

Winter Education and Diversity Retreat



Thursday, January 17, 2013
Primrose Studio, Fort Collins, Colorado

CMMAP Winter Education and Diversity Retreat

Primrose Studio - Fort Collins, Colorado

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8:30	<i>Coffee and light breakfast</i>	
9:00	Melissa Burt	Welcome and Introductions
9:15	Melissa Burt	CMMAP Highlight Reel
9:45	Colleen Cope Rodger Ames	Systems Thinking, Climate Models and High School Students
11:00	<i>Break</i>	
11:15	SueEllen Campbell	100 Views of Climate Change
12:00	<i>Lunch</i>	
1:00	LSOP	Discover a New Dimension with the Little Shop of Physics
2:00	Randy Russell	NSTA Webinars and Interactives
2:45	<i>Break</i>	
3:00	Stratis Giannakouros	Pre-College Summer Sustainability Program
3:45	Breakout Groups	Engaging Diverse Communities in K-12 Education Participatory Action Research in Pointe Aux Chenes
4:30	Everyone	Breakout Group Reports
5:00	<i>Adjourn</i>	

TITLE

CMMAP Highlight Reel

DIRECTOR

CMMAP Education & Diversity

CAMERA

DATE

1.17.2013

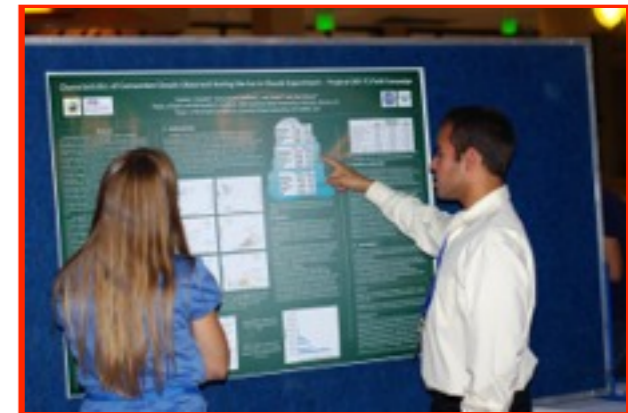
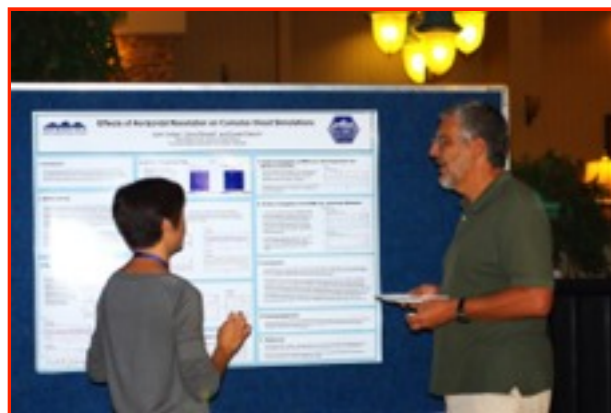
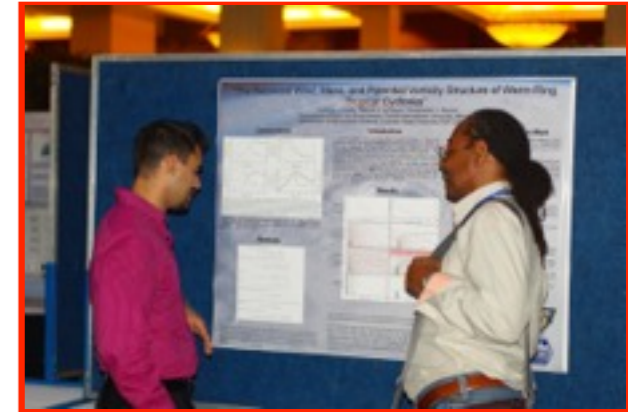
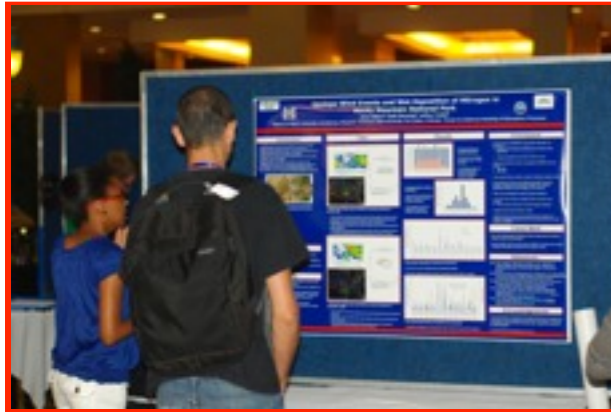
SCENE

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TAKE

7

Summer Undergraduate Internship



Presented their research projects at the CMMAP Team Meeting

Interns Present at National Conferences



**American Geophysical Union Fall Meeting
San Francisco, CA**

**93rd American Meteorological Society Meeting
San Francisco, CA**

11 interns presented their summer research as oral or poster presentations

Aryeh Drager
AGU Outstanding Student Paper Award





Video courtesy of HESTEC

Educator Day

“Ten Things Everyone Should Know About the Atmosphere”

2 workshops and 75 teachers!

