

Education is Multiscale Too!



Elementary



Junior High



Graduate

“K to Gray”

CMMAP E&D targets all of these!

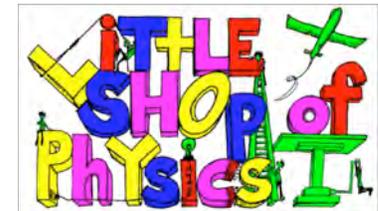


Highlights Since August Meeting

- Continuing development of fantastic climate science content at **LSOP**
- CMMAP Grad *Students Teaching* two undergraduate courses at Colorado College
- Changing Climates @ CSU :
Engaging **global change at a major research university**
- Colorado **Global Climate Conference** 2008 at Rocky Mountain High School

K-8 Education: It's Up in the Air

- Diverse group of schools & students including rural & reservation schools (Not here this week because they are presenting climate materials to > 1000 people on the Wind River Reservation in Wyoming)
- > 20,000 students per year
- 27 experiments on website with atmospheric focus
"It's Up in the Air"
- Undergraduate interns
- 6000 visitors to annual Open House
- Written materials available in English and Spanish



Enhancing K-8 Science

Television programs

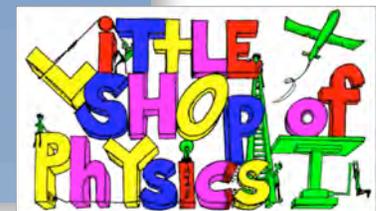
The Everyday Science show airs in Poudre School District & statewide on Rocky Mountain PBS

- Two new shows in production: “Air” & “Clouds”
- Kits of instructional materials accompany episodes

Podcasts

Available on [iTunes](#) store

- Based on episodes or “Science Minute” segments
- All new content has weather & climate focus
- Future episodes in English & Spanish



iTunes

Colorado Global Climate Conference

- Over **500** high-school students & teachers
- Intro by Colorado **Governor Bill Ritter**
- Keynote by **Dr. Piers Sellers** (NASA)
- Daylong seminar & **workshop series**
- Hands-on **exhibits**
- **Career** & scholarship information



April 18, 2008

Rocky Mountain High School

Ft Collins



Colorado Global Climate Conference

- Intro by Colorado Governor Bill Ritter
- Keynote by Piers Sellers
- Workshops:
 - Climate system
 - Climate models
 - Mitigation & Adaptation
 - Alternative energy
 - Climate policy
 - Climate ethics
- Inquiries/Demos
 - LSOP
 - Alternative Energy & Fuels
 - Career Fair
 - Visualization



500 people, April 18, 2008, Rocky Mountain HS



Junior High Science Teachers



Alumni from Summer 2007 submitted Climate Lessons
Several to teach middle school climate camp in 2008
New cohort summer 2008





CMMAP - Studying Clouds and Climate



The Center for Multi-Scale Modeling of Atmospheric Processes (CMMAP) project is studying clouds and how they fit into computer models of Earth's climate. Click on image for full size (50 Kb JPEG) *Image courtesy of Colorado State University.*

Clouds are an important part of Earth's weather and climate. Scientists use computer models to study our planet's climate. Part of those computer models are models of clouds. It is hard to model clouds. Part of the reason is because models of clouds need to include very big and very small things. Some parts of cloud models need to explain very big things like hurricanes that can be more than a hundred miles across. Other parts of cloud models need to explain very small things like raindrops and snowflakes.

There is a new science research center for studying clouds. It is called CMMAP, which stands for the Center for Multi-Scale Modeling of Atmospheric Processes. The National Science Foundation gave Colorado State University (CSU) some money in July 2006 to set up CMMAP. Windows to the Universe is helping out with CMMAP. We are creating web pages and activities that help people understand clouds and climate modeling.

The links below have more information about the CMMAP project, how CMMAP is helping people teach and learn about climate, and the science of clouds and climate modeling.

