

The NOAA Ocean Data Education (NODE) Project

Presenters:

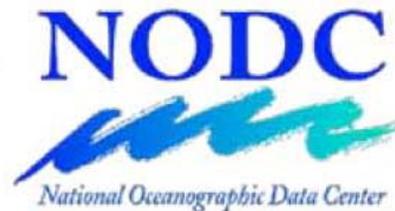
Atziri Ibanez, NOAA National Estuarine Research Reserves

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RESERVE
SYSTEM



Session Agenda

- ▶ Project origins and partners
- ▶ Curriculum approach
- ▶ Technology Framework
 - Water Quality module
 - El Niño curriculum module
 - Sea Level module
- ▶ Vision for Extending NODE
- ▶ Next Steps

IOOS Education – Demonstration Project:

NOAA Data Education Project (NODE)

Partnership Project between NERRS, NMSP, NODC, and the OEd to:

- ▶ Demonstrate how data can be easily integrated to tell a compelling story.
- ▶ Provide a test-bed for development of educational applications of IOOS data.
- ▶ Analyze the usability of IOOS data by the non-scientific public.



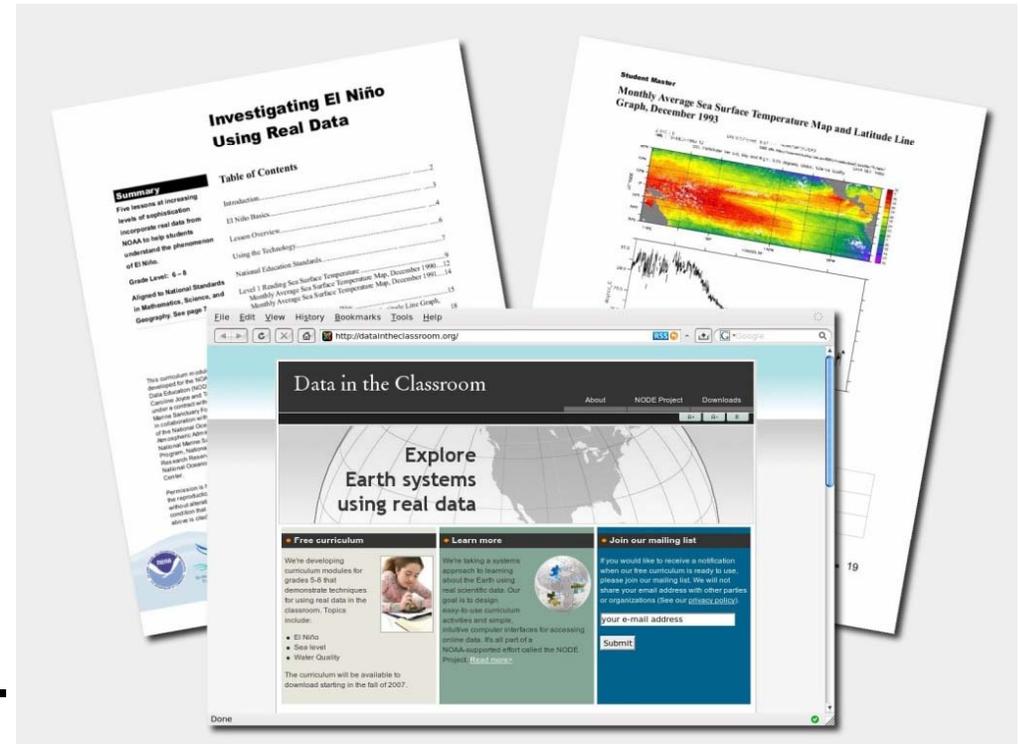
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Project Components

Three curriculum modules:
El Niño, Sea Level &
Water Quality

- ▶ Middle school, grades 6–8
- ▶ Downloadable materials
- ▶ Correlated to National Standards in Science, Mathematics, Geography & the Ocean Literacy P&C.
- ▶ Online tools for accessing data and producing visualizations.



Coming 2011 module on Ocean
Acidification!



