



## 2014 Updates to the 2008 Reviewers' Recommendations

Reviewer Recommendation	2014 Update
1. PMEL should be more aggressive in mounting long-term observation programs of the ocean water column	Since 2008, PMEL has continued to seek funding for continuing/expanding ocean water column observations. Despite the recent federal budget climate, we have received funding to increase the use of AUVs and other innovative technology, which has allowed us to make existing systems more efficient. PMEL has made significant progress in completing the RAMA Array in the Indian Ocean, and it is 75% complete at this time. The range of Argo floats was extended to 2K meters depth in the late 2000's, and PMEL was awarded new funding beginning in 2014 to help lead an effort to develop full ocean depth Argo floats.
2. NOAA should consider a more deliberate effort to measure currents and fluxes in selected areas.	A new generation of current meters has greatly improved the quality of current data measured in the RAMA and PIRATA Arrays, and at the Ocean Climate Station sites. PMEL has partnered with Scripps to establish a current measurement program using autonomous Spray Gliders of the Pacific Western Boundary Current in the Solomon Sea region.
3. PMEL climate and carbon cycle groups should have systematic ties to external (modeling) groups and some internal hires with modeling experience.	The PMEL Carbon Group scientists have been working with the US and international modeling community to provide data-model comparisons as part of the Regional Carbon Cycle Assessment and Processes (RECCAP) for the global carbon data sets we provide (see synthesis papers by Wanninkhof et al., 2013, Ishi et al., 2014; Feely et al., 2014). We have also been working with Drs Samantha Siedlecki, Nick Bond, and Al Hermann of JISAO to utilize our west coast ocean acidification data to validate their JISAO Seasonal Coastal Ocean Prediction of the Ecosystem (J-SCOPE) model of ocean acidification on the Washington-Oregon Coast. Dr. Siedlecki was a JISAO post-doc jointly sponsored by PMEL, UW, and NOAA Fisheries to develop this model.
4. NOAA/PMEL needs to continue communicating with NOAA headquarters on ship time	Agreed. PMEL has a staff position filled by a qualified NOAA Corps officer, dedicated to shiptime-related issues. This individual serves as the liaison between PMEL scientists and engineers and fleet service providers in NOAA, UNOLS, and commercial providers to ensure safe and appropriate shiptime is provided to PMEL projects. NOAA has instituted a new system for managing shiptime, which places control of all NOAA shiptime funds under direct OMAO control, reducing our ability to manage short-term and emergency needs.
5. PMEL would greatly benefit from a formal seed-fund to support pilot studies for technology development and higher-risk concepts.	Agreed. OAR initiated such a fund in 2013 (SEED funding), and PMEL scientists and engineers received financial support for two projects in that first year: development of the moored profiling crawler, or "Prawler" and the development and integration of aerosol sensors into the Manta unmanned aircraft. In 2014, however, the funding was diverted to a narrower scope of projects. We hope to see a return of the SEED proposals in 2015.
6. PMEL should invest in data management to keep up with existing and anticipated demands for increasing demands for data and for stakeholders.	Agreed. PMEL's Data Management group is actively developing tools to advance a broad spectrum of data management activities.
7. A strong, explicit mentoring program and base of upcoming mid-career leaders needs to be in place within the laboratory for a successful transition plan (succession plan) when the current crop of senior people retire or move.	Agreed. Since the 2008 review, PMEL has increased the number of post-doc positions at the lab. Hiring freezes and a more recent restructuring of NOAA's Workforce Management office have prevented us from filling several vacancies and delaying promotions for NOAA employees, but those issues are slowly being resolved and we are beginning to recruit and promote again. We continue to rely on the Cooperative Institutes to provide many of the younger scientists at the lab, some of whom move into federal positions, including lab leadership positions.
8. Whatever you do, don't break it!	No Response required.
9. It would be useful to present PMEL's roles and responsibilities within NOAA/OAR for purposes of evaluating the Lab's effectiveness.	Provided in Dr. Sabine's overview.
10. Provide statistics and budgets by research area rather than for the lab at large.	Provided in the written review materials and on the Review Website.

11. PMEL management should reinforce with scientists and technical editors that salinities should not be published in units of PSU.	Agreed.
12. Provide time for writing by the review team and establish an expectation that draft comments be provided before the review team departs.	Done.