- ◆ [Education, Outreach and Diversity page](#) on main CMMAP web site at CSU
- ◆ [Little Shop of Physics](#)
- ◆ [CMMAP project home page](#) at Colorado State University



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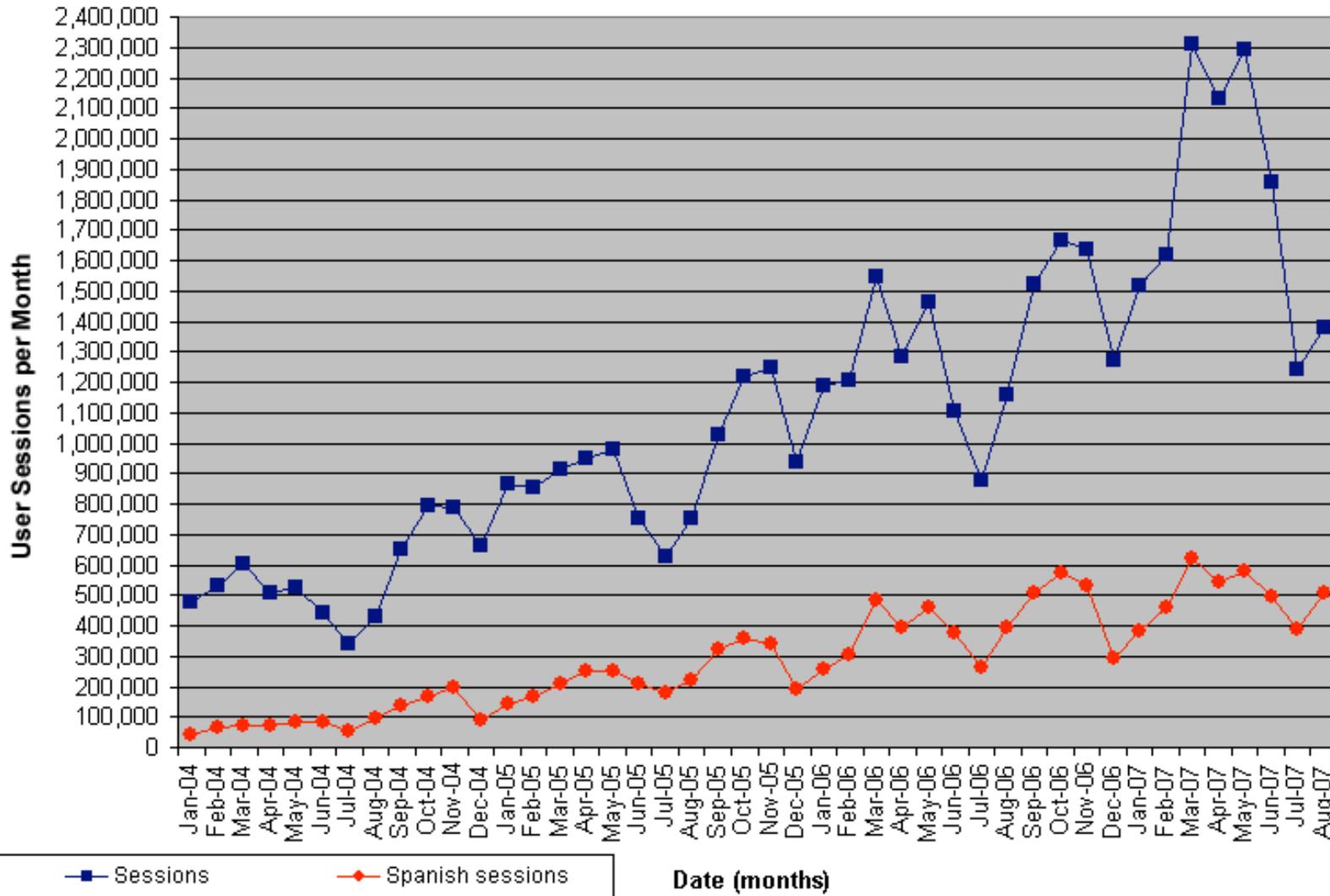
Ask a Scientist

My Journal



- Annual unique IP addresses (“visitors”) = 17.9 million
- Annual user sessions (“visits”) = 20.6 million
- Annual page views = 120.3 million
- Spanish pages account for ~29% of visits

W2U User Sessions - Total & Spanish



CMMAP Web Site



Changing Climates @ CSU

infusing global change into every part of CSU's undergrad curriculum

- Fall 2007 Colloquium (Faculty teaching each other)

