



earth2class
bringing science to the classroom

Connecting Climate Change Education with the “Teacher Behind the Closed Door”

24th AMS Symposium on Education
Phoenix, AZ 2015
Paper 2.1





earth2class
bringing science to the classroom

Michael J Passow

Earth2Class Workshops for Teachers
Lamont-Doherty Earth Observatory
Columbia University

Taro Takahashi (LDEO)

Joaquim Goes (LDEO)

Karen Smith (LDEO)

Michael Kaplan (LDEO)

Natalie Boelman (LDEO)



After most high school and middle school teachers close the classroom door, they become the “expert” for their students.



- ❑ But when teaching about climate and climate change, many rely heavily, if not solely, on textbooks or highly-produced media, in lieu research-based journals or participation in investigations.
- ❑ Consequently, they are often limited in what they know and can present to their students
Not good enough for the future!

Effective PD for teachers now

- Requires **multifaceted approach** combining **curriculum development**, understanding the **nature of science**, applications of **engineering and technology**, integrating **reading and writing**, and other pedagogical components
- **E2C workshops** provides **one model** for creating effective training to meet the NGSS challenges
- More than 140 workshops since 1998 bringing together research scientists, classroom teachers, students, and others to learn about wide range of investigations conducted at LDEO



Earth2Class Workshops at the Lamont-Doherty Earth Observatory of Columbia University (E2C) provides one effective strategy to connect cutting-edge research with teachers and students

- Monthly workshops held at the LDEO campus bring investigators, teachers, and students together to share discoveries that may not get into textbooks for years



E2C approach

- During workshops, participants interact with scientists to gain understanding of:
 - What stimulated the research questions
 - How scientists coordinate components of investigations
 - Learn how results are disseminated
- Aligns strongly with NGSS goals: mastery of the disciplinary core ideas, science and engineering practices, understanding the nature of science, and cross-cutting relationships

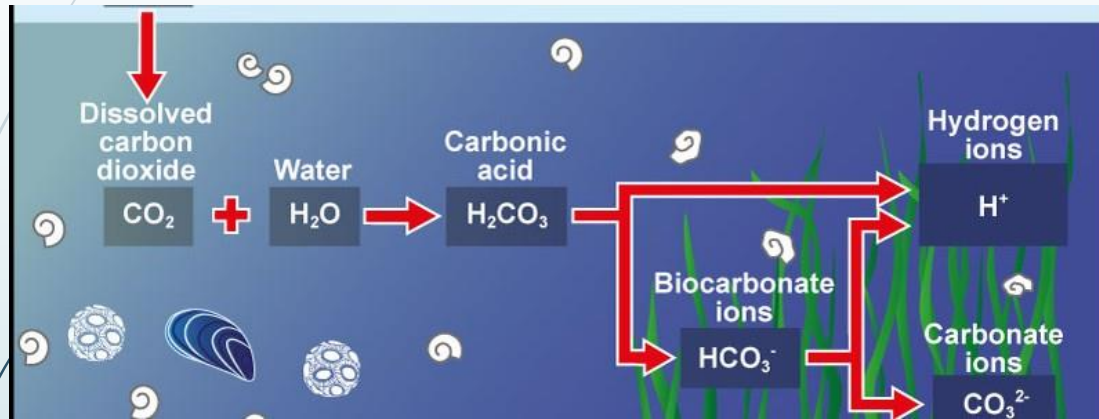


General E2C workshop format

08:45 – 09:30	Arrival of Participants and General Announcements
09:30 – 10:00	Background Information on Today's Topic
10:15 – 12:00	Guest Scientist(s) Presentation(s)
12:00 – 13:00 (noon - 1 pm)	Lunch with the Scientist
13:00 – 15:30 (1 pm - 3:30 pm)	Designing curriculum to meet NGSS and your State Standards



Dr. Taro Takahashi – Ocean Acidification



<http://earth2class.org/site/ocean-acidification-recent-progress-in-environmental-sensitivity-studies-with-taro-takahashi-nov-2013/>



Connections with NGSS

- DCI ESS2.D: Weather and Climate
- PE HS-ESS2-6: Develop a quantitative model to describe the cycling of carbon among the hydrosphere, atmosphere, geosphere, and biosphere
- NoS: Scientific knowledge is based on empirical evidence
- SEP: Engaging in Argument from Evidence
- CC: Cause & effect, stability & change



Dr. Joaquim Goes & Annette DeCharon – Alternations in the Indian Ocean ecosystems



<http://earth2class.org/site/climate-snow-caps-and-the-arabian-sea-with-joaquim-goes-and-annette-decharon-apr-2014/>



