NIMBLE AND ACTIVE: USING TECHNOLOGY TO RESPOND TO REAL WORLD EVENTS IN A CHANGING CLIMATE

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Teaching PLACE: Using technology and professional wisdom to uncover the interrelationships between natural and built systems
Champlain Basin Education Initiative – Keynote – 24 January 2015
MOTIVATION
STUDENTS IN GENERAL – ESPECIALLY TERTIARY

• declining familiarity with basics
• inability to conceptualise in 3-D space
  • multi-level ozone
  • atmospheric stability, circulation
STRATOSPHERIC VS. TROPOSPHERIC OZONE

Figure 4.10 The two layers of the atmosphere where high concentrations of ozone occur. One layer is at high altitudes and absorbs UV radiation from the Sun. Most of this ozone is concentrated in the ozone layer. The second layer occurs in the lower part of the atmosphere and is associated with pollution, particularly chemical smog in cities.
STUDENTS IN GENERAL – ESPECIALLY TERTIARY

- declining familiarity with basics
- inability to conceptualise in 3-D space
  - multi-level ozone
  - atmospheric stability, circulation
- lack of critical thinking skills & ability to make connections
- abstract concepts are challenging
- lack of basics in the tertiary curriculum
WHAT ARE THE SYMPTOMS?

• “Ozone hole causes global warming and ice cap melt”

• weather = climate = climate change

• urban sprawl, deforestation & canal dredging are evidence of climate change
OUTLINE

• VT State Standards → Common Core → NGSS
• Technology continuum
• keeping up with the apps
• Geospatial technologies
• tapping into federal resources
• using current events
• What’s SWAC got to do with it?
TECHNOLOGY CONTINUUM

- lower tech
  - daily observations
  - fieldwork
  - stereoscopic viewing
  - frisbees
  - digital photography
  - role playing
  - art

- medium tech
  - balloon launches, unmanned aerial vehicles (UAVs)
  - geocaching

- higher tech
APPS & SOCIAL MEDIA AT YOUR SERVICE
HOW OLD IS TWITTER?
US National Weather Service Burlington VT

To connect with US National Weather Service Burlington VT, sign up for Facebook today.

Sign Up  Log In

It's looking like a near miss for us on Saturday with low pressure moving up the East Coast. However, a swath of heavier snow confined to parts of southern New England and coastal sections of New Hampshire and Maine. Cold front moves down from Canada Saturday night and brings snow showers to northern New York and Vermont. Cold air returns Sunday.

Total Snow Forecast - Valid Through January 25, 2015 7:00 PM EST

Cold front moves down from Canada Saturday night and brings snow showers to northern New York and Vermont. Cold air returns Sunday.
Help!!! Can you tell me if this weekend's storm will affect us?? (more in my area of Springfield, VT!!!) Thank you!!!

01-19-2015 @ 06:14 hrs Swanton Village 2.1 inches of snow

Heavy wet snow began at 7:15p, measured 1.5 in @10:10p 2 mi south of Danby Four Corners.

A dry night is expected as a system slides south and east of the North Country.

MODIS visible satellite picture at 250 meters resolution taken on 1/20/15 showing Lake Champlain ice coverage.

Lake Champlain Ice Coverage as of 01/20/2015
Explore

Images of Change

Climate Mobile Apps

Eyes on the Earth

http://climate.nasa.gov/earth-apps/
How Hot is Earth?
Take a look at the latest worldwide temperature trends and what they mean.
› Launch interactive

10 things you never knew about Earth
Discover some amazing and little-known facts about our home planet.
› View the slideshow

The Water Cycle
Follow the path of water in our climate system.
› Launch interactive

http://climate.nasa.gov/climate_resource_center/interactives
Air pollution reduction, northeastern United States

Nitrogen dioxide (NO2) is a yellow-brown gas that can cause respiratory problems, contribute to the formation of other pollutants, and serve as a proxy for air pollution in general. It is produced primarily during the combustion of gasoline in vehicle engines and coal in power plants. Thanks to regulations, technology improvements and economic changes, air pollution — including NO2 — has decreased despite an increase in population and number of cars on the roads. These images represent the improvement seen in the northeast corridor of the U.S., from Boston to Richmond, where some of the largest absolute changes in NO2 have occurred.
IPHONE APP - GEOLOCATING PHOTOS

Theodolite
By Hunter Research and Technology, LLC
Open iTunes to buy and download apps.

