



Climate Observations & Analysis Program Review at NCDC

11-13 April, 2007

A Presentation to the
NOAA Science Advisory Board

Kevin E. Trenberth

Head, Climate Analysis Section, NCAR

Chair of Review Panel

On behalf of the NOAA Climate Working Group

23 August 2007



Outline



- Purpose
- Issue
- Presentation of Briefing
- NOAA Coordination and Views
- Desired Outcome



Purpose



To advise the SAB on the findings of the COA review

To request the SAB to

- Review the written report of the COA review*
- Accept the report*
- Transmit the report to NOAA*
- Follow up on some issues, especially those that extend beyond COA and the climate program*



Background



- I have been on the "WG" or its forerunner since 1987!
- Climate Working Group (of SAB) initiated the review as part of its oversight role.
- CWG has reviewed the completed panel report
- It is the first full external review of a major part of a NOAA mission goal (should CWG do more like this?)
- It examines strategy, priorities, implementation, etc. and makes suggestions (not recommendations)



Purpose: Report on the COA review



The terms of reference include

- Conduct a non-advocate review of the COA program of the Climate Goal
- Meet with COA program representatives for a thorough on-site brief and review in April
- Complete written report by September 15 (**done 20 May**), submitted to CWG electronically for comment and approval (**June**), and it will be discussed at CWG November 2007 meeting, and at SAB mtg in August.
- Provide informal initial feedback to COA program manager and Climate Goal lead by early May to have an influence on NOAA FY10-14 program development (**done**).



Review Panel Membership



- Chair: Kevin Trenberth

CWG members:

1. Tony Busalacchi (ocean)
2. Graeme Stephens (clouds, satellite obs)
3. Rit Carbone (radar, precipitation)
4. Judy Curry (Arctic, surface fluxes, hurricanes)
5. Bob Weller (Ocean obs)
6. Dave Robinson (State networks and user, state climatologists and regional)
7. Jon Overpeck (regional, RISA/RCC, paleo)
8. Mike Prather (atmospheric chemistry)

External members:

9. Phil Arkin (reanalysis, precipitation)
10. Kelly Redmond (State, regional, ground networks)
11. Jim Kinter (model data)
12. Mark Abbott (general, data management, CLASS)
13. Peter Cornillon (ocean obs, data management systems, CLASS)
14. Ken Kunkel (precipitation, extremes)
15. Lee Branscomb (user)



A series of 8 Panels addressed specific topics



- 1 Data Ingest, Access, and Archive (and “Storage” CLASS CONOPS)*
- 2 In-situ Observing Systems and Data Management including Stewardship*
- 3 Analysis including Reanalysis, OSSEs, OSEs, and related Research*
- 4 Climate Services and Product Development*
- 5 User Communities*
- 6 Detection, & Attribution*
- 7 Understanding the State of the Climate (including data assimilation) and Monitoring*
- 8 Space-based Observing Systems and related Data Stewardship*



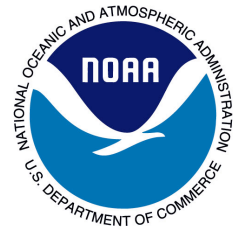
Findings



- Great deal of **excellent** work going on
- COA is providing many **valuable climate observational products and services** to the nation:
- In particular, the essential work of **collecting observations and creating climate records, assuring their quality and documenting and making them accessible to the climate research, applications research, and decision-making communities**



Main issues



There is a need for a shared vision that:

- (i) provides a coherent, integrated structure for COA activities and services, in essence a **strategic plan**;
- (ii) improves the functioning of the NOAA internal process that integrates program planning, budget formulation and execution (PPBES), and processes used to determine **priorities** when requested and appropriated budgets differ;
- (iii) advances the approach to **engaging partners** from the external communities in COA and Climate efforts; and
- (iv) furthers the **integration** of the many efforts under COA with one another and other activities under the Climate Goal.



Need for Strategic Plan



- COA is a collection of activities, no theme
- A strategic plan would not only help to **promote** the program to NOAA, Commerce, and the Congress, and help **define and demonstrate its essential nature**, but it would also provide a means of helping NOAA management **prioritize and make decisions**.
- How do the parts of COA fit together?



