

**DEVELOPING EXTENSIONS TO MAURY PROJECT MODULES  
TO ENHANCE TEACHER UTILIZATION OF THE  
SOUTHEAST ATLANTIC COASTAL OCEAN OBSERVING SYSTEM (SEACOOS) WEB SITE**

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## 1. INTRODUCTION

The American Meteorological Society initiated a series of educational programs for professional educators in the late 1980's which continue to this day. Through ongoing efforts, funding from numerous sources continues to be identified to enable the programs, intended to enhance the understanding of teachers of the critical concepts involved in the sciences related to the waters of the earth in all its forms.

One of the programs was the Maury Project, following on the heels of Project ATMOSPHERE, which set the pattern and model for these and additional AMS courses. Started in 1994 at the United States Naval Academy, the summer workshop typically draws approximately twenty-five teachers from across the country to the Naval Academy for two weeks of training in physical oceanography.

The SouthEast Atlantic Coastal Ocean Observing System (SEACOOS) was "to be one of the regional systems ringing the U.S. to form the coastal component of the Integrated Ocean Observing System (IOOS). In May of 2000, the Chief of Naval Research, the Administrator of NOAA, and the President of the Consortium for Ocean Research and Education announced the formation of OCEAN.US, an

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organization dedicated to the formation of an integrated and sustainable ocean observation system. The SEACOOS domain encompasses the coastal oceans of and off Florida, Georgia, South Carolina, and North Carolina, from head of tide inland to the seaward boundary of the Exclusive Economic Zone." (SEACOOS, 2006)

There appeared to be an opportunity to develop educational components for informing educators about SEACOOS utilizing related materials from the Maury Project.

## 2. THE MAURY PROJECT

Following the Society's original effort, Project ATMOSPHERE, the Maury Project tackles concepts related to the seas and air-sea interaction. In addition to the onsite training component of the Maury Project, printed materials were developed that would be used by the newly trained teachers to further train others. These modules emphasized single concepts in oceanography and the interaction of the seas with the atmosphere. The modules use current pedagogical theory, both to instruct and model. Each module has an overview, essential concepts, activities and resources.

Eight modules were produced specifically for the Maury Project:

- Wind-Driven Ocean Circulation
- Density-Driven Ocean Circulation
- Ocean Tides
- Deep-Water Ocean Waves

- Shallow-Water Ocean Waves
- Coastal Upwelling
- Measuring Sea Level from Space
- Ocean Sound

Two modules have also been produced that are used by both Maury Project and Project ATMOSPHERE educators, raising the total available modules to ten:

- Pressure Blocks
- El Niño – La Niña

### 3. SEACOOS

SEACOOS, in order to meet its mandate and to improve communications with the large amount of data and information it provides, has developed a particularly impressive web site that includes the general informational pieces, but also provides some very powerful tools. Several sections can be viewed to identify data measured or modeled for the region while others can demonstrate the interaction of the many parameters influencing the coastal environs of the

southeast United States. An example of the interactive modeling site is shown in Figure 1. (The SEACOOS homepage is located at <http://www.seacoos.org>.)

### 4. THE SEACOOS – MAURY PROJECT BLEND

To assist SEACOOS with its efforts at reaching out to educators, two previously developed Maury Project instructional modules were adapted and enhanced, utilizing the SEACOOS website for online real-time data illustrating the concepts of the modules.

The process started in the spring of 2005 with a gathering at the University of North Carolina – Chapel Hill, including several teachers from the central and eastern area of the state, the authors and SEACOOS staff and scientists. The review of

two selected modules proceeded, with background provided by a number of experts from the field and SEACOOS.

The two modules, *The Maury Project – Ocean Tides Teacher’s Guide* (American Meteorological Society, 1995) and *The Maury Project – Wind-Driven Ocean Circulation Teacher’s Guide* (American Meteorological Society, 1994), were selected for their relevance and application to the material found on the SEACOOS site.