Middle School Challenge

4 days of hands on activities

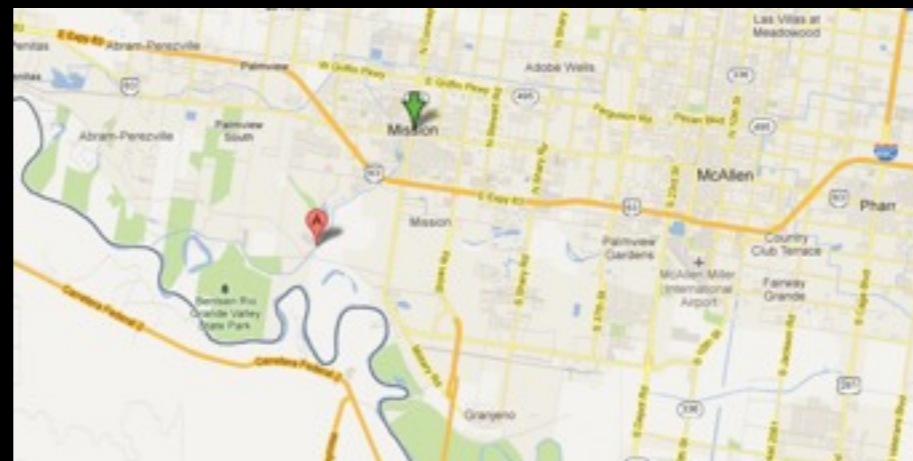
~ 4,000 kids

Community Day

open to the public

~ 6,000 attendees

El Rocio Retreat



Colorado Global Climate Conference

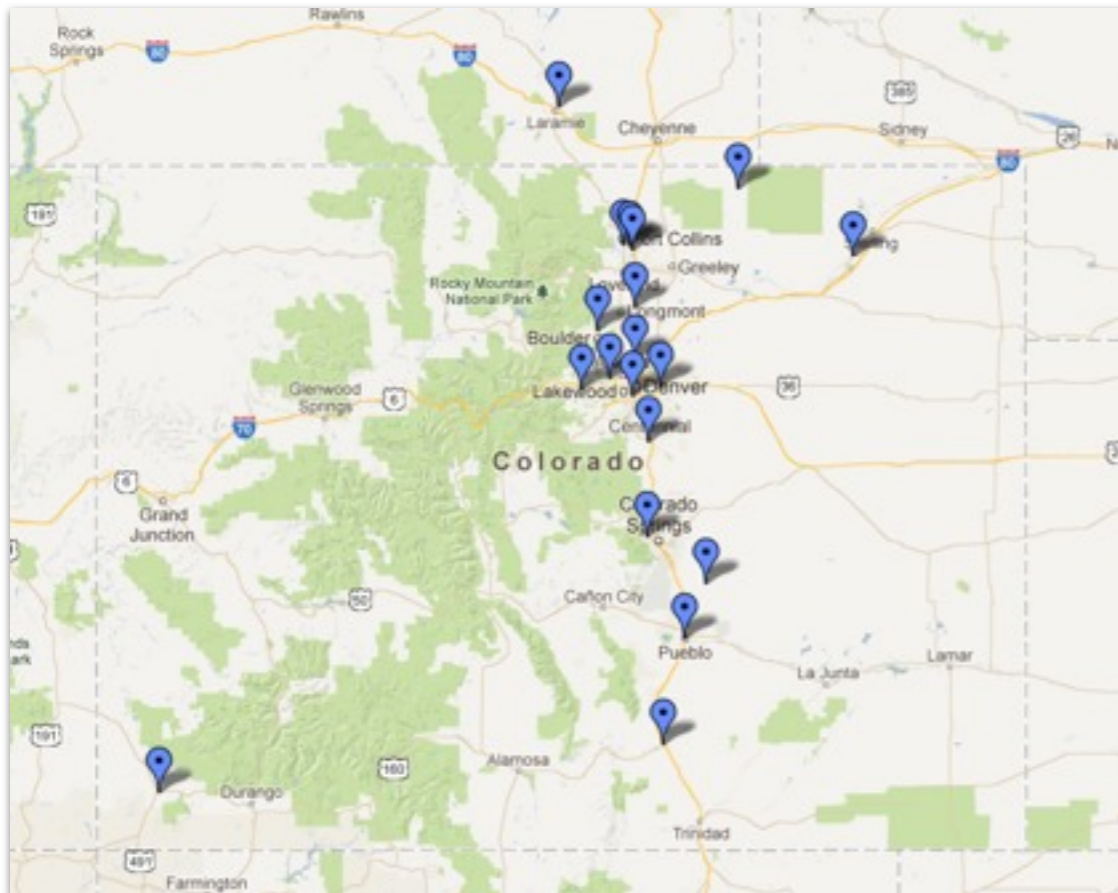
October 29, 2012

Lory Student Center

Colorado State University



- Keynote presentation on climate change
- 400 participants
- 19 schools around the state of Colorado and southern Wyoming
- 4 CSU Alliance Partnership Schools



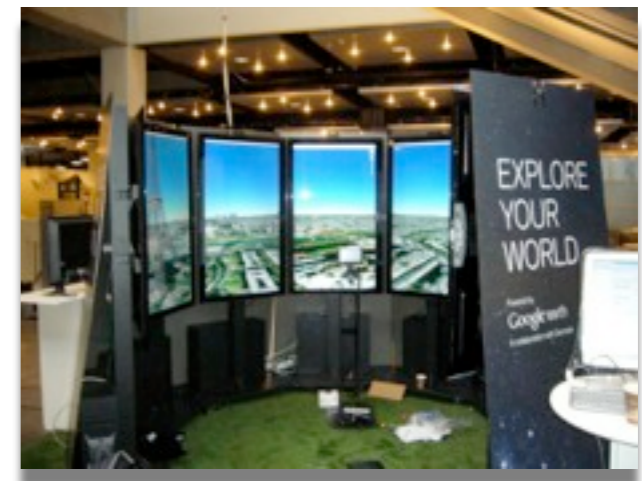
New CGCC Breakout Sessions

"Atmospheric Profiling: How Scientists use Weather Balloons to Study the Atmosphere," with a live weather balloon launch by NCAR scientist, Kate Young.

"Fire and Poop: How We're Trying to Help BILLIONS of People," a session about innovative energy solutions prioritizing human health, presented by the Engines and Energy Conversion Lab (EECL) at CSU.

"Universe at Your Fingertips with Google Liquid Galaxy," a session using CSU's new Google Liquid Galaxy wide-screen projection resource to explore Geographic Information Systems, hosted by the Geospatial Centroid at CSU.

"Teaching About Climate and Energy Topics - For Teacher's Only," a session just for high school teachers in attendance to learn about available resources and networks supporting climate science and climate change education, presented by Dr. Anne Gold from the Education and Outreach Group at CIRES in Boulder.



Building relationships with Minority Serving Institutions (MSIs)

Florida International University



Dr. Hugh Willoughby
Department of Earth Science

- Special Seminar on CMMAP Program
- Heather and Tony (Summer 2012 interns) gave presentations on their experience