Possible elements of a strategic plan?



A climate information system:

- the observations (that satisfy the climate observing principles);
- a performance tracking system;
- the ingest, archival, stewardship of and access to data, including data management and integration;
- the analysis and reanalysis of the observations and derivation of products, especially including Climate Data Records (CDRs);
- assessment of what has happened and why (attribution);
- initialization of predictions; and
- responsiveness to users.



Some implications



NPOESS crisis (Nunn-McCurdy certification in June 2006) that de-manifested a number of vital climate observing instruments.

It is critical that ongoing efforts to sustain **continuity** in many records continue, and this must remain a major priority.

This is a **major issue** for COA.

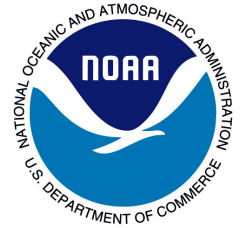
The NRC Decadal Survey is highly relevant.

Where are the **climate** needs addressed? Where are the priorities and needed funds?

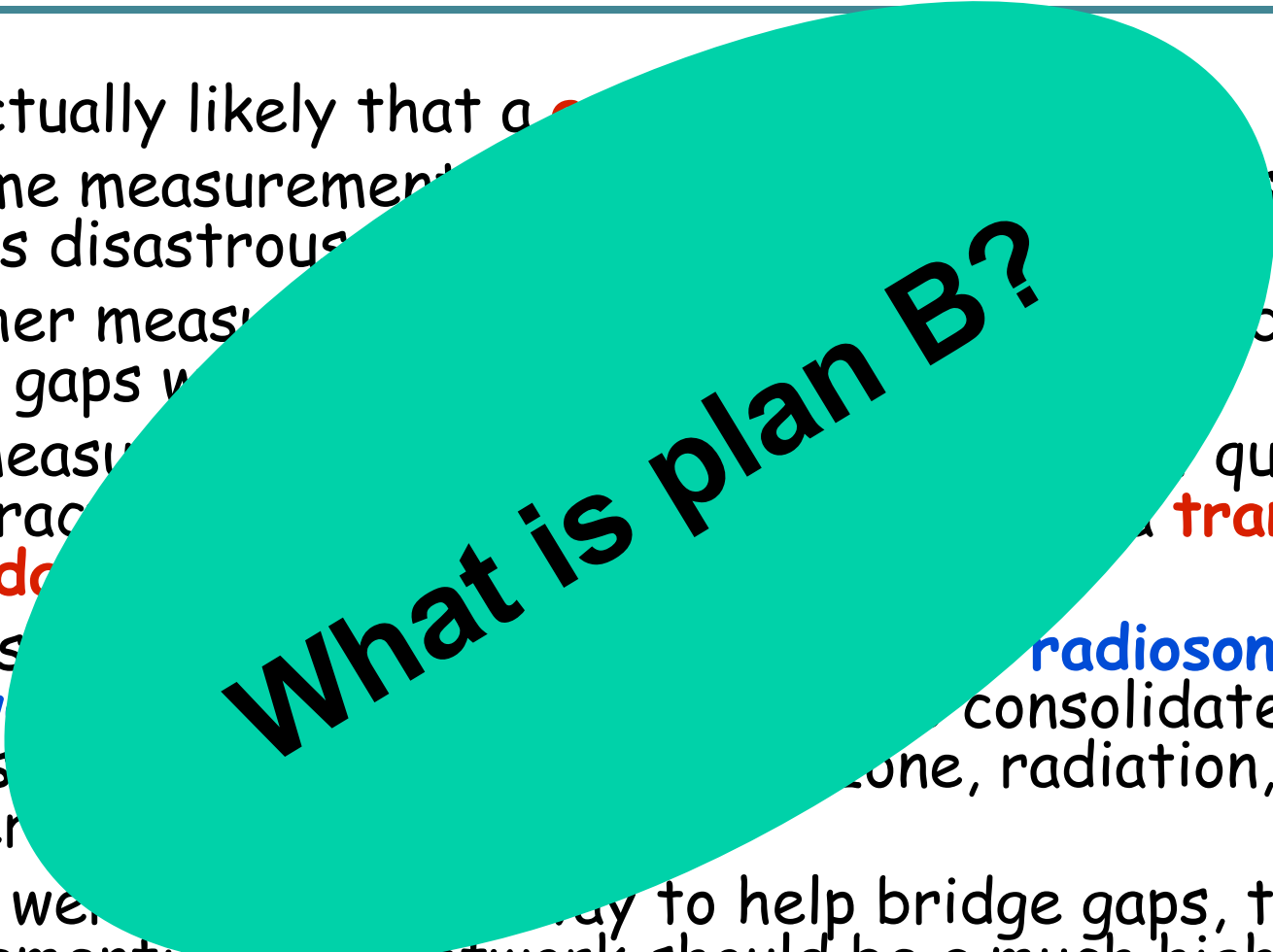
However, **contingency plans** for the inevitable gaps in the climate record must be developed as well.



