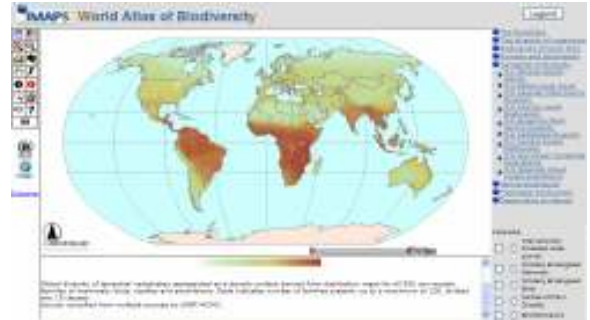


## GIS across the Curriculum - Nothin' But Net! 2008

### *Biology: Evolution*

#### 1. United Nations Environment Program

<http://www.unep-wcmc.org/>



On the left side click the Interactive Maps

Choose the Biodiversity link

Expand the Terrestrial biodiversity menu click the Vertebrate Diversity

What type of Biome seems to support the greatest vertebrate diversity?

Expand the Freshwater biodiversity choose Fresh Water Fish diversity

Any thoughts why the Amazon has greater diversity than similar biomes around the world?

Choose the Vascular Plant Family diversity

What area has a particularly high level of diversity?

What speciation pressure could be responsible for this richness?

Genetic Drift, Competition for resources, Parallel Evolution,  
Diverse geography that encouraged niche specialization,  
Existence at a time as an isolated ecosystem?

Do vascular plants seem to have been given advantages in the same geographies as flowering plants? What might be reasons for this?

Switch to flowering plant diversity

What would give flowering plants such an edge in central America?

How was this region formed over geologic time that might enhance flowering plants ability to "set up shop" in this bioregion?

## Geography: Ocean Currents, Climate, Ocean-Land Interactions

### 2. Climate and ocean currents

<http://neo.sci.gsfc.nasa.gov/>

NASA NEO

Click on the September 1 - October 1 blue marble link

Zoom plus button twice

Switch to Pan tool

What are the basic colors in the image?

Are there patterns in these colors?

What color predominates along the equator?

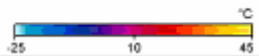
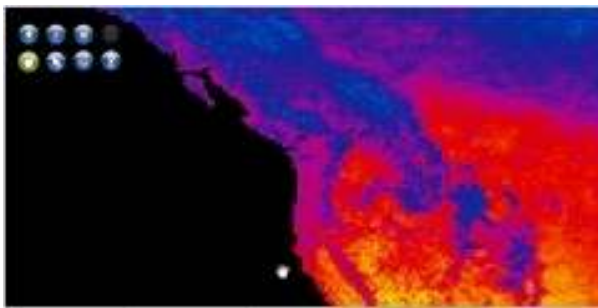
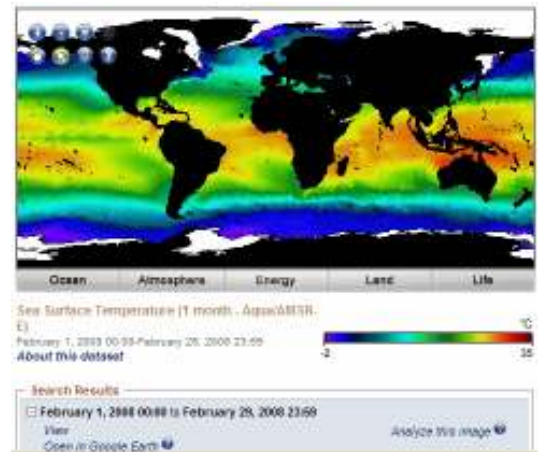
What color do you find directly above this band?

What do you think is the reason for this?

Are there any other places that have the same look as the equator?

Switch to Ocean Tab and choose Sea Surface Temperature (MODIS)

See how many global ocean currents you can find.



### 3. Geography - Orographics

<http://neo.sci.gsfc.nasa.gov/>

Click on the Energy Tab to choose Land Surface Temperature [Day]

To answer the following questions, using the legend scale on the lower right.