St. Augustine's University



Dr. Yvonne Coston

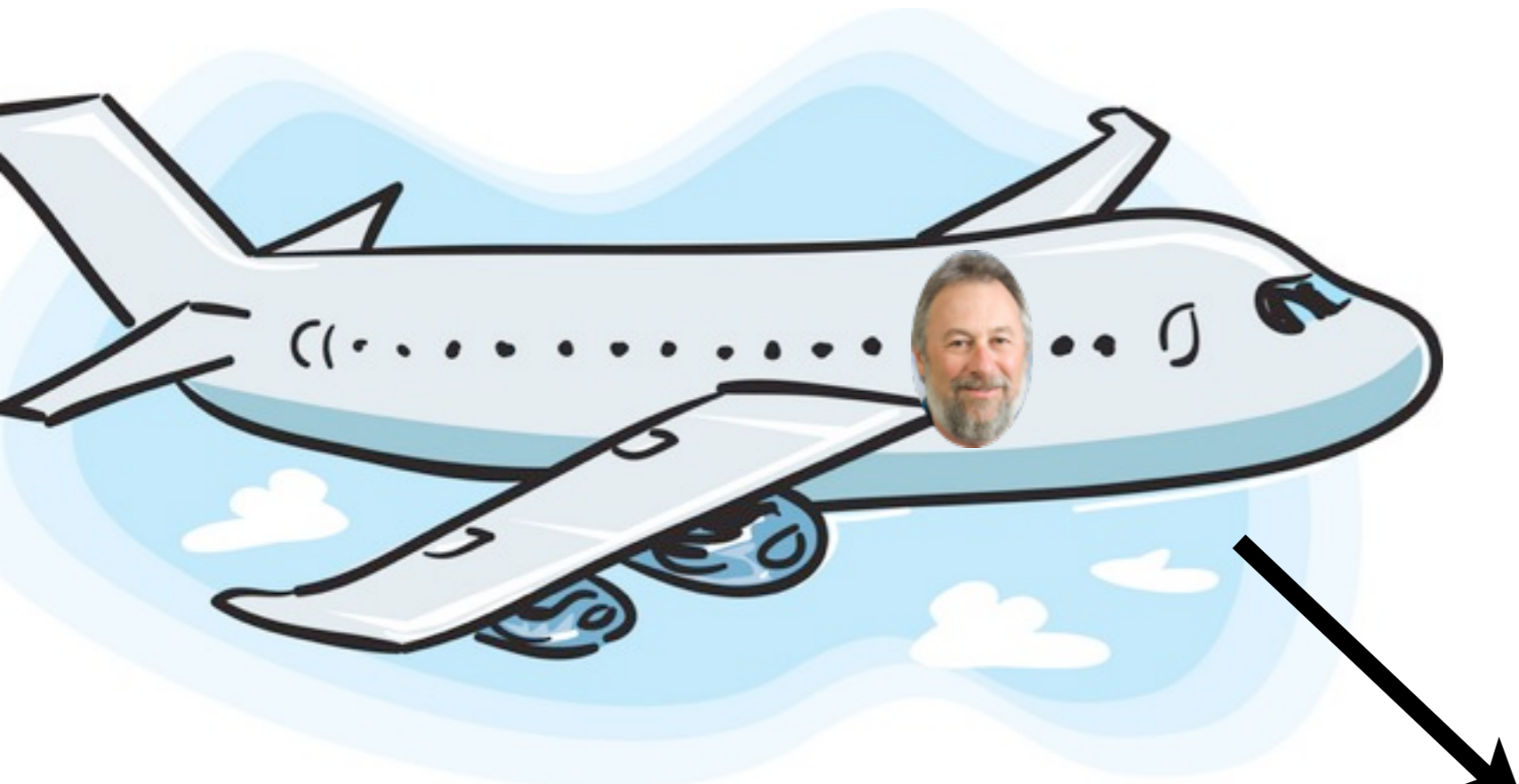


Dr. Mark Melton

Department of Mathematics and Engineering

- Meetings with the Science Faculty
- Discussed Summer Internship Program
- One-on-one meetings with undergraduate students
- CSU/St. Augustine's research collaborations
- Graduate student recruitment

Where in the world is John Calderazzo?





Statement from John Calderazzo

I came to extreme **south Florida to write about** and possibly take part in **the state's first Burmese python hunt**. This is a **public bounty** which most wildlife managers and biologists think is an **unfortunate but needed method** to **reduce the population of thousands of pythons breeding** independently and prolifically in Everglades National Park and adjacent Wildlife Management Areas.

The pythons--the longest reaching 17 feet now and pregnant females containing up to 85 eggs---are the most visible and notorious of the 350 or so **non-native** or invasive species of plants and **animals** being tracked here. Along with necropsies, a recent survey of roadkilled animals along park roads has been compared to the historical record and suggests that the pythons have been eating their way through the ecosystem.

In addition, a **2008 study by the National Park Service showing IPCC climate projections for 2100** suggests that, based on just the factors of **average monthly temperatures and rainfall**, this very **adaptive species could spread to one-third of the area of the continental U.S.**, including every southern state and west through Texas, and southern parts of New Mexico, Arizona, and California. It's hoped that during the three weeks of the hunt, the 750-plus hunters will provide GPS data on the snakes they see or kill. Also, all the killed or captured pythons will be necropsied for diet and other information.

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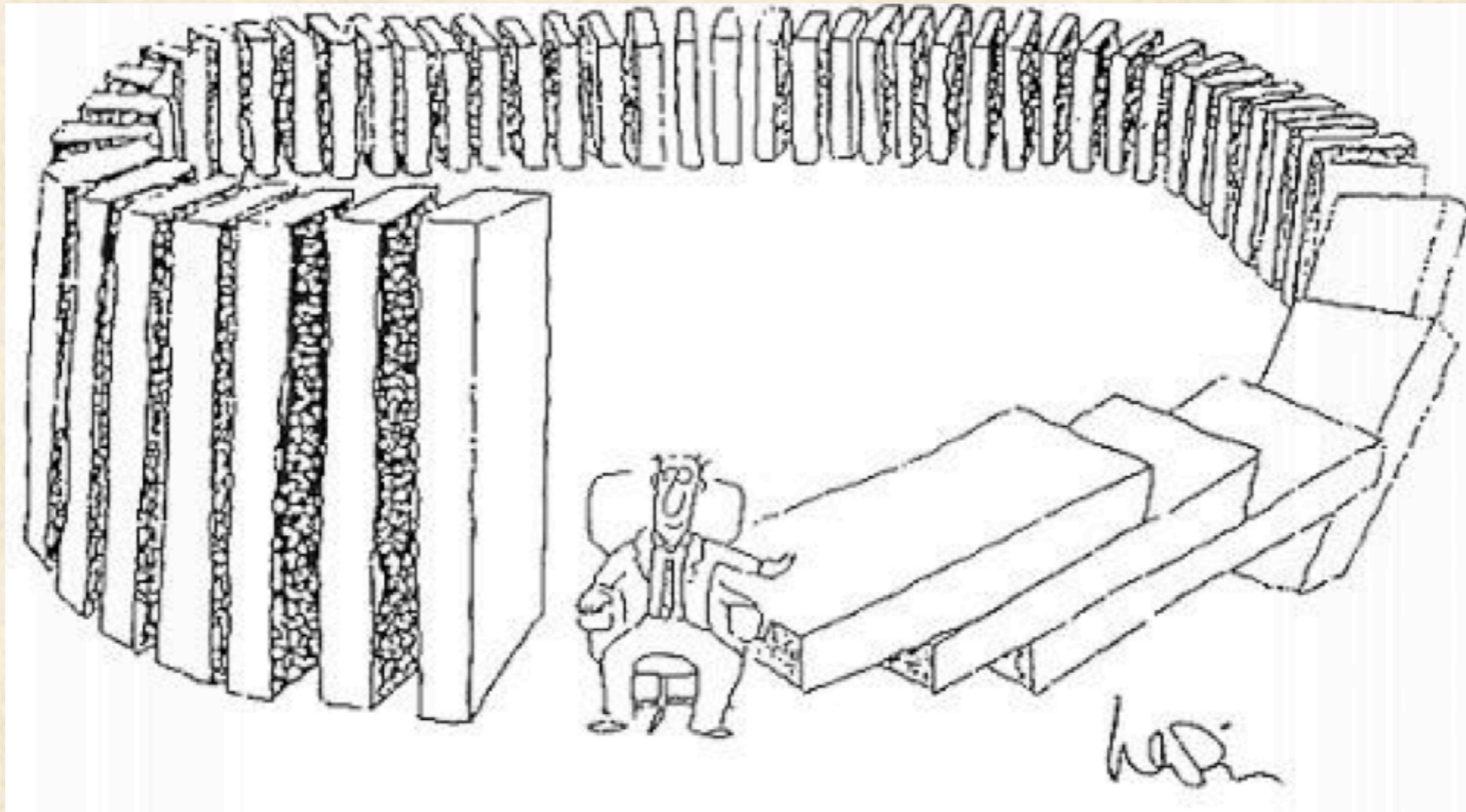
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Systems Thinking, Climate Models, and High School Students