Data in the Classroom

[About](#)[NODE Project](#)[Downloads](#)[A+](#)[A-](#)[R](#)

Investigate Earth processes using real data:

- [El Niño](#)
- [Sea Level](#)
- [Water Quality](#)



• Free curriculum

We've developed three curriculum modules for grades 6-8 that demonstrate techniques for using real data in the classroom:

- [El Niño](#)
- [Sea level](#)
- [Water Quality](#)

Help yourself to any of the documents in the [Downloads](#) section.



• Learn more

We're taking a systems approach to learning about the Earth using real scientific data. Our goal is to design easy-to-use curriculum activities and simple, intuitive computer interfaces for accessing online data. It's all part of a NOAA-supported effort called the NODE Project. [Read more>](#)



• Tell us what you think

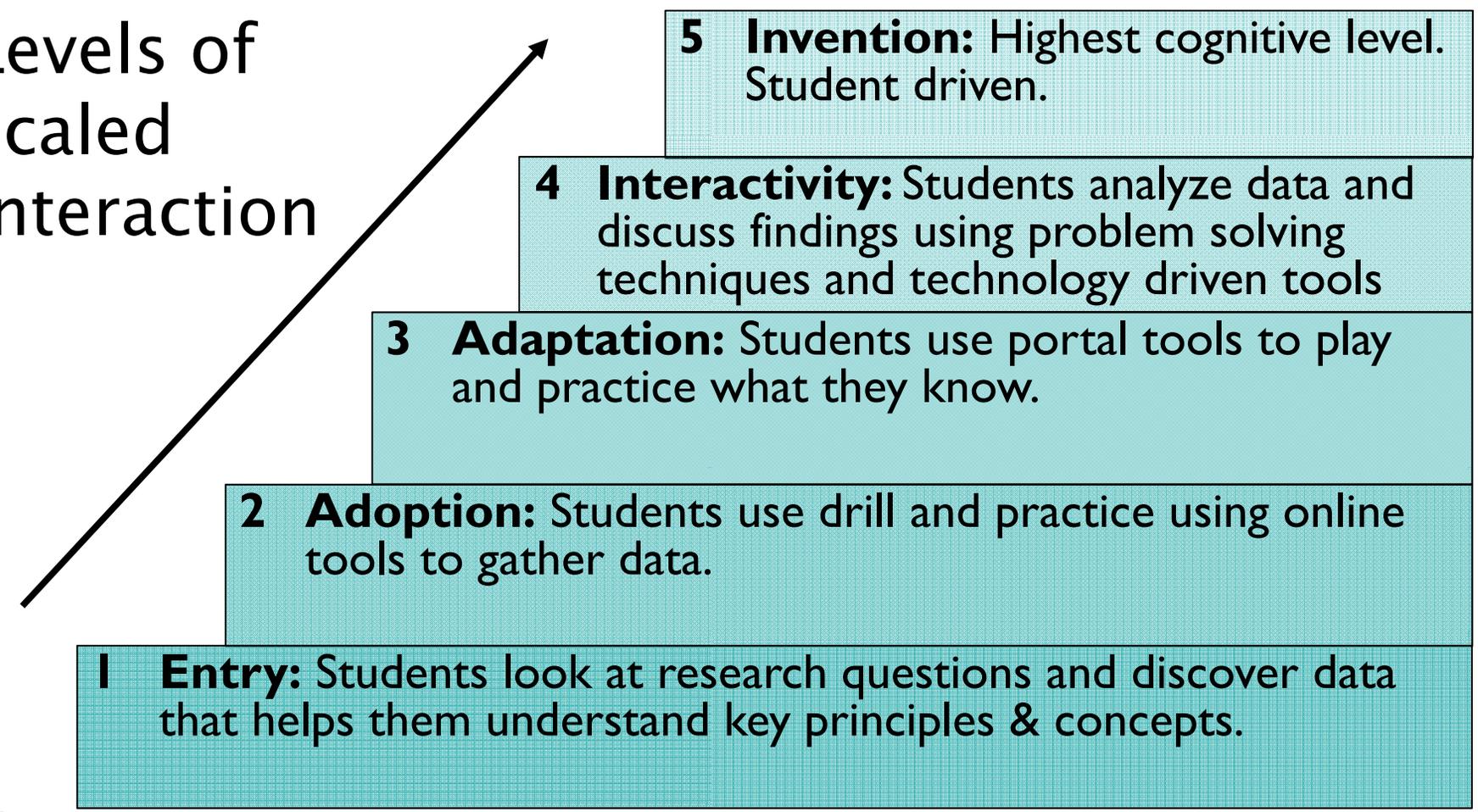
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datainthe classroom.org

