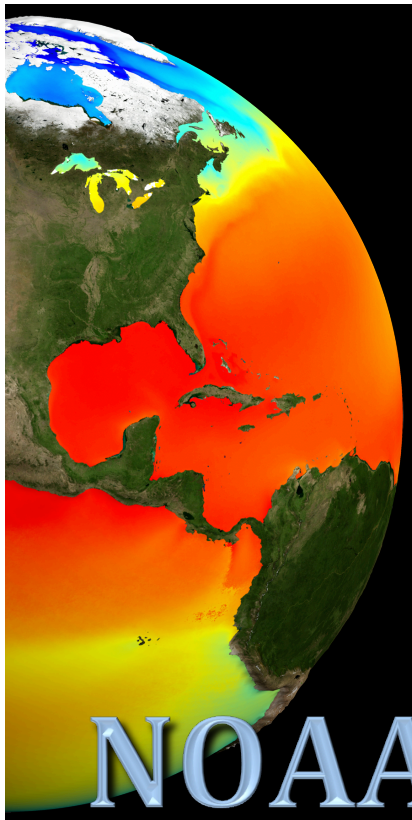


IMSG

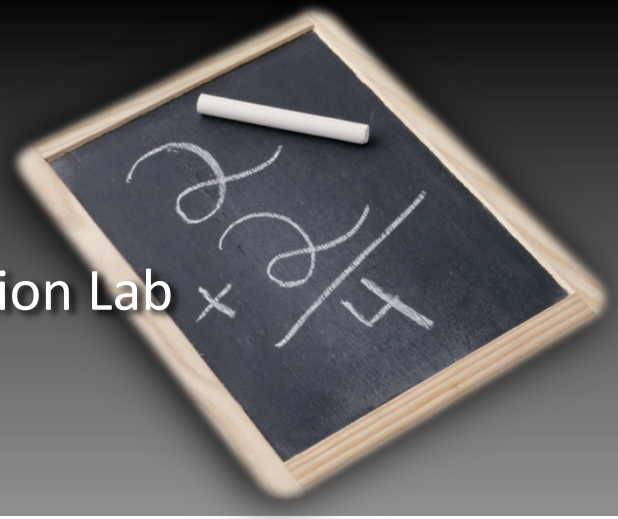
AMS 2009 – Phoenix, AZ – January 12

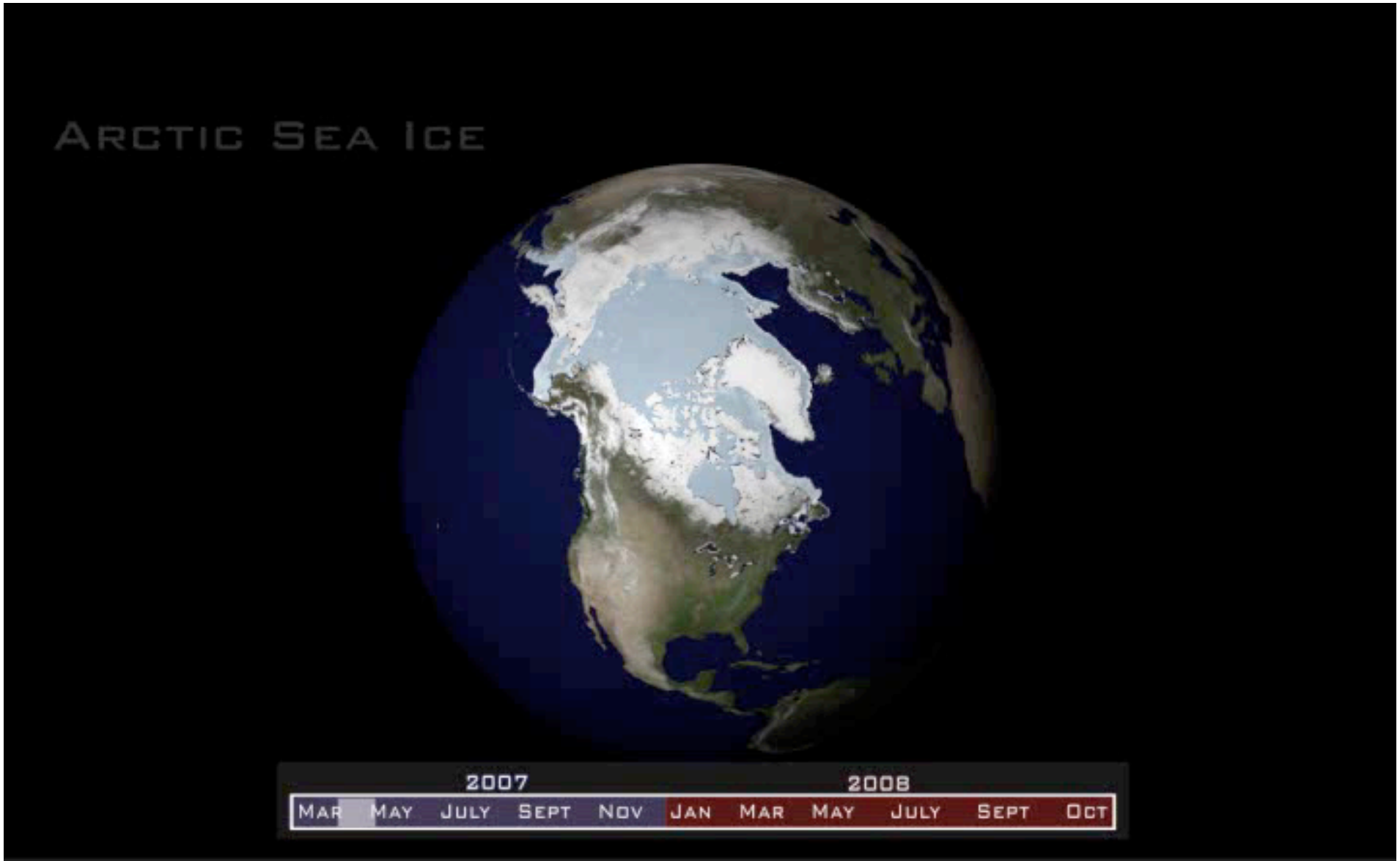
NOAA Data in the Classroom

Dan Pisut

NOAA Environmental Visualization Lab

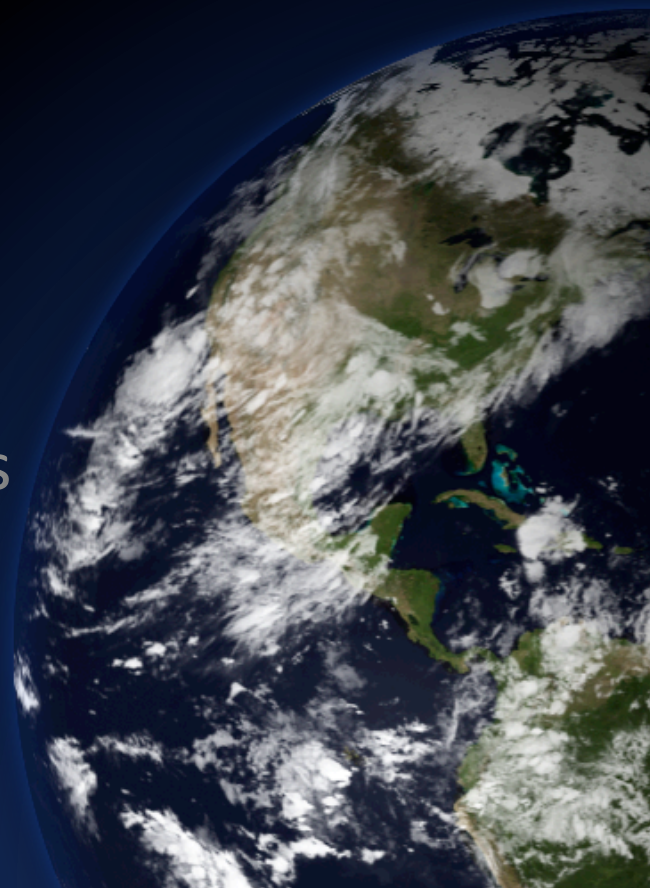
www.nnvl.noaa.gov





In 2007, the amount of sea ice in the Arctic Ocean was the lowest ever recorded since satellite measurements began in 1979.

- Hypothesis testing
  - Hurricane models
- Random sampling and replication
  - Argo float data