Some implications



It is actually likely that a **gap** is disastrous
For some measurements such a
gap is disastrous
For other measurements such gaps will
Such measurements such as **quality, transfer**
accuracy **standards**
One possible **radiosonde**
network consolidated at
the surface, radiation, and
water
If this were the way to help bridge gaps, then
implementing this network should be a much higher
priority.





Some implications

Another example is in the area where otherwise excellent comprehensive management is taking place because the planning and execution are in the same group, namely the area of **ocean observations**.

The synthesis of these observations and strong links to data assimilation and production of analyses and error fields are missing.

Having that link would also enable observing system experiments that can aid the design of the observing network.

A system approach and a more strategic view of the entire program are required.



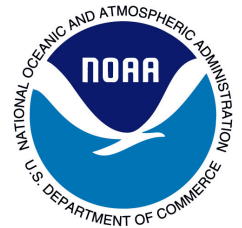
Planning and execution



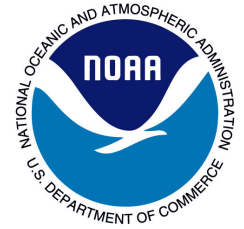
- Conflicts of interest arise (e.g. Manager of COA is also Director of NCDC, which executes major elements of COA)
- PPBES and matrix management limitations
 - Lacks flexibility
 - Disconnects the planning from execution
 - Limits ability of managers to manage
 - Insufficient control of resources to match responsibility



Example: Reanalysis



- The preparation of the observations and datasets is based in NCDC (**NESDIS**),
- The modeling, assimilation and reanalyses themselves are in NCEP (**NWS**),
- The main expertise in evaluating and using the products is in ESRL (**OAR**).
- There is overlap between the COA and the Climate Predictions and Projections (**CPP**) program.
- In the execution phase funds are allocated in an inflexible and somewhat arbitrary manner, and the Climate Program Office loses the ability to control resources and ensure coordination, including the much needed involvement of the outside community.
- This is especially a problem when resources are inadequate and less than planned for.
- The basic infrastructure for such a project is lacking and no-one is in charge - responsibility and authority not clear.⁶

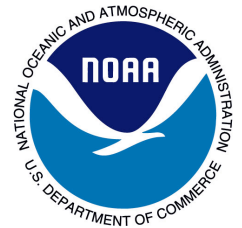


Issues beyond COA

- Some **observing systems** are planned and budgeted for in the context of other Mission Goals (most notably Weather and Water) as well as the satellite missions in the Mission Support Goal
- There is no clear mechanism for **climate requirements** to factor into decisions about **priorities** and **resources**. COA **must** have more influence on observations requirements for climate.
- There is a need to coordinate and plan these activities as part of the **climate information system** as an integral part of the proposed climate service, as **authority and responsibility** would become clear.



Overarching issues that go beyond COA



- NOAA and the Climate Goal has to address/ accommodate some significant **infrastructure investments** with benefits that far exceed COA and the Climate Program (Mission Goal) itself (e.g., Data management and stewardship, and computer resources).
- These are critical to COA as well as NOAA and need to be funded.
- COA data system elements must be **interoperable** with other data systems in NOAA as well as others, e.g., NASA and the academic research community.
- COA and NOAA need expanded capabilities and a better **balance with NASA** (including technology transfer).