Focus on the Washington Oregon coast

GIS Across the curriculum: Nothin' But Net  
Roger & Anita Palmer  
GISetc: Educational Technology Consultants

What is the average air temp coming off the ocean?  
 What happens to the temperature of the air as it passes over the peaks ranging from 3,000 - 4,000m?  
 If a fixed volume of air experiences a pressure drop from 1 atm to 0.8 atm estimate how much you could expect the air temp to drop?  
 From the image, estimate the total temperature drop.  
 Where could the extra heat have come from?

On the other side of the mountain, the air returns to its original pressure.  
 What has happened to its temperature since leaving the coast?  
 What is this heat known as?

### *Geology, Physical Geography & Chemistry: Minerals*

#### 4. Mineral Resources Data Base for Chemical Stories and Geographies

<http://mrddata.usgs.gov/>

Click on North America Map Browser  
 Click on Geochemistry  
 Make visible and active the US Geochemical Survey layer

Zoom in to southern California

Use the Identify tool to choose several sites of local interest

At the bottom, elemental concentrations in the soil are listed

Click on the word geochemical survey

Click on Database: Field Categories link

Click on Analyses by ICP/Acid Dissolution

Choose an element you are interested in and click on the lower 48 states

Investigate the following elements and describe their distribution:

- K - Potassium
- Ca - Calcium
- P - Phosphorus
- Ag - Silver
- Pb - Lead



## *Environmental: Water use across the US*

5. National Atlas <http://nationalatlas.gov>

Click on Map Maker

Click on Water (right arrow)

Choose Total Ground Water Withdrawals  
Fresh and Saline

Click on Redraw Map button

Can you outline the Ogallala Aquifer?

Turn aquifer layer on and Redraw map to check your answer

Based on the location of water use, what sector of the population uses  
ground water most? (commercial, agricultural, domestic)?



## *Earth Science: Earth's Place in the Universe*

6. Planetary Interactive GIS on the Web Analyzable Database (Pigwad)

<http://webgis.wr.usgs.gov/>

Click on PIGWAD Maps

Click on Mars image

Pick an Interface

Beginner - Launch Mars General

Intermediate - Geology Viewer

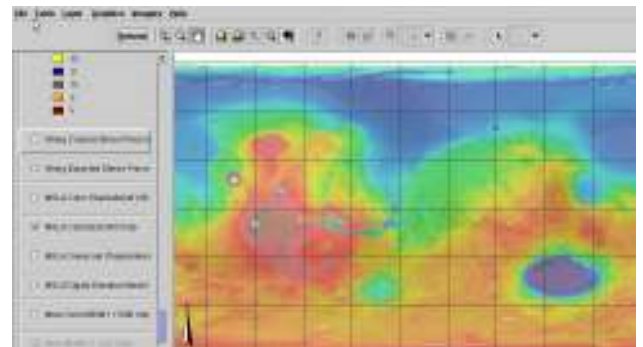
Advanced- Internet Explorer

Research the following questions:

Is there evidence of water on Mars?

Are the features new or old?

Find four landforms that are similar to what you would find on Earth



## Biology: Epidemiology

### 7. Tracking the spread of disease

National Atlas: <http://nationalatlas.gov>



Click on Map Maker

Click on People

Choose 2000 West Nile virus

Click on Redraw Map button

Where do you think West Nile established itself in the US?

Turn off the 2000 before choosing 2001 and redraw

Describe the spread of West Nile between these years?

Turn off the 2001 before choosing 2002 and redraw

How would you describe where West Nile is spreading?

What ways can disease can spread? (These are known as vectors)

Compare the remaining years (2003 and 2004)

What areas would you expect West Nile to impact next?

Should Asia be concerned about West Nile's approach?

Can they do anything to prevent it?

## *Investigation and Experimentation*

### 8. National Earthquake Information Center

[http://neic.usgs.gov/neis/epic/epic\\_global.html](http://neic.usgs.gov/neis/epic/epic_global.html)

<http://www.arcwebservices.com/awx/index.jsp>

Choose the Spreadsheet format

Fill in dates in Optional Search Parameters

Submit Search

Highlight Earthquakes starting with the header row

Right click and Copy the text

Open and Paste into Excel

Click on Data/Text to Columns

Choose Delimited

Click on Comma Delimiter then on the Next button

Click to Finish the text import

Delete "(hhmmss.mm)UTC" from the header row

Highlight the lat and lon columns to make sure they are formatted as numbers with 2 decimal places.