- Variability and graphing
  - NOAA surface weather data and climate trends
- Average and deviation
  - SST data, anomaly, and coral stress

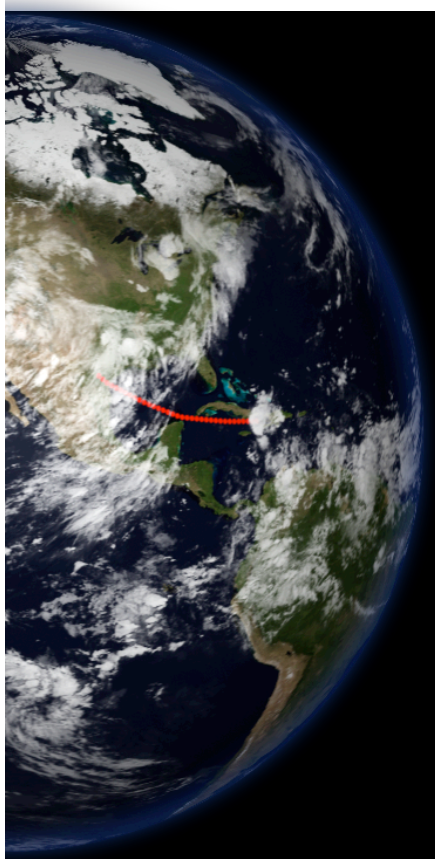


Activity 1: Testing hypotheses

- Observe weather patterns and make own hypotheses
- Develop a prediction about what will happen
- Provide alternative hypotheses

Data Portal 1: You need hurricane data?

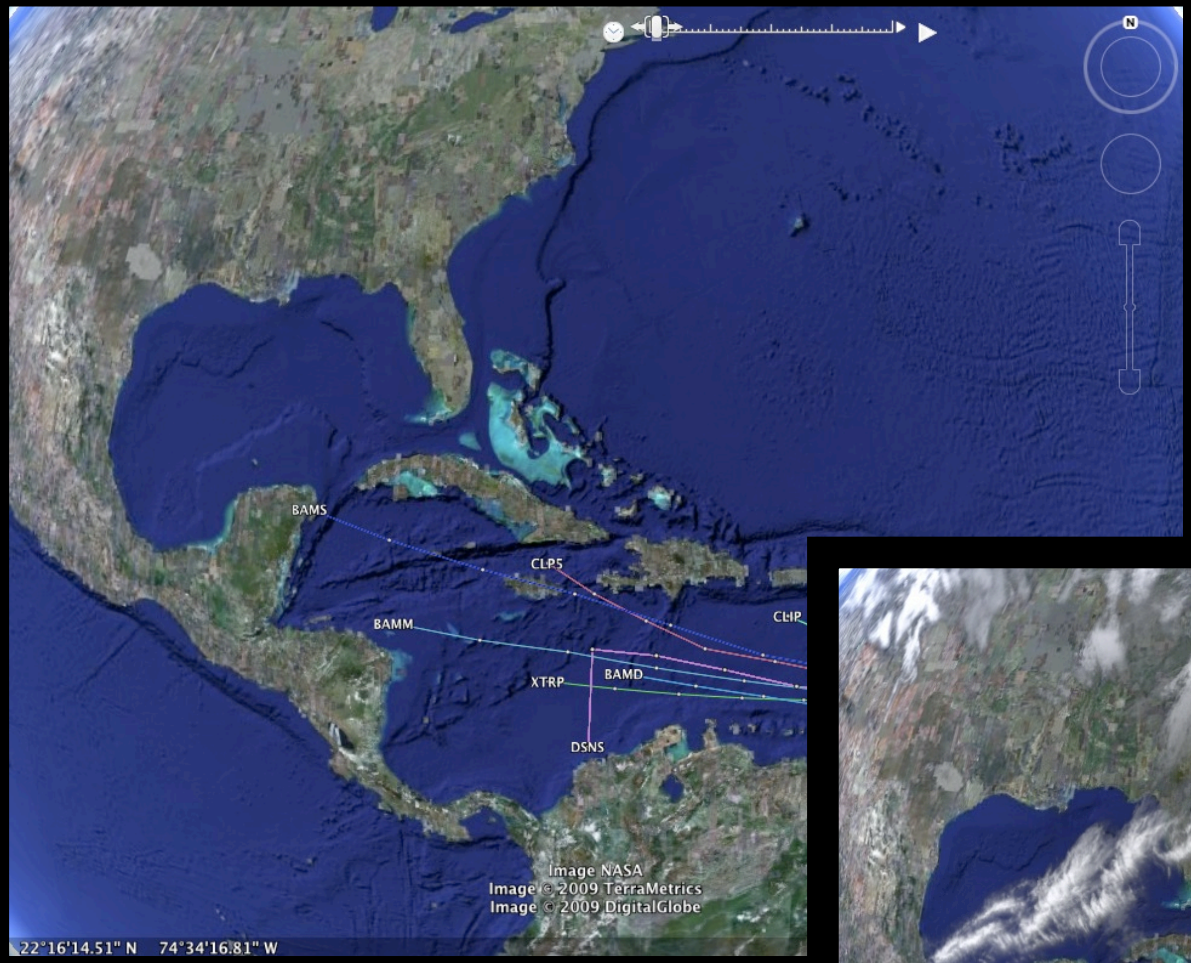
- Show hurricane model projections
- Visualize current storm positions
- Compare projections to actual storm course

