Response to the Quadrennial Review Report
of the
Atlantic Oceanographic and Meteorological Laboratory

Authored by:

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We have organized our responses according to the paragraphs of the review with a minimum of restating the issues. The paragraphs referred to are numbered on the accompanying Review Report.

Paragraph 1: We agree with this general comment about the high quality of AOML's science, its relevance to the NOAA Strategic Plan and Mission, and to societally-important issues and is the reason we are proud to be AOMLers. Larger and smaller issues that the reviewers felt needed attention concerned emphasis, direction, and management in the Laboratory. They are addressed below.

<u>Scientific Programs</u>:

Paragraph 2: The program has evolved by fine-tuning over the years. The reviewers suggest that more radical changes may be needed. The reality is that radical changes were "ordered" in the past (*e.g.*, closing of the Marine Geology and Geophysics and Air-Sea Interaction Divisions and the moving of the Hurricane Research Division from a different organization). These drastic changes happened 15 to 20 years ago and had serious personnel repercussions that are with us today. The evidence (to Director K. Katsaros) appears to be that drastic radical change is not a healthy method for change and should only be done if the slow process is too slow and the circumstances change suddenly. If needed, there should be extensive counseling and preparation. Retraining should be part of the process. Otherwise, destructive consequences, especially on personnel morale, may linger for decades (see paragraph 17 on strategic planning).

Paragraph 3: Recap of AOML's important oceanographic work.

Paragraph 4: Leadership of the Hurricane Research Division in hurricane research is recognized, as is weakness in internal theoretical and modeling work. We agree that increasing theoretical and modeling work is desirable, and feel that versatility in this area is necessary. We agree that remote sensing could become a more important aspect of hurricane research. While independent development of new models from scratch is beyond our means, in-house expertise with running models and theoretical analysis is essential to a healthy effort and to forging collaborations with extramural modelers and theoreticians. For the cost of three to five positions, at least some of which would be in a cooperative institute and supported through proposals, we can greatly enhance the scientific value of our program.

Paragraph 5: Our Coastal GOOS (CGOOS) involvement is a natural consequence of our expertise, and we are working on developing the local network (through Project ACCESS).

Paragraph 6: AOML's innovation has lead to new sampling methods. To continue, these require new opportunities and financial support.

Special AOML Research Problems:

Paragraph 7: (1) The problem with AOML continuing our long-term measurements with declining base funding (in real dollars) came to a head with the Atlantic cable issue during the quadrennial review. This is a problem that the Laboratory can only solve with OAR and NOAA headquarters support. We raised the issue at the review and appreciate the reviewers making it a primary concern. The debate goes on within OAR. The balance between research and long-term measurement programs, in the research laboratories of NOAA/OAR, is being examined and debated in various fora. We are planning to produce a white paper on this issue with suggestions for criteria and a decision process as part of an executive training program of AOML's Physical Oceanography Division Director.

Paragraph 8: Agree.

Paragraph 9: In any field program, the investigators commit to observations in circumstances that turn out after the fact not to be what the experimental design envisioned. Data obtained in these situations tends, understandably, to be "not fully analyzed." On the other hand, an investigator who has invested years of effort to design and execute a successful experiment should have priority access to the data, though by no means in perpetuity. He is also obligated to share the data with genuine collaborators in a timely way. It is simply not true that HRD has withheld "some of the better data" from qualified external investigators under present management. Real time data is posted to the web within a few days to weeks. The on-line archive of flight-level data is an example that we would like to emulate for other data sets. It contains >4000 data profiles representing 521 statistically independent samples in 60 tropical cyclones, starting with Hurricane Anita of 1977. It is available to anyone who asks for the password. We are starting to treat surface wind analyses similarly, but other data sets such as dropsondes and radar will require additional resources before we can provide comparable access. We have been and continue to seek support for generating the complete database of HRD's major data sets.

Research Collaboration:

Paragraph 10: Generally good comment. We emphasize the value of the synergy of our in-house areas of expertise, and this is widely recognized by AOML scientists.