How Climate Works	Economic Impacts
Climate Change	Climate Policy
Climate Modeling	Solar & Renewable Energy
Paleoclimate	Alternative Fuels & Efficiency
Forest Impacts	Business Models
Hydrologic Impacts	Climate Communication
Ecological Impacts	Carbon Sequestration

- 2008: CSU Freshman Composition (~ 5000 students!) using climate change writing prompts



(come to breakout to learn more)



The Climate Change Problem: A Primer for Faculty & Staff Fall 2007

How the Climate System Works

Scott Denning (CMMAP, Atmospheric Science)
August 28, Tuesday, 4–5:30, Lory Student Center 213–15

Climate Change: Forcing, Feedbacks, & Forecasts

David Randall (CMMAP, Atmospheric Science)
September 4, Tuesday, 4–5:30, LSC 213–15

Reconstructing & Modeling Past & Future Climates: Methods

Gene Kelly (Soil & Crop Sciences)
David Randall (CMMAP, Atmospheric Science)
September 25, Tuesday, 4–5:30, place TBA

Climate Change at Pingree Park

Bill Bertschy (Pingree Park Campus)
Dan Binkley (Forest, Rangeland, & Watershed Stewardship)
Ellen Wohl (Geosciences) and others
September 29, Saturday, 2–5, Pingree Park Campus

Biological & Ecological Effects

Alan Knapp (Biology)
October 16, Tuesday, 4–5:30, LSC 213–15

The Human Costs

Kathleen Galvin (Anthropology)
Gerald Callahan (Microbiology, Immunology, & Pathology)
James Pritchett (Agricultural & Resource Economics)
October 30, Tuesday, 4–5:30, LSC 213–15

The Challenges: Policy, Solar, Fuels, & Engines

Michele Betsill (Political Science)
Jim Sites (Physics)
Bryan Willson (Mechanical Engineering)
November 13, Tuesday, 4–5:30, LSC 213–15

The Challenges: Business, Communication, & Carbon Sequestration

John Grant (UNC)
Robert Henson (National Center for Atmospheric Research)
Steve Ogle (Natural Resource Ecology Lab)
November 27, Tuesday, 4–5:30, LSC 213–15

For more information, contact SueEllen.Campbell@colostate.edu (491-5382),
John.Calderazzo@colostate.edu (491-6896), or Margaret.Saldana@colostate.edu (491-7194)
or visit <http://changingclimates.colostate.edu>. Details and updates will appear in
"Today @ Colorado State."

Sponsored by the College of Liberal Arts, the Vice-Presidents for Research and for Advancement and Strategic Initiatives, the Vice-Provost for Outreach and Strategic Partnerships, CMMAP (a National Science Foundation Science & Technology Center), and the Departments of English and Atmospheric Science.

Colorado
State
University

Changing Climates
@ Colorado State University

Graduate Ed & Research

- 17 fully-funded graduate students at 5 institutions
- Direct involvement with inventing a radical new way to simulate and study Earth's climate and predict weather
- CMMAP-wide graduate student summer institute
- Teaching and outreach experience



