



Fall 2004 Workshop Report

November 10-11, 2004

Charleston, SC

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Summary

The fifth SEACOOS workshop was held in Charleston, SC November 10-11, 2004. The 74 attendees focused their attention on reviewing project status at present and developing working group and inter-working group activities for the fourth year of the project. In the opening plenary session, the recent economic benefits study was presented that assuming a 1 percent benefit to a set of core categories concluded a coastal observing system for the SE would result in \$170 million in savings each year. Working group (WG) updates highlighted recent advances in observing, information management, extension and education and modeling. The draft implementation plan was presented that defines 3 process components – physical state, biogeochemical and ecosystem, and socio-economic - to provide a bridge between the 7 societal goals and list of key variables developed by Ocean.US. It goes on to outline a set of initial applications to be pursued that focus on interaction with user groups familiar with utilizing raw ocean observations and for which SEACOOS may be able to provide significantly improved observational and modeling coverage in the near term. Consistent with prior efforts, SEACOOS is striving to first provide physical state estimation, with specific application to Search and Rescue and Spill Response, fisheries oceanography and management, surface waves, sediment transport and rip currents, and storm surge and inundation.

In plenary the status of preparations for the external evaluations was also reviewed, as was the need for WG input on the Implementation Plan, external evaluation documentation and Year 4 work statements. Jim Nelson gave an update on the State of the SE Coastal Ocean Report, and Sandy Bernard reviewed plans for the SECOORA Summit to be held in early December, 2004.

After the plenary session on the morning of day one, six joint working group sessions were held in which each of the 4 working groups met in pairs to explore topics of common interest. A number of common points of interest were identified, including development of QA/QC protocols for real-time data streams, the need for full WG participation in super-user interactions, development of a strategy to archive information and display it, focus of user interactions that build off SEACOOS strengths, and coordinating needs for observations to force, assess and validate model efforts. These joint sessions were generally quite popular, and it was decided that some form of standing cross-cutting groups were both needed and beneficial to the program as a whole. This has led to the establishment of a number of teams focused on specific applications.

The remainder of the workshop was spent in breakout sessions of the individual working groups. The focus of the breakouts was to draft year 4 work statements, develop a WG summary for the external evaluation, and draft a WG implementation plan for inclusion in the SEACOOS Implementation Plan. For the observing WG it was agreed that in year 4 the emphasis would be continuing inventory development, a coordinated program with the modeling WG to develop circulation descriptions, active engagement of fisheries councils, continued development of state variable products, interaction with Federal affiliates on technical issues, initiation of analyses to improve observing system design, and continued development of a regional waves program. Within the modeling WG year 4 will focus on skill assessment strategies, development of baroclinic nowcasts, data assimilation strategies, participation in CODAE and ecosystem-relevant applications. The IM WG identified the need for interaction with the E&E WG to define future efforts in web-based products, the need to enable data discovery and promote web services to disseminate information, continued standards development, a plan for building toward systems redundancy, continued incorporation of Meta-

door, and a planning process for archives. [E&E – missing?] The affiliates WG discussed issues of COOS/IOOS co-development, status and plans for the National Backbone, and how best to keep each other (federal and non-federal) informed of plans and developments. Interest was keen on maintaining an open dialogue between the two communities.

Appendices

Agenda

SEACOOS Fall Workshop

November 10-11, 2004 • Charleston, SC

Doubletree Hotel

Registration fee: \$100

November 10

8:30am – 10:30am – Opening Plenary – Harvey Seim

Welcome

BRIEF WG updates – 6 mins each.

Presentation of Strat & Implementation Plan

Economic benefits report

Description of WG workshop goals

WG-level implementation plans

Draft Yr 4 Work Statements (in keeping with Yr 4 goals from ExComm)

1030-11 Break

11-12 Combined WG Sessions: O&E with IM, Obs with Modeling

12-1:30 Lunch (Fed Affilliates' working lunch)

1:30-2:30 Combined WG Sessions: IM with Obs, Modeling with O&E

2:30-3:30 Combined WG Sessions:IM with modeling, O&E with Obs

3:30-4 Break

4-5:30 Individual WG Sessions (each meeting separately)

November 11

8:30-10:15 Individual WG Sessions

10:30-12:30 Closing Plenary presentations by WG

Draft Yr 4 workstatements

WG Executive Summary for External Review

Draft WG implementation plan

12:30 adjourn

1-4pm Executive Committee - open to all Pls

Opening Plenary

Economics Benefit Report-Thigpen

1. First reported on DVD Project to showcase and educate about SEACOOS project. The intended audience includes partners, information users, students, and legislators. They are currently filming.

Economic Benefits Study:

The region of interest extends from NC to FL. The methodology used for the study followed that used by Kite-Powell & Colgan for GoMOOS; Harrington & O'Brien for Gulf of Mexico. It was assumed that there is a 1% economic improvement in the various categories considered, which were categories appropriate to SE region.

The result was an estimated total benefit of \$170M/yr.

Shepherd: What level of deployment is assumed? Thigpen: thinks it assumed full build out

Fletcher: Is anyone researching what level of increase is an appropriate assumption? The assumption level is likely to vary with category.

Mooers: How does this compare with studies being done by SAIC? Shepherd: that is different, as it is focusing on industry. This is being done according to region; some are completed and on SAIC web site.

WG Updates:

Observing- Weisberg

Progress/Plans: Showed locations of present observing sites. Have filled in gaps with additional observations sites. Listed types of sites; subcommittees, and recent products.

Priority additions: waves, profilers/gliders, drifters, biological and chemical sensors, video habitat monitoring.

Priority Products: fields of variables for description and support of models through forcing functions, quantitative comparisons, and data assimilation.

Year 4 Priorities:

1. Improve reliability.
2. Better determine user needs through 2-way outreach.
3. Grow the waves, HF-radar, profiler/glider, and drifter components as feasible.
4. Concentrate on product developments
5. Targeted applications: across-shelf exchange, SAR, public awareness, test beds.

Modeling-Werner

Effort to assess quantitatively how well the models are reproducing what's out there – validation in some sense: sea level & current meter comparisons – encouraging so far. POM, ROMS & FVCOM: assessing which models might be better at some things than others – in some cases agreement, some not. Which suite of models are best for some purposes.

Barotropic/Baroclinic- what is the difference in flow field when density structure is incorporated. Demonstrated its relevance and how to improve by adding more flow components. Drifter trajectories (larval dispersal studies, etc.).

Comparison of modeled and measured drifter trajectories—giving information on how best to compute (e.g. including wind, drifter characteristics) – making good progress.

High-resolution models: for near shore estuary-shelf interactions. How do we focus into near shore and how is it coupled with off-shore—and with rest of the world's ocean (nesting with basin-scale). Beginning to work on coupling to offshore—a more difficult and richer problem.

Information Management- Fletcher

Yr 3 Priorities:

1. Continue to develop integrated, map-based products based on (a) data streams and (b) model outputs.
2. Complete documentation on data harvesting and integration.
3. Enhance data integration software and processes, e.g. QA/QC, data dictionaries, metadata tools.

Progress:

1. Networking and problem-solving: DMCC continues to deal with ongoing challenges.
2. Standards development.
 - a. Standard vocabulary (data dictionary) established.
 - b. Federal Geographic Data Committee (FGDC) metadata generated.
 - c. Meta-Door implementation
3. Data formatting and transfer processes.
 - a. Initial assessment of DODS/OPeNDAP completed.
 - b. MapServer GIS utilized for integrated data discovery and display -- additional features, e.g. multiple data layer overlays, good technical
 - c. Both netCDF and Relational Data Base (RDB) DODS servers have been established. The DODS RDB server has been shown to be technically feasible and is in place for use when needed.

4. Documentation: Web postings on tools and data aggregation efforts & issues. See (<http://caro-coops.org/bb/viewtopic.php?t=249>), internal Celoxis site, & SURA Wiki.
5. Development of initial GIS interfaces and data workflows for in-situ observations, merged model output, and remote sensing observations.
 - a. OpenIOOS: SEACOOS provided map images of in-situ wind speed/direction and SST via the OpenGIS Consortium (OGC) Web Mapping Service (WMS) protocol.
 - b. All SEACOOS data OGC-compliant .
 - c. Interface required for merging real-time data with model products completed.
6. Enhancement of Web portals for dissemination of data and metadata.
7. Access to external data streams to support modeling and outreach efforts, e.g. UC Santa Cruz' in-situ SST data, external satellite data from JPL, & external *in situ* data from NOAA NBDC, NWLON/CO-OPS, and NWS.

Planned Efforts:

1. Mapping products
 - a. Static products
 - b. Analytical tools
2. Standards development: data dictionary, QA/QC, metadata/Meta-Door
3. Infrastructure – build in redundancy
4. Archives – develop strategy (e.g. long term storage, on line access)

Implementation Plan Highlights:

1. Mapping products: opportunity for analytical products, in addition to static/interactive tools. Need to address interface/relationship with SECOORA.
2. Standards development: Continue to develop tools and procedures for SEACOOS and SECOOS partner needs – essential to coordinate with SURA SCOOP.
3. Build in redundancy, back-up, and mirror sites – strategy needed for SEACOOS principals.
4. Archives – strategy needed for long term archival and for on-line access to data.
5. Phasing with product milestones in Obs, Modeling, and E&E – what is needed from IM & what innovations can we provide?
6. Interface with private sector – opportunity for IM. Develop strategy.

7. Interface with major partners – SECOORA, SURA SCOOP, NOAA, other federal and state agencies and programs.

Education & Extension-Bacon

Framework for planning:

Facilitate PI/User Interaction

Increase public awareness

Product development—almost totally reactive – dependent

Interaction with SECOORA

Progress:

Targeted Super-User Meetings - Marine Weather and emergency management; fisheries & habitats; use of SEACOOS data in management applications

Cape Lookout Buoy – Determining user needs

HF radar – working with SC to identify sites for location; working on primer. Sea Grant extension agents know the sites and people – can probably help.

Education - COSEE has developed poster “Making Waves”.

Workshops:

SEACOOS Extension Workshop—developing “best extension practices”

National IOOS/COOS Education Workshop

SEACOOS User Needs Workshop for Georgia – to introduce user communities to SEACOOS. Did some prioritization of needs. Report available.

Boats, Buoys, and Science Teachers – SEACOOS/FL workshop

Report/Surveys: Three completed

“State Coastal Observations and Monitoring Needs: Results of a Survey to Assess Coastal Management Needs” 06/04

“The Potential Economic Benefits of Integrated and Sustainable Ocean Observation Systems” 09/04

“Promoting Lifelong Ocean Education: Using IOOS” In-press

Planned efforts:

Continue “Superuser”/PI Exploratory Meetings

Create SEACOOS digital photo file

Complete educational DVDs SouthEast & Florida COSEEs

Complete SEACOOS awareness DVD

Expand E&E interaction with sub-regional systems

Produce HF radar primer/siting guide

Supplement existing met and other obs instrumentation with an educational kiosk display at a public pier - Nags Head, NC

Facilitate User Evaluation of SEACOOS products

Strategic & Implementation Plans – Seim

Reports released: IOOS Implementation Plan; USCoP Report; legislation drafted;

Upcoming SECOORA summit = great push to make IOOS a reality. Important time for SEACOOS to shine. Will have external evaluation in January – will provide a review on where we are and whether there are any course changes needed. It will also set us up to help SECOORA. SECOORA is working on a governance plan; next it will need to do business plan (similar to SEACOOS operating plan). Interoperability moving along – COTS meeting next week. All this makes the Implementation Plan very important. The strategic and implementation plans explain who we are and what we're going to do.

SEACOOS goal – overarching. But we're not going to do it all. Will work with others and help facilitate. Need to make sure that what we do is reputable and defensible.

Strategic Plan objectives: observing system; modeling system; develop information products that combine and utilize first two pieces; regional information management system; coordinate with government agencies and private sector; promote use of coastal information by decision makers.

How do we coordinate all the pieces? A hierarchical structure of RAs & their RCOOSs, IOOS, GOOS and GEOSs. It is important to identify the Federal pieces and their role in the national backbone. Each RA is working on governance (political) side; each RCOOS is working on technical side. There must be coordination at the RA level and at the COOS level. Big challenge: how do we get from where we are now to the “big system”?

