# 11.5 COLLABORATIVE TRAINING EFFORTS AT THE NESDIS COOPERATIVE INSTITUTES

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## 1. INTRODUCTION

As satellite meteorologists and oceanographers need to be familiar with an increasing variety of satellite sensors and techniques, work has begun to increase student exposure to the sensors and techniques currently in use. Presently, graduate level satellite meteorology and oceanography courses tend to focus on sensors that the instructors are familiar with as part of their own research. This results in an uneven knowledge base for meteorologists, climatologists and oceanographers leading to communication problems between the providers and potential users of satellite services. It is believed that a wider base of knowledge would foster greater scientific collaboration, initiate more approaches using multiple sensors to address scientific issues and improve future satellite mission planning.

## 2. PARTICIPANTS

NOAA's National Environmental Satellite, Data and Information Service (NESDIS) has partnered with a number of universities to form a federal-academic coalition to further remote sensing applications for the atmospheric and oceanic sciences (figure 1). There are currently four primary cooperative institutes working with NESDIS through the Center for Satellite Applications and Research (STAR) Cooperative Research Program, one each for atmospheric science (CIRA at Colorado State University), meteorology (CIMSS at the University of Wisconsin), climate studies (CICS at the University of Maryland) and oceanography (CIOSS at Oregon State University). In addition NESDIS works closely with a cooperative science center (NOAA-CREST at City College New York with numerous partners). More information about the formation and purpose of NOAA Cooperative Institutes (CIs) can be found at www.nrc.noaa.gov/ci and NOAA Cooperative Science Centers at www.epp.noaa.gov. Because each of the Cooperative Institutes and Science Centers has unique focus areas and capabilities as well as a strong connection to NESDIS, they provide an ideal opportunity to demonstrate how improved advanced education can be achieved.

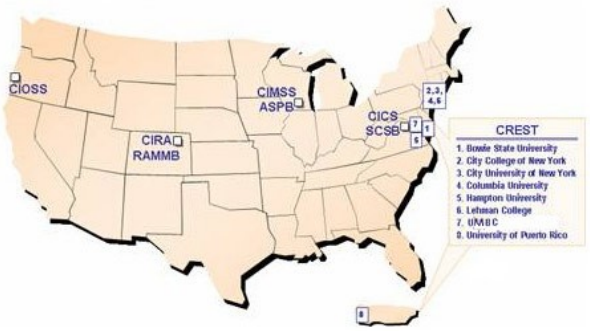


Figure 1: Location of participating CIs and Centers

## 3. TECHNIQUE

### 3.1 *Visiting lectures*

Several possibilities were considered to expand higher level remote sensing education so that a wider variety of earth observing sensors and related applications would be covered evenly in each class. A web page of downloadable lessons could be created as a sort of “lecture bank” or an entirely new course could be created. However, the participants decided to take a a simple “visiting lecture” approach in which existing classes include experts in different subject areas as guest lecturers. This allows the instructors to keep control over the content of their courses and allows students and lecturers to meet one another. In this spirit, the satellite oceanography class at CIOSS hosted an atmospheric science expert from CIRA to talk about satellite-derived wind applications. The satellite introductory class at CIRA hosted a CIMSS expert on satellite-derived soundings. The general remote sensing class at CREST hosted a meteorology expert from CIMSS as well as a global climate expert at NESDIS to talk about satellite-derived hydrology products. The visiting lecturers were not on-site at these classes so they used interactive remote presentation software

### 3.2 *Community focus*

This collaboration is focused on developing a community of well-rounded remote sensing students who better understand the application and impact of current satellites for weather, climate and ocean applications and are better prepared to support and use future satellites. It is hoped that these students will move on to careers where they can develop new applications from satellite data or serve as knowledge brokers between satellite data providers, satellite data users and satellite constellation planners. The cost of satellite programs such as GOES-R and NPOESS are published regularly but the benefits have been much more difficult to communicate. This communication must be improved in order for the current satellites to be better utilized and the future satellite constellation to be optimally designed.