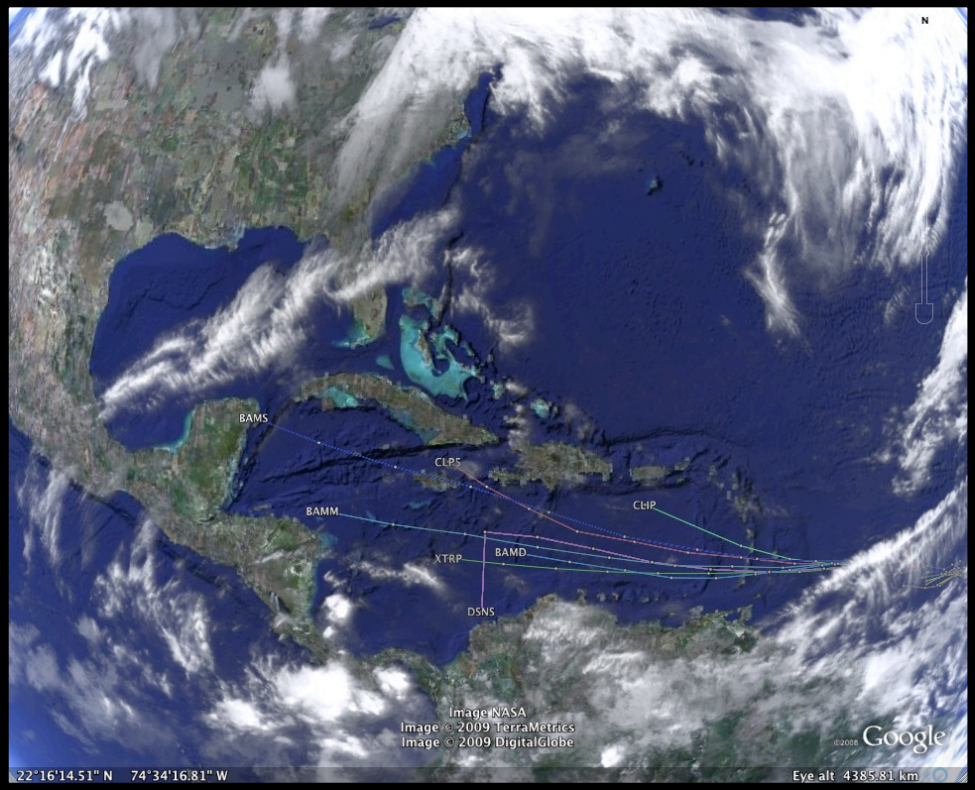


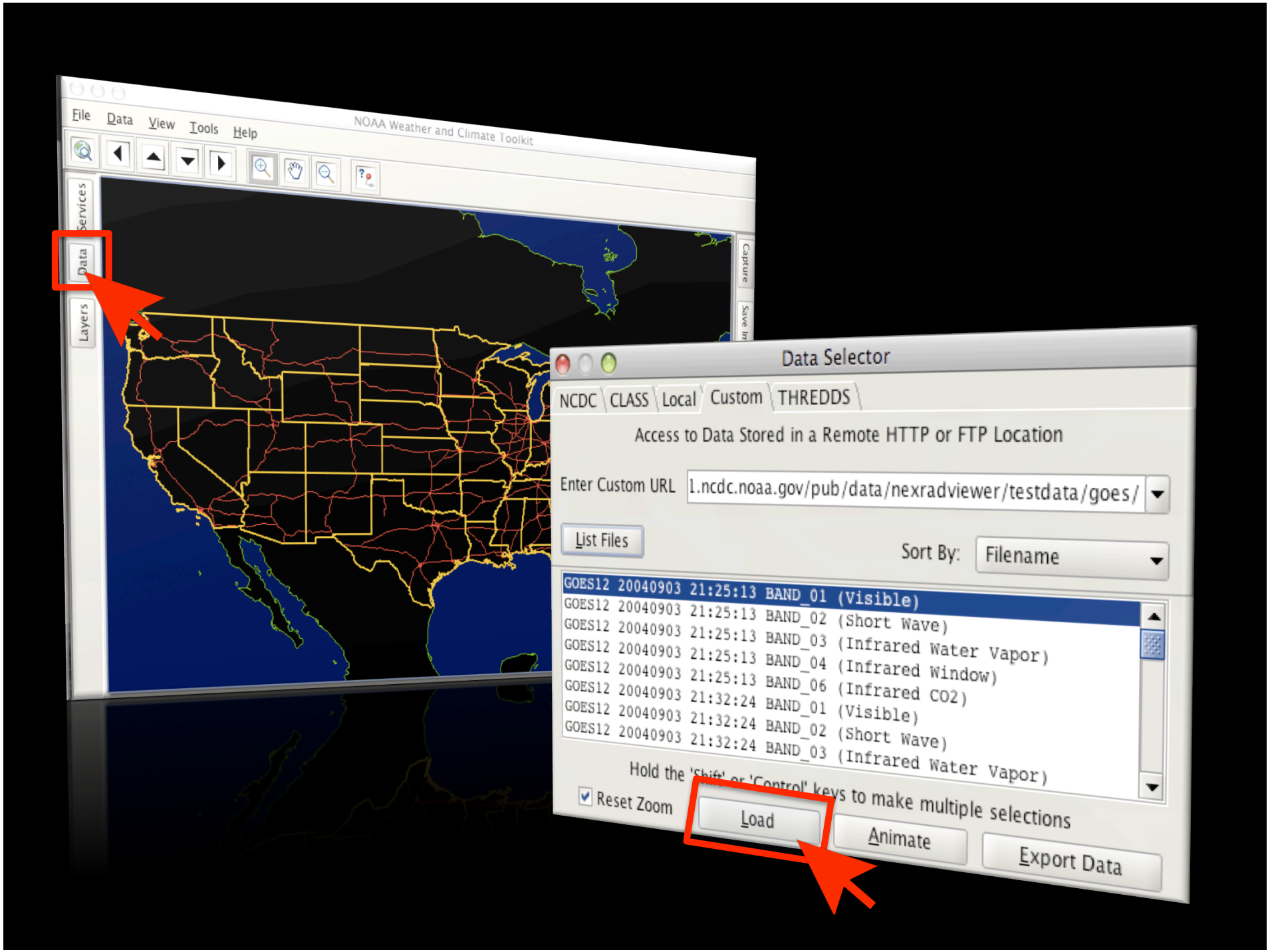
Solution

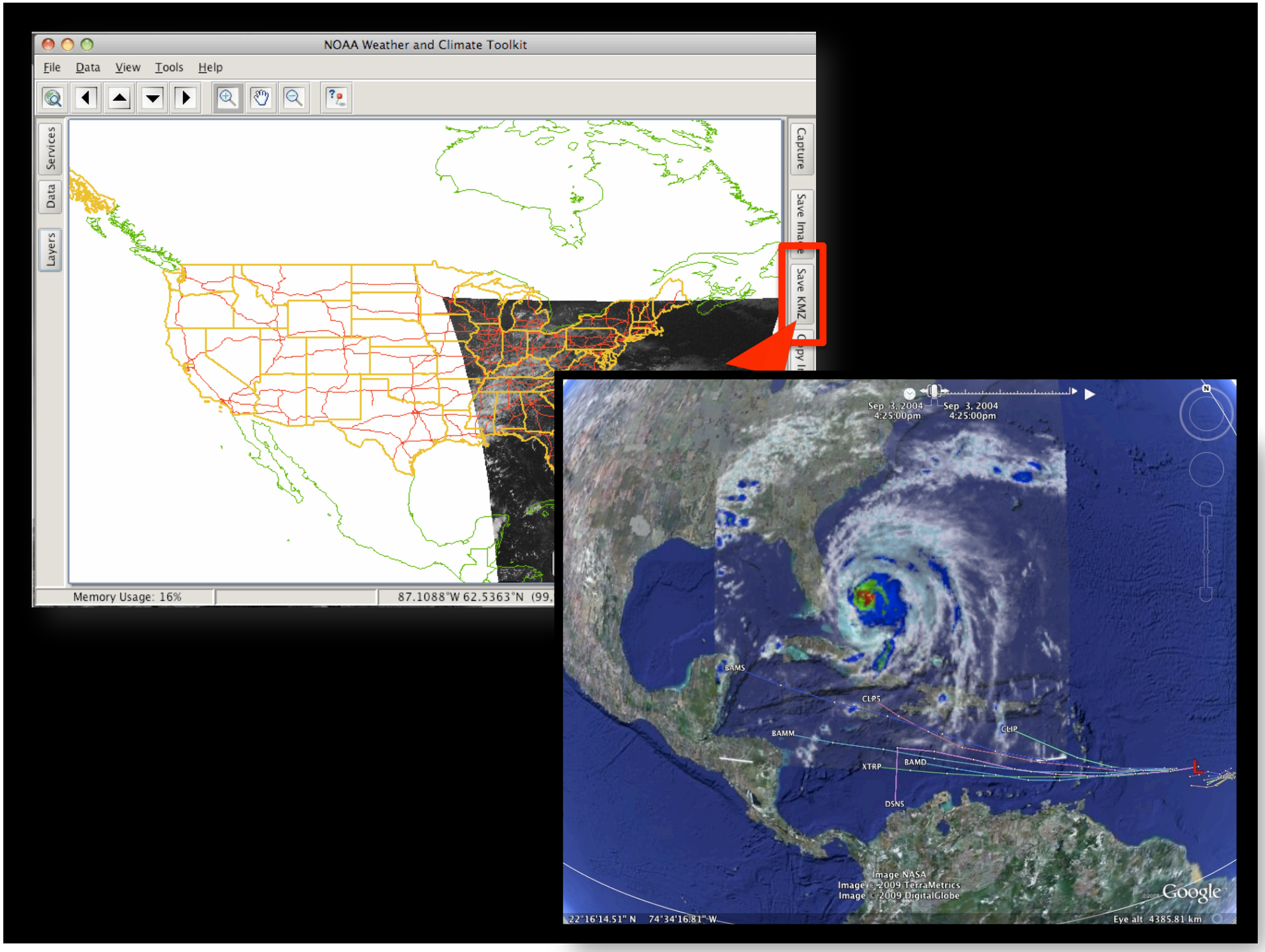
TropicalAtlantic.com hurricane models on Google Earth

Data from CLASS visualized with NOAA's Climate and Weather Toolkit


BAMS
CLP5
CLIP
BAMM
BAMD
XTRP
DSNS
Image NASA
Image © 2009 TerraMetrics
Image © 2009 DigitalGlobe
22°16'14.51" N 74°34'16.81" W


BAMS
CLP5
CLIP
BAMM
BAMD
XTRP
DSNS
Image NASA
Image © 2009 TerraMetrics
Image © 2009 DigitalGlobe
Google
22°16'14.51" N 74°34'16.81" W
Eye alt 4385.81 km


File Data View Tools Help
NOAA Weather and Climate Toolkit
Services
Data
Layers
Capture
Data Selector
NCDC CLASS Local Custom THREDDS
Access to Data Stored in a Remote HTTP or FTP Location
Enter Custom URL
1.ncdc.noaa.gov/pub/data/nexradviewer/testdata/goes/
List Files
Sort By:
Filename
GOES12 20040903 21:25:13 BAND_01 (Visible)
GOES12 20040903 21:25:13 BAND_02 (Short Wave)
GOES12 20040903 21:25:13 BAND_03 (Infrared Water Vapor)