A number of structures have been provided by OceanUS: Organizational (observing, IM, Modeling, E&E) & Thematic (7 dwarfs), plus a list of 50+ key variables. How do you pull it all together? The SEACOOS Implementation Plan attempts to organize variables according to three major process components: Physical state, Biogeochemical & Ecosystem, & Societal-Economic. Why introduce components? Because it provides unifying themes for most variables of interest. Can test for targeted applications, such as with the CODAE – this is where we bring in the science.

Phase I Applications:

1. Use circulation fields and drifter trajectories for specific applications (e.g. spill response, pollutant dispersal, HABs). Users = CG, state and federal emergency managers, NOAA HAZMAT, NWS Weather Forecast Offices. Variables = currents, winds, water temp, waves.
2. Fisheries oceanography – can emphasize particle trajectories to assess regional connectivity and fisheries recruitment. Users = SE Fisheries Science Center; SAFMC, Gray's Reef NMS, Florida Keys NMS, FMRI, SC DNR, Beaufort Marine Laboratory. Variables = salinity, species and abundance, etc.

Phase II Applications-

Add storm surge & rips and sediment transport (more inshore).

For storm surge: Variables = water levels, inundation maps; Users = NWS WFOs, state EM.

For rips and sediment transport: variables = directional waves, sediment concentration; Users = state CZM, NWS WFOs.

This provides some longer range plan & structure and carries us to 2007.

The bulk of the Implementation Plan is on: Physical state estimation: ocean circulation, marine atmosphere, surface waves, optics – all this also provides important information on ecosystem components, and is critical information for ecosystem assessment.

Additional topics are in appendices in the Implementation Plan:

Design of system – what drives the design? Geography, oceanography, history, needs.

Roles – of provider sectors, in development stages.

Development process – attempts to define a generic approach (inventory, aggregation, evaluation, etc.).

Prioritization – what is the rationale/philosophy behind selection of initial efforts.

Timeline – what's the best way to do this? Needed. Gantt chart?

Would like feed-back on Implementation Plan. Return to Harvey Seim by Dec 10.

SEACOOS Yr 3 goals:

Coastal ocean response to weather

Surface waves

Fisheries

Biogeochemical indicators

GIS coastal databases

What's next:

Need input on the Implementation Plan – need a good draft by the end of the month.

Need WG-specific implementation plans. Hard exercise – may need to do in outline form.

Jeff Hansen: What about port/inlet security, safety. Seim: have been reluctant to include ports – more complicated. But inclusion of wave field is a step in that direction. Big question is how far inshore SEACOOS can go – will require big investment. Perhaps through partnering.

Mooers: Need to make some assumptions about funding. Next year there is reduction. Need to include some planning about what we can do with reductions.

Lea: Thinks that's a very valuable statement. Thinks how we come out of the review will be an important step. Need a plan and idea on how to implement it – an important transitioning process. Will make us a very strong program, and allow us to be recognized as such. Plan needed to convince stakeholders that we are worth the investment.

Weisberg: Liked way 7 dwarfs was bridged with OOS components. But need to be careful about what we say we will address. E.g. can't address HABS without including the estuary. Same for fisheries. So we need to couch what we want to do in terms of processes, but then identify what we can actually do.

Luetlich: What is the level of coordination at the national agency level? Seim: NOPP is interagency MOA plus NORLC (heads of agencies involved). Recent meeting agreement that the agencies will attempt to include funding in 2007 budgets. Expect to see what this is soon, as President must respond to CoP report and should be reflected there.

Spence: COSEE proposers are being asked to form relationship with IOOS. SEACOOS already doing that.

Shay: Who's on evaluation committee? Seim: Altalo; Wendel Brown, Bloomberg, Hankin, Thoroughgood.

Seim: Andy Clarke is now at OceanUS.

External Evaluation: Russ Lea

Have come a long way in establishing a collaborative group that can see the SEACOOS vision. Accountability is important. What we're doing is open and visible to people outside SEACOOS and can be assessed and critiqued. Provides credibility and testing. "Puts sunlight on the process." We're going to review the program as though we had received the money through a large competitive proposal. Now is the time to evaluate because we're mid-stream and where we're supposed to be. Need to share what we're doing with a new set of eyes who can assess what we're doing. An important aspect of SEACOOS is that it is accomplishing the transition of the science to the users (6.1 + 6.2 → 6.3). This is unusual and not generally found within university research. What will we do with evaluation report? Share with Navy, website, stakeholders, anyone who's interested. Wants everyone to know that we take criticism seriously and respond to it.

Additional comments:

Thanks to SC colleagues, Claire Eager, Sarah Smith.

Working Group Objectives: Seim

Draft WG-level Implementation Plans

Develop WG Exec Summary for External Evaluation

Draft Year 4 Work Statements

State of the Ocean Report – Nelson

Needs to compile and get draft done. He will be talking to individuals about their contributions and making sure they are in.

SECOORA Summit-

Bernard- expecting about 100 people who represent a cross-section of universities, industry, and various stakeholder groups. Invitation list developed on the basis of work and visits over the past year. By end of the week, expect to get agenda out. Purpose of summit: organization. Will be sending out draft by-laws and will be discussing issues related to governance. Will also start to get input for development of business plan.

Joint Sessions

INFORMATION MANAGEMENT WITH OBSERVATIONS

Present: Andy Shepard, Jim Nelson, Travis McKissack, Charlie Barans, Stephanie Obley, George Voulgaris, Rick Jahnke, Dana Savidge, Jeff Hanson, Brian Haus, Bill Johns, Rob Bassett, Suzanne Van Cooten, Sara Haines, Xiaoyan Qi, Richard Styles, Trent Moore, Luke Stearns, Nick Shay, Rick Luettich, Jeremy Cothran, Vembu Subramanian, Chris Calloway, Sandra Vargo, Tom Gallo, Mike Muglia, Ed Kearns, Dwayne Porter, Jesse Cleary, Jason Ferreira, Rick Cole, Paul Work, Randal Abler, Bill Abler, Roger Pugliese, Bob Weisberg, Jim Sullivan, Charlton Purvis, Madilyn Fletcher

1. QA/QC.

With the DMCC, the original concept was that QA/QC rests with the original institution. With specific institutions, this is hard to handle. Also with different regimes at different institutions, you can get different qualities of data.

Questions and Issues:

Can we decide on particular standards? Are these in the data dictionary? Should we implement standards? What is the process by which we identify a set of standards? How do we implement the standards in a way that is manageable by the various institutions?

Discussion:

Kearns: in a previous discussion, we decided to identify threshold tests for the different regions, and then have a common set of flags that list all tests that are applied and overall quality level.

Van Cooten: NDBC has documented standards.

Weisberg: Suggests we start with the NDBC documentation, have IM examine this, and coordinate with the OWG to work out how to implement the QA/QC procedures.

The QARTOD standard is one to work toward, but we must identify the thresholds for various parameters—and these must be identified on sub-regional basis.

Cothran: SEACOOS partners will need the appropriate code libraries.

Van Cooten: These are not yet readily available.

Recommendations:

The SEACOOS DMCC and OWG should look at NDBC and UNC-W manuals. Cothran has already distributed guidelines for QA/QC, and we need to implement them. Each institution will identify a process to review their data and implement QA/QC process. We may be able to streamline this process by taking advantage of resources available through partners, e.g. NDBC.

2. Data delivery & display

Issue: Redundancy in data delivery and display capabilities.

To what level is redundancy needed and how do we deal with it?.

Input is needed on both vulnerabilities at various institutions and possible solutions; what are the problems and the needs? This information should be sent to Madilyn Fletcher, and the IM Working group will draft plan for how to deal with the redundancy issue.

Issue: Data display-- how can we improve on what is presently employed?

Discussion:

The focus needs to remain on how useful and functional the sites are. One thing that most slick sites lack is access to the data. It would also be good to bring together numerical modeling results with observations. (This has been done but is not presently displayed.). Many don't know the range of product types that are available. There may be a need within SEACOOS to inform everyone about what presentation tools are available.

A way to prioritize might be to identify the products first and then use the data to produce it. Some "data products" are useful for specific purposes, but not necessarily appropriate to put up on the SEACOOS web site. How do we decide what to put up, especially when the product has been produced with other agency funds? Need to make sure that products are of high quality and are appropriate to the SEACOOS mission.

Seim: As far as domain for SEACOOS, it is the EEZ. The purpose of the Implementation Plan is to define the future activities. As for standards, we need to task the IM group to evaluate specific needs. And we need to make sure that we stay on focus in terms of display products and Implementation Plan goals.

3. Archives.

Questions and issues.

What and where to archive: How do we want to deal with this? Should all archives remain distributed at institutions? Or should there be centralization? For deep archives, should SEACOOS use the NODC or another similar national archive?

Data access: What data should be available and on-line? To what extent should we archive historical data? In situ data needs to be separated from RS products and modeled products. For the latter, we need to be smarter about how we distribute the load for archiving. Given the present and potential volume, the biggest problem for archiving is the model output.

Consistency between archives: What do we do about data that are updated? NODC deals with this. If data are archived at NODC, and data are updated at institution, who updates at NODC? We need to address this, otherwise have two sets of archives. Need a process to deal with this.

EXTENSION & EDUCATION WITH INFORMATION MANAGEMENT

Present: Sandy Bernard, Pam Knox, Bill Abler, Charlton Purvis, Elizabeth Williams, Sara Haines, Tom Gallo, David Stooksbury, Braxton Davis, Jeremy Cothran, Trent Moore, Jason Ferreira, Jim Demmers, Chris Simoniello, Barbara Spector, Dwayne Porter, Jack Thigpen, Jeff Marshall, Elizabeth Rogers, Margaret Olsen, Xiaoyan Qi, Vembu Subramanian, Chris Calloway, Jesse Cleary, Mike Spranger, Lundie Spence, Bob Bacon, Madilyn Fletcher

E&E has developed a framework for planning, and they see themselves as facilitating transfer of information between PIs & users.

Fletcher: it will be really helpful to have the implementation plan, which will enable the IM group to better plan and respond to SEACOOS needs. At the same time, the IM folks are creative and need to identify innovations that can better present SEACOOS information and information products.

Spence- We want to use real data in the classroom. One product was wave poster. Since new types of data are being included, we need to know how that should be presented.

Haines – is there a way that the education people can provide some assessment of what we have to date and how useful it is.

Spence – wind data vectors looked really good, and we are beginning to work on a primer. Great big comprehensive charts are almost too much for classrooms to use. Need to break up the material into manageable pieces.

Spranger – education group is starting to understand how useful their products are to users, but need to assess this. They need to know what types of products we actually have. Can then assess which are best for what group.

Porter – what is the E&E group doing with the management community?

Bacon- Right now we can provide science information to scientists. Tomorrow can provide to management community. Phase I = super users. Phase II = management community.

Thigpen – One bias of Sea Grant is that the target should be the individual person, not necessarily the coastal management community. It may be simpler to go to communities than to individuals.

Bacon -- Sub-regional systems are working with managers.

Bernard – In SECOORA, we are starting to recognize some of the management needs. First thing we need is an inventory. There is an inventory and tool being developed on the SEACOOS web site. CSO is organizing a resource manager's workshop to assess needs.

Thigpen – Some of the E&E group had a look at Rutgers Cool Room. They're doing this very well – people working on different pieces housed in same place. It is harder for us because we're organized in separate workgroups. Suggests we have people from different workgroups working together on specific tasks.

Bacon – as different products become developed at the sub-regional basis, they can then be extended to larger level.

Fletcher – as we do projects on sub-regional basis, we need to make sure we share on a SEACOOS basis. How do we keep the information flow going?

Bernard – part of the problem she has is that when she gets information, she's not sure who would benefit from that information – IM? E&E?

Purvis – One thing that works well is that there are point people to go to. But what may not be a good sign is that there are people outside SEACOOS who are more familiar with the kinds of data we have than do the members of SEACOOS. Right now their marching orders come from PICS.

Vembu – do we have information from emergency managers about the kinds of information that they need?