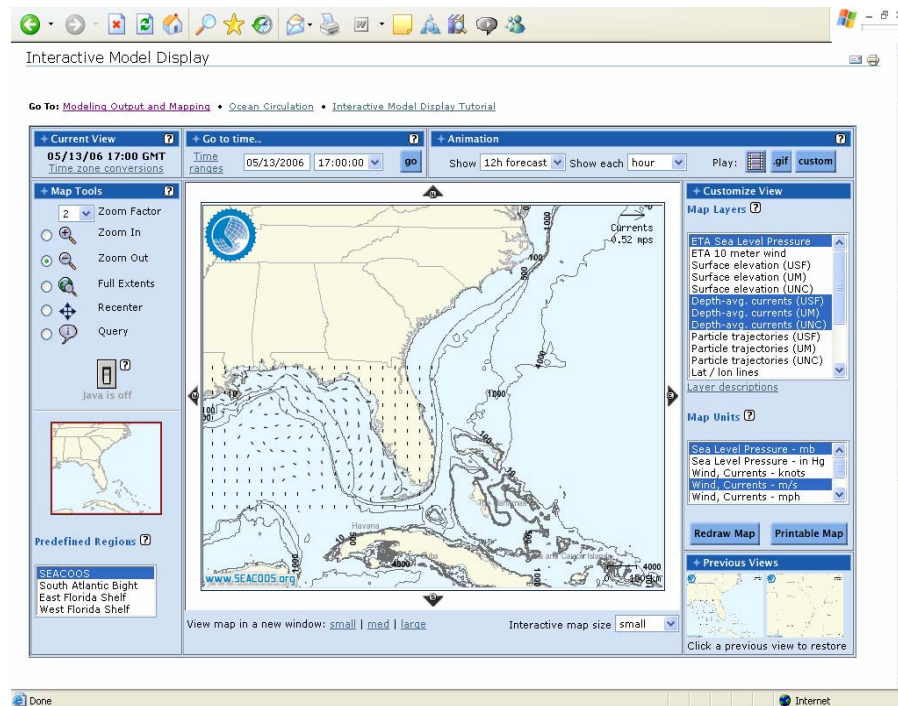


Figure 1. SEACOOS interactive display page screen shot, showing currents (from three sources) and bathymetry details. <http://seacoos.org/Model%20Output%20and%20Mapping/InteractiveModel> (SEACOOS, 2006)

Printed copies of the modules are provided by the AMS to trained Maury Project “Peer Trainers” for in-service instruction to their peers at a number of venues (e.g., national, state and local science conferences as well as programs within their respective schools and regions.

Materials have also been used with students in classrooms, as prepared, or adapted for younger students or special applications. The value of the modules has been clearly validated over a number of years of use among thousands of students and educators.

The initial efforts by the team consisted of developing an understanding of the concepts and the resources available from SEACOOS. Then ideas were generated that could be implemented in an extension to the Maury Modules involved. The extension itself was written by the authors after the initial workshop, shared with the development team and rewritten based on their input. Development review included use of each extension by members of the team and their application to other instructional situations.

The SEACOOS web site demonstrated a great deal of flexibility and power, with overlapping graphics and interactive programming allowing the user to customize areas of interest. To encourage and help instruct teachers in the use and potential application of the materials, the use of the Maury Project modules was forwarded as a solution.

With extensive use since their development, the modules have shown their validity and worth, and as key components to the extension process, it was planned that they would provide teachers with insights needed to work with the SEACOOS materials.

Each extension was planned to follow instruction with one of the modules. Then activities were developed to illustrate the concept using data available on the site. Following the first stage, several problems are posed for solving with other areas of study proposed in summary.

Thus, the design of the modules provides extensive guidance on the resources available and procedures to follow on the SEACOOS web site, and allows for additional development of the concepts to meet higher order cognitive skills. Pedagogical considerations were as important as the use of the site and the available data.

Again, primary instruction starts with the Maury Project module, followed by the extension, adding particular application to the SEACOOS materials. Flexibility was sought, since the extensions were to provide instruction in the concepts involved, and to provide insights and experience on the SEACOOS site.

## 5. CLASSROOM APPLICATIONS

Follow up investigation revealed that participating teachers found the extensions to be valuable in understanding the operation of the SEACOOS site. The extensions also found themselves being used in secondary classrooms as part of the instruction in the concepts considered in each module. In most cases this involved some adaptations, both to accommodate the

abilities of the students and the capabilities of the technology at each school or facility. The SEACOOS site requires a fair amount of computing power and a strong broad band internet connection to utilize the interactive materials online. Follow-up studies have not been extensive, but the results have been consistent.

## 6. CONCLUSION

The extensions are unique activities, providing the participant with accurate concepts developed through the American Meteorological Society, applied to the data and products available on SEACOOS.

Additional modules are being considered for development in this fashion, to further enhance the application of the module itself and the understanding and value of the impressive SEACOOS source.

## 7. ACCESSING THE EXTENSIONS

The extensions and associated activities can be found at <http://www.scseagrant.org/se-cosee> (click on "Teacher's Niche" to find the appropriate link). These activities may be reproduced for educational use only for applications in classrooms or staff development of professional educators. Permission is hereby granted for such reproduction subject to the notification of the authors of the publication or application.

The Maury Project modules are the sole property of the American Meteorological Society and the use of these modules must be authorized by the education office of the American Meteorological Society.