Some other COA issues



- Evolution, integration, and assessment of efficacy of observations would be aided by the establishment of a **Project Office for Climate Observations**.
- There is a need for a **NOAA voice** and way to build consensus and recognize individual views (e.g., attribution of weather events, such as hurricanes and climate)
- There should be an individual responsible for leadership of the COA data management activity, one who addresses COA needs as opposed to broader NOAA needs.
- Need more integration of physical with biological and chemical ocean obs.



Engaging partners



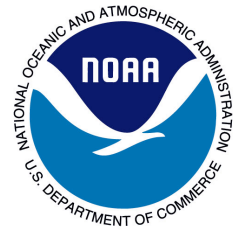
- Need for a broadly-understood and transparent priority-setting process that effectively engages Climate Program partners in and out of NOAA; esp. other lines of NOAA.

Partnerships should include:

- International, regional, national and local observing systems and programs;
 - Universities and other partners in the extramural research agencies;
 - Agency partners in a number of other agencies;
 - Regional partners including the Regional Climate Centers, State Climatologists, RISA programs and IOOS Regional Associations among others; and
 - The private sector active in climate research, monitoring and services.
- How does COA plan to engage and take advantage of expertise and interest in the outside community?



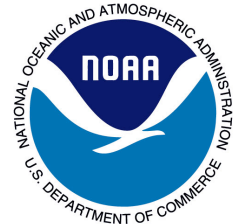
Engaging partners: grants and visitors



- Need to upgrade and invigorate the **extramural grants** program (especially related to reanalysis and attribution).
- The grants program can benefit NOAA: extramural research should help operations, just as operational or routine activities (such as improved datasets) can aid research.
- NOAA should set a fixed fraction of program funds for peer-reviewed extramural funding.
- Include a **visitor** and **postdoc** program so that connections to internal personnel are fostered. [This also often provides an inroad into recruiting new qualified staff.]



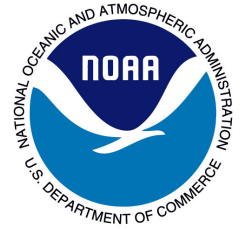
NOAA Coordination & Views



- COA is part of the climate program, which is matrix managed and thus cuts across all NOAA lines
- The review has major implications concerning links within NOAA as well as for interactions with users and other agencies, especially NASA
- However, several issues extend well beyond COA and the Climate Program, and involve NOAA as whole, and thus the SAB. These include **the PPBES process, the matrix management, how these are implemented, interactions with NASA and others involved in NPOESS, and infrastructure.**



Desired Outcome

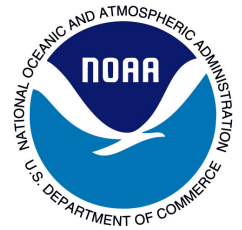


Actions for the SAB:

- *Review the results of the Panel review*
- *Accept the report*
- *Forward the report to NOAA*
- *Consider possible follow up actions on some of the issues (next slide).*



Desired Outcome



Suggestions from the standpoint of the CWG and the review panel:

- *The Panel applauds movement toward a **climate service** and urges the SAB to consider how to advance that objective*
- *Commend the leaders of COA and the Climate Program for the job they have done under difficult circumstances*
- *Allow them to continue to address implementation issues under their purview*
- *The SAB should consider whether there are some structural problems within NOAA (related to matrix management, PPBES)*
- *The SAB should take up the issue of the need to upgrade NOAA's role in Earth observations and the relationship to NASA, in particular, and how to move forward on a truly national observing system. This includes the NPOESS crisis.*



Thank you



Backup Slides



- *Information about COA, PPBES, Users*
- *Short additional items from Panel reports (one for each panel)*



COA Program Description

Capabilities and Outcomes



COA Capabilities

Capability Drivers

COA Outcomes

Observations

- Foundation for other 2 capabilities
- Critical to understanding climate

Data Management

- Essential for fidelity of archived records
- Provides archive, access, stewardship

