Adaptive Ecosystem Climatology

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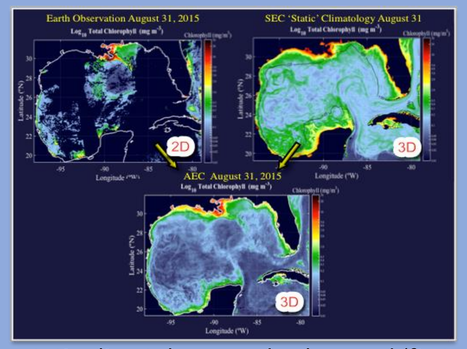
AEC Overview

- The Adaptive Ecosystem Climatology (AEC) is a system for rapidly merging oceanographic observations with numerical simulations to provide an online decision-support tool (with analysis and visualization capabilities) for ecological forecasting.
- The AEC melds observations collected by oceanographers, amateur observers, e.g., boaters, fishermen, beach-goers, students, (crowdsourcing), Earth Observation (EO) satellites, archived *in situ* data, and output from a state-of-the-art, data assimilative, coupled bio-optical-physical ocean model system.



- Using the static climatology as a background 'first guess', observations (EO, *in situ*, or crowdsourced) are optimally interpolated to 'nudge' the climatology toward measured conditions, to provide updated, representative fields (adaptive climatology).

Personal Contribution

- The section of the project that I was focusing on, centered around the crowdsourcing aspect of the data collection. In order to allow amateur observers such as students or fishermen to make scientific observation, I developed a tool kit that would provide the proper instruments for significant and accurate measurement.
- Along with creating the Ocean Sampling Kit (OSKit), I was also tasked with collaborating and coordinating with the Infinity Science Center to implement and publicize the kit.
- Another separate objective was to create a program that could find and organize *in situ* data to be used in the climatology.

Crowdsourcing

- Crowdsourcing is a way of involving the community in the scientific process by allowing "citizen scientists" to collect pertinent data. These data can be interpolated into the model to fill in gaps or can be used for calibrating other sources of data such as satellite data.
- Type of measurements include sea surface temperature, salinity, water clarity, water color, and even phytoplankton.

- Provides a great opportunity to teach students about science.
- The Ocean Sampling Kit (OSKit) has been designed to incorporate these ideas into practice with easy and accurate methodology.

Collaborating

- Coordinated and implemented the OSKits with Infinity Science Center
- Also provided a site for testing equipment

- Networked with teacher at Saint Stanislaus who uses the OSKit with students and reports data consistently through the app

Programming

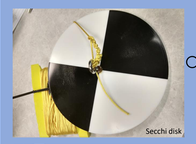
- Task: create a program that can find, extract, and organize *in situ* data so that it can be used in the climatology model.
- Learned C++ through numerous tutorials, books, and practice tasks.
- After familiarizing myself with the language for several weeks, I was able to comprise a program that satisfied the description.

Ocean Sampling Tool Kit

Creating the OSKit

- Searched for various scientific instruments online and tested their validity and reliability
- Created two versions of the kit; one is premade (teacher) and the other provides instructions for building one's own equipment (citizen scientist)
- Synthesized directions/protocols for both kits

Teacher Kit

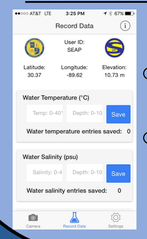


- Provides teachers with simple and accurate instruments to teach students and record data
- Provided instruments include: Secchi disk, temp/salinity probe, thermometer, refractometer, plankton net, microscope

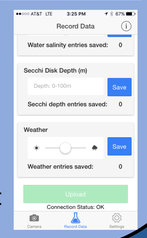
Citizen Scientist Kit

- Provides stewards of science with directions on how to build their own water testing equipment
- Many essential pieces are included, including a 3-D printed phone microscope stand

OSKit App



- The OSKit_AEC app provides the link between the public and AEC
- Allows measurements to be submitted directly by citizen scientists to be used for the project



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