## ACKNOWLEDGEMENTS

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## REFERENCES

"Observing Regional Ocean Conditions in the Southeastern United States," Southeast U.S. Atlantic Coastal Ocean Observing System (SEACOOS), <http://www.seacoos.org>, 2006.

"The Origin of SEACOOS," Southeast U.S. Atlantic Coastal Ocean Observing System (SEACOOS), <http://seacoos.org/General%20Information> , 2006.

For information on the American Meteorological Society Maury Project Peer Trainer modules, see <http://www.ametsoc.org/amsedu/maury/guide.htm>

## **Appendix**

# **Wind Driven Circulation**

*Maury Project Module Extension Activities*

Version 3.0

Utilizing Resources Provided by

The SouthEast Atlantic Coastal Ocean Observing System  
(SEACOOS)

This instructional supplement is designed to extend and compliment concepts found in *The Maury Project* instructional module on *Wind Driven Circulation*. (American Meteorological Society, 1994)

It is assumed that you have completed this module under the instruction of a qualified AMS Maury Project Peer Trainer.

### **National and State Science Standards**

Modules and extensions provide concept development that can be adapted or utilized in classrooms to assist the teacher in leading his or her students to an understanding of the expectations inherent in science and other standards across the country. The exciting nature of the concepts provides motivation that will also assist in standards seemingly unrelated, but by providing a structure and relevance, actually add meaning to those standards.

Science as it applies to the science standards is obvious, but appropriate concepts developed may be found in mathematics, language arts, geography and the social sciences. Science, by its nature, is an integrated content area that addresses many real-world issues.

Specific standards may be identified separately from this *Extension*.

### **Technical Note**

The online resources provided by SEACOOS are very powerful and comprehensive. A number of variables may limit your ability to fully utilize the information. This may include the computer's processing speed, internal memory, modem type and speed and quality of the internet connection. Use of a dial-up connection is not recommended. If problems develop loading multiple variables and viewing loops, limit your viewing to single variables. By printing out the screens or simply viewing one variable at a time, you may then be able to compare the effects of multiple variables and arrive at your solutions.

1. If any access problems develop that you believe may be with the web site, please advise the primary author so that the site may be contacted and the problem resolved.

### **Objectives**

After completing this extension, you should be able to:

2. Describe the patterns found between surface winds and sea level pressure.
3. Describe the patterns found between surface winds and surface currents.
4. Diagram an example of the ideal pattern showing the relationship between sea level air pressure, surface winds and surface currents.
5. Provide a solution to a problem utilizing what you have learned and the resources of SEACOOS. Identify SEACOOS, its purpose and resources.

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The complete extensions and associated activities can be found at <http://www.scseagrant.org/se-cosee> (click on "Teacher's Niche" to find the appropriate link).

# Ocean Tides

*Maury Project Module Extension Activities*

Version 3.0

Utilizing Resources Provided by

The SouthEast Atlantic Coastal Ocean Observing System  
(SEACOOS)

This instructional supplement is designed to extend and compliment concepts found in *The Maury Project* instructional module on *Ocean Tides*. (American Meteorological Society, 1995)

It is assumed that you have completed this module under the instruction of a qualified AMS Maury Project Peer Trainer.

### **National and State Science Standards**

Modules and extensions provide concept development that can be adapted or utilized in classrooms to assist the teacher in leading his or her students to an understanding of the expectations inherent in science and other standards across the country. The exciting nature of the concepts provides motivation that will also assist in standards seemingly unrelated, but by providing a structure and relevance, actually add meaning to those standards.

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Specific standards may be identified separately from this *Extension*.

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The online resources provided by SEACOOS are very powerful and comprehensive. A number of variables may limit your ability to fully utilize the information. This may include the computer's processing speed, internal memory, modem type and speed and quality of the internet connection. Use of a dial-up connection is not recommended. If problems develop loading multiple variables and viewing loops, limit your viewing to single variables. By printing out the screens or simply viewing one variable at a time, you may then be able to compare the effects of multiple variables and arrive at your solutions.

If any access problems develop that you believe may be with the web site, please advise the primary author so that the site may be contacted and the problem resolved.

### **Objectives**

After completing this extension, you should be able to:

1. Describe the patterns of sea level changes along the coast of the southeastern states.
2. Effectively use various data depiction systems found on the SEACOOS site.
3. Discuss the relative value of modeled, remotely sensed and directly measured data for describing our tides.
4. Describe the relationships of these variables in certain applied situations.
5. Provide a solution to a problem utilizing what you have learned and the resources of SEACOOS.
6. Identify SEACOOS, its purpose and resources.

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The complete extensions and associated activities can be found at <http://www.scseagrant.org/se-cosee> (click on "Teacher's Niche" to find the appropriate link).