Description
... Holiday Sale 50% off! ... As seen in Apple's Special Event Keynote, Theodolite is a multi-function viewfinder that combines a compass, two-axis inclinometer, rangefinder, GPS, map, nav calculator, tracker, and geo-tag photo/movie camera into one indispensable app. Uses are endless, and the app is great for hiking, boating, hunting,

Hunter Research and Technology, LLC Web Site → Theodolite Support →

What's New in Version 4.0
ATTENTION IOS 8 USERS: When Theodolite launches in iOS 8 for the first time, iOS puts up a dialog asking you to give the app permission to access the camera. Many people are mistakenly clicking "no", which causes Theodolite to display a black camera view or simply not launch. If you have denied permission to access the camera, you can

...More

$3.99
Category: Navigation
Updated: Oct 02, 2013
Version: 4.0
Size: 2.3 MB
Language: English
Seller: Craig Hunter
© 2009-2014 Hunter Research and Technology LLC
Rated 4+

Compatibility: Requires iOS 7.0 or later. Compatible with iPhone, iPad, and iPod touch. This app is optimized for iPhone 5.

Also Included In

GEOSPATIAL TECHNOLOGIES
LEARNING PATHWAYS - Watch These Videos then try "Teaching with GIS"

Welcome to the Geospatial Revolution!

DOE's ESRI K-12 GIS website is the place to begin your journey into understanding location based technologies and learning new ways of engaging your students in Social Studies and STEM content using spatial technologies.

If you are new to GIS (geographic information systems) GPS (global positioning systems) or RS (remote sensing), the four videos by Penn State Public Broadcasting linked here, provide an excellent introduction to the spatial technologies that power today's smart phones, enable mobile business applications and can start K-12 students on a path that leads to a STEM (science, technology, engineering and mathematics) career.
In June 2013, President Obama announced the ConnectED initiative, designed to enrich K-12 education for every student in America. ConnectED empowers teachers with the best technology and the training to make the most of it, and empowers students through individualized learning and rich, digital content.

Preparing America’s students with the skills they need to get good jobs and compete with other countries relies increasingly on interactive, personalized learning experiences driven by new technology. Yet fewer than 40% of America’s schools have the broadband they need to teach using today’s technology. Under ConnectED, however, 99% of American students will have access to next-generation broadband by 2015. That connectivity will help transform the classroom experience for all students, regardless of income.

The President also directed the federal government to make better use of existing funds to get in broadband connectivity and educational technology into classrooms, and into the hands of teachers trained to make the most of them. And he called on businesses, states, districts, schools, and communities to support this, which requires no congressional action. Following the 2014 State of the Union address, the President announced major progress on the initiative, highlighting commitments by the FCC and the private sector.

How ConnectED Works

1. Upgrading Connectivity
2. Training Teachers
3. Encouraging Private-Sector Innovation

http://www.geomentors.net/
GIS MAPPING - NCDC

Daily Summary Observations

Temperature Average (°F)
January 13, 2015

https://gis.ncdc.noaa.gov/mapviewer/#app=clim&cfg=obs&theme=ghcn
IRENE’S RAINFALL COMPOSITE
28 AUGUST 2011
Home

AV Summary

AmericaView (AV) is a nationwide partnership of remote sensing scientists who support the use of Landsat and other public domain remotely sensed satellite data through applied remote sensing research, K-12 and higher STEM education, workforce development, and technology transfer. For a thorough description of our program, see the 2003 Feature Article in Photogrammetric Engineering and Remote Sensing, a publication of the American Society of Photogrammetry and Remote Sensing.