GOES12 20040903 21:25:13 BAND_04 (Infrared Window)
GOES12 20040903 21:25:13 BAND_06 (Infrared CO2)
GOES12 20040903 21:32:24 BAND_01 (Visible)
GOES12 20040903 21:32:24 BAND_02 (Short Wave)
GOES12 20040903 21:32:24 BAND_03 (Infrared Water Vapor)
Reset Zoom
Load
Animate
Export Data

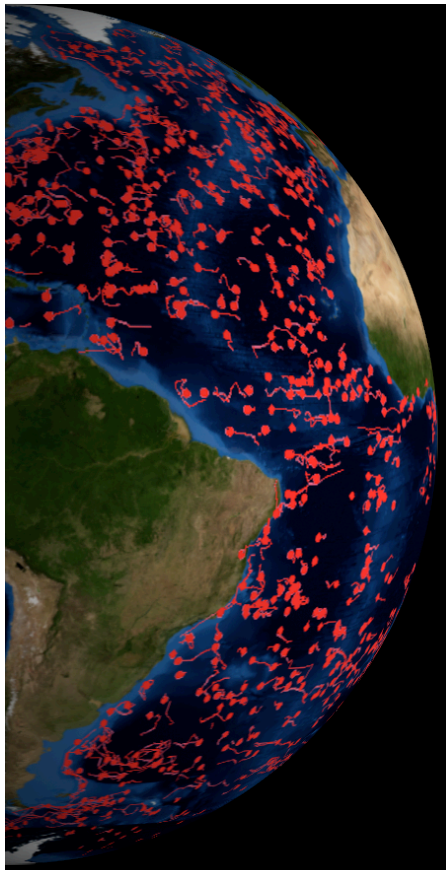

NOAA Weather and Climate Toolkit
File
Data
View
Tools
Help
Services
Data
Layers
Capture
Save Image
Save KMZ
Memory Usage: 16%
87.1088°W 62.5363°N (99,
Sep 3, 2004
4:25:00pm
Sep 3, 2004
4:25:00pm
BAMS
CLP5
BAMM
CLIP
XTRP
BAMD
DSNS
Image NASA
Image © 2009 TerraMetrics
Image © 2009 DigitalGlobe
Google
22°16'14.51" N 74°34'16.81" W
Eye alt 4385.81 km

Activity 2: Experimental design

- Demonstrate random sampling
- Difference between replication and pseudo-replication
- Teach properties of physical oceanography
  - Temperature
  - Dissolved gases
  - Nutrient concentration
- Plotting coordinates

Data Portal 2: You need Argo data?

