

# A New 5th Grade Weather & Water Curriculum Emerges: Collaboration Between the Southern California Coastal Ocean Observing System, the Ocean Institute, and the Center for Ocean Sciences Excellence-California



OS16L-14

## SOUTHERN CALIFORNIA COASTAL OCEAN OBSERVING SYSTEM

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### ABSTRACT

The Ocean Institute in Dana Point, California has developed a model outreach and education project called “Weather and Water” that effectively integrates Southern California Coastal Ocean Observing System (SCCOOS) products into 5th grade public classroom curriculum. The early pilot project, tested on seven 5th grade classes, successfully identified the challenges of using SCCOOS products in K-12 educational environments.

Second year efforts focused on developing, testing, and implementing a comprehensive 9-week curriculum designed to help teachers meet 5th grade California Science Content

Standards in weather and the water cycle, improve student performance on mandatory standardized assessments, and model best practices for scientific inquiry. The new program includes: a 9-week *Weather and Water* curriculum, with both inquiry and direct instruction lesson plans; a *Weather and Water* Science Kit complete with all of the required resources to effect the lesson plans; a 7-hour Teacher Professional Development Workshop that shows teachers how they can use this curriculum to improve student test scores on standardized testing; a custom Ocean Institute



field exploration that teaches students the most difficult of the required concepts; and a new SCCOOS Education and Outreach Web Site that adapts data

products into student-friendly activities supporting performance on standardized tests. The curriculum carefully integrates the new Web site into creative school-based activities allowing students, for example, to use real-time SCCOOS sensor data to study differential heating and development of coastal sea

breezes. The project has been well received by the education community—as demonstrated by the additional funding provided by the private Arnold and Mabel Beckman Foundation—to expand the delivery of the *Weather and Water* curriculum to 100 classrooms in 17 school districts in Orange County, California during the 2005 school year.

SCCOOS’ collaboration with the Ocean Institute was facilitated by the Center for Ocean Sciences Excellence in Education—California. We have learned that a successful E&O program requires the involvement of E&O professionals who, with funding from the larger science projects, develop effective programs predicated on both understanding and overcoming the obstacles to improving performance in classrooms. This program allows SCCOOS scientists interested in E&O to contribute efficiently and effectively to a comprehensive and sustained program, is recognized by program managers at NOAA and the California Coastal Conservancy, and improves the overall impact that SCCOOS has as an emerging Regional Association.

### INTRODUCTION

The *Weather and Water 5th Grade Program* offers a viable solution for integrating SCCOOS and other observing system data into formal education. This project carefully integrates data products into a 9-week comprehensive weather curriculum designed to address California Science Content Standards and improve student test scores on required standardized tests. The *Weather and Water 5th Grade Program* provides a model for Education and Outreach, broader impact, partnership development, and sustainability.

### PROGRAM OVERVIEW

The *Weather and Water 5th Grade Program* addresses broader impact by integrating SCCOOS data into a comprehensive 9-week curriculum. Various components were developed to leverage the use of weather and ocean data and include:

- Professional Development
- Teacher Notebook
- Science Kit
- Lesson Plans: Direct Instruction, Student Investigation, Homework, English Language Learner (ELL) Option, Gifted and Talented Education (GATE) Option
- *Weather and Water* Web Site
- Assessment
- Ocean Institute Field Trip

The *Weather and Water* Web site integrates scientific data into the curriculum through student-friendly classroom activities and can be found at [sccoos-weather.ucsd.edu](http://sccoos-weather.ucsd.edu).

### OUTCOME

Developed a comprehensive *Weather and Water* 5th Grade Curriculum.

Provided professional development and *Weather and Water* Science Kits to over 100 5th grade teachers in 16 school districts in Orange County, California.

Hosted over 3,500 students in a comprehensive 9-week program with technology strand and specialized *Weather and Water* Field Trip.

Attracted private foundation funding from the Arnold and Mabel Beckman Foundation to further broaden the impact.

### CONCLUSION

Complex data products can be utilized by formal K-12 education when they are properly integrated into curriculum.

The process of integrating data products into formal education is time and labor intensive and involves a careful analysis of where and how to make effective linkages. In the end, SCCOOS products could not be effectively integrated using stand-alone lessons but rather required embedding them into a comprehensive 9-week curriculum.

Achieving broader impact required effective partnerships, project management, awareness of formal education needs, and a team of qualified curriculum developers and education-savvy researchers.

Scientific data can be used to teach classic examples of weather conditions, such as sea breezes and the ocean’s effect on weather, through a student-friendly Web site.

Response from a participating teacher:

“I wanted to let you know that my students and I have just started working on the *Weather and Water* program and are extremely excited about all the learning to come. In my 18 years of teaching I have never felt as enthusiastic and empowered about teaching science as I do right now.”

Images (top to bottom): Teachers investigate evaporation rates during the professional development; Students demonstrate the uneven heating of the Earth in the classroom; Students investigate convection currents during the field trip to the Ocean Institute; *Weather and Water* 5th Grade Program Web site home page; Sample pages from the *Weather and Water* Web site at [sccoos-weather.ucsd.edu](http://sccoos-weather.ucsd.edu)