Bacon – Perhaps we should include an IM person in these various meetings with stakeholders.

Eager – UNC-CH is thinking of getting an IM person for each workgroup. Can make sure information is channeled to web site. They're doing a workshop to better inform IM folks and others.

Seim – We created a bottleneck by requiring that information go through a single point, and we want to share information in a more distributed fashion = web site.

Olsen – Concerning education, teachers have to teach according to education standards. Are we limited to using data that are now on the web site? Where do they go to find data that aren't on the web site?

Spence – We need three types of data that are available on a selecting basis.

Porter – these are very important points. What is role of SEACOOS in archival? What is the utility of access to historical data?

Fletcher – getting back to Margaret's question. We need to know what kinds of requests there are for information. For now, to get this information you can contact Porter.

Williams – Let's get back to the original question of whether we should have centralized or distributed data base. We had agreed on regional distribution. We have also discussed extensively metadata. Once we have metadata for all data sets, they will be searchable. This will really help in accessing data.

Knox – It would be helpful to have list of contacts on the web site that shows points of contacts for particular types of information.

Rogers – It would be helpful to have an online request form, help desk. (Chris – we're working on this).

Calloway – do we assume that we use DODS to transfer data. Yes, for now.

Recommendations:

IM & EE Workshop so EE can see what's available. Can be an interactive conference workshop.

IM person on each working group, but need to make sure the information diffuses out.

Web site can be mechanism for diffusing information. Need tools so that non-technical people can get information on web site. Workshop between Jan 3 & 11. Need to have flatter organization for distribution of data.

Need to have more information on upcoming meetings to provide sufficient notice so people can plan.

IM person in WGs can alert as to what is coming from working groups. A white paper on what is needed for interface with each group and the funding necessary. Would be very fundable (Lea).

Include an IM person in the Super-User meetings.

INFORMATION MANAGEMENT WITH MODELING

Present: Chris Calloway, Bill Abler, Ed Kearns, Chris Mooers, Alfredo Aretxabaleta, Inkweon Bang, Rick Luttich, Cisco Werner, Roger Pugliese, Geno Olmi, Tom Gallo, Jeremy Cothran, Alexander Barth, Dwayne Porter, Jerome Fiechter, Vembu Subramanian, Jeff Hanson, Xiaoyan Qi, Sara Haines, Trent Moore, Jason Ferreira, Jesse Clary, Charlton Purvis, Pat Welsh, Brian Blanton, Madilyn Fletcher.

Current modeling products. Ocean models are run every day. There is also a forecast product for 3 days. Files are gathered by the IM group and turned into layers that are visible on the web site: water level & depth average currents. It is educational to see all this co-displayed. The map layer GIS approach was a very good display and solution. An other product is the wind field that is a re-processed product used to drive the model. There is also a sandbox area where models, observations, and RS are superimposed.

Agenda Items:

1. The Modeling WG wants data available so they can do skill assessment exercises. Currently they are demonstrating the skill of models, so would like to have data together for one stop shopping. Right now we are aggregating winds and SST, and are also ready to do water level. Models have depth average velocity and water level. So we need data for comparison. Is there a more aggregated way of doing it? Answer is yes. All data are accumulated at USC and sit on one data base. DOD servers are at individual institutions. More recently, we have incorporated OGC, which allows sharing of images. Same technology allows one to see the data behind the image. There is also OPenDAP for access to the winds and SST data. With OGC, we can use the WFS to access data. Can you get entire data set? Yes, all have to do is specify a box. It would be better if the modeling group can specify queries ahead of time. The group is encouraged to share aggregated data among the group. It could be a very useful product.

2. Archival- The Modeling WG will discuss. There is a need to develop a standard.
3. Assessment products
4. See 1 above for discussion of access to data for comparison of SOSST and in situ data.
5. This is the same question as 4, but with a different field. We have been doing monthly analysis of winds with existing data set, but haven't yet done forecast analysis. We would like to use OPenDAP access, rather than having to produce monthly files. There is a persistent offshore bias in the available winds (underestimation of the wind speed blowing offshore). They are an important forcing field. Are quickscat winds in the evaluation? JPL is sending the data without request, and will send any additional needed data sets. The ability to cross-validate is going to be continuous, and there needs to be a real time component.

Is there an additional product that can be developed that can be produced from aggregated data from the observations and from the model? Blanton – yes, but it would have to be interpolated. It would be useful to see this rather quickly. Now this is usually done in MatLab. It's clearly useful to look at all data layers together – is there a product based on that that would be useful? It can be used to identify where the errors occur – determine consistency of data set and features of the model that have not been described in the literature. Doing the differencing in an appropriate way is the challenge. The Boulder lab has produced a large body of software that does this analysis, based on netCDF.

7. How do we ensure metadata documentation? It is ensured to some extent because we are required to submit model data to Charlton. We need to set some sort of standard, and also need to be coordinated with SURA SCOOP.

OBSERVATIONS WITH EXTENSION & EDUCATION

Bob Bacon (E&E WG, discussion leader), Jim Nelson (OWG, recorder).

Objectives for the session:

Discuss and further define interactions between the Extension & Education and Observing Working Groups. Define areas for Year 4 focus.

In a recent planning meeting, the framework for Extension and Education has been defined in terms of five elements:

1. Facilitating PI and user interactions;

This includes the regional level, but is also being targeted on a sub-system basis (i.e., Florida E&E with Florida Observing elements, etc.);

2. Interactions with business and industry;
3. K-12 education;
4. General public awareness activities and internal program development;
5. Transitioning to SECOORA – the RCOOS to RA process.

Establishing effective lines of communication is an area of emphasis in E&E planning. It is felt that in the past, Extension has been “reactive” and thus is looking to be more “proactive” in interactions with other Working Groups and potential user groups. For example, in the case of the OWG, how can E&E contact and educate appropriate parties to assist in the site permitting process for HF Radar. What are options for convincing local landowners and beach users that this can be of benefit to them? How can the initial activities in this area be expanded?

Discussion topics:

1. Produce a “primer” on HF Radar for extension agents.

For the extension personnel to be effectively involved in OWG activities, such as HF Radar deployments, they need some basic information on the system technologies, interpretation of data, and potential applications.

Discussion: In Nick Shay’s experience, it is necessary to show what the system can do for various interests. And to sell the idea of environmental monitoring as a worthy objective in itself; as opposed emphasizing what the beach communities can provide the academics. It was suggested that a “benefits list” is useful in this context (e.g., Search and Rescue; oil spill tracking, etc.).

2. Hold a set of observation “focus meetings.”

The idea is that such meetings would involve specific user groups and emphasize project-related discussions with targeted users.

Discussion: Suzanne Van Cooten (NDBC) feels that it is important to define the plan and priorities, and the “requirements process” for locating additional SEACOOS assets. NDBC is very interested in being kept in the loop on deployment plans. In a general sense, this information is also important in terms of managing expectations for various potential user groups.

Bob Bacon noted that SEACOOS E&E has a moveable program for engagement of user groups. Meetings with potential “super-users” have been held recently (e.g., with Hazmat groups). Fisheries interests have been identified as a potential target for further engagement.

3. K-12 interactions

Lundie Spence and Barbara Spector noted that educators are beginning to get the COOS data and use it. How can the educational applications be best developed? There are several themes presently being emphasized in education circles that are relevant to COOS education. These include the concept of “locally relevant science”, developing an appreciation for the concept of uncertainty, and understanding the evolution of processes. Promotion of technologies is another area of emphasis, with less text book learning, but still with adherence to sets of State and National standards.

Discussion:

The idea that the COOS scientists should be doing more than supplying data was expressed (Bob Weisberg); that is, also providing the basis for phenomenological explanations by the educators. One way to do this would be through case studies and explanations of various processes these illustrate. For example, tides: Why are there differences in the tidal regimes in different parts of the SEACOOS domain? How do these patterns compare to other regions, and again, why the similarities/differences? Such case studies could provide local context illustrating basic principles that could then be expanded to a regional and larger-scale contexts. Case studies were also proposed as a mechanism for 'in-reach' for extension/education. It was suggested that "project teams" could be formed to develop explanations for the science and environmental data for educators and for the lay person.

Brian Haus (UM) described the UM experiences in Dade County FL with the WERA site. While they have contacts in the science arena, engaging the broader public (e.g., how can boaters and businesses utilize this information) is needed. How best to do this?

For educators, a key issue is how science standards can be taught through the coastal ocean science disciplines. Along these lines, Margaret Olsen (SE COSEE) is holding a workshop with teachers and SkIO SEACOOS P.I.s (Feb. 2005) to focus on getting COOS information into the classroom.

At a basic COOS education level, Nick Shay noted that the idea of a "Modeling/Observations 101" (a primer on the basics of both observations and modeling in SEACOOS) has been proposed in the past. This is something that should be followed up. George Voulgaris has a basic set of lectures that may be an appropriate starting point for this. The idea of a COOS oceanography web course was raised (Lundie Spence). As a starting point, it was suggested that a regional resource list be developed for educators, including what products are available on web.

Also raised during the discussion of educational programs was the question of bi-lingual educational programs in SEACOOS. In addition to the large hispanic population in some areas (like South Florida) there are also opportunities for funding through NSF geo-sciences grants. It was noted that the SECOSSEE program has an emphasis on under-represented/underserved groups, with the initial focus has been on the African-American coastal community, but there is not a specific bi-lingual effort at present.

4. Building the lines of communication between WGs and implementing joint projects.

Bob Bacon suggested that an E&E representative be assigned to each regional observing sub-system to develop the system explanations, and collect the common questions as FAQ's. It was noted that it is the E&E people who have the contacts among educators and know the requirements for science standards. These people should be involved in the process with the researchers.

Discussion:

Frank Muller-Karger (USF) sees the internal communications as being essential for developing the E&E programs, and defining the budget requirements for E&E within SEACOOS. He also raised the question of links to the external user community; what is the interface? And he feels that this engagement should be focused on linking the E&E activities with specific problems for the user community, such as those in the Fisheries area.

In this sense, Bob Bacon sees the E&E Working Group as “facilitators” of information exchange. Presently the status of SEACOOS development has lead the focus of engagement to be with the “informed users”, for example the meeting with Hazmat representatives that was held last month. Sandy Bernard noted that SECOORA is working on identification of the range of constituencies and “needs” areas in the SECOOS region. And SECOORA is seeking to include representation of various “stakeholders.” In terms of expanding the engagement, George Voulgaris (USC) suggested that press releases can bring people to you (based on his experience in SC).

5. Private sector interactions.

Discussion:

The area of interactions with private sector was also discussed briefly. This is an area with potential conflicts, and one that is challenging in terms of developing interactions. As noted by Nick Shay (UM), for some aspects of the interaction with private industry, SEACOOS may not want to provide too much (i.e., possible “value-added” products that elements of the private sector may want to develop).

OBSERVATIONS WITH MODELING

Objectives and agenda: The overall objectives for the joint session were to coordinate between the OWG and MWG, discuss information to be provided for the upcoming External Evaluation and to discuss Year 4 objectives. The session was organized around the topic of the observations needed for modeling, separated as “forcing fields” and “ocean fields.”

Forcing Fields

- Wind Products

Presently the models are merging wind products with EDAS (NOTE: state the resolution in space and time) (NCEP). OI blending with observations is presently a research product. Should this be extended to become a SEACOOS product? Improvement of hindcast winds has been demonstrated through merging marine observations with the present set of observations, showing the utility of COOS surface wind observations in this area. It was noted that better wind products are also critical to improving the skill of surface wave forecasts.

OI issues were noted, in particular where mismatch of time frames of observations and models can lead to the observations being discounted. This is an issue for the NWS “analysis of record”; i.e., what is “ground-truth” for model assimilation and validation. ETA could well be discounting the observations that could correct the model.

Consensus: The OI wind product should be further pursued. “Packaging” this for possible broader distribution should also be considered. Sensitivity studies are needed for SEA-COOS models relative to accuracy and spatial and temporal resolution of winds to guide further efforts.

- The Nowcast/Forecast (N/F) uses the ETA winds and heat flux – is this sufficient or should others be run?