Analysis of Climate System

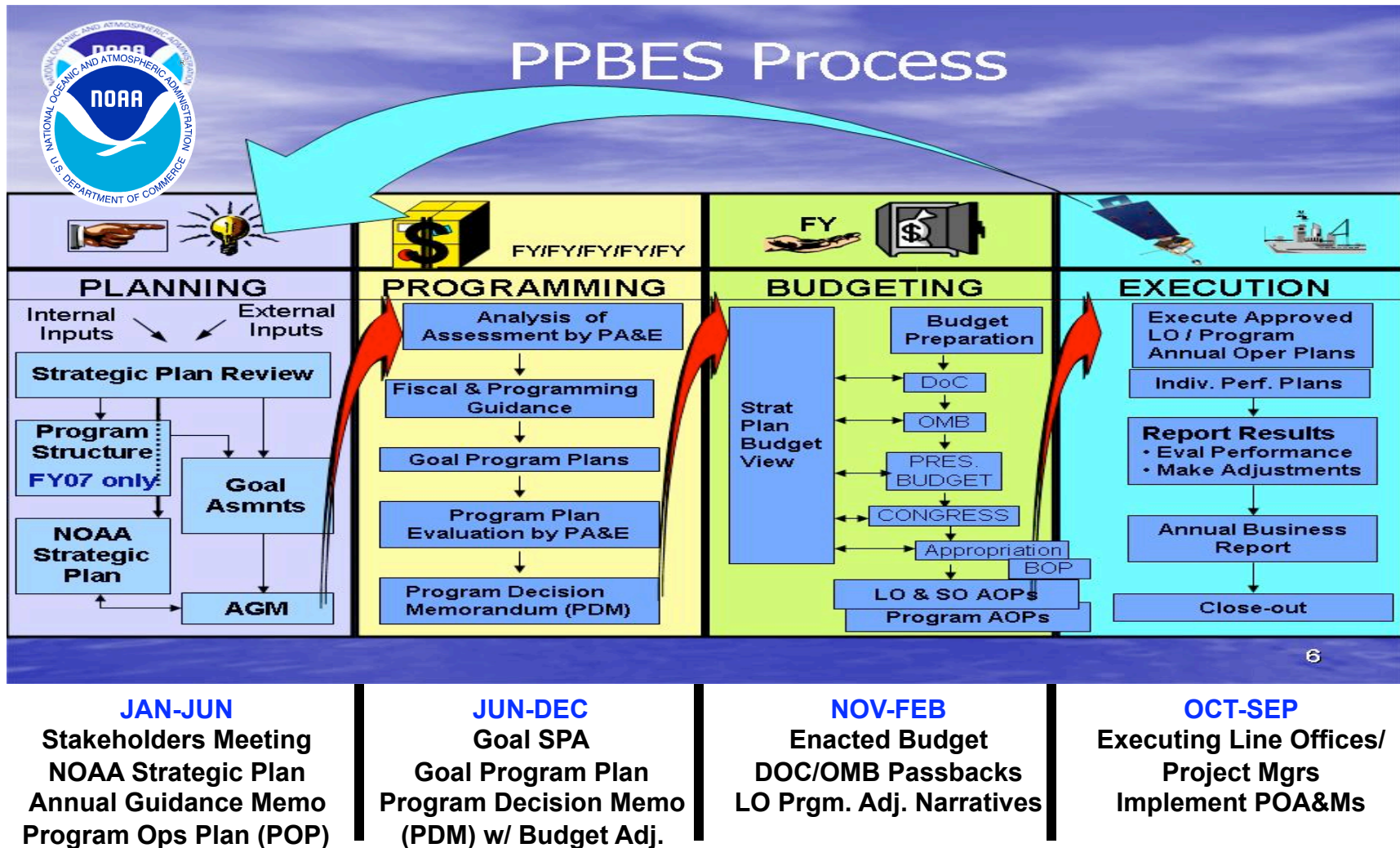
- Dependent upon first 2 capabilities
- Critical to societal benefits

