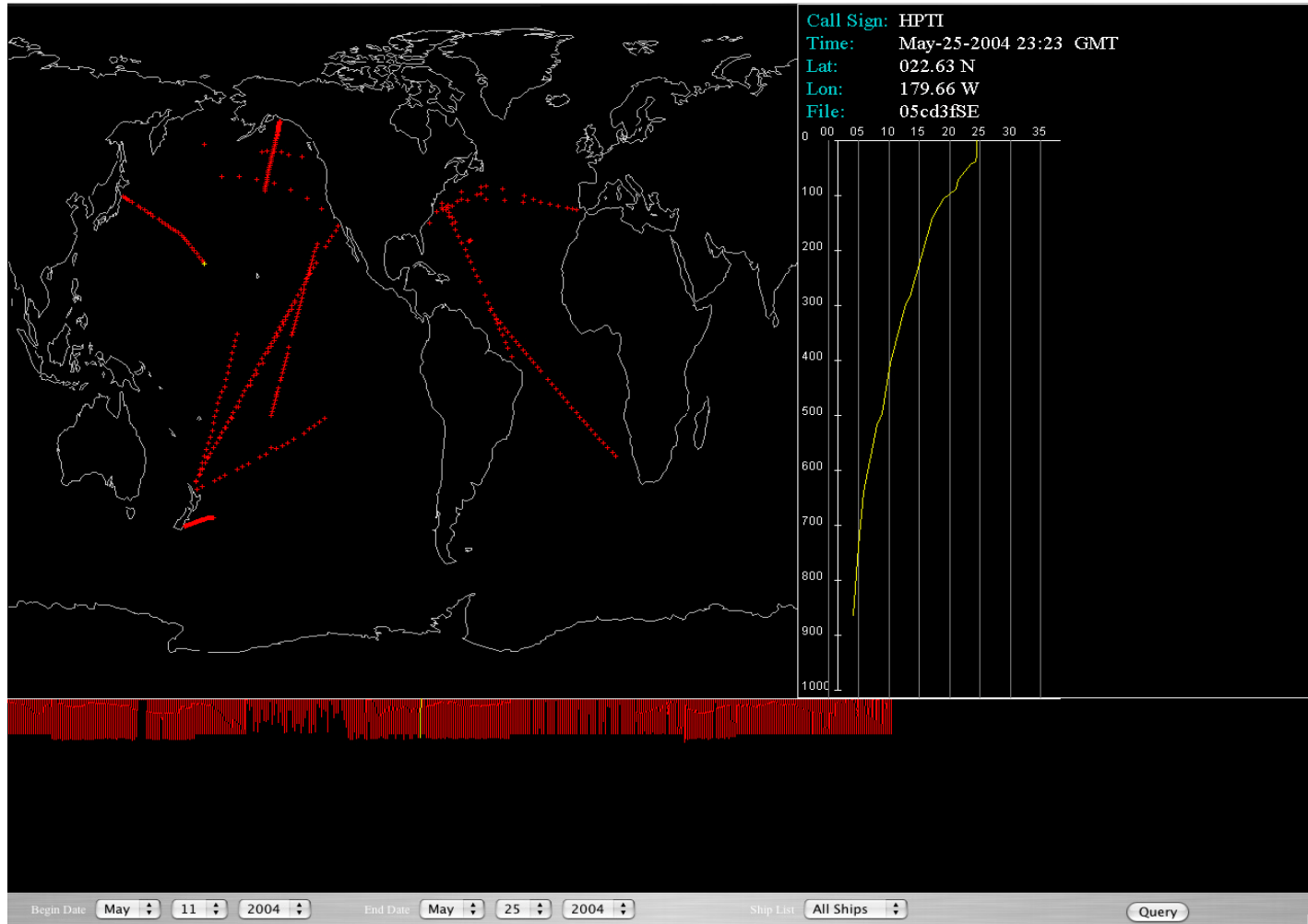
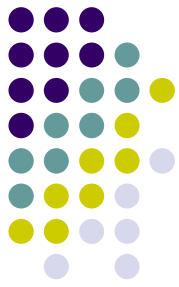
Float Status & IDs

[Float: Id & Type](#)
[FTP Float Metadata](#)
[Table with 'active' Floats](#)
[Table with 'inactive' Floats](#)
[Status by ProgramID + Year](#)

Performance Statistics



Ocean Observations for Climate - - continued



Some interesting “unknowns” about El Niño



- **Triggering mechanism(s)**
- **Intensity & Duration**
- **Carbon Dioxide story**
- **Modulating factors**

Sea Surface Temperatures and El Niño -- wrap up



- **70% of the heat stored on this planet resides in the top few feet of the world's oceans**
- **Area of critical interest is the Inter-tropical Convergence Zone (ITCZ) -- the so-called equatorial wave guide approx. 9 degrees north and south of the equator**
- **Western warm water pool is the heat exchanger for planet earth**

Some great resources to learn more about ENSO



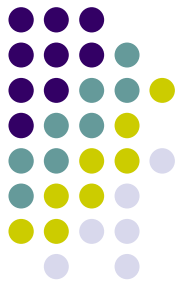
- **World Wide Web**

- www.pmel.noaa.gov
- www.iri.columbia.edu
- www.noaa.gov
- www.tec.army.mil/publications/el_nino/

- **TEACHER AT SEA/ TEACHER IN THE AIR/TEACHER IN THE FIELD**

- Contact Jennifer.Hammond@noaa.gov
- www.tas.noaa.gov
- www.ogp.noaa.gov

Muchas Gracias to IABM & Forum Barcelona 2004



**And
To
You
The
Real Folks
Who
Bring
The wonder of weather
To
The world**