Paragraph 11: Reviewers suggest AOML reassess its relationship to other parts of NOAA (OGP, NOS, NWS, NESDIS). Should the Florida-Bahamas cable measurement series be dependent on OGP or other research funds? Can funding commitments be obtained for our

routine operations from the other line offices (since we have not been able to get adjustments to base)? We intend to enhance collaboration with the operational line offices and other OAR laboratories to secure such support, since they may be stronger advocates than the research line for some of these requests (even though they agree with us that these measurement programs should have their home at AOML). Several initiatives for 2001 and 2002 are of this nature, *e.g.*, data assimilation and climate services, and they may solve the problem. However, a related issue concerns which agency (line office) carries the main U.S. climate mission. We think NOAA's OAR is appropriate, but this needs to be officially endorsed by NOAA Headquarters and, especially, by NWS and NESDIS.

Paragraph 12: We agree that ever greater collaborations can be sought. We are collaborating with European, South American, and Caribbean nations on tropical Atlantic buoy and profiler measurements and on analysis for the Atlantic Ocean of estimates of air-sea fluxes based on satellite data. More active collaboration with Puerto Rico is developing rapidly. Good cooperation is a two-way street. The new data-assimilation emphasis for both atmospheric and oceanic research should help us attract modelers to our subject areas.

Paragraph 13: Good suggestion. We will propose that a separate fund be established for scientists on sabbatical or extended research visits in the Laboratory each year. This program could readily also be a vehicle for attracting researchers from under-represented parts of the U.S. population in order to enhance diversity in the Laboratory. Under current funding it is not possible, except with "reimbursable" funds for research programs.

Laboratory Resources:

Paragraph 14: Laboratory resources are stretched thinly and are really not adequate as the review states. We are falling behind in networks and computing (directors start-up funds in 1998 helped but were mostly a band-aid). We are not able to hire young principal investigators to replace retirements as we feel is needed. Our infrastructure, the building, does not have a capital improvement fund, and the general NOAA resources for roof-replacement and other repairs always come in crisis mode rather than prevention.

Computers:

Paragraph 15: Agree. The Laboratory Director has hired a Computer Networks and Services Division director who is developing a plan for the future of the Laboratory computing services, requirements, priorities, and options. He is working on this with (1) a computing and networks committee and (2) with buy-in from a larger group via "town" meetings. The sources of funding of these services are also to be identified. We may need to follow examples of two or three other OAR laboratories who have obtained major computer resources via "ear mark" line items in the Congressional budget or we may choose to outsource some services currently under investigation and debate.

Paragraph 16: Agree. A mirror site is under discussion. Approaching NOAA facilities office and the OAR CIO has been done, but the issue is urgent and must be pursued more vigorously.

Strategic Plan and Vision:

Paragraph 17: Agree again. We do need to go through the complete strategic planning process with the larger AOML community involved for thorough "buy-in" and agreement of the plan, goals, and priorities. OAR now has a Strategic Plan (as of July 2000), which we plan to use as the basis for our more specific plan. In the current funding (and personnel management situation - no lay offs) we do not have much latitude for action, but we need clear thinking and vision to solve the dilemma (or at least give guidance) for choosing between pure and applied research and the commitments to long-term measurements and to our partners' expectations of us. The Strategic Plan process has been started with Division Directors and a preliminary town meeting. We take this suggestion as a primary one and intend to have an AOML Strategic Plan early in 2001. The criticism of HRD's science plan resulted from not communicating what is obvious to us at AOML since we participate in the U.S. Weather Research Program, especially the "Prospectus Development Team Five." In fact, HRD's science planning is completely aligned with the U.S. Weather Research Program objectives for Hurricanes at Landfall and in order of priority are the following:

(1) Advancement of physical understanding of hurricane intensity change, leading to skillful intensity forecasts. A particular target of this work is rapid intensification. Forcing by the oceanic heat source is emerging as the dominant factor in intensity change.

(2) A comparably important (primarily) technological effort is analysis of hurricane surface winds. This work has managed to attract support from external sources and is absolutely essential to support forecasting, emergency management, design of hurricane resistant structures, and insurance regulation.

(3) An effort to which HRD devotes fewer resources is synoptic surveillance and targeted observations, a mature investigation where there remains a good deal of scientific value to be added. This work focuses on the basic science needed to improve track forecasts.

(4) At a similar level of effort, HRD is starting to leverage its own expertise with meteorological radar and collaboration with NASA scientists (primarily through their recurring CAMEX field campaigns) to address quantitative estimation and prediction of tropical cyclone rainfall.

(5) Finally, we also devote some effort to climatology of hurricane occurrence and impacts as a way of keeping the other research responsive to real-world needs.