Colleen Cope

"Climate change may be happening...
but let's just wait and see."



Statements like “wait and see” regarding climate show a basic misunderstanding of systems thinking

System thinkers...

Take the perspective of seeing the big picture

Use visual tools to find patterns and create mental models

Explore cause and effect relationships

See how things change over time

Use systems models to make predictions

Take the parts and see how they fit into the whole

What are the visual tools we need to teach to students?

1. Identify stocks - elements that change over time.

Identify flows - movement into or out of stocks.

2. Identify connections - elements that cause other elements to change.

3. Behavior Over Time Graphs (BOTGs) that show change over time rather than focus on single events.

4. Create Stock-Flow Maps and climate models to make predictions.

New educational iPad App

Rodger Ames





Welcome to Earth [carbon]

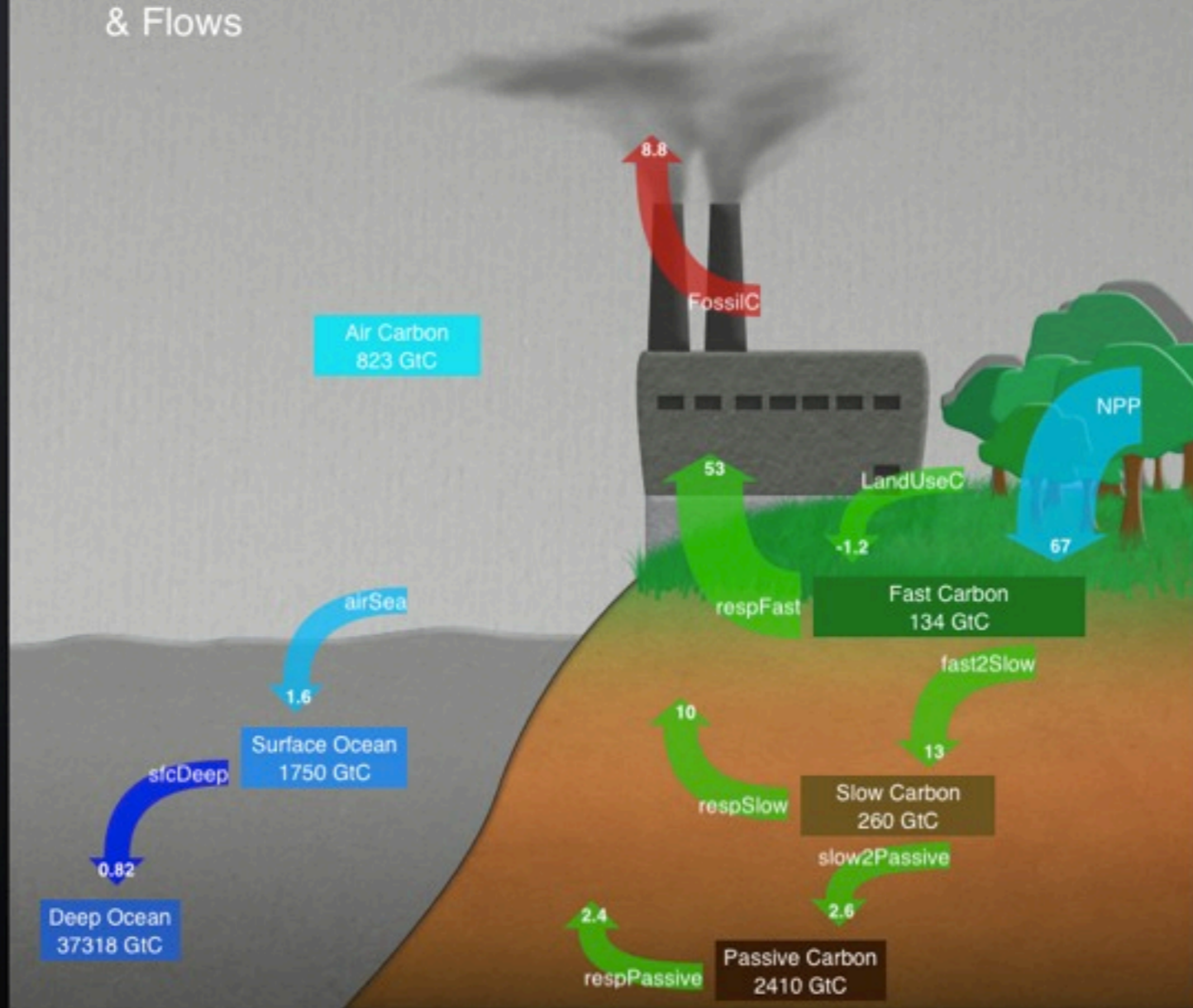
Tap on the Earth Cycle icon (the one at the bottom of the page) to use an interactive diagram of the Earth's carbon cycle.



Tap on the Earth icon to play the Earth [carbon] game where you calibrate a simple model in Level 1, and then predict carbon storage and climate for the present and future in Levels 2 & 3.