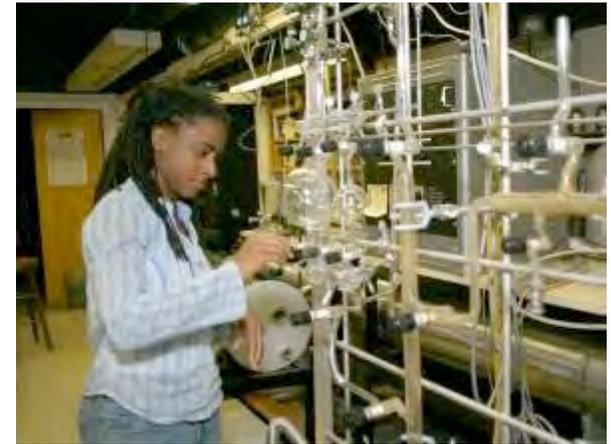
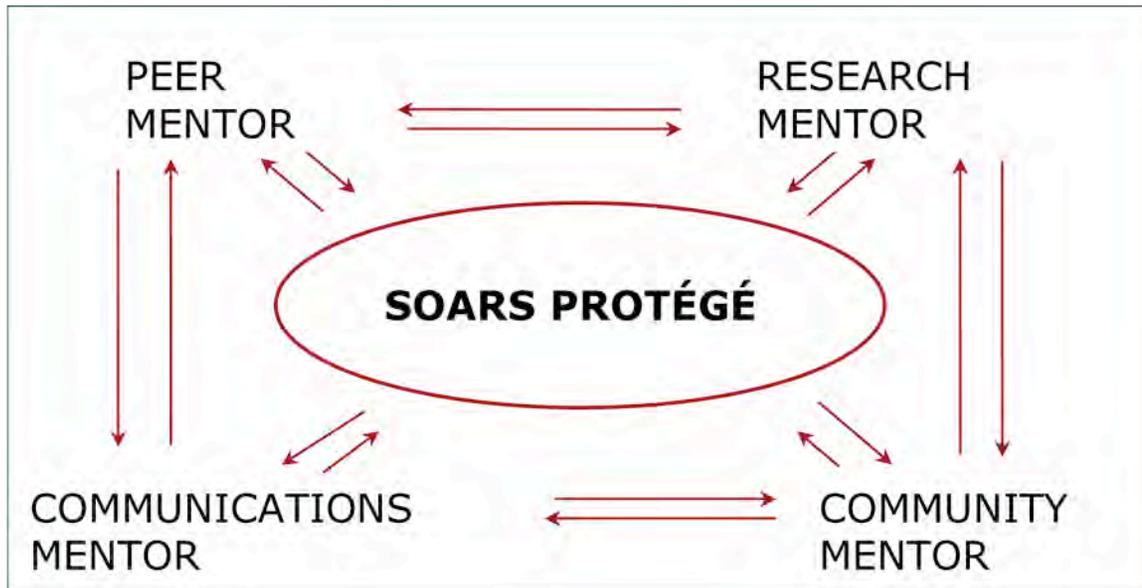
CMMAP Summer Grad Colloquium

- Provide an opportunity for all CMMAP graduate students to interact with each other and other scientists
- Support collaborative research among the graduate students involved with CMMAP
- Annual workshop held in conjunction with summer Team Meeting
- Please send your students Aug 21-28

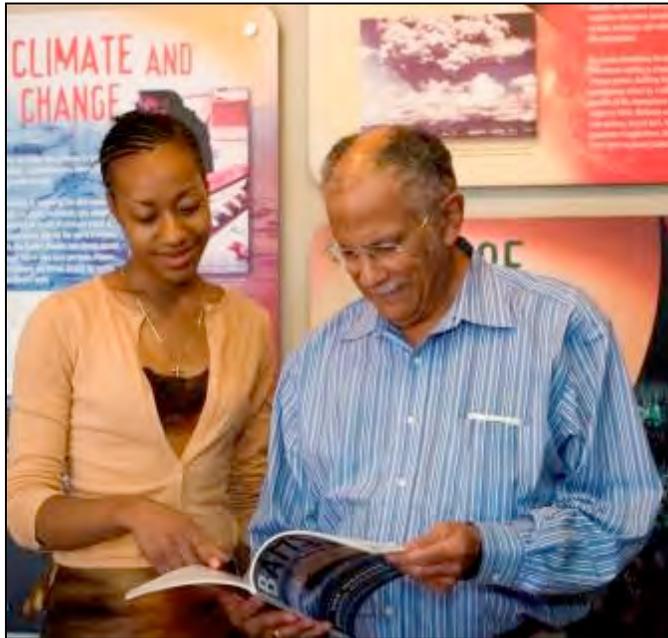




SOARS Protégés



Kimberley Trent - *Effect of the Gulf of Mexico's mixed layer depth on hurricane intensity*



Jointly mentored by
Dave Randall
and Warren Washington

Actual Track of Hurricane Katrina (2005)