12.2 PMEL's tsunami program needs to dedicate effort to publishing its research in the scientific literature as well as developing operational products to improve the Tsunami Warning Program within NOAA.	In addition to the completion of the 75 inundation models, PMEL Tsunami scientists were authors or co-authors on 41 journal articles in the peer-reviewed literature from 2008 through 2013.
12.5 PMEL's tsunami program needs least one or two additional PhD level scientists.	In 2008, that might have been true, but in 2014, this is no longer a valid statement. PMEL ramped up to provide 75 forecast models from 2009 to 2012, but those models have been delivered and Tsunami-related funding has decreased, as has the number of NCTR scientific staff.
13. Transfers of climate observation technologies should be followed by institutional cultural and scientific adjustments enabling new technology initiatives (e.g., glider program).	No Response required.
14. PMEL should consider a more aggressive instrumentation activity including a heavier focus in monitoring the water column, for programs such as the Ocean Climate Station program.	PMEL has not been funded to expand our role in the Ocean Climate Station program; however, significant improvements to data quality, delivery, and reliability to the existing ocean climate stations has been made. New instruments have increased the accuracy of current measurements (see Recommendation #2 above), redundant sensors have been added, and real-time data dissemination capabilities have been incorporated into PMEL's Ocean Climate Station moorings.
15. The Live Access Server should have greater visibility and attention.	The Live Access Server has increased it's visibility by being an integral part of several projects. A few examples include the Earth System Grid Federation project where LAS was used to provide visualization and analysis tools to the IPCC AR4 model data. Another example occurs with the Unified Access Framework project where LAS is one of three default visualization tools available through the data catalog.
16. Bridge across PMEL research groups by connecting the water chemistry studies to ecosystem impacts and the discovery-exploration of CO2 release by underwater volcanic systems.	PMEL's Earth-Ocean Interactions group carried out an investigation funded by the NOAA Office of Ocean Exploration and Research to conduct a preliminary investigation of impacts of ocean acidification from a shallow seafloor volcano in the Marianas Islands in summer 2014.
17. The PMEL review team should have met with Mike Johnson.	(Note to Reviewers: In 2008, Mike Johnson was the NOAA Climate Program Office's Ocean Observations Program Manager (a key stakeholder), and several of PMEL's climate observing programs were funded by his office.) Since 2008, NOAA has implemented stakeholder input into the review process. Dr. Wayne Higgins, Director of NOAA's Climate Program Office, is one of our stakeholders for this review.
18. PMEL should play a lead role in an OAR determination of how to scale up efforts to operationalize NOAA Climate program activities.	This recommendation was in response to a movement underway in 2008 to establish within NOAA a National Climate Service organization. PMEL scientists and managers were closely involved in that discussion. Ultimately, the politics surrounding the debate determined that the status quo would be maintained for the foreseeable future.
19. PMEL should better demonstrate the importance and utility of the tropical oceanographic data products.	The response from the 2008 review remains applicable: PMEL believes that the utility of the tropical oceanographic data products has been demonstrated adequately. As an illustration of this point, through 2008, 676 peer-reviewed publications have appeared in the scientific literature utilizing tropical oceanographic data from the TAO-TRITON, PIRATA, and RAMA Arrays. In 2008 alone, 28.8 million web hits were registered on PMEL's and NDBC's tropical moored buoys web sites, indicating that these datasets are being heavily used by the research and operational communities.
20. The TAO transition should have involved PMEL in developing a strategy for maintaining climate quality data.	No Response required.
21. PMEL needs an appropriate role in any NOAA Climate Services organization, with clear boundaries between research and operations, prioritization of field efforts and two-way information exchange to translate field observations into decision support tools.	(Note to Reviewers: In 2008, NOAA was in the midst of proposing, and Congress ultimately rejected, the formation of a NOAA Climate Service Line Office. This recommendation was aimed at that activity and is no longer applicable.)

22. The PMEL CLIVAR and carbon programs should be given high priority for NOAA ship time on the Ron Brown or for NOAA funds to charter an equivalent Class I research vessel.	CLIVAR/GO SHIP has been the highest priority program for shiptime within OAR for the past four years. Because of the cost of chartering suitable UNOLS vessels, the NOAA Ship Ronald H. Brown has been tasked to support these cruises, including moving the vessel to the Pacific Ocean for a three year period, to support CLIVAR/GO SHIP goals.
