Meeting Summary
National IOOS HF Radar Technical Steering Team Annual Meeting
17-18 July 2012
NCARCenter Green Offices
Boulder, Colorado

The Steering Team (ST) is presently composed of the following individuals:

Jack Harlan (IOOS Program Office) <Jack.Harlan@noaa.gov>

The following were selected by the Regional Associations as Regional representatives to the ST.

Eric Terrill	(SCCOOS)<eterrill@ucsd.edu>
Jeffrey Paduan	(CeNCOOS)<paduan@nps.edu>
Larry Atkinson	(MARACOOS) <latkinso@odu.edu>
Nick Shay	(SECOORA) <nick@rsmas.miami.edu>
PierreFlament	(PacIOOS) <pflament@hawaii.edu>
Scott Glenn	(MARACOOS) <glenn@marine.rutgers.edu

The following were selected by the IOOS Program Office as experts in HF radar or in operational oceanography.

Mike Kosro	(Oregon StateUniversity) <kosro@coas.oregonstate.edu>
Ming Ji	(NWS Ocean Prediction Center) <ming.ji@noaa.gov>,
Patrick Burke	(NOS CO-OPS) <pat.burke@noaa.gov>
Bill Birkemeier	(USACE) <William.Birkemeier@usace.army.mil>,
Rich Patchen	(formerly NOS Coast Survey Development Laboratory) <rich@patchen.com>,
Richard Crout	(NWS NDBC) <richard.crout@noaa.gov>,
Don Barrick	(CODAR Ocean Sensors, Ltd.) don@codar.com

Attendees to the July 2012 Meeting:

Jack Harlan
Eric Terrill
Jeffrey Paduan
Nick Shay
Scott Glenn
Mike Kosro
Ming Ji
Rich Patchen
Don Barrick
Patrick Burke (via phone)
Richard Crout (via phone)

Original Agenda Items:

Freshwater Tiger Team Position Paper

Waves Tiger Team Position Paper

Modeling/Data Assimilation Tiger Team

GEO Global HF Radar

Other Topics:

- Interface with NWS (NCEP, AWIPS, GTS etc) (Crout)
- Bistatic& Multi-Static Data: Technical & Data Management Issues (Barrick)
- Archiving: Technical & Data Management Issues (Harlan, Terrill)
- Community-based Trajectory Tool: Technical Issues (Terrill)
- QC/QA
    - Data QC
    - Operational Site QA
    - Software Beta Testers(volunteers endorsed by IOOS)

As this is a small group of professionals, the agenda for the meeting is usually fluid with the group occasionally adding items not on the original agenda.

Summary Notes:

Freshwater Tiger Team:

The report is nearly complete. Consensus that the field work done by Codar and U Michigan in 2011 and the report from that work provides a state-of-the-art description of HF propagation in freshwater with corroborative experimental data. Jeff Paduan will finish the introductory text and add the recently received data from work at Old Dominion U (Updyke) and SF State U (Garfield et al).

(Off-agenda question) Annual Report for HF Radar Program

Consensus opinion that ST create an annual report. Example items to include are: national metrics, including budget levels versus last year and versus national network plan. Also include region association inputs. Suggest that the ST make suggestions on format to the regions so it will be easy to extract those sections from the regional reports and make a coherent HF report. Include some assessment of non-IOOS funding levels and sources for HF radar.

ACT Waves Test & Evaluation Report

There was considerable discussion of the ACT T&E report's section on HF radars.
ST recommends the following be sent to ACT Waves Team:

The Steering Team has reviewed the final version of the ACT Waves T&E Report. The Steering Team suggests that some substantive modifications should be made to the sections 4.3 on Codar and WERA radars to more accurately characterize those radar systems. For the Codar section, the phrase "peak performance" should be removed and only the average power should be addressed since this is the actual power transmitted during any waveform. A more accurate statement would be:
"Transmitting requires 80 watts peak power and 40 watts average power, operating with a 50% duty factor (square-wave pulse modulation)."

For the WERA section, there is a lengthy paragraph that appears to have been misplaced in this section. The paragraph begins " When considering the First-5..." and ends with "fundamental sensor accuracy".
This paragraph is not relevant to this section.

Lastly, the table should be modified where it mentions "resolution/accuracy" of WERA SWH. There is no physical basis for the resolution of the wave height measurement. It should be "n-a" as for Codar.

Waves Tiger Team

The report is complete and was distributed to the ST prior to the meeting. No issues. Jack Harlan will distribute via IOOS web page. (COMPLETED 10 Aug 2012)

Modeling & Data Assimilation Tiger Team:

This team has been re-formed with Mike Kosro now leading since Rich Patchen has retired. Rich is open to continue to be involved in some capacity. The recent Paduan and Washburn book chapter (publishing data later this year) provides a fairly comprehensive review of the use of HFR data in models. This will be referenced in the Tiger Team report.
Much discussion occurred on the specifics of modeling.
Rich noted that by FY15, NOS CSDL should be running a west coast circulation model (Zizang Yang is lead). Consensus that, in order for HFR data to be used properly, the mission of any model using HFR data needs to be understood.

The ST agreed to provide an item for input to the FFO about to be released for the IOOS Modeling Testbed as follows:

Evaluation and optimization of assimilation of HF radar based ocean surface current measurements for use in coastal ocean circulation models including the examination of the trade offs of radar data from systems with different spatial and temporal resolution, inclusion of radar processing qa/qc parameters in defining uncertainty fields and assimilation cost functions. The goal of this effort is to define best practices assimilation approach for use in operational forecast models.