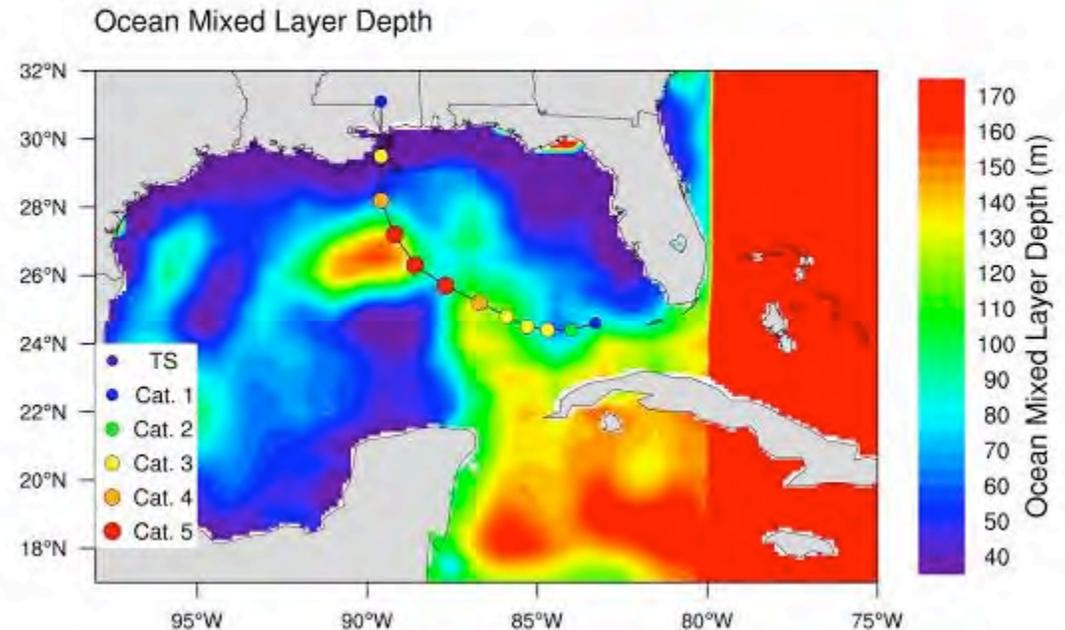


Fig. 3.2. This plot shows the actual track of Hurricane Katrina and the SSTs observed during the time the hurricane passed through the Gulf of Mexico

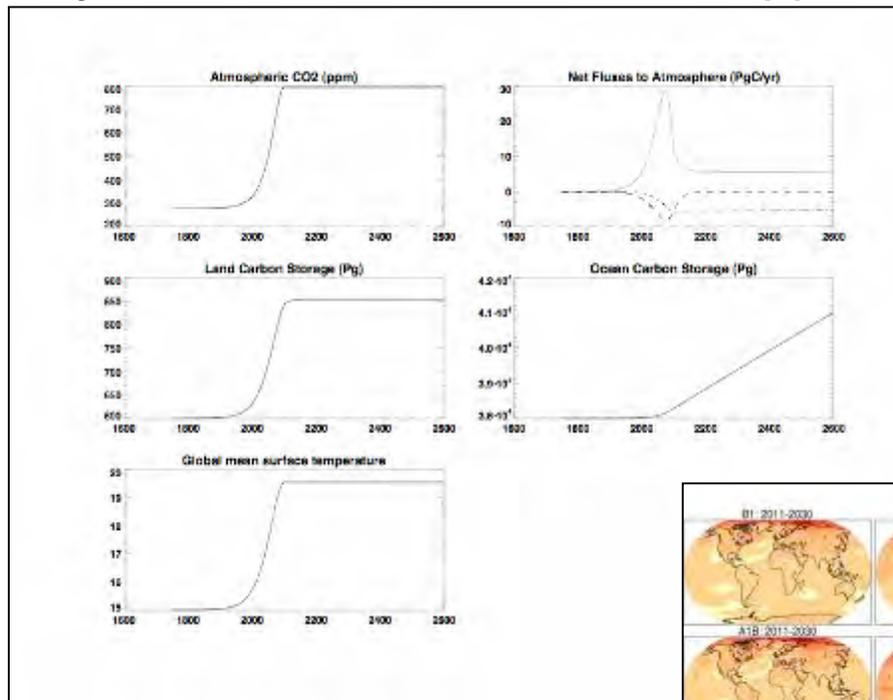


CO2 Stabilization Scenarios: Sensitivity of Emissions Pathways to Experimental Carbon Turnover Rates for Ocean Circulation, Vegetation Growth and Soil Respiration

