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## 1.0 INTRODUCTION

Over the past 11 years, the COMET Program has focused primarily on providing distance learning materials for the professional development of forecasters in the National Weather Service (NWS), Air Force, and Navy. We have created hundreds of hours of computer-based learning (CBL) materials on a wide range of topics, including numerical weather prediction, satellite imagery, fire weather, marine meteorology, and more. (For a complete list of materials, see the COMET Web site [<http://www.comet.ucar.edu/et.htm>] or the MetEd Web site [ <http://meted.ucar.edu/courses.htm>]). Most of these materials are at a level appropriate for upper-level or graduate students.

However, in the last few years we have created learning materials meant for undergraduate students, emergency managers, and middle school students. These materials may also be of interest to the general public and others in K-12 education, higher education, and government officials who are impacted by weather emergencies.

## 2.0 USING SATELLITE DATA IN UNDERGRADUATE SCIENCE COURSES

The first module we developed for a non-forecaster audience is a 1998 Web-based module called *Remote Sensing Using Satellites*. This module is meant for undergraduate students enrolled in an introductory earth or atmospheric science course and is designed to supplement lecture and textbooks.

The module's goal is to make students better consumers of weather information by providing dynamic graphics, animations, and science content about remote sensing. Students apply what they learn by exploring hurricanes using satellite imagery.

Topics covered in the module include: basic principles of remote sensing, what satellite-based sensors observe, and the imagery created from remotely sensed data. Students will develop a basic understanding of the principles of satellite imagery interpretation, as well as some classic hurricane characteristics.

The module can be viewed at:  
<http://www.comet.ucar.edu/nsflab/>

## 3.0 HURRICANE PREPAREDNESS FOR EMERGENCY MANAGERS

In 1999, the COMET Program released a CBL module designed primarily for emergency managers in hurricane-prone areas. *Community Hurricane Preparedness* (<http://meted.ucar.edu/hurricane/chp/index.htm>) describes hurricane formation, influences on their life cycle and paths, and hazards associated with hurricanes and tropical storms. Students learn about the forecast process, the uncertainties inherent in hurricane forecasting, and how best to deal with those uncertainties as they make decisions regarding their community's safety. The module contains many compelling photographs, graphics, and animations that illustrate conceptual material, and audio pieces in which emergency managers talk about their real-life experiences. A concluding exercise allows the learner to play the part of an emergency manager faced with an oncoming hurricane. During the exercise, the student must make decisions based on forecast track, storm speed, and community evacuation criteria. As in the real world, decisions are complicated, conditions change rapidly, and making the right choices at the right time is very difficult.

A shorter path through the module is also available for people in decision-making roles (such as mayors, county commissioners, police chiefs) who need to understand hurricanes and the difficulties emergency managers face. *Community Hurricane Preparedness* is available from the Federal Emergency Management Agency (FEMA) as a free CD-ROM for emergency managers who

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register to take the FEMA independent study course (<http://www.fema.gov/emi/ishome.htm>) by the same name. A Spanish translation of the short version is available at <http://meted.ucar.edu/hurrican/spnindex.htm>.

#### **4.0 HAZARDOUS WEATHER FOR EMERGENCY MANAGERS**

In 2001, we released a second module for emergency managers. *Anticipating Hazardous Weather and Community Risk* (<http://meted.ucar.edu/hazwx/index.htm>), which is also offered through FEMA's independent study program. This module provides a basic introduction to meteorology as viewed from global, synoptic, and mesoscale perspectives. We believe that K-12 and college-level educators will find the conceptual materials and graphics in this section particularly useful. Hazards and the forecast process and products are discussed, but from a broader perspective than in the hurricane module since this module covers hazardous weather of all kinds. *Anticipating Hazardous Weather* also concludes with a decision-making exercise, which is based on the 1997 Fort Collins, Colorado flood. Like *Community Hurricane Preparedness*, *Anticipating Hazardous Weather and Community Risk* uses still images, animations, and audio.

#### **5.0 AND NOW FOR SOMETHING COMPLETELY DIFFERENT**

One of our latest products, called *Hurricane Strike!*, is based on the *Community Hurricane Preparedness* module, but geared toward middle school students. Because the audience is much different than either forecasters or emergency managers, we have chosen to use a story-based format for the design, rather than the traditional expository form. *Hurricane Strike!* puts the student in the role of a visitor to a Fort Walton Beach, FL home. Just as he or she arrives at the virtual front door, the Weather Channel announces the approach of Tropical Storm Erin.

The storm intensifies over a six-day period, and on each day the student must perform various tasks to prepare for the hurricane. These include investigating activities in which the student learns about hurricanes from a scientific perspective and safety activities where the student helps the virtual host family in their hurricane preparations. For example, one of the science pieces allows the student to explore the three-dimensional structure of a hurricane by "moving" around and through the

storm. One of the safety activities requires the student to choose items at the grocery store that the family might need if the hurricane hits their area.

The module is designed to be highly interactive and entertaining for middle school students. A teacher's guide is included, along with printable worksheets that can be used to test a student's knowledge at various points. The content is tied to the Red Cross' *Masters of Disaster* curriculum.

A Web-based version of *Hurricane Strike!* will be available online from the COMET Web site (<http://www.comet.ucar.edu/et.htm>) near the end of 2001. Because the product has so many animations and audio pieces, it will run best over a T1 or better connection. It requires the free Macromedia Flash™ plug-in, which can be downloaded from the Macromedia Web site (<http://www.macromedia.com/downloads/>). Schools that do not have such fast connections can obtain a copy of the module on CD; further information will be available on the COMET Web site.

#### **6.0 A FEW FINAL COMMENTS**

The National Science Foundation funded the satellite imagery module, and the NWS and FEMA jointly funded the other three modules described in this paper. While these products represent a small fraction of the total hours of content produced by the COMET Program, they demonstrate the engaging and effective use of multimedia products for audiences other than professional forecasters.

In addition to the modules themselves, teachers and trainers are free to use all or portions of our modules for non-commercial purposes. (A few non-COMET objects have copyright restrictions.) Restrictions on using the modules are documented in the Disclaimer section of each product (usually a link on the module's opening screen).

At the time of this writing, the COMET Program is developing a Web-based, searchable multimedia database. Successful database queries will return thumbnail images of the media that satisfy the search criteria. For a given media item, the user can then download the media item to his/her computer. Media types available from our database include static images, animations, video, and audio clips. The database is expected to be available on the COMET Web site in early 2002,

and as holdings in the Digital Library for Earth Science Education (<http://www.dlese.org>).

For information on obtaining permission to use any module objects (graphics, animations, audio, etc.) not in the database and on any copyright restrictions, please contact the COMET copyrights administrator, Lorrie Fyfe at 303-497-8344 or e-mail her at [fyfe@comet.ucar.edu](mailto:fyfe@comet.ucar.edu).