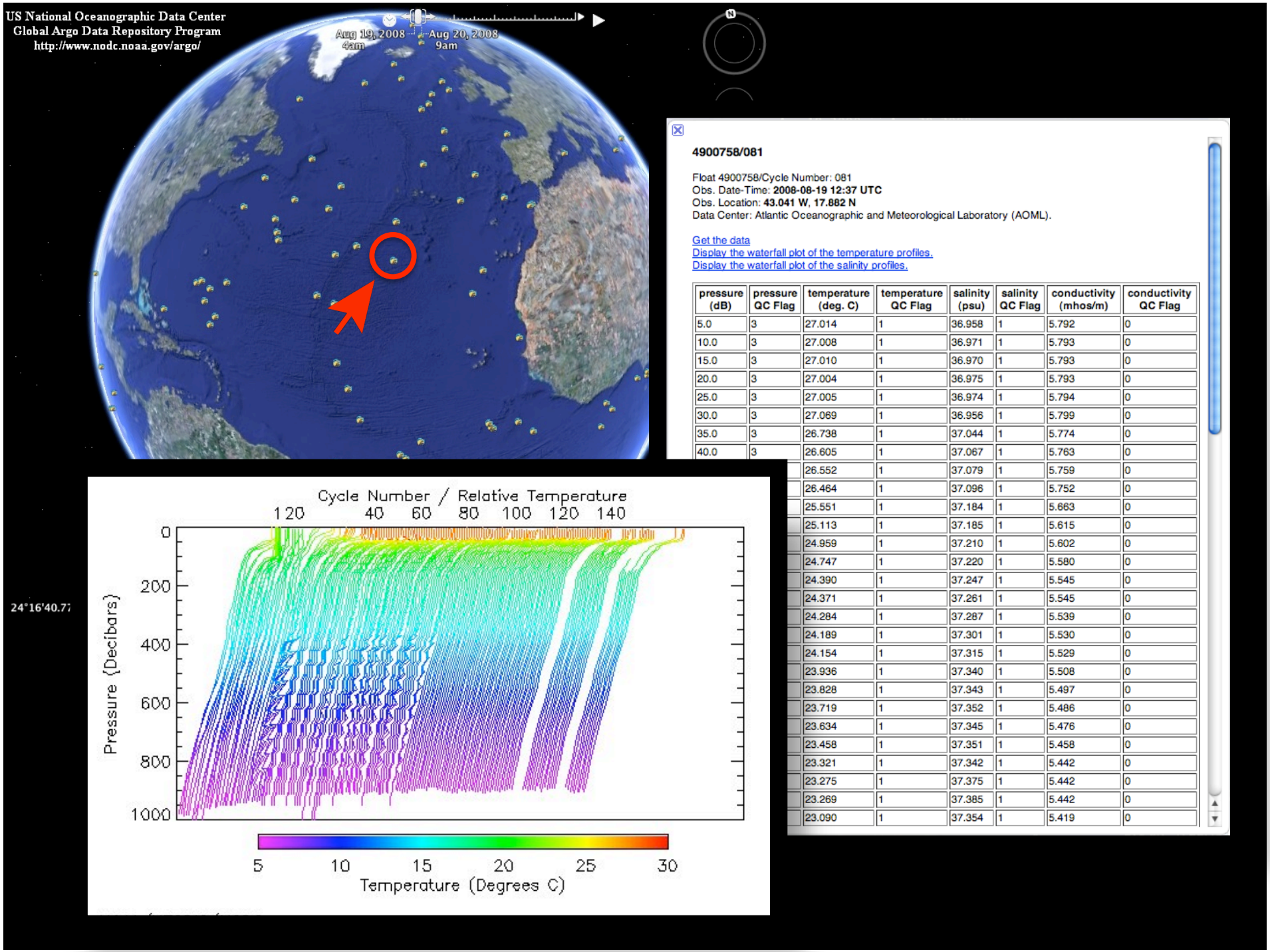
- Positions in time
- Current data collected
- NODC buoy archive is somewhat daunting



Solution

Argo float data from the

National Buoy Data Center on Google Earth



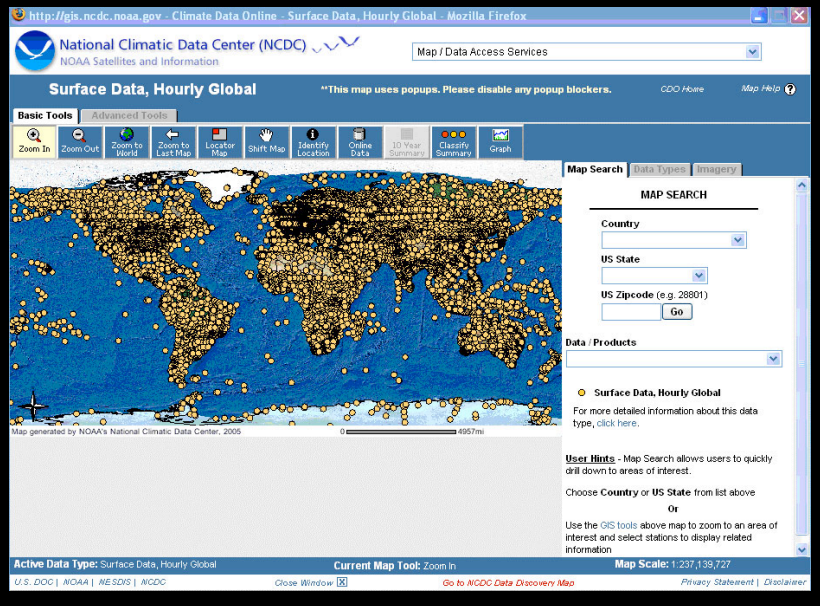
pressure (dB)	pressure QC Flag	temperature (deg. C)	temperature QC Flag	salinity (psu)	salinity QC Flag	conductivity (mhos/m)	conductivity QC Flag
5.0	3	27.014	1	36.958	1	5.792	0
10.0	3	27.008	1	36.971	1	5.793	0
15.0	3	27.010	1	36.970	1	5.793	0
20.0	3	27.004	1	36.975	1	5.793	0
25.0	3	27.005	1	36.974	1	5.794	0
30.0	3	27.069	1	36.956	1	5.799	0
35.0	3	26.738	1	37.044	1	5.774	0
40.0	3	26.605	1	37.067	1	5.763	0
		26.552	1	37.079	1	5.759	0
		26.464	1	37.096	1	5.752	0
		25.551	1	37.184	1	5.663	0
		25.113	1	37.185	1	5.615	0
		24.959	1	37.210	1	5.602	0
		24.747	1	37.220	1	5.580	0
		24.390	1	37.247	1	5.545	0
		24.371	1	37.261	1	5.545	0
		24.284	1	37.287	1	5.539	0
		24.189	1	37.301	1	5.530	0
		24.154	1	37.315	1	5.529	0
		23.936	1	37.340	1	5.508	0
		23.828	1	37.343	1	5.497	0
		23.719	1	37.352	1	5.486	0
		23.634	1	37.345	1	5.476	0
		23.458	1	37.351	1	5.458	0
		23.321	1	37.342	1	5.442	0
		23.275	1	37.375	1	5.442	0
		23.269	1	37.385	1	5.442	0
		23.090	1	37.354	1	5.419	0