It was agreed that a more routine communication should be pursued between NAVO (Bub and Cummings) and the HFR community. Eric Terrill and Jeff Paduan can lead.

GEO Global HFR Effort

Some background on the effort was discussed (Jack, Don Barrick, Scott Glenn, Jeff Paduan have attended either or both of the first two meetings: London, Seoul).

Key recommendation by ST: It was recognized that GEO's foundation is rooted in sharing data but does recognize national policies. The ST advised that the GEO HF radar initiative work carefully with each nation on their opportunities and challenges on sharing data.

NWS Interface

Background was given by Dick Crout about the latest interactions between NDBC and other NWS programs e.g. AWIPS, NCEP.
A number of questions were asked about the specific models and missions that NWS is interested in. Dick will do some follow-up with NWS staff. NDBC will be placing x,y,u,v (6 km) data into a GRIB2 format with completion target date of October 2012. Ming Ji mentioned the need to get the radial velocity HFR data into BUFR format so it can get into the data tanks aka TOC.

The Steering Team recommends that, over the next few years, the community places a priority on the relationship with WFOs and RFCs to learn their needs so that the HFR community can suggest new products and build those products for WFO/RFC demonstration and testing purposes.

Archiving

Archiving is covered in the National Plan and was coordinated with NODC. Need a regularly scheduled post processing procedure and schedule. Regions need to document whether or not they are keeping up with reprocessing (spectra-to-radials), on what schedule, and, if not, what resources are lacking. Need some dedicated office/person to take (annual) radial files and produce reprocessed/best available vector products. Recommend that archiving of reprocessed vector products as well as reprocessed radials occur at NODC.

Beta Testing of Radar Software

This section applies primarily to Codar systems. Currently, Codar does in-house testing and customer base does de facto beta testing. Should IOOS formalize a beta testing process for both Codar and WERA systems? Agreement that it would improve efficiency of update cycle and uniformity of version use. Difficulty in requiring all partners to use latest version (another reason to manage the network as one system rather than via 11 regions).

The Steering Team recognizes the need to have independent tests of new radar software updates and upgrades. While the radar manufacturers perform testing in-house and possibly test with some selected radars, a broader testing of software is warranted. This improved testing would be performed prior to deploying the software throughout the network and is seen as a modest

recurring cost of an operational radar network. The end effect would improve the overall robustness and stability of the IOOS HF radar network.

Since this testing requires dedicated and experienced personnel with unique skills, there should be funding provided to institutions where those personnel are employed.

QA/QC Methods

The methods used and recommended by Codar were distributed including a detailed checklist that customers are encouraged to follow. Also, the WERA QC checks were distributed. Consensus that these documents should be distributed more widely.

Trajectory Tools

ST discussed several methods but made the recommendation that funding for a trajectory toolkit assessment be provided. ST sent the following language to Becky Baltes for insertion in the Modeling Testbed FFO:

Recommend the development of a Lagrangian trajectory and visualization toolkit that enables the use of multiple particle trajectory algorithms with a range of dispersion parameterizations to be deployed in surface current fields produced by both ocean models and by HF radar.

Annual Report for HF radar program (topic revisited)

Report should be tied to the FY rather than calendar year. The performance metric will be reflected in the report. Also, a few operators have their own displays of regional HFR health that could be included. Scott showed the displays used in MARACOOS and Eric showed the national statistics web pages.
As part of the annual report discussion, National Monitoring and Reporting was also considered. It is important to have reliable reporting of any radar downtime of more than 24 hours whether downtime was planned or unplanned. A number of ways to provide network statistics were discussed. Integrating all these is something that Eric will discuss with his team so a national display can be generated for monitoring and reporting purposes.

ST recommends:

That the report will include detailed information on the radars in every IOOS region such as performance statistics, radar inventory updates, success stories and new applications.

That ST provides guidance to operators for preferred input/format for RA reports (to be used also in annual report)

That ROWG explore and discuss metadata management best practices.

That annual report is written by PIs receiving IOOS support.

That information be given to RA directors on how to access the monitoring data

Multi-static Operations

Don Barrick gave a background talk on the technical issues involved in bistatic and multi-static radar operations. Also, a discussion paper was submitted by Don which is an appendix to this document. The radial velocity files created by Codarbistatic radars are identical to those from standard Codars so could be ingested by the national servers with no enhancements to the servers.

ST recommends that studies be conducted and that multi-static options be considered in future purchase and build out decisions.

IOOS Wayne Ave Offices Display

As an outgrowth of the annual report discussions, ST also discussed ways to inform the IOOS community about the HFR network.

The Steering Team recommends that a large display monitor in the Wayne Avenue offices of the IOOS Program Office be dedicated to displaying the status of the IOOS HFR network. A number of real-time display programs have been, and are being, developed by IOOS regional partners that would provide an interesting and intuitive experience for Wayne Avenue visitors. The display would rotate through several different views of the national network such as maps, statistical health displays and detailed regional statistics views.

Recognition of HFR Technicians & Engineers

The Steering Team requests assistance from the IOOS Program Director to recognize the superb job done by regional HFR technicians and engineers who keep the radars running under constrained fiscal conditions. Jack Harlan will draft a letter to the regional HFR PI's requesting the names of individuals who will be recognized by a PI. The individuals would then each receive a personalized certificate from NOAA, at the highest level in HQ possible. The IOOS Director's assistance is requested to obtain signatures from HQ e.g. Dr. Sullivan. The ST is seeking to have these certificates distributed to the awardees by Oct 31.