Funded by a grant from the U.S. Geological Survey, the AmericaView consortium is comprised of university-led, state-based consortia working together to sustain a network of state and local remote sensing scientists, educators, analysts, and technicians. Remote sensing, the process of detecting or monitoring the properties of an object without physical contact, is a ubiquitous part of 21st Century society and is used in a wide range of applications from business to the natural sciences.

Spotlight
AmericaView Winter Business Meeting at USGS HQ and Washington, DC on February 23-24

What have we been up to?
To read about what’s going on in AmericaView, click here to read our blog!

http://www.americaview.org/
Science On a Sphere® (SOS) is a room sized, global display system that uses computers and video projectors to display planetary data onto a six foot diameter sphere, analogous to a giant animated globe. Researchers at NOAA developed Science On a Sphere® as an educational tool to help illustrate Earth System science to people of all ages. Animated images of atmospheric storms, climate change, and ocean temperature can be shown on the sphere, which is used to explain what are sometimes complex environmental processes, in a way that is simultaneously intuitive and captivating.

http://sos.noaa.gov/What_is_SOS/index.html
IGLOBE

Bill Horn
iGlobe, Inc.
Bill@iglobeinc.com
USE OF GOVERNMENT RESOURCES
Global Science Investigator

This is an animated interactive that displays, on a Global Viewer, NOAA datasets on hazards, ocean, and climate. User can visualize data on phenomena such as hurricanes, humpback whale migrations, carbon tracker, sea ice extent, IPCC scenarios on global warming.

Go To:
http://www.csc.noaa.gov/psc/dataviewer/

NOAA Pacific Services Center

Notes From Our Reviewers

The CLEAN collection is hand-picked and rigorously reviewed for scientific accuracy and classroom effectiveness. Read what our review team had to say about this resource below or learn more about how CLEAN reviews teaching materials

Excellent quality, easy to use after initial fiddling/experimentation.

Animation can be paused over time to have students focus on one specific area

Grade Level:
Middle (6-8)
College Lower (13-14)
High School (9-12)
NOAA VIEW

http://www.nnvl.noaa.gov/view/
SIMULATED PRECIPITATION UNDER VERY HIGH GREENHOUSE GAS EMISSIONS
FIVE-YEAR GLOBAL TEMPERATURE ANOMALIES

NASA/Goddard Space Flight Center Scientific Visualization Studio

http://svs.gsfc.nasa.gov/cgi-bin/details.cgi?aid=4252&button=recent
USING CURRENT EVENTS
AIR QUALITY, HUMAN HEALTH ...

What If Every Volcano on Earth Erupted at Once?

By Becky Oskin, Senior Writer
January 12, 2015; 11:25 AM ET

Whether it's glowing lava snaking into the sea or lightning blooming in billowing ash clouds, the sight of an erupting volcano inspires awe and wonder.

Now imagine 1,550 of these suckers all shooting off at once. That's how many active volcanoes dot the Earth, plus an unknown number hidden under the ocean. Every day, between 10 and 20 volcanoes are erupting somewhere on Earth, but scientists say the chance of every volcano on the planet erupting at once is so small that it's impossible. But what if it did happen? Would Earth as we know it survive?

Not likely, said Parv Sethi, a geologist at Radford University in Virginia. Even if only the volcanoes on land blasted in sync, the effects would trigger an environmental domino chain many, many times more powerful than a nuclear winter, Sethi said. "Things will become so bad that I wouldn't want to survive on an Earth like this," he told Live Science. [Top 10 Ways to Destroy Earth]

The two big hazards from a worldwide volcanic cataclysm are ash and volcanic gases. (While the explosions and outpourings of lava would be deadly to people living close by, the number of deaths would pale compared to those caused by the ensuing climate change.)