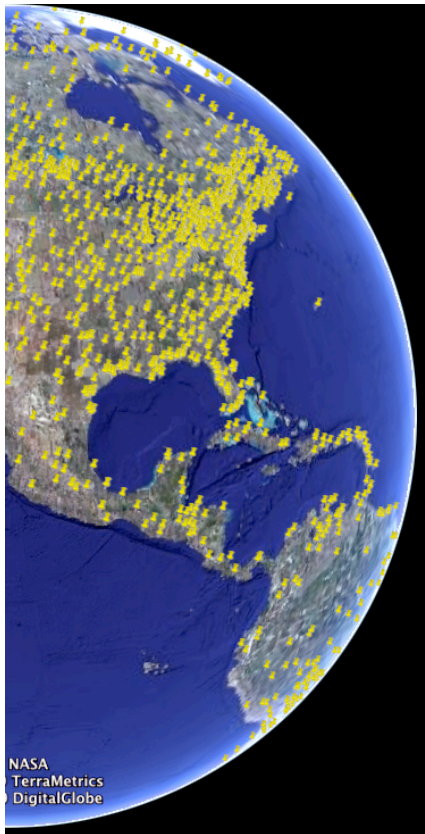
Activity 3: Variability and graphing

- Teach data collection
- Compare results to forecasts and “official” observations
- Use time series for data analysis and graphing exercises

Data Portal 3: You need temperature?