Curriculum Approach

Levels of
scaled
interaction



5 Invention: Highest cognitive level. Student driven.

4 Interactivity: Students analyze data and discuss findings using problem solving techniques and technology driven tools

3 Adaptation: Students use portal tools to play and practice what they know.

2 Adoption: Students use drill and practice using online tools to gather data.

1 Entry: Students look at research questions and discover data that helps them understand key principles & concepts.

What are the attractive features of the modules?

- ▶ Classroom activities
- ▶ Teacher Guide
 - Activity Summary
 - Learning Goals
 - Estimated Time
 - Standards Connection
 - Important Terms
 - Preparation
 - Procedure
- Teacher Worksheets with Answers
- Student Worksheets
- Data log sheets

Web Links

For links to helpful Web sites about El Niño, visit www.dataintheclassroom.org.

El Niño Basics

El Niño is a set of phenomena caused by periodic changes in the ocean-atmosphere system in the tropical Pacific Ocean. During El Niño, the trade winds, which usually blow warm surface waters to the west, die down or even reverse. When the wind stops blowing the warm water to the west, the warm water pools in the east, triggering a number of effects in the atmosphere and ocean. The eastward movement of warm moist air, which follows the warm water, can bring above-average rainfall to places like Peru, as well as changes in atmospheric circulation. The warm water causes the air immediately above it to become warmer than the surrounding air masses. This warmer air is less dense and rises. As the air rises, it adiabatically cools. The cooling air reaches its saturation temperature, and the moisture condenses, resulting in rain. In the ocean, meanwhile, the pooling of warm water pushes warmer temperatures even deeper into the water column. This disrupts the normal upwelling circulation that brings cold, nutrient-rich waters to the surface. Shutting off the supply of nutrients results in a decline in primary productivity, which then impacts organisms farther up the food chain.

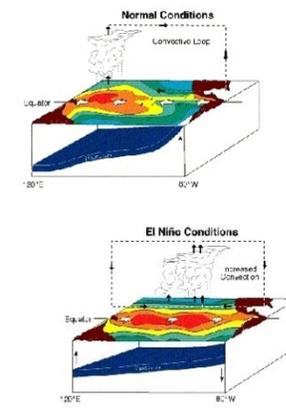


Image courtesy NOAA Pacific Marine Environmental Laboratory (PMEL).
<http://www.pmel.noaa.gov/tao/elnino/el-nino-story.html>