- Enable policymakers & resource managers to make informed national & global policy decisions.
- Easy access to new & historical national & global obs. & climate analyses that meet rigorous scientific standards for quality.
- Documentation of the State of the Climate system through a network of integrated climate observing and data management systems



COA Program Review

NOAA Planning, Programming, Budget, and Execution System (PPBES)





COA Program Description

Users / Feedback



User interaction & feedback are critical to NOAA's success in terms of feedback on NOAA data, information, products, and services

Data Users' Workshops

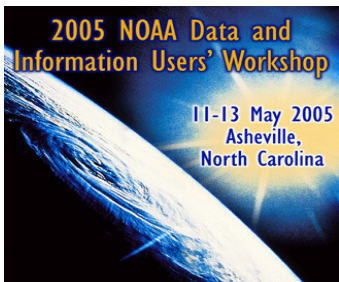
2003 Workshop

Boulder, CO
 350 in attendance
 Keynote: VADM Lautenbacher
 188 recommendations



2005 Workshop

Asheville, NC
 250 in attendance
 Keynote: Jack Kelly
 102 recommendations



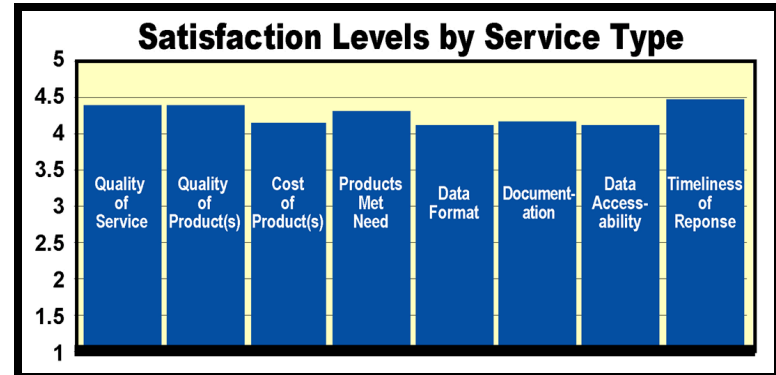
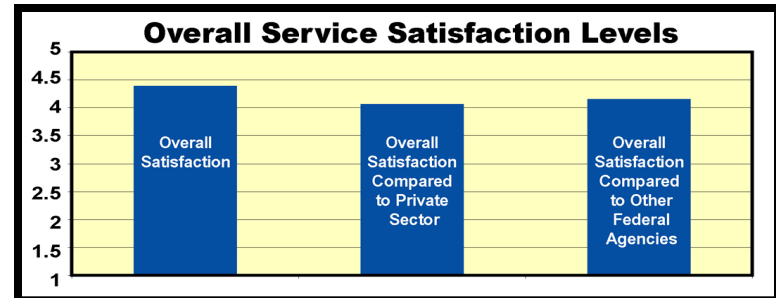
Planning 2008 Workshop

Likely Asheville, NC
 Broadened to all of NOAA
 Climate, Weather/Water,
 Commerce/Transportation,
 Ecosystems

Annual NOAA Stakeholders Meetings

Satisfaction Survey

(Scale 1-5; 5 extremely satisfied)



Response Period: Feb - Apr, 2003

NOAA Offices: NCDC, NODC, NGDC, SAA

Population Size: 25,000

Response Rate: 6300 (25%)



Panel 1 *Data Ingest, Access, and Archive (and “Storage” CLASS CONOPS)*

Moderator: Peter Cornillon, Jim Kinter

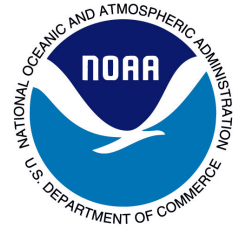


- GEO-IDE is critical to COA as well as to the rest of NOAA and needs to be funded.
- GEO-IDE (and CLASS) should be elevated to a higher level in NOAA: the reach and importance of these program elements goes far beyond COA.
- There should be an individual responsible for leadership of the COA data management activity, one who addresses COA needs as opposed to broader NOAA needs.
- To address COA data system requirements, climate users and user needs must be clearly identified *and* prioritized.
- COA data system elements must be interoperable with other data systems in NOAA as well as those outside of NOAA, e.g., NASA and the academic research community.
- Data integration and a systems approach are central to COA