There are a number of issues concerning the ETA12 model. ETA12 is a major advance in mesoscale resolution (12km), but the accuracy of its heat flux has not been well characterized. Accuracy and biases of heat flux models will have to be considered in planning for SEACOOS regional baroclinic models. How ETA deals with the ocean-to-atmosphere feedback loop is seen as a problem, and such coupling issues are considered to be a key “missing link” for coastal ocean forcing. ETA suffers from not having a good initialization of heat flux and it is seen that there is a need for an order of magnitude higher resolution. OI SST (Objective Interpolation, creating a “filled”, cloud-free daily grid, 5 km resolution) is one product that can be produced presently for the regional SST part of the feedback problem.

Given the above issues, should the N/F models continue to rely on ETA, or should a SEACOOS regional wind model be added? Questions of the time frame and resources required for this were noted. It was thought that refinements in the regional wind/heat flux models would require partnering, notably with NCEP. Assessment of skill through comparison of observed and modeled winds was again suggested as a SEACOOS activity for the Observations and Modeling Working Groups. SEACOOS is in the position to do this under a variety of forcing regimes.

Consensus: SEACOOS needs to look at a variety of coupled atmosphere-ocean models, particularly at mesoscale resolution. What can be accomplished in the next 2 years? What might be done longer term? Analysis and assessment of models was suggested as a joint OWG/MWG focus area. Near-term priorities and specifics of this effort need to be defined. For example, sensitivity studies for SEA-COOS models need to be conducted relative to heat flux accuracy and spatial and temporal resolution to guide further modeling and observational activities.

- Heat flux – how should this be approached?

There are resource issues on the observation side in terms of measurements for full surface heat flux estimates (the costs of instruments, maintenance, calibrations, ensuring regional consistency in measurements, etc.). Thus, do measurements at a limited number of locations make a difference for ETA heat flux? It was suggested that there could be enough locations to verify the modeled heat fluxes and fold the observations back into the models. The value of climatological reference stations was also noted. The present approach used in the COMPS domain on the WFS is to locate the heat flux measurements where the dynamics warrant this.

Heat flux could be the basis for a SEACOOS “white paper” that would summarize measurement protocols, procedures for obtaining heat flux estimates from the observations, and the issues and applications for coupled ocean-atmosphere models.

- Information on freshwater influx.

River discharge information should be obtained in a coordinated manner for the entire SEACOOS domain. This activity is presently handled in different ways by the sub-regional

modeling groups. Whether the needed observations are being made and how to best package the information presently being obtained (e.g., from USGS and/or RFC sources) will need to be considered further. It was proposed that the requirements for regional river discharge information should be discussed with the Information Management group and a coordinated plan for obtaining this developed.

Ocean fields

- Comparison of modeled fields to observations
- Quantitative comparisons.

MODELING WITH EXTENSION & EDUCATION

E&E is working – in demonstration mode – with the middle-person in an organization (not with the person on the street_ to provide links with:

- Fisheries community
- Recreational community
- NOAA HAZMAT
- Search and Rescue
- Marine mammals – GIS displays

In our discussions, we came up with the following products that both groups would be interested in pursuing. The two groups will need to work together to incorporate the scientific information into formats that are useful and understandable for other users.

- Summer 2003
 - Poster
 - Lectures
 - Web site information
- Poster on “*What is modeling?*”
 - Description for non-modelers
- Lagrangian Trajectories
 - Interactive web tool – also working with data management group on this
 - Larval dispersal examples to illustrate Lagrangian particle tracking
 - In the SAB – Karen
 - From Florida keys coral reefs - Jerome
- SOO Outreach
- Super Users

Individual Work Group Sessions

OBSERVATIONS

Wednesday Afternoon Session

Objectives: Define present status and Year 4 work statements; develop basis for WG executive summary for the External Review; and lead into a draft of the OWG Implementation Plan

Year 4 Work Plan.

There was some general discussion of the goals for the Year 4 work statement.

Bill Johns (UM): Expressed the opinion that this should be a phased implementation. And the Year 4 Plan should show consistency with Implementation Plan goals, defining what will contribute to target areas. For example, Lagrangian observations are mentioned in the Implementation Plan, but a program for this has not been defined. This also needs to be developed in the context of 3-D fields.

Suzanne van Cooten (NDBC): Emphasized that from the NDBC perspective, the observing system components need to be assessed for reliability. Data benchmarks should be defined along with measurable performance metrics. How well do we do in keeping the real time data stream going.

Harvey Seim (UNC): Noted that while incrementally improving the existing observing system as part of the Year 4 plan, how this plan can contribute to topics like Fisheries (focused application areas) should remain a central point of consideration.

Frank Muller-Karger (USF): Can we take advantage of new technologies?

Roger Pugliese (SAFMC): Fisheries management is going toward an ecosystems-based approach. This community is interested in applications of COOS information. It needs to be ensured that the observing arrays can support the goals of long-term ecosystems-based management.

Andy Sheppard (NOAA NURP): NOAA NURP has a program waiting to team with the regional COOS. An RFP could be set up to address specific target areas.

George Voulgaris (USC): Sees two modes for further development of the system; either expand or look to other entities to partner for addressing specific topics, with SEACOOS as an information source for interested parties.

Recommendations:

- The connections/dialog between SEACOOS scientists and the fisheries management community need to be pursued. It has been proposed to focus the next SEACOOS Spring WS on fisheries. In advance, we need a finite list of priorities from the fisheries

people and an assessment of what are the appropriate technologies and initiating a technology support group in this area.

- The Year 4 emphasis should be on the maintenance of the existing observing array as opposed to growing the array, given the reality of a cut in funding. For IOOS and RCOOS planning, a firm accounting of maintenance and operations costs for each of the sub-regional systems in SEACOOS should be obtained.

Status of the Observing System.

The present status of the in situ Observing System components was reviewed with summaries provided by partners.

North Carolina (Harvey Seim, UNC):

In North Carolina, two offshore towers are presently targeted (21 and 23, with Tower 23 active). The Cape Lookout Buoy will soon be deployed. The UNC long-range CODAR is discussed below. Also in North Carolina, the CORMP program will be putting in pier stations. Andy Sheppard will provide writing brief on this effort.

Fish camera/video systems (Charlie Barans, SCDNR):

The primary real time system is associated with a Navy (SABSOON) tower off Georgia that provides the environmental information to correlate with changes in the observed reef fish communities and fish behavior. It is intended to look at adult latitudinal distributions using a non-real time systems at several locations with video data loggers (shooting 10 sec clips to help identify fish through their characteristic swimming behaviors). A system is planned in collaboration with CORMP off North Carolina, two others at experimental artificial reefs off South Carolina, and another in the Gray's Reef National Marine Sanctuary off Georgia.

There is also interest in fish larvae as well as the adults. Physical data from the observing system elements will provide basic environmental data to correlate with recruitment, etc. There is a plan to deploy drogues on gag grouper spawning sites this winter (phased with the moon and the fish spawning events). Charlie is also interested in linking SEACOOS information with other information sources such as the SC DNR MARMAP (Marine Resources Monitoring, Assessment, and Prediction Program).

- **Recommendation:** A short (~½-1 page) "briefing paper" for the OWG on the fisheries video program was requested.

South Carolina near-shore installations (George Voulgaris, USC):

Two stations are being established; at the Springmaid Pier and at Folly Beach. These are not yet real-time. There have been some issues with phone lines and with the RDI software (ADCPs with directional wave modules). Directional wave information in the near-shore is targeted. There is collaboration with NDBC in these installations. Voulgaris and Paul Work (GIT, Savannah) are also involved in a project that is "calibrating" SWAN (directional wave model) off South Carolina, as part of a wave forecast system.

Georgia (Jim Nelson, SkIO; Paul Work, GIT)

Off Georgia, the SABSOON (SkIO) program has installations on three Navy towers at present. One (R2) is fully operational at present, the other two have operating Met stations, but in-water systems need to be replaced or installed. At the M2R6 tower, the anchor system must be reinstalled and an ADCP/cable replaced (the cable was damaged when a Navy wind turbine broke off during a storm). At the R8 (NE platform), final components of the power system (separate from the Navy system) are scheduled for installation. Then in-water components will be deployed. Tower work this spring-summer has been hindered by a lack of availability of the helicopter service (tied up with Navy work on upgrading their power system).

Inshore, Paul Work (GIT, Savannah), has deployed a Triaxus wave buoy off Tybee Island, Georgia (a site of past beach "renourishment"). Iridium telemetry for this has worked well ("turn-key"). To assess the Triaxus wave information (e.g., possible biases associated with varying tidal currents), and to provide and inter-comparison with the ADCP approach to directional wave measurement, a self-contained (non-RT) ADCP has been deployed for a 3-month period. The buoy will be retrieved and taken to the SE Florida site for the planned winter wave experiment in the WERA domain. The data from the wave buoy is available on the web; not in a polished form at present. It is planned to integrate this information into the SEACOOS web site. With the Iridium telemetry, the raw data are not presently being obtained. It was noted that a directional wave inter-comparison study is planned for the USACE site at Duck, NC in January. Suzanne Van Cooten emphasized that directional wave information is very useful for NDBC and the NWS forecasting offices, and that they would like to know where and when sustained measurements are planned or are being made.

South Florida Waves Experiment:

Brian Haus (UM) reported on the planned inter-comparison of the WERA wave products with in situ wave measurements. The latter will be the Triaxus buoy, ADCPs with directional wave modules, and an ADP. The location will be off Biscayne National Park. The objective is to obtain inter-comparisons in different portions of the WERA footprint in different wave climates.

Autonomous profiling package:

Bill Johns (UM) summarized the status of the "SWAMP" profiler. This design/development was initiated with DURIP funding and continued with SEACOOS support. The design has an upward-looking ADCP and profiling package/winch system. The communications package is on profiler and links when at the surface. Bill is hoping to have this operational by mid-year, 2005. It is targeting up to 50 m operational depth and 6 profiles per day. The strength of currents is an issue for the winch system. It is designed for currents of 1 knot or less. Above that, power becomes an issue. There have been several technical challenges. UW communications has been OK, but the biggest problem has been associated with winching the profiling package into the base. They are trying to make this smart to try to avoid winch failure. The system has been deployed in day tests and they are hoping to have extended tests in January.

West Florida Shelf -- COMPS array (Bob Weisberg, USF):

Buoys are in place with both telemetering (real time) and non-telemetry systems. Five buoys have surface meteorological packages (five without). Most have been out several years, and thus provide time series information. The "C17" buoy was deployed as part of SEACOOS. There are also a number of coastal stations and one in the path of Charley reported through the

landfall. ADCPs have been installed in the cut between Rebecca Shoals and the Dry Tortugas and in the vicinity of the Pulley Ridge to the west of the Dry Tortugas to assess flows through these exchange points.

In SEACOOS Year 3, near-shore COMPS deployments (5-10 m isobath) are planned to get information in the salinity gradient zone. Wave measurements are also been assessed (Nortec and RDI systems tested) with acoustic modems (Benthos tested and LinkQuest to be tested), with the intention to decouple the ADCP from the buoy. USF is also developing/testing a bottom stationed ocean profiler (BSOP) through other funding. The deployed profilers worked through Hurricane Frances. It is intended to add high-resolution ADPs (for velocity profiles along with T, S).

In collaboration with Frank Muller-Karger's group, Weisberg's group is also working on OI ocean color animation and a blended set of TOPEX data for sea surface height and for estimating geostrophic currents.

Questions/further discussion:

Shay: Anything real-time in the SFMOC area?

Weisberg: NSU has an ADCP deployed on the 11 m isobath but without funding for continuation. SFTF has had telemetering ADCPs in the past, but the future of this is unknown.

Are there drifters being deployed as part of SEACOOS? At present this information is from other programs.

HF Radar

HF Radar systems and performance in SEACOOS was reviewed. Two types of systems are presently deployed: Long-range CODAR from SeaSonde (Palo Alto, CA); and Wellen Radar, or WERA (Germany). With plans for a GA/SC deployment, there are a number of issues to be considered.