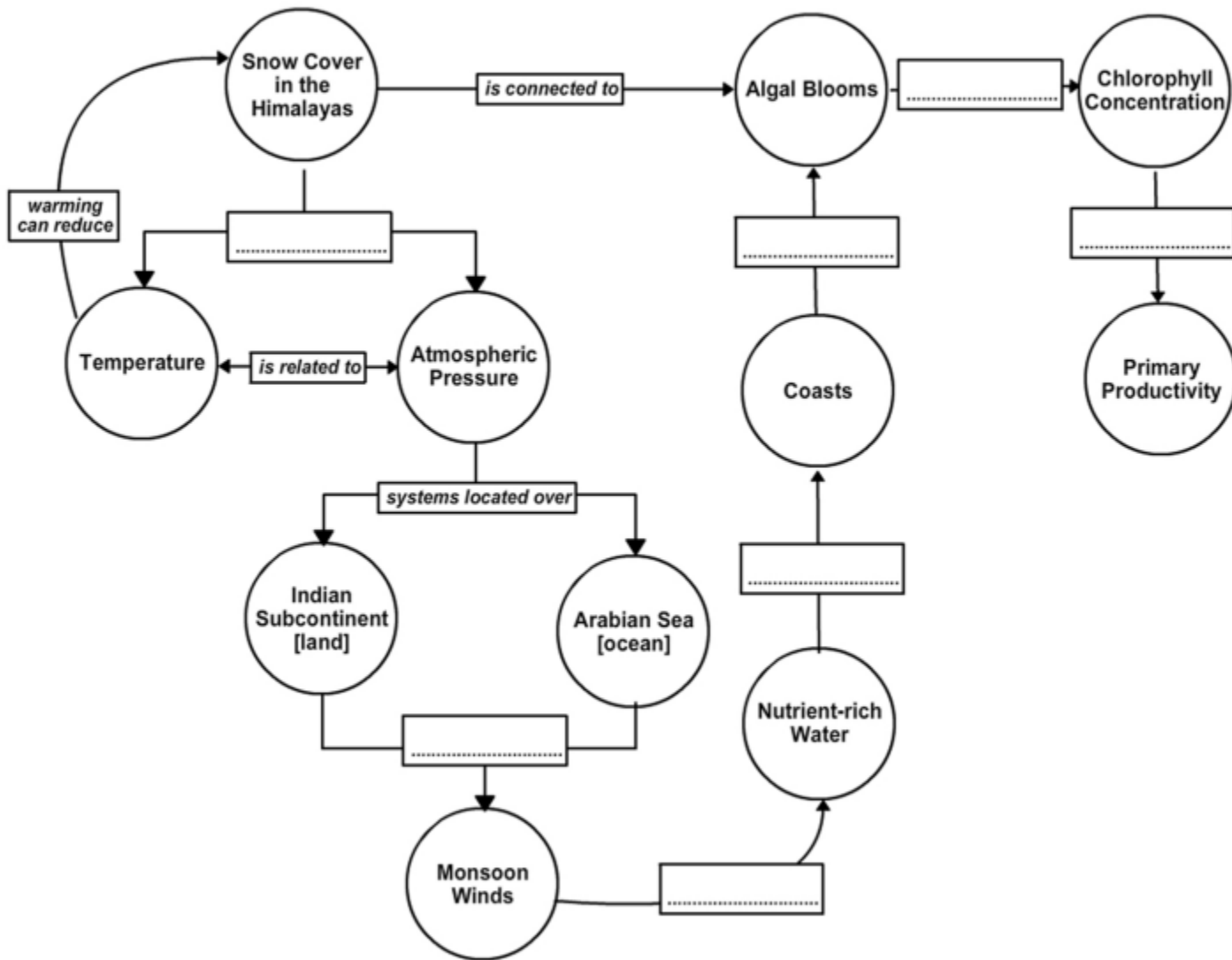
- ESS2.E: Biogeology
- LS2.C: Ecosystem Dynamics, Functioning, and Resilience

Changes in Himalaya snow cover affects nutrient flow to Indian Ocean, marine ecosystems, and climates

Teleconnection (Skype) with co-presenter



The Effects of Snow Melt on Monsoon-driven Primary Productivity



Dr. Michael Kaplan – Dating deglaciation in Alpine Regions

- How can we find out when glaciers retreated when there are only boulders & till?