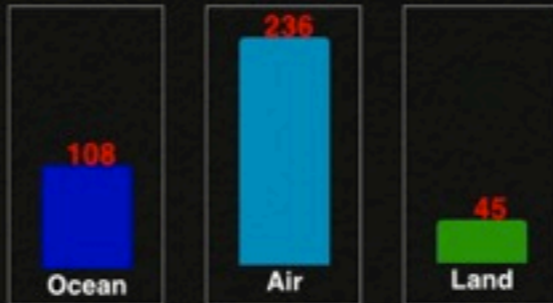



Carbon Stocks & Flows



TIME IN YEARS 1750 2011

Change in carbon:



Default

User Defined





EARTH

[carbon]



Your model needs some love. Before you can predict carbon storage and temperatures in the future, you need to calibrate your model using observations from the past. Good luck!



Now that you have a realistic model of the Earth's carbon system, you can predict future CO₂ levels and temperatures over the next 100 years.



This level demonstrates how CO₂ from present day human made emissions can persist in the atmosphere and influence climate far into the future.



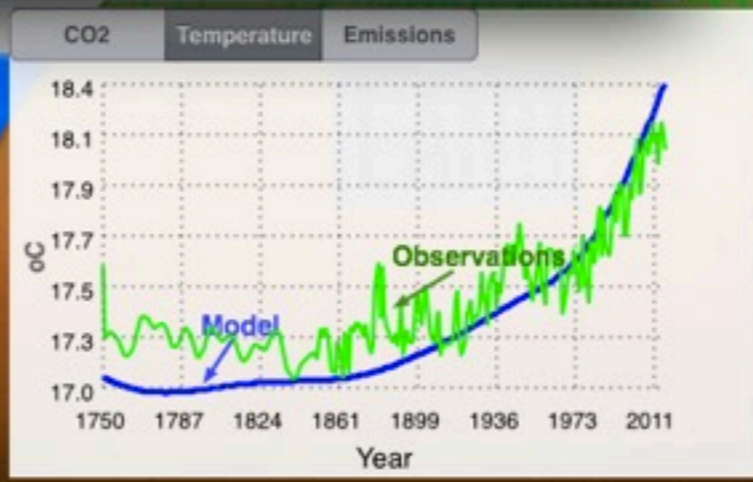
Climate Sensitivity

4 °C

Climate Sensitivity is how much the Earth's surface warms every time the CO2 concentration in the atmosphere doubles. Adjust the 'Climate Sensitivity' so that temperature predicted by your model matches observations.

Note: The observed temperatures (GISS global mean surface temperatures) are reported as the anomaly from the 30 year (1951-1980) mean. The observed anomalies are scaled to temperatures predicted by your model by adding the corresponding 30 year mean temperature from the model. Thus, when you adjust climate sensitivity, you change the range of temperatures predicted by the model, rather than the absolute temperature.

Hint - Set to 3 to calibrate.



TIME IN YEARS 1750 2011

SYSTEM CONTROLS

ANNUAL CO₂ EMISSIONS

HIGH

MEDIUM

LOW

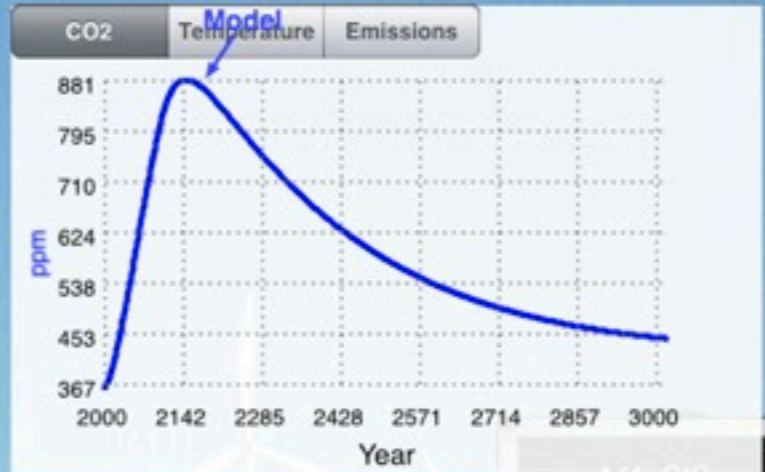
MODEL RESULTS

TEMPERATURE

17.1 °

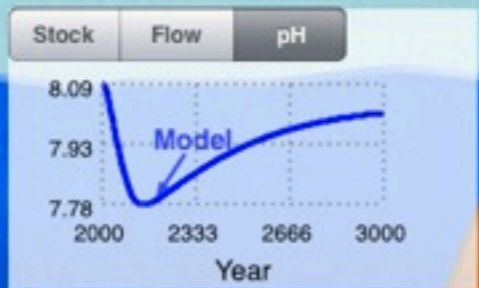
FAHRENHEIT
• CELSIUS

CO₂ Temperature Emissions



955 GtC
AIR

141 GtC
PLANTS



282 GtC
SOILS

38432 GtC
DEEP OCEAN

2782 GtC
PASSIVE

TIME IN YEARS 2000 3000

SYSTEM CONTROLS

ANNUAL CO₂ EMISSIONS

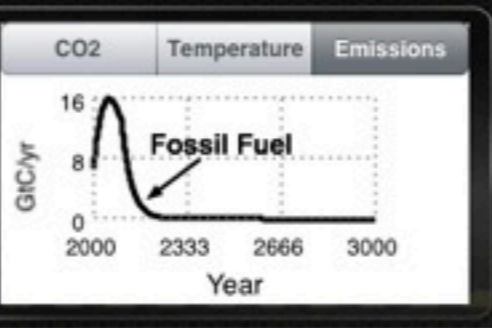
HIGH MEDIUM LOW

go

MODEL RESULTS

TEMPERATURE 19.1 °

FAHRENHEIT CELSIUS





HOME

CLIMATE

NATURE

HUMANS

ACTION

BIG PICTURE

CC@CSU

ARCHIVE

100 VIEWS OF CLIMATE CHANGE

UPCOMING EVENTS



The Climate Itself

Clear, Current, High-Quality Resources

Global climate change is everybody's business. It's a challenge so daunting and far-reaching, and so prone to misinterpretation, that it needs to be understood and tackled from as many different perspectives as possible. That's what this website is about.

100 Views of Climate Change takes inspiration from the 19th-century artist Hokusai, who created 100 Views of Mount Fuji, Japan's most sacred mountain. Though climate change is hard to "see" in the everyday sense, it looms over our lives as much as Fuji looms over the Japanese landscape.

Whether you're a college teacher, a student, an interested citizen, or a researcher, you'll find useful materials here in the form of short and long videos, notes about good books and articles, and links to key websites. We offer **clear, current, high-quality information about climate change**—on ethics and atmospheric science, economics and agriculture, literature and ecology, policy and refugees, and more.