WERA system on EFS (*Nick Shay, UM*):

WERA specs and communications issuers were summarized. The FCC licenses are experimental and need to be renewed each 6 months, and are "secondary" licenses. WERA has several configuration options: with a 4-antenna array, direction-finding is in the software; with an 8-16 antenna array, it is a phased array system. The 16-element array can be focused [*check on this *]. Peak power is 30 watts and the baseline distance between stations is 40-70 km. There are options for longer range with lower frequency. WFS test results were summarized (range, comparison with ADCPs).

For the EFS deployment, a tidal pool influence on range of the WERA was noted (improved after relocation). The working web site is putting out data updated at 3-hour intervals.

Performance of SEACOOS CODAR systems (UNC, USF):

For the UNC system, Harvey Seim reported variable range depending on environmental conditions and the time frame of averaging. For the USF system, Bob Weisberg reported range of 70-220 km in winter and 0 (flat calm conditions) to 200 km in summer. There are day-night differences with omni-directional CODAR. And it is thought that below 6 MHz, this may be an issue with WERA as well.

Radio-interference is a problem. The UNC system has been chased off two frequencies. North of Cape Hatteras, operating systems from UNC and for MAB programs are on the same frequency; requiring coordinated time stepping to avoid cross-contamination. Apparently FEMA reactivating an old system for Homeland Security and is reclaiming a number of frequency bands. Bob Bassett (NOS) says that Ocean.US is working to get approved secondary use approval in the required frequency bands. This is needed for oceanographic applications on a national scale. There have been permitting issues for deployment on dunes; and once deployed erosion events during storms have been problems in North Carolina in the Cape Hatteras area. Performance at the NC site has been at about 80% of the time for a 100-120 km footprint, but a rather small footprint for 95% temporal coverage.

Other HF Radar issues.

How CODAR constructs the surface current vectors (built into software) was seen as a potential issue. Beam distortion problems have been reported for various sites. These have been from structures (e.g., structural metal in concrete piers) or buried materials (pipes, etc.). Relocations require recharacterization of beam distortion patterns; a challenge for the NC location that includes Frying Pan Shoals.

A raised for the GA/SC location -- is water depth a concern? That is, the 15 m isobath can be a good distance offshore. Will this affect the lower frequency CODAR? Brian Haus feels that if one obtains good s/n, this is less an issue. Depth changes shift peaks relative to each other, but there can be correction for shallow water wave speed (if bathymetry is well known). There are also potential algorithm performance issues in this regard. If using the same algorithms, the WERA 5-7 MHz systems would have the same problem. Nick Shay sees further testing needed for direction-finding algorithms (e.g., MUSIC algorithm).

Personnel requirements were discussed. Dana Savidge noted this is a central question for WERA in GA (where sites may be on remote barrier islands). How much time, and how often, does WERA need to be adjusted? An assessment of what is required is needed. Brian Haus reported that one of the EFS WERA sites has not required attention. Another required some adjustments for improved data quality. In terms of personnel time, power and communications have been more an issue.

Recommendation:

- A power point presentation will be compiled for use in the external review.

Thursday Morning Session

Objectives: outline Year 4 work statement; draft WG Executive Summary for External Review; outline WG part of the Implementation Plan.

Preliminary discussion – Priorities

Harvey Seim noted that the Phase 1 Implementation Plan is based on the August discussion. For initial application areas, Fisheries Oceanography and Search and Rescue have been targeted. Each of these builds on the overall SEACOOS focus on coastal ocean circulation. Additional inshore applications will require considerably more development.

Several commented on the need to focus on some near-term achievable goals, deliverables. Although it was noted that “putting all the eggs in one basket” can have its risks as well (e.g., if a storm focus and the storms don’t happen). The issue of how this is to be developed was also raised (e.g., is there to be a focus on pilot projects that are to be passed on to an operational entity in the future?). It is clear that developing SEACOOS observational applications to address various user needs/priorities will require extensive interaction with the Extension and Education WG and SECOORA. And building the system in a rational fashion will require consideration of a variety of objectives, scientific and applied.

Defining Year 4 Work Plan objectives for the OWG

Operational assessment -- with circulation as initial focus, what will it take to operate the observing system?

A target for Year 4 is to be quantifying this in terms of maintenance and operations. What are the required inventories of equipment in the field and as spares? What are the associated personnel costs and effort levels? This should be defined for each component system/project. Suzanne Van Cooten (NDBC) emphasized that this would be valuable information for IOOS planning/development, and recommended that a central “clearing site” for this information be established to facilitate outside access. Bob Basset (NOS) noted that NOAA is going through an evaluation process for what maintenance and operations costs for its part of the national backbone will be. Part of this process is also identifying the “gaps” and how partnering may be a cost-effective option for filling these gaps. Such partnering will also be important in the generation of “value-added” products for various applications.

Circulation focus – output that can benefit Fisheries Management and S&R.

Circulation would be approached through an analysis system; combining the observations and models. It was also noted that a deliverable in this context should be errors as well as means for various sensors/field estimations. These will need to be 3-D fields for the Fisheries application.

In the near-term, the system design is seen as something of a balancing act; with circulation driving the initial design, but with adjustments in the system planning to accommodate the needs of application areas and address the inshore issues.

Coordination

Common threads in much of the discussion concerning Year 4 planning and the OWG contribution to the Implementation Plan were: 1) that the OWG will need to coordinate closely with the other WGs within SEACOOS; and 2) that SEACOOS as a whole will need to partner with other groups, such as the Federal Affiliates, to effectively address the targeted applications. As part of the system planning, it was emphasized that it will be necessary to work with Fisheries people to help identify what is needed and where. Potential “value-added” products will need interactions with the E&E group to define how the information can be used (and what SEACOOS can do now). It was also noted that there are other observing programs coming on-line (e.g., OOI, ORION) and that the SEACOOS plan should be developed to allow SEACOOS to complement these other programs.

SEACOOS has a success story in the partnership area in the recent ADCP inter-comparison study; a good example of how SEACOOS can function as a technical advisory board for the agencies charged with developing the “national backbone” for IOOS. This fits with the concept of “test-beds” for SEACOOS. In this sense, an issue for SEACOOS resources is having the personnel time required for thorough analysis. Similarly, documenting the “SEACOOS experience” and providing this to other regional COOS programs that are just starting up would be a valuable contribution. “Lessons learned” are needed, and it was thought by Suzanne that this would be most effective for other regional COOS programs if it came from their “peers.” Again, this documentation requires commitment of resources, and personnel time in particular.

Year 4 Objectives.

Based on the above discussion and that in the previous day’s sessions, a set of Year 4 objectives was proposed for the OWG in Year 4. In light of budget constraints, and in keeping with the objective of defining what it takes to operate the COOS, a core Year 4 emphasis for the OWG will be on maintaining the systems that are in place and documenting this in terms of the maintenance and operations costs.

1. Inventory the observing assets. Ensure that this is up to date; develop the interaction with federal affiliates to assess the maintenance and operations costs for the observing system components; define the “leveraging” contributed by the SEACOOS partners.
2. Develop circulation descriptions based on existing SEACOOS data with applications to S&R and fisheries oceanography. Work with MWG to define where additional observations are needed to support ocean circulation
3. Actively engage fisheries councils to find common interests. Do advance legwork for either:
1) Fisheries Oceanography as an organizing theme for Spring SEACOOS WS; or 2) organize a separate symposium with the Fisheries community. Work with Fisheries community to use existing observations and identify how to augment these with additional observations.
Where? What is needed?
4. Develop additional “value-added” products with existing observations (science-based products, e.g., winds, SST, ocean color, surface currents...)

5. Interact with Federal Affiliates on technical issues. Provide test beds for technical evaluations of emerging technologies, deployment packages, etc.
6. Perform the analyses required to improve the observing system design (interactively with Modeling WG) and to develop products for broader applications (interactively with E&E WG and IM WG).
7. Initiate a collaborative regional wave program. Coordinate with affiliates, starting with a regional workshop at the FRF.

Surface waves pilot project.

The surface wave program for SEACOOS is at an early stage. Thus, the last portion of the session was devoted to further discussion of this topic.

What next? It was seen that there is an inherent amount of science in this analysis of design and best practices. And this is an area where interest in several agencies could be developed through the planning process. For example, Jeff Hansen (USACE, FRF Duck NC) reported he is working with the NWS to couple gridded wind products and WaveWatch III with local versions of SWAN. There is obvious public interest in the near-shore issues, such as rip currents and beach erosion. A question would be how to model from the far field to the beach. George Voulgaris suggested a test bed focus, leveraging existing programs as a means to accelerate the development of proto-type observation/coupled-model systems. Requirements would be WWIII, SWAN, and enough points to validate SWAN. Obviously the observing and modeling groups will need to coordinate in this area.

How to proceed?

Jeff Hansen suggested that a regional wave workshop could be hosted at the Duck FRF, bringing together the various parties interested in the wave issues. An initial list for a regional "Wave Group" was generated.

Year 4 plans for SEACOOS OWG partners.

The plans for each partner institution were briefly described. Bob Weisberg is compiling these.

External Review Documentation for the OWG.

The emphasis here will be on developing operational capabilities. A set of documents has been proposed that includes:

- A description of the Observing System -- present status; examples of data and what we've learned from the data; time lines for system components;
- Descriptions of measurement systems;
- The "Equipment Inventory" (Jesse Cleary, UNC);

- Lists of SEACOOS related papers, presentations with published abstracts, and reports;

Examples of partner specific products and applications.

MODELING

Present: Cisco Werner (chair), Pat Welsh, Alexander Barth, Brian Blanton, Inkweon Bang, Chris Mooers, Karen Edwards, Jerome Fiechter, Alfredo Aretxabaleta (rapporteur)

Before the agenda items were discussed, there was an update on the requested information for the WG's Executive Summary to be provided to the External Review Team.

The Executive Summary for external evaluation needs to include: a brief workgroup summary, a description of leveraging for this WG, a list of identified primary super-users, and a list of supporting documents. At the time of this meeting, the only item ready was the (tentative) list of supporting documents that the ModProd WG will provide. Parts of these documents already exist in draft or finished form:

- Implementation of Nowcast/Forecast System (the document includes):
 - Status of the Modeling System
 - Sub-regional modeling system components, status and lessons learned
 - Barotropic skill assessment procedures and results
- Publications including:
 - Hindcast of March 2001 Storm Events in SEACOOS domain
 - Gulf Stream instabilities off east Florida Shelf
 - Lagrangian circulation in SAB
- Opportunities and approaches for linking to offshore (basin-scale) models
- Future directions including Data Assimilation and CODAE

Agenda Items and Discussion: (also see Notes at end of section)

Documentation:

We need to explain how we run the models. There is a draft that Brian put together with info from every group but still lacks some specific details. There are some concerns about the inclusion of skill metrics and the need to have the document ready for the external review. The SSRA manuscript will be given to external reviewers but the specifics about skill assessment from the hindcast are not the same as the ones needed for the NC/FC document.

Documentation is fundamental to the project at this point in time. Both Harvey and Mel Briscoe have insisted on this topic. Brian provided a copy of the draft of the NC/FC system documentation for each group. There is a need for each group to revise and feel comfortable with the document. Originally it started as a manuscript for publication, but it was established that the technical documentation was needed first. The document describes the basics of the system from grabbing files to running models and finally to the posting of results on the web.

The draft includes three levels: the first is a skeleton; the second includes database of tidal and wind forcing as well as a list of model parameters; and the third consists on the scripts that

performed all the runs. Instead of including the full scripts, at this moment the draft contains a summary of the scripts from each group and a description of what happens in the scripts. A tarred/ziped version of the system will be made available as part of the final documentation. The document will serve as a record for a possible future transition of the whole system to some other institution. The draft contains a description of metadata of the files that are transferred to the information management group. This step was fundamental and Charlton was instrumental in its development. There is a second file standard for Lagrangian trajectories, but at this moment it has not been standardized and should be viewed as a preliminary product.

The section on barotropic skill assessment is empty right now, but something might be included. The SSRA manuscript is not enough to explain confidence in models in the NC/FC system. Right now the task is to provide feedback to Brian about missing components in the document so that it can be distributed to the external review team. This draft will eventually lead to an article.