In addition to the "cross-training" approach there are three other activities used by NESDIS/StAR to help form this community. (1) NESDIS has an annual Cooperative Research Program Symposium, where students and researchers from the CIs and Center meet to focus on a topic of community interest. Students provide oral and poster presentations while experts in the topic of interest judge the student presentations. The location of the symposium alternates each year to a different CI or to the Center. The most recent symposium theme was hosted by CIOSS in Corvallis, Oregon with the theme "Data-Model Fusion - Use of Satellite Data with in situ Data and Models," covering everything from simple data-model comparisons to complex data assimilation. An agenda with links to the presentations is at http://cioss.coas.oregonstate.edu/CIOSS/workshops/CoRP_symposium_08/Agenda_CoRPSymp.html (2) NESDIS also sponsors "student exchanges" where students can visit other CIs, the Center or NESDIS locations to investigate future collaborations by meeting one on one with local experts. (3) Finally, the director of NESDIS' Center for Satellite Applications and Research meets annually with the directors of the CIs and Center each year to further the federal-academic partnership to improve remote sensing information available to achieve societal benefits. Examples of benefits anticipated by improved observations can be found at http://www.earthobservations.org/about_geo.shtml.

### 3.3 *Remote Presentation Software*

While the participants shared significant background in satellite remote sensing they did not all have strong backgrounds in collaborative education or long-distance collaborative techniques. Therefore the participants chose a simple interactive remote presentation software package already being used by CIMSS and CIRA for training applications called VISITview®, as well as a simple speakerphone in the classroom. VISITview® is a teletraining and real-time collaboration tool developed for the National Weather Service and provides image animations, zooming, and freehand drawing and is available at http://www.ssec.wisc.edu/visitview/ . There are several commercial packages with similar capabilities that could have been used. Each guest lecturer generated a slide show using Microsoft PowerPoint which was converted into the VISITview® format and provided via an Internet link to the classroom of students.

## 4. LESSONS LEARNED

In these lessons, some problems emerged. Though the VISITview® collaboration software worked well, the speakerphones proved to be more difficult. In particular it was difficult to obtain a comfortable balance between the classroom and instructor volume levels so that each could be clearly heard. Additionally, two of the guest lecturers felt disconnected from the students because they could not use visual cues to determine whether the students understood key points. However, the guest lecturer who had previous experience with teletraining did not have these same concerns, having already become used to these methods.

One lesson used Skype (http://www.skype.com) rather than the speakerphone with good results The guest lecturer and remote classroom each had two laptops. One laptop had Skype on it with a video screen displaying the other party as well as the voice volume control and one laptop had the VISITview® presentation on it. While it was not attempted, a single laptop could have been used running both Skype and VISITview®.

The collaboration for the community involved in this effort appears to be growing. Several students have used the NESDIS symposium followed by a student exchange visit to discuss research and potential collaborations. The community has a blog (www.corpblogspot.org) to keep the group informed of graduations as well as jobs and funding opportunities. In addition NESDIS/StAR has a webpage which includes current events and items of interest at http://www.star.nesdis.noaa.gov. Several cross-CI/Center/NESDIS hires have been made and joint research projects started. However, it is clear that more face-to-face interaction helps to make these exchanges more beneficial and enjoyable for all involved.

## 5. FUTURE WORK

The focus of the project will continue to be building the community of remote-sensing students and seasoned researchers. To do this, more face-to-face interactions are planned prior to and after guest lectures such as at conferences where many participants are likely to convene as well as "drop-ins" by researchers to students who are in the area for other work. The remote sensing community focused on NESDIS-related activities is relatively small so members frequently cross paths. More work will be done integrating guest lectures into remote sensing courses. Ideally each semester-long course would have 3-4 guest lectures and at least some of the students will have met the guest lecturer prior to the course to ease communication barriers. We

also expect lecturers to become more comfortable with distance learning techniques as time goes by.

## 6. CONCLUSION

Work is being done to provide a broader knowledge base for remote sensing students who are likely to go on to take jobs in the satellite realm or in operational services such as the National Weather Service and the National Ocean Service. Satellite constellation planning will likely improve as both users and providers are better trained and communication between the two groups is enhanced.

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