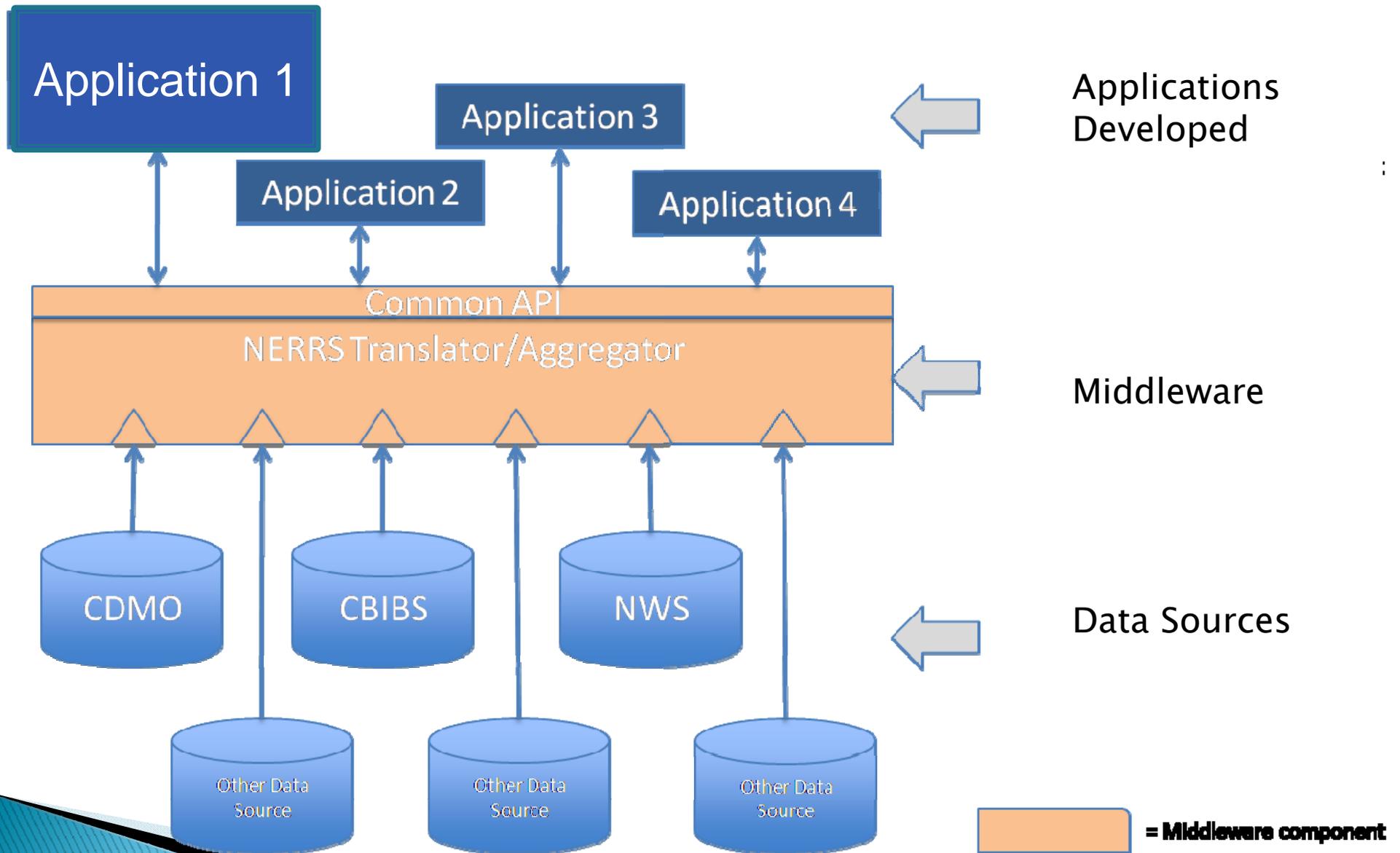
Technology Goals

- ▶ Develop easy-to-use Web browser-based interfaces.
- ▶ Build on existing NOAA software tools and services that conform to IOOS data management best practices.
- ▶ Create examples that can be modified and expanded upon.

Tapping into data

- ▶ Live Access Server (LAS), developed at NOAA Pacific Marine Environmental Laboratory
- ▶ Web Services for System Wide Monitoring Program data, offered by the NERRS CDMO
- ▶ Google Maps application programming interface (API)

Proposed Architecture for Educational Support Middleware



Level 1

Level 2

Level 3

Level 4

Level 5

Get Data

Teachers

Survey

Water Quality

Changes in water quality conditions have a big impact on organisms living in estuaries. But how is water quality monitored?

This Web site features five activities at different levels to help you learn about monitoring water quality using real data.

Teachers: [start here](#) to download the curriculum guide.

Links

- Estuaries.gov
- [National Estuarine Research Reserves System \(NERRS\)](#)
- [System-wide Monitoring Program Water Quality Indicators](#)
- [NERRS Centralized Data Management Office](#)



Level 1 [Water Quality](#) ▶ [Get Data](#)

Which data?