The web-product developed by the information management group will not be included in this draft. The level of detail of the documentation should be enough to be able to reproduce everything if even the three people currently running the system leave. The presented draft will be accompanied by a link to a tar file in the SEACOOS archival system that includes version 1.0 of all the scripts.

Cisco expressed asked about the software in which it is written. Brian prefers to avoid proprietary software. Currently the document is being created in LaTeX. The possibility of tracking changes to the document was raised and the response is that changes are not easily being tracked at the moment. The format standard is an issue for all SEACOOS "common" documents. We should try to find a convention and standards for documentation for all SEACOOS. Maybe the best way is to use web-base document (e.g., html, even if the possibility of changes exist). The main point is that we need to provide Brian with whatever is missing from document. The document will need to be ready by mid-December to be included in the package for the external review team.

SSRA document:

Although Ruoying was not present, the group believes the manuscript will be ready for submission before Xmas. Chris has given Ruoying a series of comments for inclusion in the next revision. There are additional new current meter data available in the Miami region for March 2001 that may be used for comparison. A remaining question is that of the overlapping regions where simple statistical comparisons between the models are need additionally evaluate performance. There are some large domain simulations available for the region and the results are ready for comparison.

There is a Quoddy run implemented for the whole domain (mesh with boundary at 60W). A comparison with the regional results and the water level stations has been created and it shows that there is not much difference. This indicates that using the regional domains may be adequate for the dynamics considered. Further comparisons in the West FL shelf might be needed. The run was done to check that coastal trapped wave propagation (or its absence) was not affecting the computed solutions. This domain-wide run will not be included in the SSRA paper, except for a comment about the fact that the domain wide run did not provide any difference. To avoid delays we are going to keep track of status of article so that the document will be ready on time. Contact Ruoying once a week.

Robustness:

It is beneficial to have a distributed approach to running models, in general, and specifically during events (e.g., the recent hurricanes) that result in down-time for one or more modeling sites. The hurricanes impact during these past months revealed the benefits of duplication. The node that loses power misses runs but the rest of the solutions are available. The idea might be to duplicate runs for each domain creating multiple forecasts for each region. A consideration is that robustness should be achieved while minimizing the number of runs. However, the scale issue will remain, i.e., in the future we will need more resources → more resolution, and thus more run-time. One solution is to include a coarse resolution run (suggested by Pat) as a backup for failure.

Another question is the interest in model runs dealing with hurricanes and their ability to reproduce surge effects. Other related issue is the possibility of “regenerating” missing observations during periods of hurricanes. It was suggested as a future possibility associated to the use of DA. The long-term goal (ideas coming from SURA-SCOOP) is that software will be able to deal with these issues. SURA-SCOOP is already using grid computations and grid technology to deal with this. The hardest problem to be able to push forward with this is security. The main conclusion is that robustness cannot be addressed locally; it has to be done somewhere else. We should endorse approaches by SURA-SCOOP and pay attention to the results of their experiments. One limitation is that IT people have to control these runs. We should include a reference to the potential of these techniques in the 5th year proposal.

An advantage that grid approaches provide is that the source of, for instance, met files might not matter (i.e., issues about file formats are taken care of somewhere else). We should study the possibility of translating this to SEACOOS, even though it might be problematic: lack of files, network connection between groups, change of formats, etc. We need to better define robustness needs of the system (Brian + Inkweon). It is certain though that the solution to robustness must not be a duplication of the system, because even if it seems the obvious solution, it is not the most efficient way to do it. We need to better define robustness and look for single point failure. Find weak points and faults. The problem is that even people with a mandate of robustness, like the Weather Service, are not able to do it. It is clearly a very difficult problem that needs further study.

SURA-SCOOP:

The vision of SURA-SCOOP is inter-operability. Basically it means the possibility of working independently of the source of files. GRID (see above discussion on Robustness) and Earth Science language might be part of the solution. Grid computing is not the panacea; it is just a way to interact between different groups. Everything in SURA-SCOOP is open source, not proprietary. Brian will keep us informed.

Skill assessment:

This issue is of great importance. The reason we are not doing more spatial assessment of the observations is that we do not have enough data. Brian presented partial results of skill assessment, which need to be reviewed and complemented.

- Wind skill: When the EDAS winds are compared with all the available observations for the same period of time, a 2-3m/s bias is observed. The EDAS file for a specific time is

compared to the instantaneous observations for the same period of time. The bias observed is predominantly in the offshore direction and is on the order of 3m/s.

- Barotropic skill: The main problem when the total barotropic nowcast signals are compared to observations is the presence of a tidal phase problem. The problem can be of order 50 degrees, which is much larger than what can be expected from previous studies. This indicates that there are some problems with either the way the signal has been processed or with the setup. In the case of USF, it seems that some phasing issues might have been discovered. Ruoying is going to re-synthesize the whole time series. The good news is that the non-tidal part of the signal presents the expected errors. Those errors are associated with the lack of baroclinic fields in the case of UM, for instance. The problem with the UNC time series is the gaps in the time series. When a gap occurs the run is restarted from cold-start and therefore it misses the continuity of the series. This is especially problematic in the tidal analysis. A more in-depth analysis of these series is needed as well as checking for processing errors. Brian is working on this.
- Forecast skill: Brian looked at the forecast skill for each forecast hour by putting together a series of forecast runs. The total signal shows a bias in the UNC solution that might be associated with the datum. The errors are of order 10cm for the other models, with a clear tidal signal. This signal is not going to be removed unless the tides are completely filtered, which is not possible considering the length of the records. The non-tidal water level forecast shows an interesting character: the RMS error decrease in the UNC case, which is contrary to the expected increase as the forecast proceeds. Pat provided an explanation for this: There is a known problem with the first 10-18h from forecast. So, the observed error in the ocean model forecast is explainable by forecast winds being bad at beginning of forecast period and then improving as run progresses. Looking at the forecast low-passed errors is difficult with the length of record and the way of attaching the simulations. In general, the error is of order 5cm.

The tasks that remain to be done are for UNC to re-synthesize parts of signal so that cold-start problem is removed and for USF to rerun almost the entire period. The total record at this point is about 6 months of analysis, basically since May. The good thing is that we have identified some things that do not seem a source of errors. An example is the phase in the tidal boundary conditions between the different models, which is pretty small, clearly not 50deg in phase. We have to check again in hindcast tidal runs to compare lengths more appropriately and be able to do proper analysis. This exercise points to problems of the implementation procedure.

Chris suggested that maybe we should include some of the results in the nowcast-forecast system documentation, so that we can explain the lessons we learned. Brian might include something if it provides some interesting results. The issue is that to be consistent we should wait for USF. The idea is for Inkweon to try to duplicate Brian analysis to check that is correct. There is a clear need for fine tuning the analysis and checking with Ruoying and Inkweon. We should replicate analysis with the described corrections. The skill analysis might be more useful if we have a year-long record is fundamental. This analysis is not going to be available for external review.

Pat: ETA vs WRF.

Pat presented some results of real-time verification of performance comparing ETA 12km and WRF 5km. There is a consistent error of size 2.5-3m/s. They compared ETA vs. WRF physics vs. WRF with DA. The results showed that WRF performs better than ETA, as much as RMS 1m/s better than ETA. The same is true for the bias. There is not much difference in the physics of precipitation between the two models, but the precipitation in ETA is more diffuse. WRF has problems with a cold bias that is seen during the summer months. Sea breeze is also misrepresented. They analyzed the separate sources of error: pattern, volume and size. WRF generates way too many small storms, but it is able to predict most of the events: WRF 84% prediction of sea breeze, ETA 28%.

Thursday, 11 Nov, 8:30-11:15

The meeting resumes on Thursday with *Krispy Kreme*® donuts – there was unanimity (no show of hands was needed) that this was the best part of the meeting.

SSRA (continued)

An additional discussion took place about the possibility of modifying the SSRA manuscript to include additional runs like the external mode of POM. The consensus is that is too late for inclusion in the paper. That run might be useful for places like the UM domain to improve subtidal skill on water level by the inclusion of an estimate of the effect of the Gulf Stream. The ideal situation would be to wait until we all are on the same page for these runs and fully move to the baroclinic model runs.

Skill assessment (addendum)

At this point we are dealing with the barotropic runs only, but the procedures are probably good for dealing with the skill assessment. The spatial statistics or spectra remain as an open question and additional observations are probably needed to have an appropriate evaluation for specific regions. One possibility might be looking at the HF radar, but the comparison between barotropic model solutions and observed surface currents is not possible. Tidal water level stations might be the best option at this point. An elaborate coherence analysis was suggested. Pat suggested looking at the effects of hurricane Francis as a skill assessment study, comparing the ETA forced model and coastal sea level data. It might be a possible example that builds on the experience of the SSRA study.

SURA-SCOOP is focusing on storm surges looking in particular at hurricane Ivan's impact. In our case Francis might be the best option, but the question remains the accuracy of ETA forcing during this kind of extreme event. The agreement is that it might be better to concentrate on long-term statistics at this point considering the limited manpower. The idea might be to examine the spectra without getting into the details of an event. We should be using quantitative techniques (e.g., EOFs, neural networks) and continue improving our skill metrics when we start studying the baroclinic runs.

Baroclinic analog:

The transition to baroclinic runs in the nowcast/forecast system is imminent. The possibility of using the summer 2003 cold-water event as a baroclinic hindcast study needs to be assessed, i.e., if we have enough data for the summer 2003.

A first step might be to look at depth averaged effects of baroclinic forcing and compare with the barotropic solutions. As soon as we complete the nowcast/forecast system 1.0, we can move to 2.0 (baroclinic). The strategy to follow might use a hindcast study to improve quality of nowcast/forecast the same way that the March 2001 was used. In this case we will use the summer 2003 as the hindcast period. Pat has anecdotal kingfish data available for this period that might be useful for the study. Observations during this period might not be as extensive as desired, but it might be enough for this study. We should contact Suzanne van Cooten at NDBC to get access to in-water data from the 41002 buoy.

The proper evolution of the nowcast/forecast system to include the baroclinic fields needs to be carefully considered. The difficulties of coordinating such an effort already appeared during hindcast Case III (see SSRA paper for details), which used background levels of stratification, and the differences were difficult to iron out. For the nowcast-forecast system two sources of heat flux are available: from ETA model runs and from climatological COADS fields updated with SST. This might be the time to introduce the large-scale oceanic model runs. HYCOM has good spatial and temporal resolution. One question that remains to be answered is whether these large-scale models are better than Levitus climatology. This might be true for the open ocean, but we need to determine its performance in coastal domains. The other large-scale possibility is the global solution from NCOM that includes a 72h forecast. The UM group suggested using the reanalysis of NCOM for hindcast period. Chris stated that NCOM is a true operational product and that is ready to be used for open boundary conditions. To validate if the NCOM solution has the appropriate skill UM is going to use temperature transects regularly available in their region.

Where are we going with the NC/FC system?

- Same winds (NCEP will change the operational model to WRF-NNMM in 2006).
- Same tides (POM specifies tidal velocity boundary condition from a larger domain. Then they compute the harmonic constants for the boundary of the operational domain).
- Non-tidal flow/elevation
- Heat flux
- River discharge (precipitation??)
- T/S initial (u,v,w)
- T/S BCs
- Meshes

Table to be completed

	Wind	Tide	Nontidal flow/elev	Heat flux	River discharge	T/S initial	T/S BC's	Mesh
When to deal with it?	Future	Future	Future	Now	Future	Now	Now	Now
USF	Same	??				?		??
UM	Same	Large domain				NCOM?		Extend East to Bahamas??
UNC	Same	Same				HYCOM?		Extend North to Virginia

The nowcast/forecast runs will need to spin-up with velocity, but there is a concern about the need of reinitializing every time. The runs will consist of an initial mass field that is allowed to evolve and adjust to the boundary conditions. One possibility is to allow for no change of BC's during forecast period. The target is to have a 3-day forecast. It can't be much longer than that because of the deteriorating skill of wind product.

