

NESDIS-CIOSS Scientific Exchanges: Summer 2005
(Ted Strub and Laury Miller)

In the summer of 2005, two NESDIS research scientists visited CIOSS in Corvallis, OR. Dick Reynolds (NCDC) visited for nearly a month to work with Dudley Chelton, in order to improve the accuracy and spatial resolution of the global SST fields that Dick produces at NCDC. These fields are widely used in research by oceanographers and atmospheric scientists around the globe. They are also used as boundary conditions for atmospheric forecast models. Recent analyses by Chelton and Wentz (BAMS, August 2005, 86(8): 1097-1115) have shown that: (1) Improved methods are available to construct SST fields with much higher spatial resolution, retaining more realistic spatial gradients in SST, as seen by comparing these fields to all-weather microwave satellite SST fields; and (2) When used as boundary conditions for atmospheric forecast models, the higher resolution SST fields produce more realistic fields of surface wind stress, as compared to satellite scatterometer surface wind fields.

During the visit, Reynolds and Chelton made extremely good progress in improving the spatial resolution of the SST fields (see the separate report by R. Reynolds). This success was made possible partially by prior discussions between Reynolds and Chelton and preliminary calculations by Reynolds, while at NCDC. Subsequently, the personal interactions during the visit allowed a much more efficient use of time in refining the analysis steps, trying alternate methods during each step and making specific choices of the best methods. The simple act of spreading graphic results out and discussing them in person allows the different perceptions to be discussed and clarified, without the countless iterations and emails that would be necessary otherwise. Even with the increased pace of progress during the visit, however, one month proved too short a time. Work is continuing and, although the pace is slower, the progress made during the visit makes it certain that a new analysis procedure will be put in place at NCDC, improving an important NOAA product with widespread use. The same analysis procedure will be used to analyze the entire global SST time series (1985 to present) retrospectively, which will provide improved boundary conditions for the next atmospheric re-analyses at NCEP and ECMWF.

Laury Miller's visit was shorter – a little over a week. Discussions over the half year preceeding the visit resulted in three objectives:

- 1) To discuss a previously identified, specific collaboration between Laury, Ted Strub and their colleagues.
- 2) For Laury to gain a better understanding of the breadth of activities at CIOSS and COAS. This will better allow Laury to identify other areas where collaborations are possible as he works at NESDIS, especially given his new position as Branch Chief for the satellite altimeter group.
- 3) To explore, more generally, how to foster increased interactions between research scientists at CIOSS, NESDIS and other NOAA line offices.

These objectives were all well met.

(1) The specific project under discussion is the combination of altimeter SSH and geostrophic velocities with coastal radar surface velocities and scatterometer-derived surface Ekman velocities. This combination will result in fields of surface velocities in the region next to the coast that resolve the vigorous mesoscale circulation features found off the west coast of the U.S. To some extent, these are similar to surface velocities calculated from just the altimeter and scatterometer data in the tropical ocean (35°S to 35°N) in the OSCAR project. The OSCAR fields, however are very coarsely mapped to a 1° grid (~100 km) and strongly smoothed. They are also missing in the region within 100-200 km from land. By making use of the coastal radars, which see out to approximately 150 km from the coast with 3-5 km resolution, along with higher resolution scatterometer winds (5-12.5 km resolution) and alongtrack altimeter data that has been carefully screened for the coastal region, we hope to create surface velocity fields that can resolve the intense mesoscale circulation features in the 200 km next to the coast. Altimeter experts working within the altimeter group at NOAA/NESDIS (John Lillibridge and others) have the expertise needed to look more carefully at the alongtrack altimeter data and extend it as close to the coast as possible. In COAS, Mike Kosro maintains a system of coastal radars that cover the Oregon coast. Kosro and Strub are supervising a post-doc, Martin Saraceno, who will develop the methods needed to combine altimeter, radar and scatterometer data. We will also work with Fabrice Bonjean (ESR, Seattle). Coordination with Bonjean, who is presently funded by NESDIS to extend the OSCAR calculations to 65°N/S, will assure that the coastal velocity fields are as compatible as possible with the OSCAR fields.

(2) During the visit, Laury discussed NESDIS and CIOSS research with a number of the CIOSS Fellows in COAS. In addition to the specific project described above, other ongoing or pending projects in data analysis and modeling at CIOSS/COAS are relevant to the “Dynamics and Data Assimilation Division”, where Laury now serves as Branch Chief. We expect that there will be further opportunities to collaborate on some of these projects in the future.