Paragraph 18: We agree wholeheartedly and include all the specific suggestions for goals and a five-year plan as a part and parcel of the Strategic Plan, as well as its consequences. Such a detailed plan is so dependent on resources, that in the current status of "limbo," as we hang on, hoping for financial relief in 2001 (now that our plight has been fully understood), we cannot do

meaningful detailed planning except as "scenarios" for different circumstances. Such projections were actually requested by OAR Headquarters for AOML (and the other OAR Labs) in the spring of 2000.

Paragraph 19: AOML is becoming a small laboratory by default and by attrition. Reassigning employees to the most urgent tasks have been done with our central activities retained. The difficult choices for reducing activities and funding the ones that are retained better does require a guide. We have done an exercise of such planning by request from OAR Headquarters (spring 2000). It should be done with wider participation by AOML principal investigators and senior members of support staff in the strategic planning process.

Paragraph 20: Agree. Message for NOAA and OAR headquarters.

What Distinguishes AOML from a University:

Paragraph 21: Why NOAA research laboratories? We agree that our "raison d' Λtre" should be clearly stated. We feel that our long-term commitment to a research theme or project, our stewardship of crucial data sets (for research on oceans, climate, hurricanes, and the coastal environment of Florida) define our niche in the diverse web of research institutions. The federal laboratories role as "honest broker," neutral objective holder of the facts, is an important aspect. Another aspect is the building of "capacities" and expertise to provide the link between research and operations. We wholeheartedly agree with the ideas and eloquent statements 1, 2, and 3 of our esteemed reviewers.

Paragraph 22: We agree. AOML researchers cannot become entrepreneurial in the sense that university professors currently are, if we wish to select our own research goals (with assistance from review committees) and not follow opportunistically every funding announcement. With regard to enhancing the transition of AOML research to the operational service lines of NOAA, we believe that dialogue, joint workshops, and projects with some linked funding will be helpful. We are pursuing these ideas in several NOAA initiatives. A notable historical one is the U.S. Weather Research Program (which, unfortunately, has not had strong Congressional support).

Funding Process:

Paragraph 23: We agree with the analysis and will continue to raise these issues at OAR and NOAA Headquarter levels.

Paragraph 24: In 2000, AOML senior personnel participated in numerous program planning activities, both in the Congressional initiatives process and in national science groups such as CLIVAR, the U.S. Weather Research Program, NOPP, and others. The Deputy Director and Outreach Coordinator have begun a series of visits to local Congressional staff offices. We are being as proactive as we can afford and are allowed to be.

Paragraph 25: Agree. We do keep the budget lines separate (although for some activities the separation between research and operations is not so clearly defined).

Paragraph 26: Agree. As increases in base funds begin to come, the Director intends to keep some discretionary funds for infrastructure emergencies or opportunities and for new ideas, high risk or unpredicted research opportunities. Some years such a fund of the order of 100K could simply be used for supporting visiting scientists.

Career Development:

Paragraph 27: We agree that participating (often with partners) in developing research proposals is an educational and enlarging exercise that can be very beneficial to government employees. "Service" activities are central to some of our employees' work and are for those employees given high weights in their evaluations. It is probably true that young, recent hires have been given strong encouragement to obtain external (non-NOAA base) funds for their research. The pressure is on all research scientists in the Laboratory to do so. Some of the senior scientists had not developed this mode of operating as a habit, so they have not always been as successful in this area. Certainly, at this point we have the pressure equally distributed! The level of emphasis on scientific publications versus service (to the peer community) or support to the operational aspects of the work is agreed upon with each individual in writing their annual performance plan. Each activity has a weight and is evaluated accordingly. There is no general policy to favor publications over other work, except that Ph.D. level folks are expected to have a large percentage of their activities in scientific research and publications. The mutually-agreed upon performance plan should guide the evaluation. Favoring publications in performance plans of the scientific principal investigators should be included in the writing of the performance plans.