Taking Action



Living with Nature



The Big Picture



The Human Face



Changing Climates @ CSU

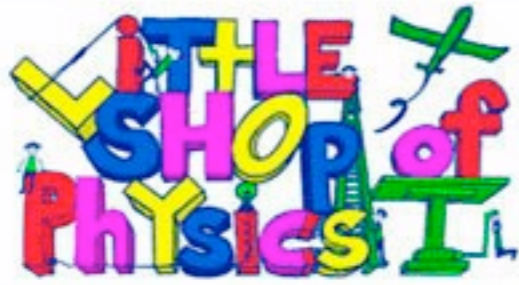


For more information, [contact us](#)



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 Colorado State University, Fort Collins, CO 80523 USA
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<http://changingclimates.colostate.edu/>



2012-2013 Theme

Discover a New Dimension with the Little Shop of Physics

brainstorming session on new podcasts, tv shows, and experiments!

A New “Type” of Video from LSOP

10 things you should know about...



Video from B. Jones

Kinesthetic Activity

Greenhouse gases



New exhibits at NCAR Mesa Lab

Randy Russell



Cloud Field Guide

Slides from R. Russell



Make a Thunderstorm

Touch a Cloud to Learn More



Cirrus



Cirrocumulus



Cirrostratus



Contrails



Lenticular



Altostratus



Altostratus



Kelvin-Helmholtz



Cumulus



Stratocumulus



Stratus Clouds and Fog



Cumulonimbus



Kelvin-Helmholtz Wave Clouds

What do these clouds look like?
Rows of curlicues that resemble ocean waves

How high are they?
From the top of fog layers to as high as 30,000 feet (ground level to 9 km)

What are they made of?
Ice crystals and/or water droplets

What do they tell us about the weather?
Winds are stronger near the top of these fair-weather clouds than at the bottom, which gives the clouds their wavelike shape

Fun facts:
The process behind Kelvin-Helmoltz clouds also occurs in ocean waves and the Sun's corona

Credits



Cloud Matching Game



Series of 4 Webinars: Teaching Climate With Models



1. Breathing of the Earth

June 11, 2012 - 48 attendees

2. Heating and Warming: Sensitivity of Earth's Climate to Atmospheric CO₂

Sept 24, 2012 - 48 attendees

3. Future Climate Projections

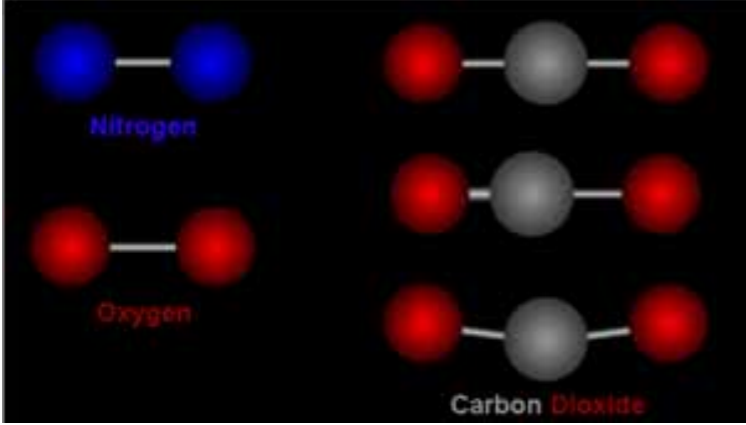
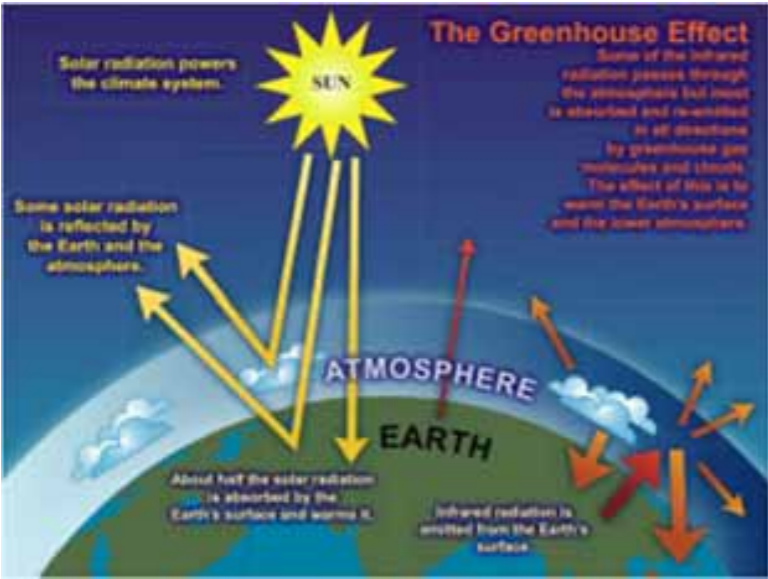
Feb 28, 2013