The river discharge is not a requirement to get the system running. The heat flux can affect significantly the solution and represents a concern. The strategy is to run a set of tests to evaluate the validity of the heat flux products. There is intense model activity on this area and we should try to keep up with research. There is some experience using a relaxation of the climatological temperature to SST imagery. $K \frac{\partial T}{\partial z} \sim \alpha(T - T_{\text{clim}})$. We will evaluate heat flux from SST instead of feeding SST directly to model. Another possibility is the use of smooth SST fields (20-30km averaging window). The heat flux issue should be a continuing effort. In some implementations solar radiation flux affects the whole water column. Pat suggested that this effort on using the appropriate heat flux might lead to couple ocean-atmosphere model. This might be a future direction of the nowcast/forecast model system.

Three different strategies for initial conditions are:

1. Climatology + nudging
2. Reanalysis
3. OGCM (NCOM, HYCOM)

Regardless of the product used, the models' spin-up remains a problem, because of inconsistent bathymetry, interpolations, etc. UNC has experience using a minimum time of around 7-days for spin-up. The boundary conditions are fixed on inflow and radiating on the outflow. Software that dynamically interpolates minimizing gravity waves (e.g., VIFOD created by Pierre de Mey) is available and should be studied.

The use of OGCM solutions is probably the way to go for initial conditions because of its better resolution and increased data availability. There are concerns about future inconsistencies when we get to introduce DA, but probably there are other inconsistencies that we need to deal with right now like differences between the winds used by OGCM and regional models. Considering all these issues a 7-day spin-up might not be sufficient. In this context, the T/S fields need to be thought as best estimate. We should elaborate a comparative study of the different effects and proceed from there. This is our 1st order problem.

Another important issue is the T/S BCs and different groups are familiar with different procedure options. In some cases the BCs are allowed to evolve and in some others they are forced to relax to OGCM. UM is changing upper boundary to deal with boundary flow being perpendicular to boundary.

Each group should think about needs for changing meshes. One issue is the possibility of using a common footprint versus regional meshes. The use of a common footprint will allow the creation of ensemble means or at least an envelope of model solutions like NCEP produces. We should be careful when using the term "ensemble" because of the different definitions of ensemble. UNC has concerns about stability in regions like Cape Hatteras, but they are going to extend the mesh up to Virginia anyway. UM might need to cover the Bahamas to recover the adequate baroclinic processes. Another approach might be to try to improve BCs from OGCM instead of pushing boundary farther away. This will need to be addressed. It seems necessary to extend domains at this moment to analyze the repercussions before proceeding with the baroclinic runs. We should look into ROFS NCEP solutions that extend to Labrador Sea because it might be an interesting comparison.

The first step we need to make is the change of meshes. We might need three sub-regional meshes and one common mesh. This will allow for the development of initial conditions on the common mesh and use that solution for the open boundary conditions for the regional meshes. This common mesh might also be very important for CODAE efforts. This approach might be useful but we have clear limitations of manpower and computing abilities to make this feasible. Another possible future evolution is the production of an inner shelf high-resolution solution with Kálmán filtering of observations and OGCM fields. Realistic timelines that consider the available manpower and computational resources still need to be determined. The first step might be to use OGCM frozen fields to have an estimate of the baroclinic effects.

Data Assimilation:

We are not talking about DA now, but there are clear needs of its inclusion in the future of the NC/FC system. Regarding HF radar, we will be using it for verification instead of assimilation for now.

CODAE:

Chris described the recent successful (Oct 2004) meeting of GODAE in Miami. One of the main conclusions was the recognition that they are running out of time to consolidate the program and that they are not going to be able to maintain their system if they don't show a clear connection to the coastal ocean. They only have 2 years left and their main message according to Chris was that "we have to have CODAE". There are several institutional sponsors to this idea including Mel Briscoe, (ask Chris about the other two names). We should include this in our 4th year statement.

We should establish a link of communication with GODAE. We will talk to the GODAE program managers about how to proceed with CODAE and start rigorously analyzing their fields. A possible first contact is the AGU meeting in San Francisco and we should take advantage of that opportunity.

Ecosystem models:

We have made concrete progress in this aspect. There are several studies (e.g., SAB Lagrangian particles, Jerome's East Florida studies) that are getting ready for publication. One concern is the difficulty to validate ecosystem models with appropriate observations. We should establish a line of communication with the Observational WG to address this. Satellite data might be the only data available at this point. Pat informed us that UNF is starting to produce drifters (\$100 cost) for estuarine studies in the north Florida region.

Wave Models:

The wave model issue is not going to be ready in the next 2 years. Paul Work (GaTech), Brian Haus (RSMAS), Will Perrie (BIO), SURA-SCOOP are possible contacts with whom we should keep an ongoing dialogue. Wave modeling has clear connections to sediment transport model.

River discharge:

NOAA River forecast centers are fundamental to have reliable river discharge products. The main center in our region is in Peachtree City, Ga.

Review of joint WG meetings:

Following are the action items that resulted from the different joint WG meetings.

Mod-Obs:

- Skill assessment
 - o Radar surface current
 - o SST
 - o Color imagery
 - o NDBC biological data
- Observing systems design
- OI wind fields (hindcast)
- Heat flux

Mod-E&E:

- Summer 2003 poster + lectures + web
- Poster on "*What is modeling?*"
- Particle trajectories:
 - o Interactive tool
 - o Posters about Jerome's and Karen's research
- SOO outreach
- Super-users

Mod-IM:

- Interactive tool for Lagrangian trajectories
- 2nd tier (analysis) layers: skill assessment with monthly reports.
- Data aggregation is greatly appreciated
- Long-term model output archival

Year 4

- Regional to local downscaling (high resolution)

Modeling Tasks:

(The estimated timeline is in parenthesis)

- Provide comments to implementation plan. *(This meeting)*
- Create the executive summary for external evaluation. *(This meeting)*
- List the objectives for year 4. *(This meeting)*
- Include CODAE and links to GODAE in objectives for year 4. *(This meeting)*
- Provide Brian with comments for the documentation draft. *(Before mid- December)*
- Brian will have a final draft of the NC/FC system
- Documentation for inclusion in external reviewers' docs. *(Mid December)*
- Generate discussion about documentation formatting for the whole SEACOOS in plenary session or ExComm. *(This meeting)*
- Ruoying will give the final touch to the SSRA article so that is ready for submission *(before Xmas)*
- Include a reference to the SURA-SCOOP potential (grid technology) *(5th year proposal)*
- Find an appropriate approach to the problem of robustness (Brian & Inkweon). *(TBD)*
- Brian will keep the WG informed about the developments of SURA-SCOOP. *(TBD)*
- Brian will check accuracy of skill assessment study. (Cold-start corrections)
- Ruoying will correct the phase issue of the USF solution.
- Inkweon will try to reproduce skill assessment study and check for sources of error.

Tasks day #2

- Expand and correct the skill assessment study and include advance techniques (e.g., EOFs, neural networks).
- Alfredo will contact Pat about the kingfish data for summer 2003.
- Evaluate the appropriate heat flux product for nowcast/forecast.
- Check that OGCM (HYCOM, NCOM) products have better skill than climatology.
- Evaluate the possibility of using new interpolation algorithms (e.g., VIFOD)
- Evaluate need to modify mesh domain to allow appropriate baroclinic forcing.
- We need to familiarize ourselves with other model solutions in our region (e.g., NCEP ROFS).
- Establish a communication link with the program managers in GODAE to evaluate the feasibility of CODAE. *(AGU San Francisco meeting)*

Notes

ModProd WG meeting (half day)

- Documentation of the various system components (UNC, UM and USF)
 - Robustness – (how to keep the system running in case of power outages, and other technical issues)
 - Need to understand role of SURA-SCOOP vis a vis SEACOOS, grid technologies, etc. SURA-SCOOP to provide help in robustness and computer needs.
 - Skill assessment strategies
 - o Doing time series comparisons, correlations, etc.
 - o Not doing spatial statistics, or spectra
 - o Neural networks (instead of EOFs) – does this suggest where data should be collected so that the model and data structures can be compared?
 - SSRA manuscript
 - Baroclinic analog
 - o The need for a baroclinic hindcast paper (focus on summer 2003?)
 - o Can we define the SEACOOS modeling strategy for this case?
 - o What are optimal nesting strategies?
 - Data assimilation strategies (do we need HF radar for assimilation or for verification?)
 - CODAE
 - o to assimilate data,
 - o to recommend – via OSSEs – where to measure, and
 - o for reanalysis
 - Ecosystem-relevant applications (Lagrangian measures)
-

Other topics for possible discussion

Wave modeling

- Important, we need someone, we can't do it ourselves (contacts include Paul Work, Brian Haus)
- Look at partnership with privates such as Oceanweather Inc
- Perhaps we need to borrow results from somewhere

Coupled atmos-ocean models

- UMiami (Shuyi Chen), Sethu Raman (NCSU), Pat Welsh (NWS) lead existing efforts that we could consider
- When the 5-year sustained effort comes into place each modeling site should have a meteorological modeling effort (the marine meteorological community would be a natural client)

Ecosystem models

- Lagrangian models (MPAs) – this is strength we already have and we should proceed with this right away
- Lower trophic models are harder and need a “true” biologist

Sediment transport

- requires wave-modeling particularly inshore
- may need additional mapping of sediment types, seasonality of algal maps
- seek advice regarding scientific questions, models' robustness

Strategic versus tactical modeling M.O. - consider in the future for opportunities for tactical (swat-team) approaches to be possible

River discharge data – should this be added to the DMAC list of “wet data points”? Also, SCOOP may be a player. The runoff data should be QC'd.

CODAE – see IOOS “white paper”

INFORMATION MANAGEMENT

Present: Madilyn Fletcher, Charlton, Purvis, Jesse Cleary, Bill Abler, Jason Ferreira, Clarie Eager, Chris Calloway, Vembu Subramanian, Xiaoyan Qi, Jeremy Cothran, Trent Moore, Liz Williams, Sara Haines, Dwayne Porter, Ed Kearns.

Review of 3rd yr activities

1. Sarah sent out list of activities & status, and we haven't been very good at completing them. Why is this? We have an in-reach problem: communication problems and information overload. We need to be more responsible about recording what we're doing and provide a static medium for people to go to and see what's been done. There is a question of management and all of our tasks. Celoxis is not being used and there is now no opportunity to go see what's being done. There are so many tasks with little prioritization. We're getting new tasks with dwindling resources with little appreciation of how much is to be done and how long it will take.

Does anyone feel that they have more resources now than last year? There have been some improvements at UNC and SkIO, but not at USF. All feel that they need more personnel.

Sarah: sometimes unable to tell what the priorities are. Would help to check in once a month or so to see where stand on identified tasks. There is a clear need for prioritization and communication of priorities. Needs: means for ongoing communication, e.g. a newsletter perhaps, teleconferences, meetings (expense an issue), or a Wiki. Time for communication is an issue. A replacement for Celoxis is being investigated – to be determined.

Fletcher: Observations and Modeling have their objectives and goals, with some sort of timeline associated with it. Can we identify at which points input is needed from the IM group, so we can phase things and prioritize? It's too easy for modelers to do their work without Observations and Information Management. We need more ongoing regular communication.

Porter: We need to re-do the list of priorities and re-commit to maintain communication (conference call in mid-December). We need clear prioritization at the ExCom level.

There was agreement that we need to have one IM person participating in Obs, Modeling, and E&E WGs. How will this function?

Calloway: needs to be better exchange of data and mutual informing of what each group is doing.

Sarah: what is helpful: a place to put things (download), bulletins, people interaction.

Actions: Conference call: Dec 10 or 13- purpose to reassess list of priorities.

Charge ExCom with arranging mechanism for cross-participation within WGs.

2. Review of Year 3 activities:

1. Geospatially-referenced maps done.
2. Data integration software and process development.

QA/QC was not done as originally conceived.

This was now identified as a priority – Liz and Jeremy will take lead. This is a Yr 3 priority that will extend into Yr 4.

3. Automation of operational data streams. The question is really a matter of redundancy. Back ups of web sites are desirable, and we should explore low cost solutions. Chris Calloway will provide summary of redundancy options. Data streams are already automated. We should check on DMAC requirements again to make sure we are consistent.

4. Incorporation of Meta-Door. Distributed CD demo.

Documentation

- "Technology Soup": A web posting describing the various technologies that have proved effective in developing the data management infrastructure for SEACOOS.