Save file as Excel document

Open up ArcWeb Explorer

Click on Find (Look for the Excel File widget)

Browse to the Excel file you just created and Click okay

Turn on Satellite photo

Zoom in to a specific set of earthquakes

What patterns can you recognize from the satellite views of these areas?

Is there evidence in the satellite view of what caused the buildup of the stress that was released in this earthquake?

What types of landforms appear to be created in earthquakes areas?

What is the closest set of cities to these earthquakes?

What types of natural resources would draw people to live near earthquake zones?

## 9. Whalenet Ocean Animal Tracking

<http://whale.wheelock.edu/Welcome.html>

<http://www.arcwebservices.com/awx/index.jsp>

Find an animal of interest: Grey Seal (Recently Tagged)

Copy the location information and paste first to notepad

Find and replace all unnecessary letters with commas

Finish by replacing all spaces with commas

Copy data from notepad and Paste the data into Excel

Click on first column of Data/Choose Data pull down and Text to Columns

Choose Delimited

Click on Space as a Delimiter and click on Next

Click on Finish

Make sure there is a field name for each column

Format the Lat & Lon field as Numbers with 3 decimal places

Save file as GreySeal.xls document on your C drive (someplace easy to find)

Open up ArcWeb Explorer

Click on Find widget/Click the Excel button

Browse to the Excel file you just created

Click on okay

Turn on Satellite photo

What can you tell about this animal from its position:

What was the date range for which you mapped your animal?

Does this animal have much of a range?

Does this prove for sure that the animal doesn't migrate?

What other timed data would you need to answer this?

Does the animal spend more time someplace in its range?

Why would it choose this place to spend more time?

## *Literature takes place in local geographies*

### 10. Google Literature Trips

[www.googlelittrips.org](http://www.googlelittrips.org)

Click on the 9-12 link

Scroll down to the last entry (first chronological entry) The Illiad

Click on the link and then onto the image to download the KML file



If you have google earth installed, you will spin to the extent of the journey  
These files also open in ArcGIS explorer - ESRI's free virtual globe.

Double clicking on any point allows you to zoom to each event in the journey  
If you Right click copy the file then paste in a second version

Right click each stopping point and rename them with a single space.  
This will create an unlabeled version you can use to quiz your students.  
Uncheck your original Layer to turn these labels off and make a clean map.  
Students can print out this map at it's greatest extent to describe the journey as they read and take notes along the way.

Use this map to project on screen in class and have students describe what happened in various locations as a refresher before starting more in depth analysis of your stories.

## *Geography - Population Dynamics*

### 10. World Demographics with animated graphs

[www.gapminder.org](http://www.gapminder.org)



Clicking on the Gapminder World in the upper right allows you to watch time animated graphs of variables you choose along the x and y axis.

The videos section shows the original author teaching concepts with the graphs

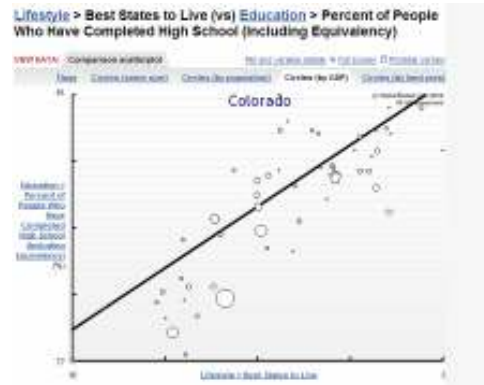
The downloads area is an animated slide show explaining what these demographic variables mean in powerful ways.

## 11. National Demographic Statistics

[www.nationmaster.com](http://www.nationmaster.com)

## 12 U.S. State statistics

[www.statemaster.com](http://www.statemaster.com)



Statemaster and Nationmaster are fantastic sites to explore relationships between thousands of variables that are sure to interest your students. From the grizzly most murderous states to the best states to live in, students can explore through correlation what factors correlate to each other. Students are literally drawn in to discovering relationships between state social and demographic factors.

## 13. Demographic Statistics for finer geographic and historic detail:

[www.socialexplorer.com](http://www.socialexplorer.com)