4. Opportunities for Abundance: Solving the problems of energy, carbon, and climate

April 25, 2013



Heating and Warming: Sensitivity of Earth's Climate to Atmospheric CO₂



Scott Denning



Randy Russell



Heat Budgets



Heat in



Heat in



Heat out



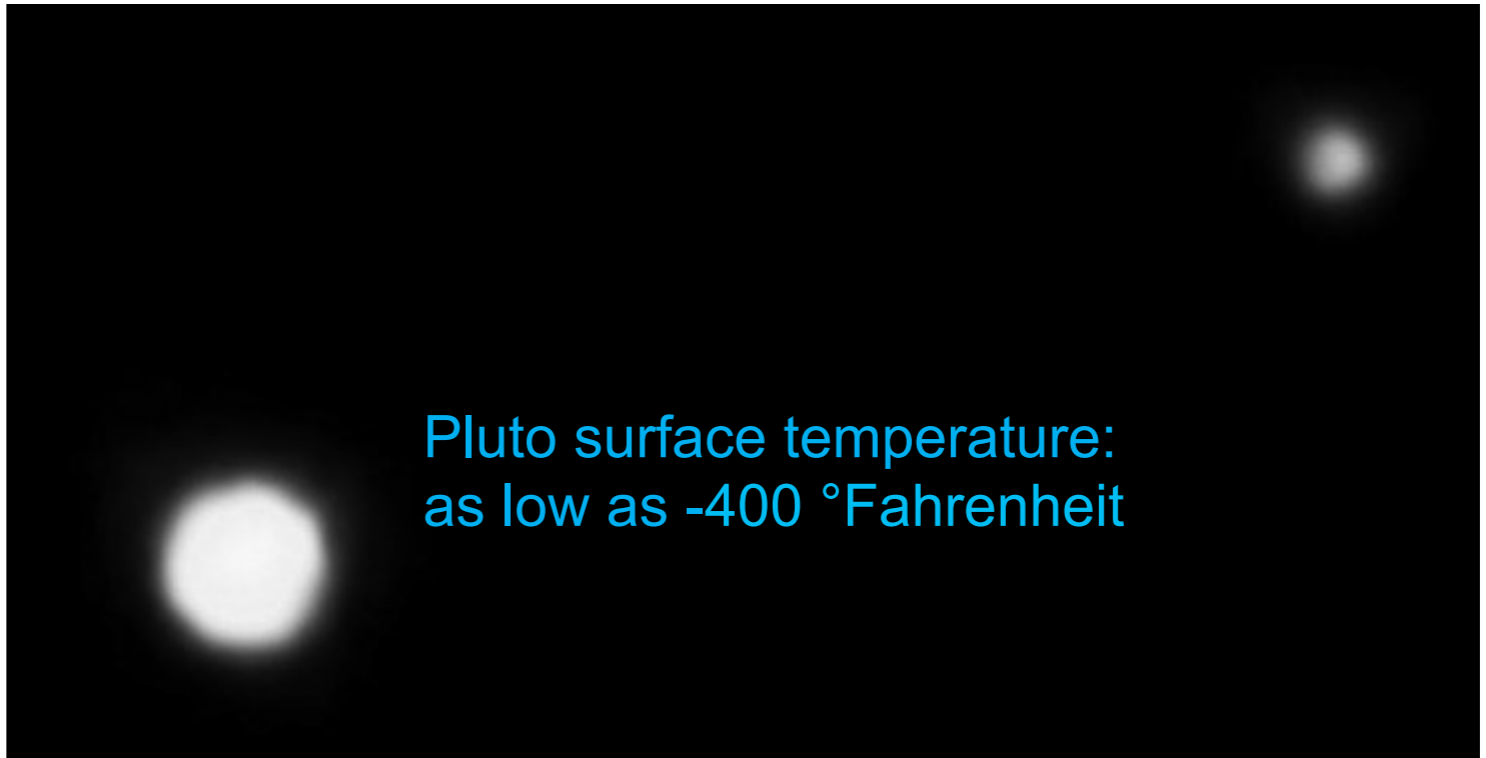
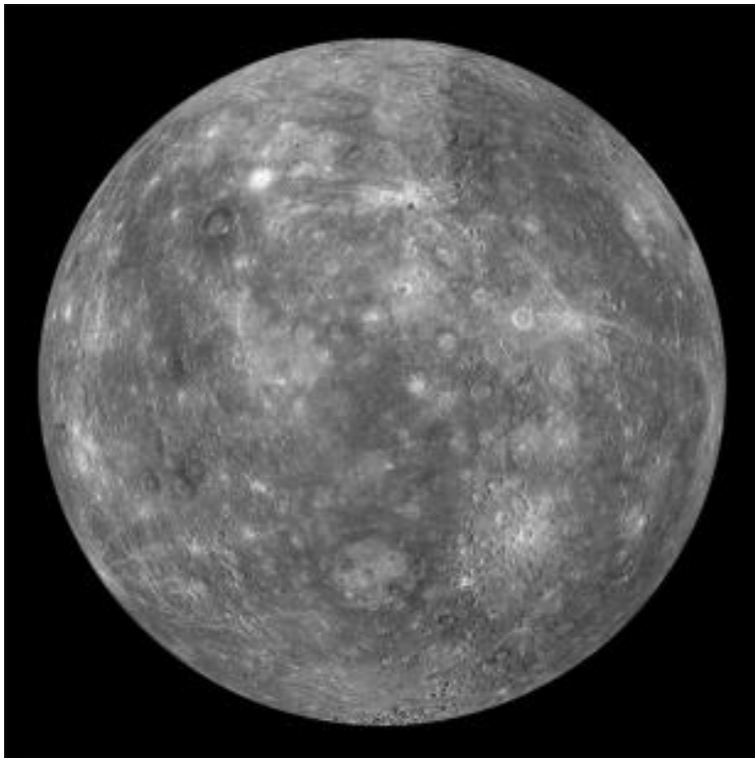
Heat out



Poll: Which gives off longer wavelength infrared radiation:

- A) hot Mercury or
- B) cold Pluto?

Responses: 11% said Mercury,
53% said Pluto,
35% did not respond



Mercury surface temperature:
up to 800 °Fahrenheit





Questions?

- ❖ Is an albedo of 0.9 really bright?
- ❖ Please explain the discrepancy between Earth's theoretical temperature (no atmosphere) of 0°F and what we observe?
- ❖ Temperature calculation seems to be for one wavelength; is there a significant difference when integrating across the whole spectrum?
- ❖ What do you mean Earth's temperature is 0°F ? I thought it was about 59°F .



Collaborative Activity with SoGES

Pre-College Summer Sustainability Program



Stratis Giannakouros

Goal: Expose high school student participants to a wide range of social, economic, and environmental perspectives on sustainability and utilizes an experiential learning approach at CSU and in and around Fort Collins that provides students with hands-on experience in the field.



SCHOOL OF GLOBAL
ENVIRONMENTAL
SUSTAINABILITY

8 day summer residential program

- Energy and Climate
- Food Security
- Environmental Institutions and Governance
- Sustainable Communities
- Land and Water Resources
- Biodiversity Conservation and Management

Brainstorming session on what should be included in the atmospheric component of the program.