- "Data Standards": A web posting describing the various protocols and formats identified for data organization within SEACOOS to facilitate data transport and aggregation.

- "Code Repository": A web interface to publish and access OOS-related code developments or links.

- SEACOOS NetCDF Standard: SEACOOS CDL v2.0 (set of conventions and standards to promote sharing and exchange of data)

- Data dictionary

- "Visualization Cookbook"- Target date 1st week of December

- Draft manuscript "Information management for coastal ocean observing systems." To be submitted to EOS- Target end of Jan 2005.

- "Lessons Learned": A summary of the primary accomplishments and lessons learned that enabled the development of a collaborative IOOS data management infrastructure. Target date 2nd week of Dec.

- Review of status of archiving and redundancy- Target date December 15.

Posters: Get full titles & copy of Geotools 2005 poster.

Need for documentation section on web site- will work out process and discuss in next teleconference.

Year 4 Objectives

I. Web based products—future products will largely be decided through interaction & discussion with other WGs, particularly E&E WG.

A. Mapping products

1. Static tools

- a. Some with interactive features
- b. Aggregate real time data
- c. Work with E&E WG and Obs WG to identify event based products for development.

2. Analytical tools – allow people to pull down information and develop products they want

- a. Real time & archived data
- b. How do we identify the kinds of tools to be developed?

B. Data discovery products

C. Web services – provision of tools & mechanisms for product development by SEACOOS partners (e.g. for cached image production by UNC).

II. Standards development

- A. Enhancement & build-out of data dictionary
- B. Review existing/Develop QA/QC standards
- C. Promote utilization of OGC standards by non-SEACOOS entities so they can utilize SEACOOS data.

III. Infrastructure

A. Examine potential for building in redundancy. (Calloway will draft one-pager).

IV. Continue incorporation of Meta-Door into SEACOOS

- A. Evaluate functions to incorporate into SEACOOS. SkIO (Abler will beta test) and UNC (Jesse) will beta test SensorML.
- B. Document metadata standards (Metadata module will already be in place by year 4)
- C. Ensure that meta-data records are updated as new systems are brought on line or modified.

V. Archives – establish/organize/document

- A. Deep archive –store and/or identify central repository (e.g. NODC). If we're providing data to NDBC, they may be providing the data to NODC.
- B. Identify data for on-line archive. Establish capability for retrieval either at home site or on central SEACOOS server.
- C. Identify the aggregated data products and establish central archive. These include in situ products, possibly RS products, and event-based products. Need to work with Modeling WG to establish what products they need archived and establish related costs.
- D. Ensure that original data and metadata can be reached through products via links.
- E. Ensure that back-ups are in place for all archives (each institution is tasked with submitting draft of current status of back-up and archiving).

Additional tasks:

1. Review DMAC recommendations and prepare statements of how SEACOOS is addressing each.
2. Each institution is tasked with submitting draft of current status of back-up and archiving. We will then prepare document on what SEACOOS is doing with respect to archiving and redundancy.

Web products

Ocean circulation modeling- includes interactive model output – essentially done; needs sign-off by Cisco.

Next product: water level. The PIC is not yet in place. Need agreement on benchmark. But also need to consider datum that is used by the particular user. This will include observations data and model output for one-on-one comparisons. We need discussion of predicted water levels at spring workshop.

Implementation Plan:

There was a discussion of the implementation plan and how information management activities addressed the IP components. The results of the discussion are outlined below:

The Three Principal Areas:

Physical State

Phase 1 –	Circulation fields	}	These are addressed by
	Fisheries oceanography	}	
Phase 2 –	Storm surge	}	event-based products

Surface waves }

Biogeochemical/ecological	Linkage of near shore to offshore Incorporate biological & chemical data into IM structure
Socio-economic	(include diversity & student involvement) User-targeted products/deliverables, e.g. storm surge Training/technology transfer Operation stability Inclusion of demographic/economic data

Overarching themes and needs:

- In-reach (iterative)- process must be developed
- Redundancy
- Archiving
- Standards development
- Coordinate with other RAs, national organizations to ensure cross-fertilization

EXTENSION & EDUCATION

minutes unavailable

AFFILIATE MEMBERS COMMITTEE

Present: Chris Mooers (UM), Madilyn Fletcher (USC), Jim Nelson (SkIO, rapp.), Jim Sullivan (NOAA, GRNMS), Geno Olmi (NOAA, Coastal Services Center), Cisco Werner (UNC), Bob Weisberg (USF), Sandy Vargo (FIO), Harvey Seim (UNC), Rob Bassett (NOAA NOS, CoOPS), John Lamkin (SEFMC), Suzanne van Cooten (NOAA, NDBC), Russ Lea (UNC, Office of the President), Bob Bacon (SC Sea Grant)

Proposed topics for discussion:

- COOS/IOOS co-development
- Status and plans for the “National Backbone”
- Other topics

The discussion started with “**Other**”:

Rob Bassett (CoOPS): Likes the suggestion of using a CODAE approach for the more mature components of the observing system, thinking that this could provide input to NOS as to where to deploy assets or where there are opportunities to partner and complement observing components.

Suzanne van Cooten (NDBC): It would be very useful for NDBC to be aware of the SEACOOS strategic plan for station additions and instrumentation. For example, the Frying Pan Shoals buoy is fairly close to an existing NDBC station. NDBC would like to know about plans for the design of the regional observing system for out years.

Harvey Seim (UNC): We are trying to get there (design of the regional system), but there are presently issues of funding uncertainty, and where to focus efforts.

RCOOS/IOOS co-development

Bob Weisberg (USF): NDBC resources on the East coast make sense in terms of regular spacing; in other areas this is not as coherent. He would like to see a regular, national backbone, recognizing that the resources available at the national level are different than those available at the regional (e.g., the sizes of vessels and their capabilities). Thus, what can National Backbone provide that the RCOOSs can't provide? Examples for the national role would include large buoy capabilities (with the ships and facilities capacity to stage/service them), and moorings in deeper water/higher current regions.

Suzanne Van Cooten (NDBC): NDBC siting of buoys depends on who is paying and where the customer wants it (e.g., the 41008 buoy at GRNMS).

John Lamkin (SEFMC): Noted past interactions of the NMFS with MMS. In his opinion, biology was treated as an after-thought in planning the MMS program, instead of being coordinated between the two groups. He would like to see involvement of NMFS on a joint-basis for planning deployment of SEACOOS assets. For example, with respect to HF radar coverage, NOAA field programs in South Florida (Charlotte S. to Key Largo) could benefit from coverage of their areas.

It was noted that SEACOOS has been following "test-bed approach" and resources dictate to some extent where SEACOOS assets are located now. For practical matters, SEACOOS has started with local, sub-regional programs, and is now addressing how to grow these out.

Jim Sullivan (GRNMS): Expressed an interest in how GRNMS can fit in with RCOOS development and the role to be played by the larger NMS system. How can these programs assist in the regional developments?

Bob Bacon (SC SG): Emphasized that SEACOOS E&E is looking for opportunities for dialog with users (e.g., NMFS).

Geno Olmi (CSC): Presently in IOOS discussions, it is his opinion that distinctions are not clear between what will constitute the National Backbone and what will constitute the RCOOSs. But, the present efforts demonstrating cooperation are important in moving the IOOS process forward. Long-term funding is an issue. It is not presently clear which agencies will lead the program. Regional approaches, bringing in the various interests, are among the necessary intermediate steps at present (e.g., through NDBC, maybe not optimal, but making progress).

Chris Mooers (UM): Recent meetings show the potential for teams of super-users partnering with SEACOOS. Preliminary plans have been discussed.

Russ Lea (UNC): Looking forward, DOD agencies are losing 6.1 and 6.2 funding. He considers demonstration of early 6.3 activities (technology transfer to the private sector from academia) to be crucial for longer term support of COOS activities.

Issue of mandate for “ecosystem-based management” – e.g., fisheries oceanography as a starting point; means of approaching ecosystems-based management

Madilyn Fletcher (USC): Noted that in the Data Management arena, SEACOOS is looking for products to showcase that will have broad appeal.

Russ Lea (UNC): Raised the question of how to make the SEACOOS products appealing and understandable to a broad audience.

Suzanne Van Cooten (NDBC): SEACOOS needs to show a customer base for what it is doing, and show mechanisms to get back quality data (reliability and QA/QC). The recent ADCP inter-comparison between SEACOOS and NDBC is an example of how the RCOOS can function in an important technical advisory role for NDBC to ensure a dependable product. That is, contributing the expertise for analysis and to evaluate what constitutes quality data.

Other issues noted by Suzanne were data archiving and tracking the data being acquired (inventory of data, and types of data standards being applied). There are also issues of data access for real-time, near real-time data if related to regulatory issues (* ____ * Act?). Suzanne also feels that it is important to put the “data plan” right up front. NDBC is presently doing that. It was asked if this results in workforce issues for NDBC. Suzanne says that they are reallocating staff and also contracting out some tasks. Pulling in additional resources from academia is another route. There could well be growth issues for national backbone.

Bob Weisberg (USF): raised other National Backbone issues such as,

Telemetry – Where is the national backbone going? Iridium?

Data Quality – Will operation of calibration facilities be a National Backbone activity?

Ship time – How will the RCOOS be able to support the ship time needed to get to offshore assets?

Such issues make sharing resources between RCOOS and federal programs essential.

Rob Bassett (CoOPS): Suggested that it is important to identify what the RCOOS does well. And what the national systems do well (e.g., archiving). What are the issues for coordination?

Russ Lea (UNC): Need to ensure that the SEACOOS Federal Affiliates group is willing to collaborate and approach Federal agencies for issues such as above; going in together, lobbying for 6.3 resources.

Geno Olmi (CSC): Margaret Davidson’s view is that some degree of coordination of operations across region makes sense (standardization of platforms, etc.). He also noted there have been

private sector complaints about a perceived lack of private industry involvement in IOOS to date. And there is interest in private sector involvement in SE programs.

Chris Mooers (UM): Raised the question -- what is the national concept for "operations"?

Geno Olmi (CSC): One private industry view of IOOS planning (SAIC) is that it should be designed from scratch. But that is not where we are coming from. There is a history to the endeavor to this point that has to be recognized. This sets the starting point and will affect the course of development.

Bob Weisberg (USF): There is also still a lot of research to be done to build an effective COOS. Until we understand the processes better we will not be able to build the most effective COOS, i.e., effective monitoring presupposes that we understand what we are attempting to monitor. Keeping a strong science emphasis in COOS is essential. In this regard we should avoid the artificial demarcation between monitoring and science that is sometimes discussed relative to the NOAA COOS and the NSF ORION activities.

Status of National Backbone

Geno Olmi (CSC): Noted that ~ 90% of NOAA can be considered to be involved in some form of environmental observation. This presents a challenge within NOAA with regard to the IOOS – which activities are or will be IOOS activities? For example, NOAA mission mandates include weather forecasts and other "backbone" components. He sees partnerships with regional groups as a 'right pathway' for NOAA to pursue.

Mike Lamkin (SEFMC): NOAA fisheries is looking for a mode of participation in IOOS, but are considering their own ecological observing system. He sees this as an attitude that could continue unless the bridges are built early on. He feels that there is not a strong historical relationship with academic physical oceanographers and this need relationship needs to be developed early on.

Madilyn Fletcher (USC): There is also a need for caution in what is promised near-term.

Mike Lamkin (SEFMC): Sees the burden of building bridges to fisheries probably on SEACOOS.

Harvey Seim (UNC): The IOOS Implementation Plan identifies the initial parts of National Backbone, but there is not discussion of how it evolves (this topic avoided at the recent IOOS Implementation Conference).

Geno Olmi (CSC): There is a need to engage the regions in the process of what is required; where stations are needed, etc. There is also the issue of standards (e.g., CoOPs standards are expensive).

Harvey Seim (UNC): SEACOOS needs to appeal to broad sectors. We see fisheries oceanography as an area of utility for ecosystem-based management. But for this, SEACOOS will need help from other groups in region and help in establishing these interactions.

Opening Plenary Presentations