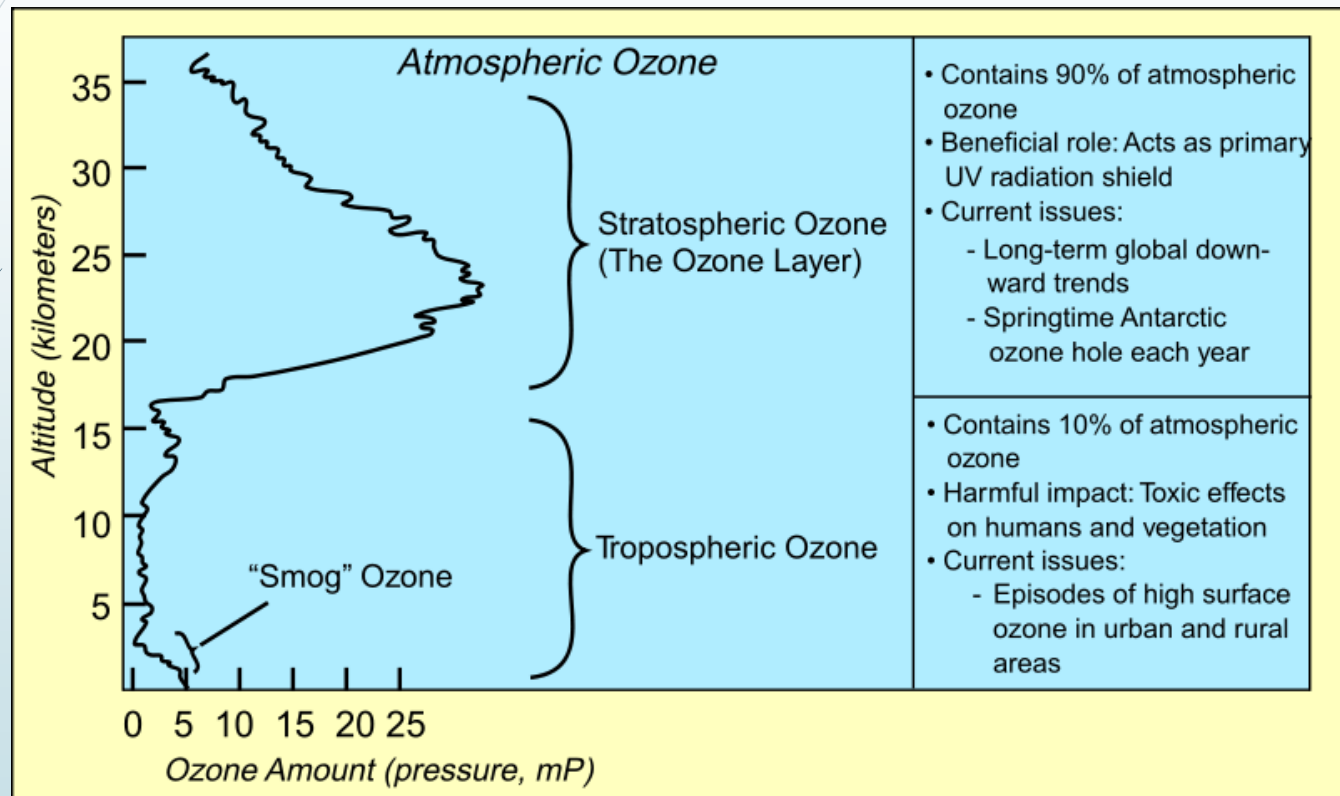
cosmogenic isotopes



<http://earth2class.org/site/how-glaciers-have-behaved-in-patagonia-in-the-past-with-mike-kaplan/>



Dr. Karen Smith – Climate Change and Stratospheric Ozone Depletion



<http://earth2class.org/site/antarctic-climate-change-and-stratospheric-ozone-depletion-with-karen-smith-oct-2013/>



Dr. Natalie Boelman – Impacts of Acute Warming on Arctic Flora and Fauna

A screenshot of a web browser displaying a page from 'The New York Times' 'Scientist at Work' series. The browser's address bar shows the URL: scientistatwork.blogs.nytimes.com/author/natalie-boelman/?_r=0. The page features the 'Scientist at Work' logo with a mountain and water icon, and the subtitle 'Notes From the Field'. A search bar on the right contains the text 'Search Scientist at Work'. Below the logo, a grey box indicates 'Posts published by Natalie Boelman' with '5 Results'. The main article is dated 'JUN 15, 2011' and has '9' comments. The title is 'Eavesdropping on Arctic Birds' by 'NATALIE BOELMAN'. A small portrait of Natalie Boelman is shown next to a bio: 'Natalie Boelman, an ecosystem ecologist at the [Lamont-Doherty Earth Observatory at Columbia University](#), writes from the North Slope of Alaska, where she is studying the effects of climate change on the interactions among plants, insects and migratory songbirds.' The browser's taskbar at the bottom shows various application icons including Internet Explorer, File Explorer, Word, PowerPoint, Excel, and several web browsers.

<http://earth2class.org/site/arctic-songbirds-and-climate-change-with-natalie-boelman-jan-2014/>



Past and future E2C Workshops

- How Does the Land Affect Climate?
- Global Climate Models: Any Progress on Prediction?
Tree, Climate, and Societal Relevance:
A Case Study in Mongolia
- Could Global Warming Mean Less Sunshine and Less Precipitation?
- Climate Change Human Health Project

<http://earth2class.org/site/category/climate-change/>



E2C website

www.earth2class.org

- Enables teachers and students not able to attend 'live' workshops to access archival versions

- Also provides wide variety of educational resources for ES learners
 - Slideshows, activities, links to Standards, Regents Exams, websites

- Valued on national basis--average of >175k hits per month from thousands of site visitors.



What's Next?

- Over the next few years, E2C program plans expansion to provide more resources for educators seeking to introduce NGSS-based programs in their districts
- Revise and update website resources
- E2C model can be applied in other settings, with appropriate modifications

Questions? michael@earth2class.org

www.earth2class.org