Level 2 Water Quality

Level 3 Meteorological Factors

Level 4 Nutrient Levels

Level 4 **Which station?**

Level 5 ▼

[Station Information](#)

Get Data

Which parameter(s)?

▼

Teachers

Optional second parameter

Survey ▼

Specify start date.

▼ ▼

Duration 1 Day

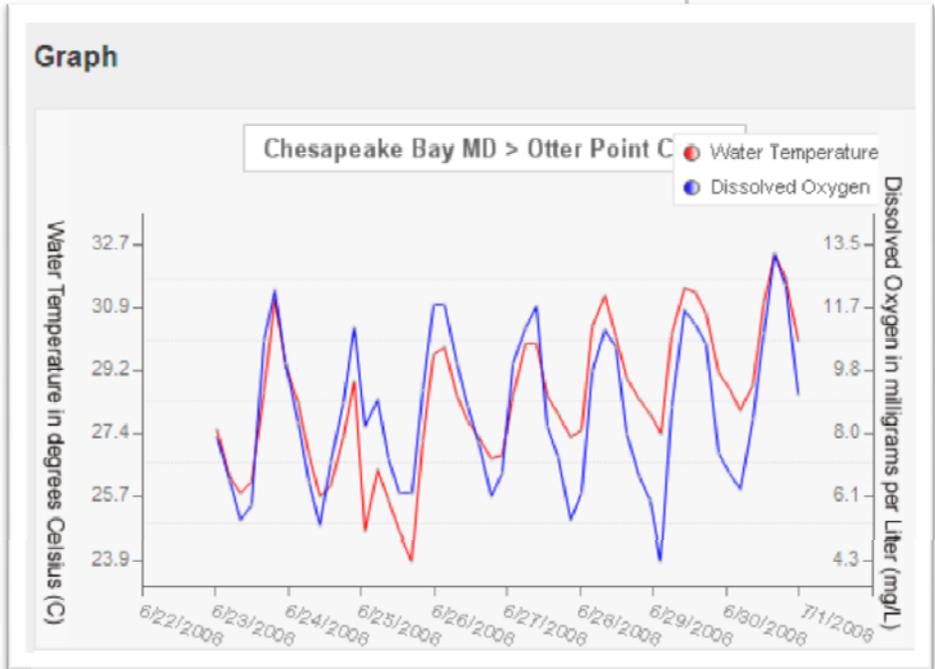
1 Week

1 Month

1 Year

Specify end date

Select an output format.



Level 1

Level 2

Level 3

Level 4

Level 5

Get Data

Teachers

Survey

El Niño

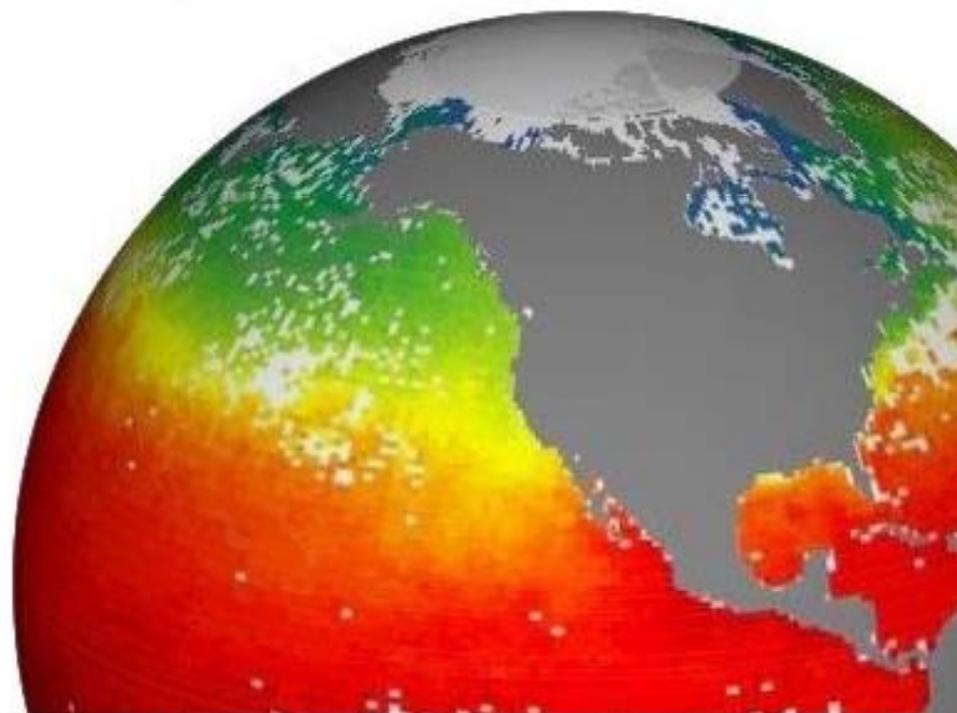
People blame El Niño for all kinds of abnormal weather. But how does El Niño really work?