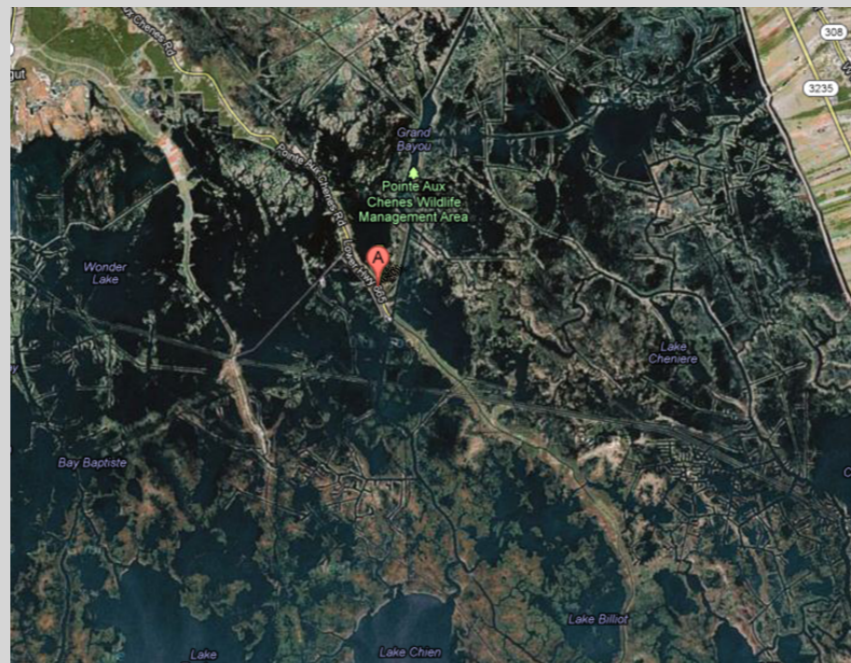
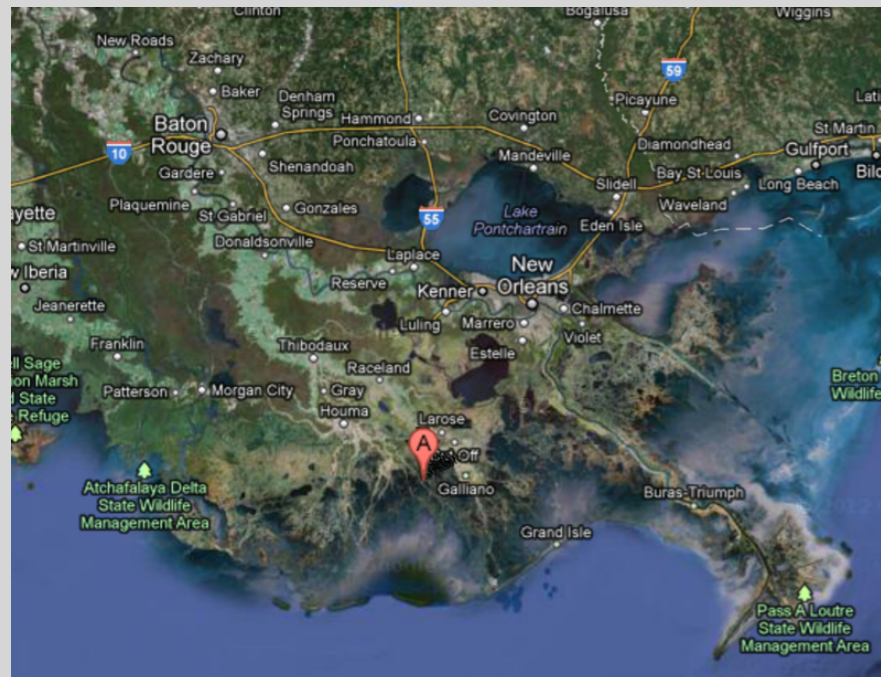


Breakout: Engaging Diverse Communities in K-16 Education

How we can make deeper connections in the Latino communities of south Texas during our week long trip to HESTEC?

Rather than sweeping into the community and showing off our hands-on science, why don't we involve the local students and community in the process. A few things we discussed were having the UTPA folks teach us as a learning exchange, maybe conduct a "build it" afternoon where we can work with UTPA students and have them create some of their own hands-on activities, feature hands-on exhibits produced by UTPA and even kickoff the week with a tie-dye party.

Breakout: Participatory Action Research in Pointe Aux Chenes



Frances Roberts-Gregory, SOARS



Jordan Allan, RESS



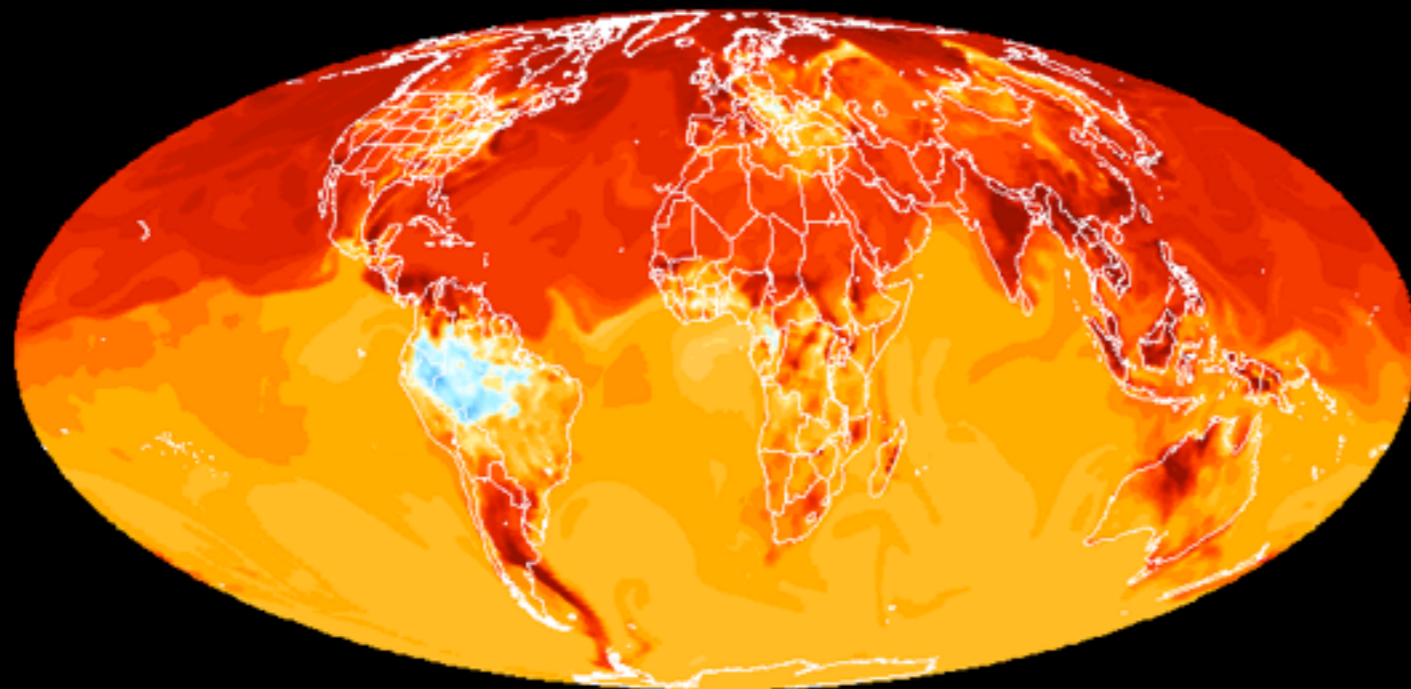
Sandra Maina, SOARS

The Breathing of the Earth

Scott Denning

3-Hourly [CO₂] 500m AGL

Month=Jun, Day=1, Year=2004



Popular book
Topic: Carbon Cycle



A scenic winter landscape featuring a snow-covered mountain range under a clear blue sky. In the foreground, a snow-covered path leads through evergreen trees, some of which are heavily laden with snow. The overall scene is bright and serene.

Thanks.