Preliminary Results: A2 Scenario - 800 ppmv by 2100



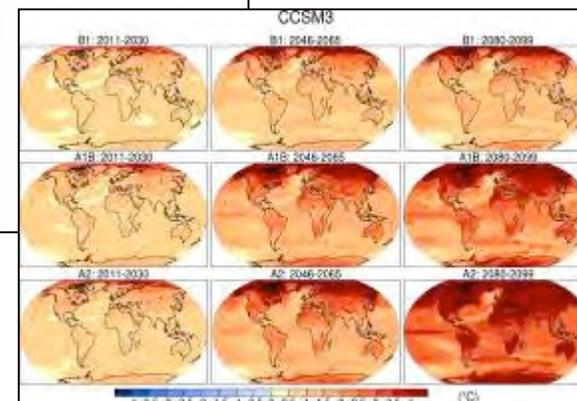
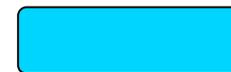
ZiZi Searles
Geology
San Francisco State University
Mentored by Scott Denning



Vegetation-
Soil Sink

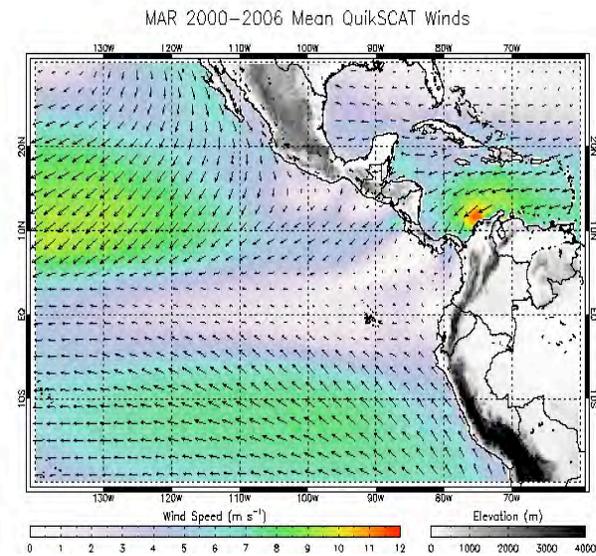
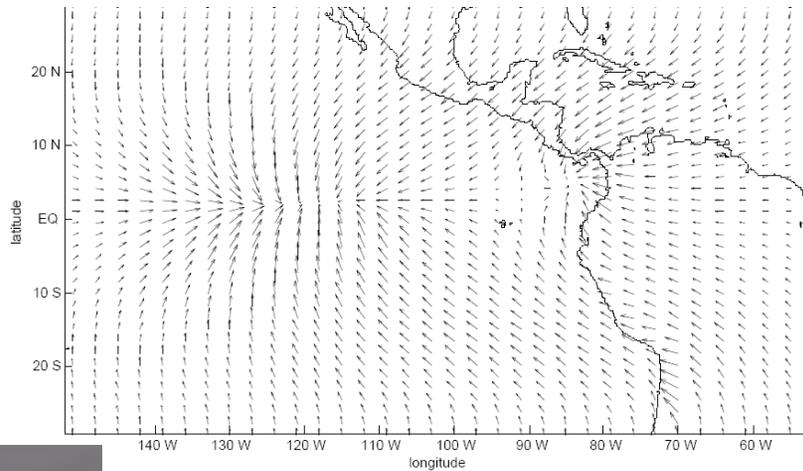


Ocean Sink



Modeling Heat-induced Large Scale Tropical Circulation

Model result (ITCZ at 2° N) vs. Observation



(Schubert et. al., 2007)



Alex Gonzalez
Meteorology
Penn State University
Mentored by Wayne Schubert and Nedjelka Zagar



Packaging, Porting, & Partners

- Many CMMAP E&D achievements are mature, evaluated, and very portable!
- LSOP Atmospheric Inquiry units on web, DVD series, even iTunes!
- Entire Climate for Teachers course is online, including both lectures and activities
- Diversity recruiting not just for CSU
- **Help us reach your schools and cities!**
- Scientists as Educators lunch tomorrow