This Web site features five activities at different levels to help you learn about El Niño using real data.

Teachers: [start here](#) to download the curriculum guide.

Links

- [NOAA El Nino page](#)
- [The Integrated Ocean Observing System \(IOOS\)](#)
- [Science and the Sea: El Niño](#)



Level 1: Reading Sea Surface Temperature

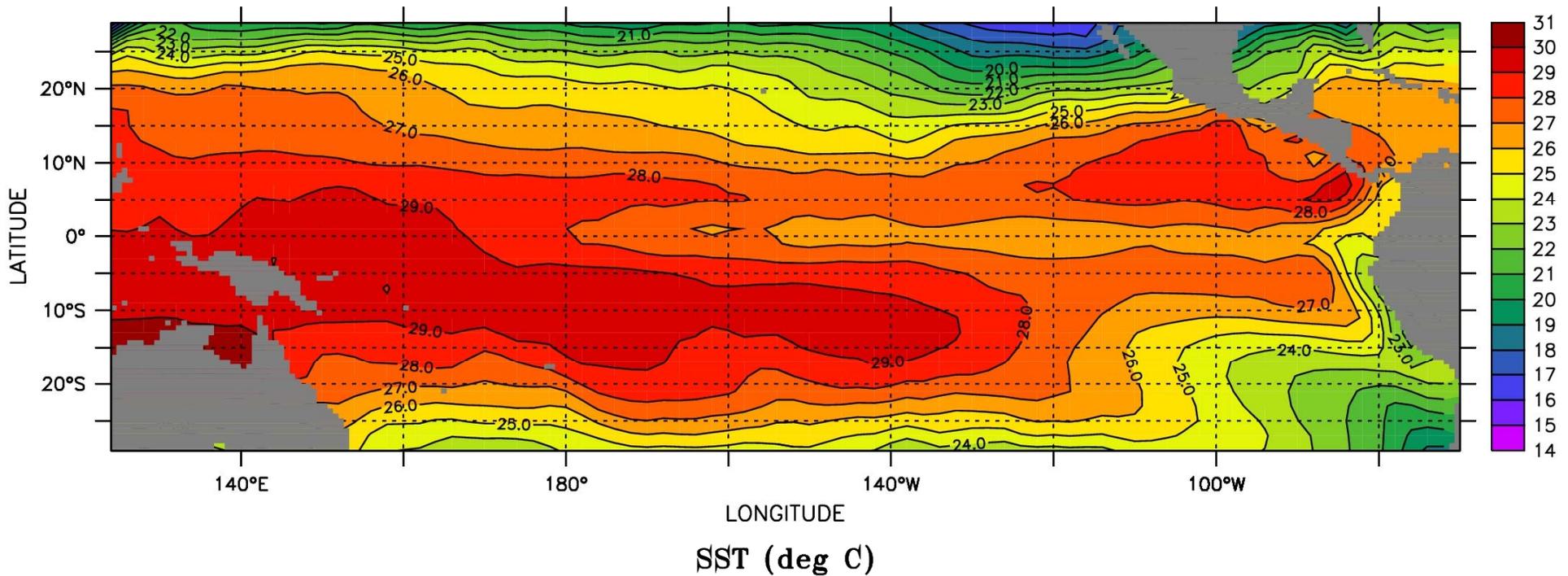
- 5 Invention
- 4 Interactivity
- 3 Adaptation
- 2 Adoption
- 1 **Entry**