(3) The desire to increase interactions between members of CIOSS at COAS/OSU and research personnel in NESDIS has been a topic of discussion for some time between the leaders of CIOSS at COAS/OSU (Ted Strub, Mike Freilich, Mark Abbott, Dudley Chelton) and NESDIS (Eric Bayler, Al Powell, Marie Colton, Fran Holt). The initial discussions explored the possibility of NESDIS personnel being (semi-)permanently relocated to Corvallis, similar to the permanent NOAA personnel at CIMSS, CIRA and CICS. At present, this seems unlikely, given the proposed changes in CI policy that make their continuation for more than 5-10 years uncertain.

At the same time, the level of interactions between COAS and NESDIS personnel has increased markedly over the first two years of CIOSS' existence. This is due to both individual efforts (e.g., Dudley Chelton's interactions with Dick Reynolds; Ted Strub's interactions with Laury Miller; Jack Barth's interactions with Tim Mavor, etc.) and the development of specific teams (e.g., the COAST group, led by Stan Wilson, Mark Abbott and Curt Davis; and the Ocean Vector Wind Workshop organizers, led by Mike Freilich, Dudley Chelton and Paul Chang).

These group interactions will be augmented during the first “CIOSS Working Group Meeting”, to be held in Corvallis during September 7-9, 2005 (see the agenda in a separate section of this briefing book). Ted Strub and Eric Bayler have identified four Working Groups: 1) A “Dynamics” WG, consisting of ocean circulation modelers and satellite sensor experts, with an emphasis on models that assimilate the satellite data; 2) An “Ocean Products” WG, consisting of members with interests in the surface fields needed for both research and operational uses in the IOOS era; 3) The “Ocean Vector Winds” (OVW) WG, led by those who organized the first workshop on this topic; and 4) An “Ecosystem” WG, presently constituted by the COAST research group. The third and fourth working groups are already established and making progress. On September 7-8, the COAST research scientists will meet to plan specific collaborations that are expected to be funded, starting in FY 2006. They will join the other three WG’s on September 9. On September 8-9, the other three WG’s will meet to plan activities for the next year. The Ocean Vector Wind WG will continue activities begun at the first OVW workshop in February, 2005. Members of the first two working groups (Dynamics, Ocean Products) have not met as CIOSS working groups, but many members of the Dynamics WG have worked together on NASA altimeter SWT activities or modeling projects funded by NOPP, NRL, NSF, and NOAA. Likewise, those in the Ocean Products WG have interacted within the IOOS meetings in the Pacific Northwest (NANOOS, PACOOS), science education initiatives, CoastWatch activities and various research projects. The outcome of the September 7-9 WG meetings is expected to be a number of specific projects for the near future and longer-term commitments to continue collaborations in general.

During Laury Miller’s visit, he and Ted Strub discussed the above evolution and felt that CIOSS is past the initial “ice-breaking” types of meetings and well into a more mature phase of ongoing, individual and group interactions. They considered ways to encourage these interactions. Given the productivity demonstrated by science exchanges, such as the visits by Dick Reynolds and Laury, they placed a high priority on encouraging and funding these. This raises the problem faced this summer in bringing Dick Reynolds to Corvallis, since CIOSS can not fund travel by Federal employees. Laury and Ted suggest the following strategy. Each year, a small amount of CIOSS funding (order \$20-\$30K) should be retained in NOAA (ORAD) and set aside to fund such travel. CIOSS will have the discretion to direct when this funding is used to allow travel by Federal employees for the purpose of science exchanges for specific collaborations. Both short-term (1-2 weeks) exploratory visits (such as Laury’s) and longer-term (1-3 month, or longer) working visits are envisioned. A separate type of activity will consist of periodic meetings of the working groups or subsets of those groups, not necessarily at the same time. At present, we expect Federal members of those groups to pay their own way, as in the COAST workshops. These working groups will plan larger workshops (several days to a week) as needed. CIOSS has some resources for such workshops in its CORE administrative funds. Other funds will be proposed as the working groups mature and develop a schedule for future workshops.

Thus, the outcome of discussions during Laury Miller’s visit to CIOSS is an approach to enhance interactions between academic and Federal research scientists, which uses several mechanisms: (1) short, exploratory science exchanges (1-2 weeks) to identify specific, potential collaborations; (2) longer, working science exchanges (1-3 months, or possibly

longer) to carry out those collaborations; (3) Working Group meetings to develop plans for science exchanges and workshops; and (4) workshops on specific topics relevant to CIOSS and NOAA mutual interests. A proposed mechanism to allow Federal scientists to participate in the science exchanges, without draining the ORAD travel funds, was developed.