Panel 2 *In-situ Observing Systems and Data Management including Stewardship*

Moderator: B. Weller, Rit Carbone



- Blue water obs is system oriented but lack of linkages with the regional **coastal** ocean observing efforts
- No system or integrated approach apparent for **atmosphere**
- Need more integration of physical with **biological and chemical** obs
- **Analyses** can play an important role in judging the efficacy of observing systems
- The observing system is in stasis, held back by lack of funding. **Priorities** needed.
- Need also good data management (ease of access, metadata, cataloging). (**Panel 1**)
- These plus clear process for evolution, integration, and assessment of efficacy are needed: should be aided by the establishment of a **Project Office for Climate Observations**.



Panel 3 *Analysis including Reanalysis, OSSEs, OSEs, and related Research*

Moderator: Kevin Trenberth, Phil Arkin

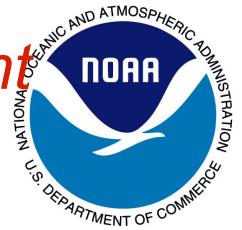


- An essential integrating activity for COA
- Has 8 essential components: input data, data assimilation and model, bias correction of obs, archival and access, evaluation, OSEs, post-processed products, lessons learned
- Involves several NOAA lines
- **Lacks coordination** in execution phase
- Implementation plan needed with someone in charge



Panel 4 *Climate Services and Product Development* (half of the hourglass)

Moderator: Dave Robinson, Kelly Redmond



- Put users first and understand needs
- Constituent workshops are only one step
- A culture of stewardship (for data, products and service functions) must be fostered, encouraged, and inculcated.



Panel 5 User Communities
(the other half of the hourglass)
Moderator: Lee Branscome, Ken Kunkel



- Do core mission well
- Take advantage of what private sector and universities do well
- Enable private sector
- Engage partners



Panel 6 *Detection, & Attribution*

Moderator: Jonathan Overpeck, Graeme Stephens

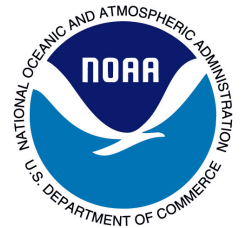


- Essential integrating activity for COA
- Underpinned by “predictability” understanding and research, that needs more emphasis
- Need NOAA voice and way to build consensus and recognize individual views
- Plan for attribution service: need commentary on what has happened and why
- Issues: Coordination, Research, and Communication.



Panel 7 *Understanding the State of the Climate (including data assimilation) and Monitoring*

Moderator: Tony Busalacchi, Judy Curry

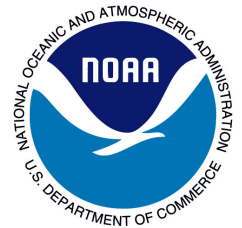


- *Annual State of the Climate* report is valuable
- Should be more of team effort and thus consensus? [Downside: slows it down]
- Lacks integration: need for new sections on analysis, attribution and assessment?
- Prioritize ECVs [NOAA vs GCOS?]



Panel 8 *Space-based Observing Systems and related Data Stewardship*

Moderator: Mark Abbott, Michael Prather



- Stewardship of data:
 - In situ done well, but reprocessing could be fostered
 - Satellite: need CDRs
- Distributed throughout NOAA
- Engaging NOAA partners difficult
- NPOESS cuts must continue to be addressed
- Must also plan for gaps
- Plan for new information (research to operations)
- Expand capabilities and achieve better balance with NASA
- Must have more influence on observations requirements for climate
- Issues extend well beyond COA



SAB recommendations



- The report was accepted.
- The report was regarded as valuable advice. The review was helpful and the CWG is encouraged to follow up with further reviews.
- There was considerable discussion on how to move toward a climate service
- The next administration is regarded as an opportunity
- Micro-management of NOAA by Congress remains a problem.