The Proposal Process:

Paragraph 28: We try to keep up with appropriate funding opportunities. Systematic checking of the relevant Web pages should be instituted with such service assigned to certain individuals. Guidance is currently done within the Divisions and peer-groups. All our current projects align with the mission and current vision. No others are put forward, but obviously selection could be more narrow and focused. We would like to become more self-directed but are currently afraid to lose out. Our proposals are reviewed and signed by Laboratory Division Directors and the Laboratory Director. Better lead times from principal investigators would allow more thorough review and such discipline may need to be instituted if abuses occur. We are not aware of any cases that could have prompted this comment by the reviewers. However, we acknowledge that under current stress, the system (fewer employees for support functions) that some poorly executed proposal might have slipped through. We are not raiding proposal funds for "base support," but it is obvious that the NOAA leveraging of new proposal is weaker now than previously. This is where full understanding of our budget by principal investigators is required and why we have a very open policy.

Paragraph 29: The management strongly encourages national participation (see chart of recent activities) and such activities are evaluated positively in the annual evaluations. They are usually enriching, stimulating, and informative, and we feel contribute to AOML's principal investigators being able to produce better publications as well. Not only AOML but all of OAR would welcome stronger reliance by the operational line offices on our expertise and ability to look ahead. Participation with university researchers is mostly limited by funds and our time commitments. Many more opportunities exist than we can meet.

Joint Institutes:

Paragraph 30: AOML's relationship with CIMAS is very good indeed. In 1999, we developed similar personnel evaluation criteria, and we reconciled pay scales between AOML and CIMAS employees for equivalent work. We have developed employee handbooks for both organizations in parallel that spell out policies and requirements. Thus, the differences between AOML and CIMAS employee status has diminished. The visitors program exists, but we could benefit from longer working visits rather than the current typical one to two week stays. We do want our work with CIMAS to be driven by AOML priorities and have secure funding (currently we have a general hiring freeze including CIMAS). Greater respect for CIMAS employees by stronger roles in academic departments of RSMAS has also just been established. However, the government has very different obligations for continued support of CIMAS employees compared to AOML employees. This is a fact we cannot change.

Personnel:

Paragraph 31: We agree on all points. Our hands are tied now with a hiring freeze and diminishing buying power. Several senior scientists are retiring soon. The replacements will be done when affordable in specialities that coincide with the Strategic Plan and our goals for new directions.

Paragraph 32: The new personnel performance system (the "Demo") has been a serious problem for us with poor preparation from above. We did not have a functioning system for the first year's training sessions, so it has been difficult for employees at all levels including rating officials, supervisors, and the Laboratory Director. Increased communication and possibly an empowerment of the employees in controlling their own careers better are the only advantages we can see so far. The new provision for matching competitive job offers did allow us to retain an employee in whom we had invested substantially for specialized training. We value the NOAA mission and the transition of research to the operations, but some complaints voiced to the reviewers in this regard may be viewed as a justification for non-compliance with their performance plans. We are a research laboratory first and foremost. Operational methods and new services developed by us also warrant thorough documentation and publication, even if only on the web. Such documentation and publication would receive full credit, guaranteed!

Paragraph 33: We were not aware that there was a desire for more mentoring. Usually a junior scientist has an advocate (principal investigator or the Division Director) who is enhancing their

program by hiring the young person. We will make an effort to improve these relationships. Mentoring will become part of the performance plans of senior scientists in the Laboratory and junior scientists will be asked to identify their mentors and the activities they do together. We also expect the junior scientists to empower themselves and seek the support they need proactively. Awareness of funding opportunities is a problem. We will attempt to establish a clearing house, an intranet web listing in the building.

Paragraph 34: Correctly stated. Transfer from CIMAS to AOML positions is not automatic. A different review process exists for government hiring and both a FTE position and long-term guaranteed support is needed before we want to advertise a position. Most CIMAS hires have expertise in areas into which AOML wishes to expand, but no CIMAS hire should plan on automatic transfer to employment at AOML. The Strategic Plan goals and priorities will make our direction for future hires clear to everyone. It is definitely a needed document.

Review Process:

Paragraph 35: Thank you for the kudos. We had researched the process by attending reviews at sister laboratories.

Paragraph 36: We do think the private discussions give a more complete picture, but we do not understand the comment that the senior staff were not available for discussions. They were all at the review and attended their posters (even the senior staff may look young at AOML!) Not all junior or all senior staff had been asked to come to the discussion sessions, and that may have skewed the impressions. Unfortunately, one middle-aged technical person at AOML found this review comment discriminatory (in the sense of age discrimination). Youth is not in itself a valuable criterion, and we attempt to evaluate each person for their individual contribution.