23. The recent ocean carbon survey along the US West Coast should be integrated into the NOAA observational network, with observational rather than research funding, and be repeated on a regular basis.	The West Coast OA survey has now been integrated into the Ocean Acidification Program's plan which supports regional monitoring cruises on the East Coast and in the Gulf of Alaska as well as the West Coast survey.
24. PMEL instrumentation to autonomously measure two components of the ocean carbonate system should be incorporated into a wider network of moorings.	In 2009, the first mooring to measure two components of the ocean carbonate system was deployed at Ocean Station Papa. Since then, the number of platforms measuring dual carbon components has grown to 21 and continues to increase.
25. PMEL should have a performance metric to track obtaining and providing ocean observations data to the larger external community (in addition to publications).	A measure tracking the number of ocean observing platforms deployed/maintained by PMEL was initiated in FY 2010 and has been in use ever since. The measure accounts for PMEL-managed tropical moored buoys, Argo floats, and Ocean Climate Station moorings. See the AOP tab in the Review documentation to view PMEL's annual accomplishments in this area.
26. PMEL's engineering innovation and the science-engineering partnership should continue to be strongly supported.	Agreed, and recent developments such as the AUV initiatives in 2014 will help to increase support for these activities and expand the number of partners our engineering staff works with.
27. FOCI should consider a more proactive use of Lagrangian techniques to explore, chart and understand the mesocale dynamics of the Bering Sea/Gulf of Alaska region.	Surface drifters and ARGO floats have long been used in the Gulf of Alaska and Bering Sea regions, and they have been invaluable in describing transport, especially in the vicinity of the Aleutian passes. Lagrangian methods are a valuable tool in the EcoFOCI toolbox and will continue to be utilized as observing requirements demand.
28. FOCI should consider gliders and/or AUVs for insight into the structure of the circulation, the eddy field, mixing processes and the role of topography to define advective and dispersive processes which play a major role in fixing the water properties.	Gliders have been employed successfully in the Gulf of Alaska basin, in partnership with Dr. Charles Eriksen of the University of Washington. The eastern Bering Sea, where EcoFOCI operates, is quite shallow (< 70 meters) and a high volume of trawling and crabbing much of the year makes glider deployments untenable. With EcoFOCI's recent move into the Chukchi Sea to support the DoI/BOEM, EcoFOCI has initiated a collaborative effort with Dr. Tom Weingartner of the University of Alaska-Fairbanks, who is employing gliders in the Chukchi Sea.
29. NOAA should continue to support FOCI long term time series for assessing changes in ocean climatology and fisheries.	PMEL's biophysical moorings in the Bering Sea, which are considered cornerstone observations for the eventual development of an integrated ecosystem assessment in that basin, have continued to be supported by a combination of NOAA and non-NOAA funds. PMEL continues to seek permanent support for these platforms from NOAA. Other long-term biophysical time series observations are being maintained with a mixture of PMEL base funds and project funds from the North Pacific Research Board. These include the long-term time series observations on "Line 8" and the Late Larval Survey in Shelikof Strait/Gulf of Alaska and a CTD/bongo time series on an established survey grid in the Bering Sea.
36. PMEL should assure funding for maintenance of the four Bering Sea moorings.	
30. The successful FOCI partnership between PMEL and the National Marine Fisheries Service should be highly commended as an example of strong within-agency cooperation and coordination to address societally relevant goals.	No Response required.
31. Research efforts, such as EcoFOCI, need to build on the approaches developed by program with a single species focus to a broader ecosystem-wide orientation.	PMEL has become almost completely focused on a holistic approach to Arctic and sub-Arctic marine ecosystems since the late 2000's, rather than on single-species based research.
32. FOCI should determine if the current mooring network is adequate through a more thorough observational network design study.	During the BEST/BSIERP field experiment, comprehensive hydrographic surveys confirmed the current locations of the Bering Sea moorings as appropriate, but identified two additional locations (Unimak Pass and in the Shpanberg Strait) that would better define the northward transport of the Alaska Coastal Current, which would support the research in both the Bering Sea and the Arctic. PMEL has been active in seeking NOAA funding for a new mooring site in Unimak Pass.