LAS 6.5.2.1/Ferret 6.02 -- NOAA/PMEL

DODS URL: <http://ingrid.ideo.columbia.edu/SOURCES/.CAC/.sst/>

TIME : 16-DEC-1990 00 360_DAY

DATA SET: CAC/.sst/dods



Level 1

Level 2

Level 3

Level 4

Level 5

Satellite Data

Tide Data

Tide Model

Teachers

Survey

Sea Level

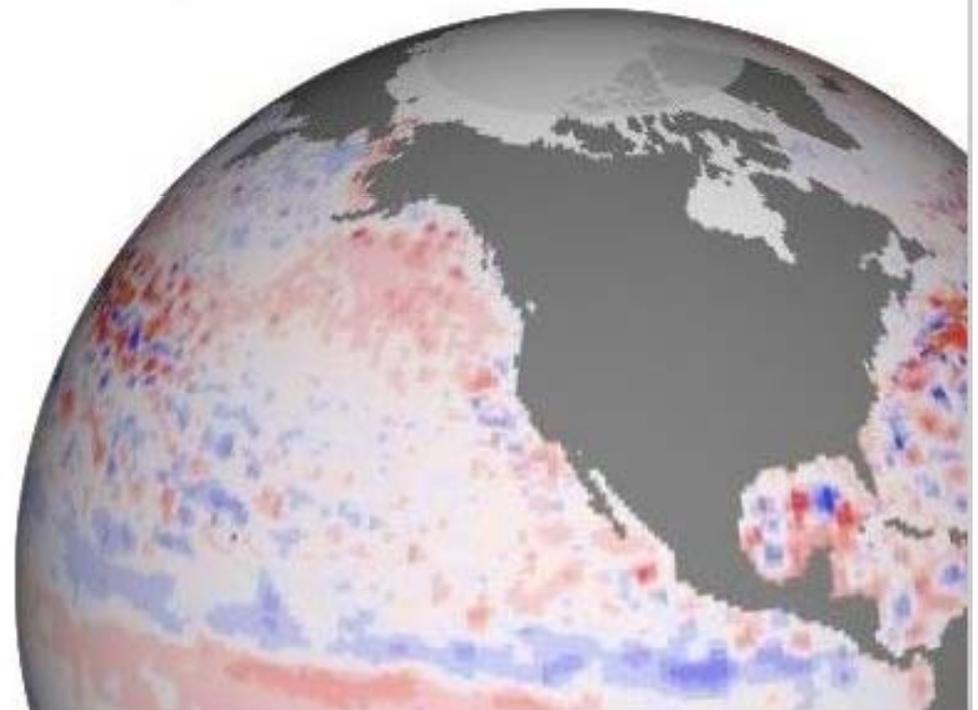
Researchers believe that sea level is rising worldwide. But how are water levels monitored and measured?

This Web site features five activities at different levels to help you learn about sea level using real data.

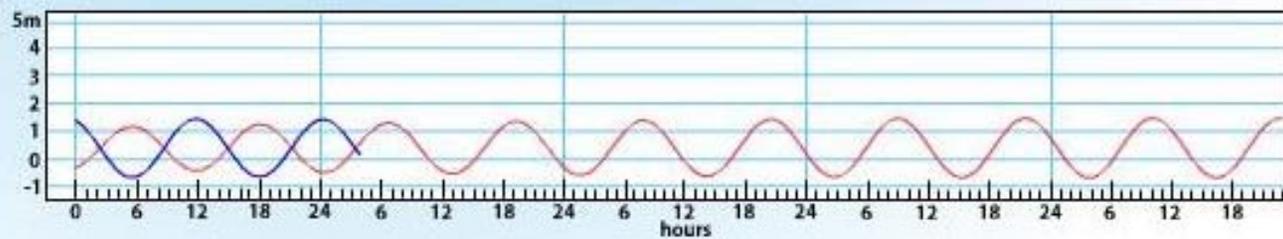
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Links