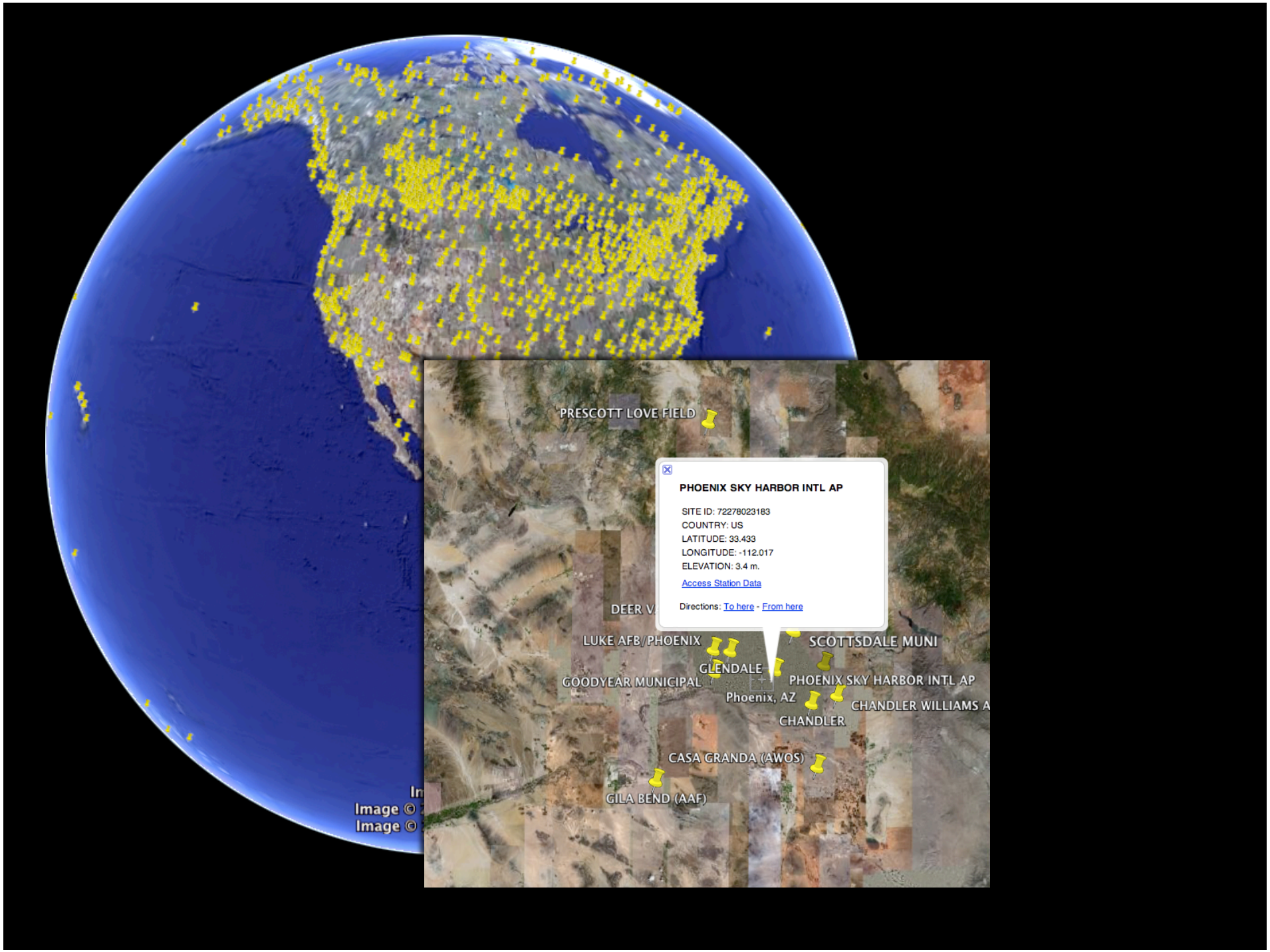
- NCDC’s Global Summary of the Day

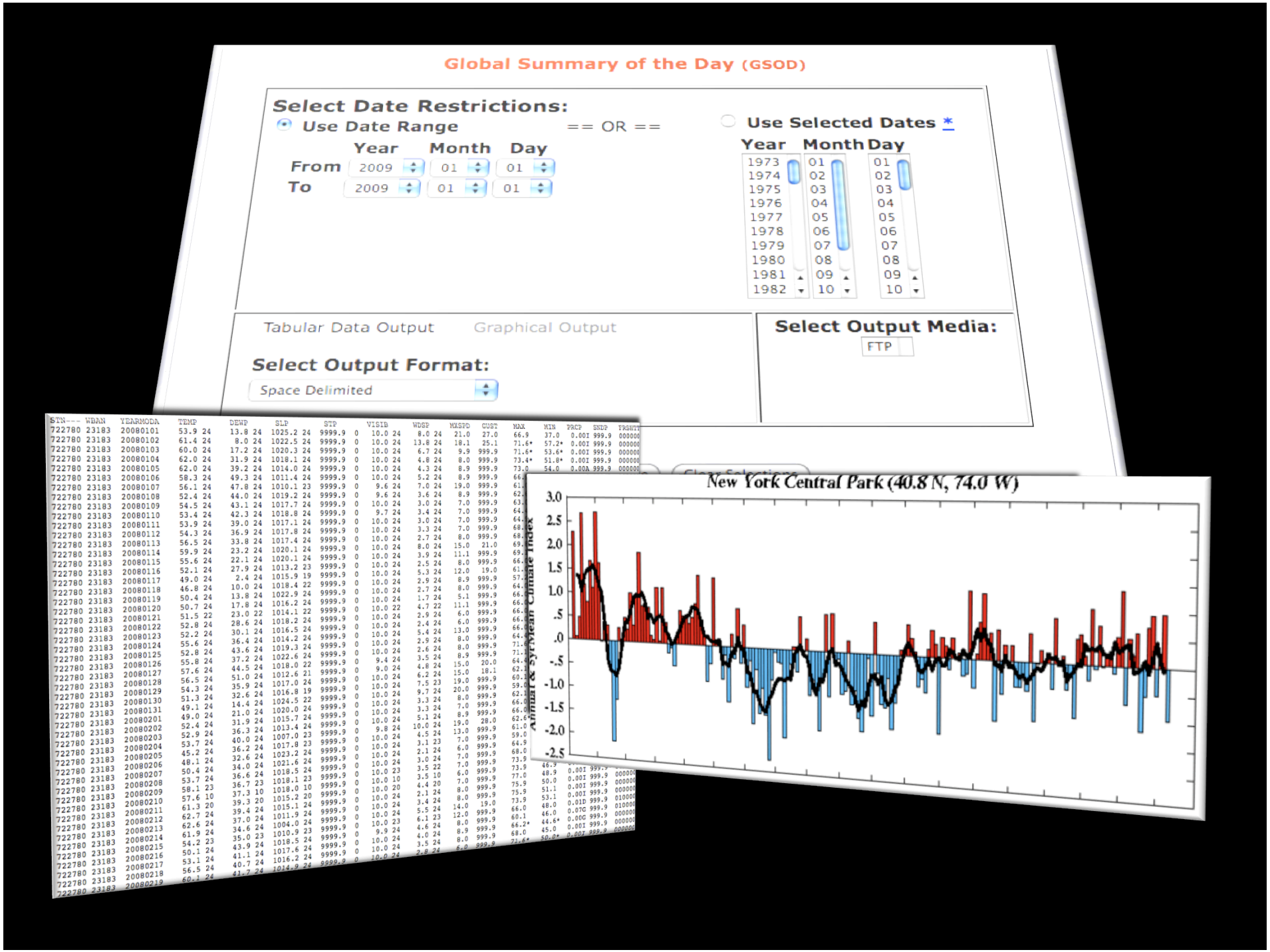




Solution

NCDC's GSOD data on Google Earth


PRESCOTT LOVE FIELD
PHOENIX SKY HARBOR INTL AP
SITE ID: 72278023183
COUNTRY: US
LATITUDE: 33.433
LONGITUDE: -112.017
ELEVATION: 3.4 m.
Access Station Data
Directions: To here - From here
DEER V
LUKE AFB/PHOENIX
SCOTTSDALE MUNI
GLENDALE
GOODYEAR MUNICIPAL
PHOENIX SKY HARBOR INTL AP
Phoenix, AZ
CHANDLER WILLIAMS A
CHANDLER
CASA GRANDA (AWOS)
GILA BEND (AAF)
Image ©
Image ©

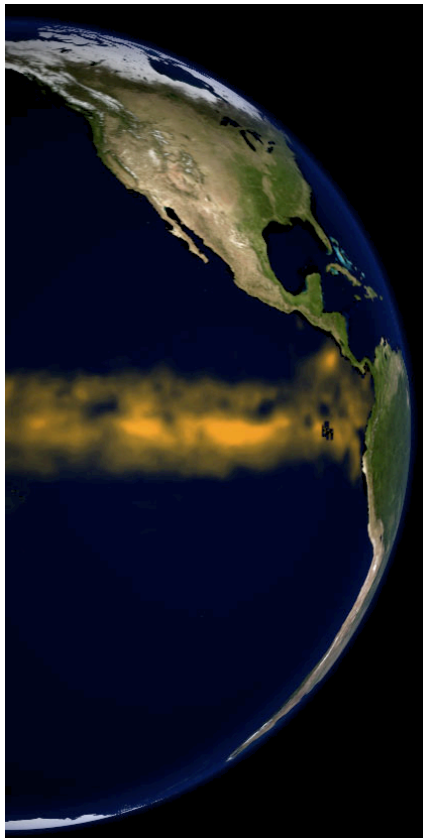

Global Summary of the Day (GSOD)
Select Date Restrictions:
Use Date Range
== OR ==
Use Selected Dates *
Year Month Day
From 2009 01 01
To 2009 01 01
Tabular Data Output
Graphical Output
Select Output Format:
Space Delimited
Select Output Media:
FTP
New York Central Park (40.8 N, 74.0 W)
Annual & 5yr Mean Climate Index

Activity 4: Data analysis

- Interpret false-color data
- Perform statistical analyses such as average and deviation
- Propose rationales for correlations in data

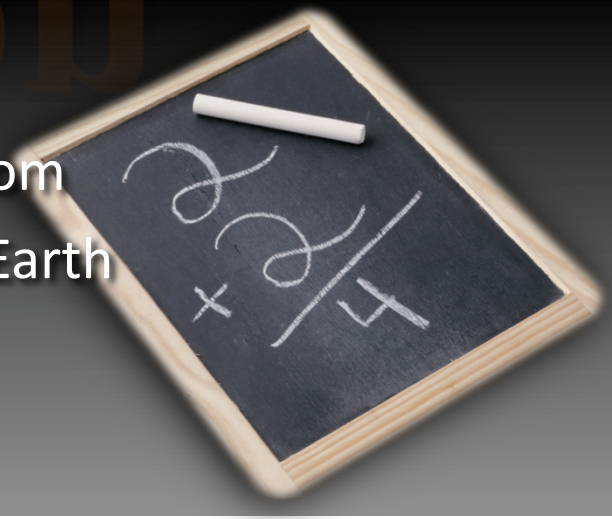
Data Portal 4: You need remotely sensed SST?