33. EcoFOCI would benefit from greater contact with regional climate modeling groups, for projections of future climate change, climate downscaling products and boundary conditions (atmospheric and lateral) for local numerical models.	EcoFOCI was awarded funding through FY13 to utilize ESRL, GFDL, and ROMS ocean models to develop regional ocean models that will drive ecosystem models maintained by NMFS. Drs. James Overland and Muyin Wang are working with climate models and Dr. Al Hermann is leading the EcoFOCI ocean model effort.

34. EcoFOCI should set priorities and research directions to meet the emerging focus on IEAs in support of ecosystem approaches to management	EcoFOCI research migrated towards an ecosystem-based approach before this became a popular concept in NOAA. EcoFOCI participated in the NSF/North Pacific Research Board's BEST/BSIERP study since 2008 and the GOA/IERP starting in 2011. Both programs were an integrated ecosystem approach that will form the basis of an IEA in their respective regions.
35. Base funding should support a higher fraction of FOCI activities. One possible avenue to enhanced base funding is a commitment to shaping IEAs in the Gulf of Alaska and the Bering Sea.	We agree that increased base funding would allow for more certainty when planning long-term research; however, we have received little support through the budget process to date to increase funding for marine ecosystem research in Alaska. PMEL is involved with integrated ecosystem assessments in the region, but there is very little funding associated with this activity. We are involved in NOAA's Arctic planning teams to expand support for our research in the Arctic and Bering Sea.
37. FOCI must decide what is planned for transition and what will be supported in the long term, specifically with regard to the four Bering Sea Moorings, which probably should not be transitioned.	FOCI's data collection efforts are largely used for research purposes. Data is shared freely with NMFS, thus we see no compelling reason to transition these systems to a more operational entity. NMFS is satisfied with the status quo and no other agency would likely be interested in maintaining these platforms.
38. Why not put the output of an ocean hydrophone on the net?	There are several examples on PMEL's Ocean Acoustics website of ocean sounds from various sources. Sounds from the 2011 Japan Tsunami captured by a PMEL hydrophone have been viewed nearly 650,000 times on You Tube.
39. Consider a hydrophone offshore of a harbor.	PMEL established a hydrophone in Yaquina Bay, Oregon (Newport) as part of an exhibit on underwater sound at the Hatfield Marine Science Center in Newport in 2008.
40. In the case of tsunamis, a performance measure other than publications should be used to measure the success of the program.	From 2008 through 2012, the transition of NCTR's Tsunami models to NWS operations was a leading NOAA measure reported to DoC. After completion of the models in 2012, we have a new measure which focuses on the development of tools and technologies transferred to the Tsunami Warning Centers.
40.1 PMEL should consider expanding server capability to provide access to tsunami buoy data and forecasts during large earthquake events.	PMEL has addressed this recommendation in several ways. First, NCTR purchased an F5 Load Balancer for use by PMEL to better manage server capacity. NCTR is also in the process of offloading computations to the very robust and secure servers of the National Centers for Environmental Prediction, which will further alleviate congestion in accessing PMEL's servers during an actual tsunami event. Finally, the NWS National Data Buoy Center is also providing DART data operationally to the research community, which will further lessen demand on PMEL's servers.
40.2 PMEL tsunami group should publish a paper with the details about FACTS and maintain both FACTS and ComMIT servers.	<p>NCTR did publish the paper describing ComMIT and its use as suggested (ref. below). FACTS has been discontinued and replaced by more capable tools; in particular, the Tweb application, which is hosted on much more robust servers and is planned to be hosted on operational NWS servers in the future.</p> <p>Titov, V.V., C. Moore, D.J.M. Greenslade, C. Pattiaratchi, R. Badal, C.E. Synolakis, and U. Kânoğlu (2011): A new tool for inundation modeling: Community Modeling Interface for Tsunamis (ComMIT). Pure Appl. Geophys., 168(11), doi: 10.1007/s00024-011-0292-4, 2121–2131.</p>
40.3 PMEL'S tsunami group must maintain the 'branding' of its MOST code vs other less capable codes marketed by newcomers.	2008 Response: Publications using the NOAA tsunami forecasting models will continue to establish the accuracy and performance of the models. We cannot control other publications, but we trust that the peer review process will filter out unfounded claims.
40.4 PMEL should be more assertive in debunking invalid claims made for less capable tsunami models.	