Klyuchevskaya Volcano - Kamchatka, Russian Federation - Summer 1993. (Credit: Flickr/Giorgio Gregelli)
Blocking Pattern:
Last few weeks we have had an east coast trough & west coast ridge
SWAC’S USE OF TECHNOLOGY
SWAC IS...

- NSF-funded teacher professional development program
- in-service science & math teachers
- elementary, middle and high schools
- inquiry & project based learning
- STEM content knowledge & skills
  - climate, weather
  - engineering
  - geospatial technologies
WHY SWAC?

- varying student and teacher content knowledge
- curricular constraints
- role of the media or Internet
- gender difference in understanding
  - underlying physics vs. patterns
- overarching principles
  - Backward design
- Earth Science, physics, chemistry, social studies, math

Photos: L-A. Dupigny-Giroux
SWAC MODULES

- introduction to EMR & satellites
- cloud identification & monitoring
- weather interpretation
- tropospheric profile creation
- land surface interpretation
- permafrost
- Geo-applications
- “just-in-time” - air quality, Irene, 2012 drought
- climate change
- snowstorms of the North Country
SWAC BALLOON LAUNCHES

Photos: L-A. Dupigny-Giroux
SWAC BALLOON VS. ALBANY SOUNDINGS

Radiosonde Upper-Air Measurements
Temperature vs. Pressure

Altitude (m) vs. Temperature (K)

Radiosonde Upper-Air Measurements
Temperature vs. Altitude

Mike Fortney
“When we did the weather books it really helped me to understand the symbols and the clouds. It helped by doing it every day to get practice. I can now use those terms and skills to understand the weather on the weather channel.”

Elise
SWAC 2014
HOW TO BE NIMBLE

• cross-cutting concepts & lesson plans
20 January 2015

WITH GREAT TECHNOLOGY COMES GREAT RESPONSIBILITY

Posted by Chris McEntee

RFID, or radio frequency identification, isn’t something most of us talk about in everyday conversation, but in many ways, this technology has become a regular part of our lives (though we often don’t see it). It’s in the books we check out of the library, the systems used to restock shelves at our grocery store, the passes that allow us to pay a toll on the highway without stopping, and the badges we use to swipe in and out of our offices.

In a world where maintaining the privacy and security of our personal information is becoming a complex challenge, the idea that others are collecting data about us is understandably concerning. That’s why I want to apologize for how AGU implemented and communicated a recent experiment with RFID at the 2014 Fall Meeting.

For those of you who are not already aware, here are the facts about AGU’s use of RFID at the Fall Meeting: The program was piloted in a small number of high traffic areas, including the exhibit and South poster halls, the Honors Ceremony, and in the large general session.
At least 50 U.S. law enforcement agencies quietly deployed radars that let them effectively see inside homes, with little notice to the courts or the public.

WASHINGTON — At least 50 U.S. law enforcement agencies have secretly equipped their officers with radar devices that allow them to effectively peer through the walls of houses to see whether anyone is inside, a practice raising new concerns about the extent of government surveillance.

Those agencies, including the FBI and the U.S. Marshals Service, began deploying the radar systems more than two years ago with little notice to the courts and no public disclosure of when or how they would be used. The technology raises legal and privacy issues because the U.S. Supreme Court has said officers generally cannot use high-tech sensors to tell them about the inside of a person's house without first obtaining a search warrant.
HOW TO BE NIMBLE

• cross-cutting concepts & lesson plans
• no need to re-invent the wheel
HOW TO BE NIMBLE

• cross-cutting concepts & lesson plans
• no need to re-invent the wheel
• partnering with outdoor agencies and groups
• judicious use of crawls and listservs
• ongoing teacher professional development and support for curricular reform
• cutting-edge content, skills and inquiry-based experiences for students
• invite a scientist or the media into your class
“We live in a society exquisitely dependent on science and technology, in which hardly anyone knows anything about science and technology.”
“We live in a society exquisitely dependent on science and technology, in which hardly anyone knows anything about science and technology.”
THANK YOU!

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