- [NOAA's Tides & Currents](#) 
- [NOAA's Sea Level Trends](#) 
- [NOAA's National Ocean Service Tides and Water Levels page](#) 
- [The Integrated Ocean Observing System \(IOOS\)](#) 



TIDES AND SEA LEVEL MODEL



Controls	
Pause	Reset
Speed	◀ ▶
Tide	Height Change (m) 2.1 <input type="text"/> Period (hours) 25 <input type="text"/> <input checked="" type="checkbox"/>
Storm	Height (m) 1.6 <input type="text"/> Duration (day) 2 <input type="text"/> <input type="checkbox"/>
Long-term Change	Sea Level Rise (m) 0 <input type="text"/> <input type="checkbox"/>

Evaluation – Research Question

What do teachers need to help them develop competency in the use of online tools to access real-time data so that they will be able to integrate them into their instructional practices?

We looked at:

- ▶ Lessons to guide and organize the teachers' integration of technology in their instructional practice;
- ▶ A website featuring tools to access data;
- ▶ Science content designed to heighten interest in students and teachers to use real-time data collection tools.

Accomplishment: Succeeded in providing a test-bed for the development of educational applications of IOOS data.

- ▶ Teachers (100%) found they were able to navigate between modules, lessons, assessments, and “live” data.
- ▶ 61% of teachers strongly agreed that the structure and the format of the NODE Web site provided a useful context for teaching core science.
- ▶ 55% found it useful to have the scientific story presented in levels of interactivity because they were able to integrate technology, and real time data into their instructional practice in a way that made sense to them.
- ▶ 67% of teachers rated their experience using the NODE Demonstration Project as excellent.

Teacher Quotes

- ▶ "The data was very easy to access and the teacher guide was very easy to understand. I learned that I need to do a better job teaching the inquiry process to my students."
- ▶ "The lesson format was wonderful. Starting with teacher directed and moving towards student directed was GREAT!"
- ▶ "Real time data showed scientific data in a way that made being a "real" student-scientist relevant for my students. "

Vision: NOAA's Education Flagship Program for Advancing Data Literacy

- NODE is central point for all educators to access NOAA data for formal informal education use
- A vibrant and effective NODE Teacher Network engaged in advancing data literacy across the nation
- Housed under a site that truly represents us all
- NODE contributes to the current literature on data literacy and education research
- Well-funded and promoted by various NOAA line offices

Next Steps: The Multiplicative Scale-Up Approach

- ▶ Strengthen the evaluation of the NODE materials and delivery through PTD.
- ▶ Increase the number of educators trained in NODE
- ▶ Expand the curriculum to cover other key NOAA topics
- ▶ Build-out the middleware to ensure that NODE is sustained on a reliable platform that allows for easy and quick retrieval of data

Questions?

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About NODE Project Downloads

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Back-Up Slides

NODE Module Development

- ▶ Identify research stories and data sets.
- ▶ Design activity sequence.
- ▶ Work with data providers to integrate data delivery.
- ▶ Design custom web interface to access/select data.
- ▶ Develop online tutorial for using interface.
- ▶ Identify or develop supporting multimedia (e.g. applet)
- ▶ Announce new module and present at conference.
- ▶ Deploy web survey to gather teacher feedback.

NODE Data Requirements

- ▶ Analysis of available data needs to support a grade-appropriate learning objective.
- ▶ Data must be available online with appropriate metadata.
- ▶ Ideally, data should be available on a delivery platform already supported by NODE.
 - Live Access Server (LAS)
 - CDMO Web Services
 - (Interfaces to other platforms will require additional development)