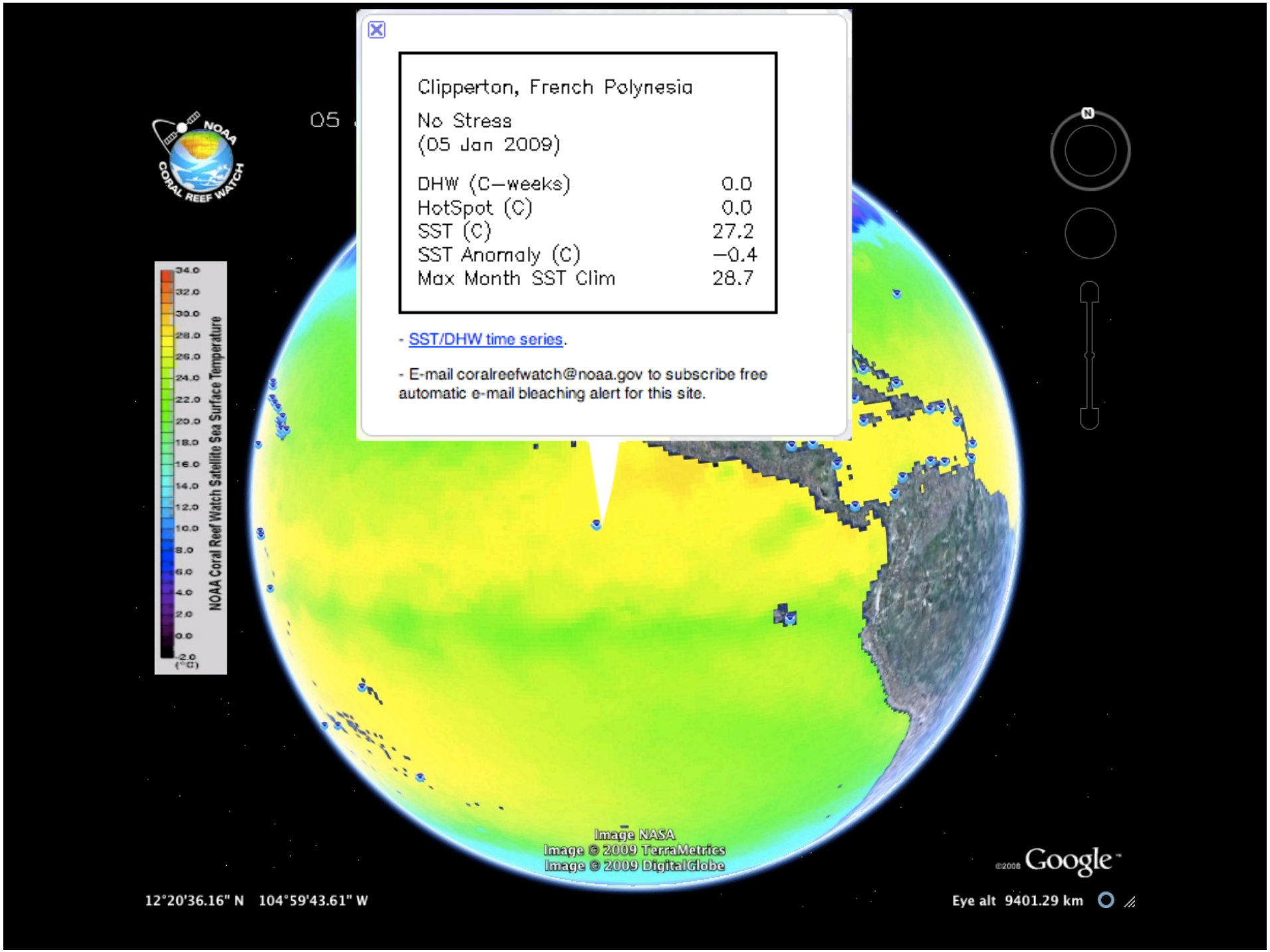
- Current SST and anomaly data
- Ability to get actual point measurements



Solution

Ocean temperature data from
Coral Reef Watch on Google Earth




Clipperton, French Polynesia
No Stress
(05 Jan 2009)
DHW (C-weeks) 0.0
HotSpot (C) 0.0
SST (C) 27.2
SST Anomaly (C) -0.4
Max Month SST Clim 28.7
- SST/DHW time series.
- E-mail coralreefwatch@noaa.gov to subscribe free automatic e-mail bleaching alert for this site.
NOAA CORAL REEF WATCH
NOAA Coral Reef Watch Satellite Sea Surface Temperature
34.0
32.0
30.0
28.0
26.0
24.0
22.0
20.0
18.0
16.0
14.0
12.0
10.0
8.0
6.0
4.0
2.0
0.0
-2.0
(°C)
Image NASA
Image © 2009 TerraMetrics
Image © 2009 DigitalGlobe
©2008 Google
12°20'36.16" N 104°59'43.61" W
Eye alt 9401.29 km

Links to Google Earth files and other resources

- NOAA Evironmental Visualization Lab
  http://www.nnvl.noaa.gov
- NCDC's global surface observation data
  http://gis.ncdc.noaa.gov/aimstools/kml/gsod.kmz
- Tropical Atlantic hurricane model plots
  http://www.tropicalatlantic.com/plots/ge/Atlantic-Spaghetti.kmz
- NCDC's Weather and Climate Visualization Kit
  http://www.ncdc.noaa.gov/oa/wct
- Comprehensive Large Array-data Stewardship System (CLASS)
  http://www.class.noaa.gov
- NODC's Argo float data
  http://www.nodc.noaa.gov/argo/data/kmz/argo_latest.kmz
- Coral Reef Watch's SST and derived products
  http://coralreefwatch.noaa.gov/satellite/ge/products/CRWGE_CurrentProducts.kmz

Thank You

NOAA Data in the Classroom
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dan.pisut@noaa.gov
www.nnvl.noaa.gov