

Appendix XI

**NSF OCE
Decadal Planning Committee**

Charge: *“The objective of this activity is to develop a clear and compelling description of the most important and promising opportunities for discovery and new understanding in the ocean sciences over the next decade.”*

“The foundation of the report will be the four disciplinary science reports, plus, as appropriate, other recent planning documents ...”

Motivation: *“It is essential that all our plans be based upon a sound intellectual foundation.”*

Context: *“Based on this document a long-range implementation plan for the Division will be constructed.”*



OCEAN SCIENCES DIVISION
Disciplinary Science Workshops

- **APROPOS: Advances and Primary Research Opportunities in Physical Oceanography Studies**

Workshop: December 15th - 17th., Monterey, Ca.
Chaired by Bill Young

- **FOCUS: Future of Ocean Chemistry in the U.S.**

Workshop: January 6th -7th., Seabrook Is., S.C.
Chaired by Larry Mayer and Ellen Druffel

- **OEUVRE: Ocean Ecology: Understanding and Vision for Research**

Workshop: March 2nd - 3rd., Keystone, Co.
Chaired by Peter Jumars and Mark Hay

- **FUMAGES: Future of Marine Geology and Geophysics**

Workshop: December 4th - 6th., Ashland, Ore.
Chaired by Marcia McNutt and Paul Baker

www.joss.ucar.edu/joss/psg/project/oce_workshop

NSF OCE Decadal Committees

- **First disciplinary meeting: FUMAGES (12/96). 4 disciplinary meetings held.**
- **Synthesis Committee first meeting 12/98**
- **Membership = 24**
- **Messages sent out via e-mail to about 10,000 scientists, national and international.**
- **About 120 detailed responses received. These clustered into 4 areas: Coastal processes, Climate/Ocean interactions, Ecosystem research, Crustal processes and flows.**
- **7-8 working groups established**

Committee Membership

Co-Chairs: Peter Brewer (MBARI) Ted Moore (U. Mich.)

Bob Beardsley (WHOI)

Rainer Bleck (LANL)

Ken Bruland (UCSC)

Russ Davis (SIO)

Jody Deming (UW)

Bob Detrick (WHOI)

Stan Hart (WHOI)

Mark Hay (Georgia Tech.)

Peter Jumars (Bigelow)

Dave Karl (U. Hawaii)

Cindy Lee (SUNY)

Susan Lozier (Duke)

Donal Manahan (USC)

Larry Mayer (U. Maine)

Marcia McNutt (MBARI)

Frank Millero (RSMAS)

Mark Ohman (SIO)

Peter Rhines (UW)

Eli Silver (UCSC)

Sharon Smith (RSMAS)

Karl Turekian (Yale)

Francisco Werner (UNC)

FUMAGES

- **8 “State of Art” science papers**

Mid-Ocean Ridges

Formation/Aging of ocean plates

Convergent Margins

Shelf & Sediment Transport

Water in the Lithosphere

Paleoceanography

Passive Margins

Near Shore Marine geology

- **4 Workshop Themes**

Solid Earth

Sediments

Paleoceanography

Fluids

- **Promising new Areas**

The time domain on all scales

Characterizing & Modeling Complex Systems

Role of Biological Activity on Geological Processes

Longer Term Variability of Geological Processes

- **Enabling Technologies**

OEUVRE

- **Recent Progress:**

- Pelagic Microbial Food Web*

- Fe Limitation*

- Alternating Semi-stable Population States*

- **Reasons for Recent Progress:**

- Technology on all scales, including Biotech.*

- Computing power*

- Explicit theories and models*

- Interdisciplinary insights*

- **Future Directions:**

- Role of organisms in geochemical transformations*

- Form, function and behavior of individuals*

- Processes structuring the assembly of organisms*

- Human impacts on climate, fisheries, and habitats*

General Comments from all four reports

- **Satellites** – *barely mentioned*
- **Time domain** – *very strong common theme*
- **Large Scale Surveys** – *barely mentioned*
- **Perturbation experiments** – *strong interest*
- **Monitoring/Observatories** – *passive interest*
- **Non-Equilibrium/Non-Steady State** – *strong interest*
- **Computing power** – *Assumed*
- **Drill ship** – *assumed*
- **Submersible/ROV** – *assumed*
- **Land-Sea Boundary** – *strong interest*

Question: What does a Decadal report look like?

Answer: Pick two examples that have been admired and been effective, and learn.

Examples:

- ***The “Field Report”. Astronomy and Astrophysics for the 1980’s. 1982.***
- ***The “Pimentel Report”. Opportunities in Chemistry. 1985.***

Both are NAS Committee Reports

Example: The “Field Report”

- *Decadal report of the Astronomy Survey Committee*
- *1978. – 223 scientists contacted. Committee of 7 selected; grew to 21*
- *Dec. 1980. Final meeting.*
- *Established 7 working groups: 4 on core science themes, 1 on related science, 2 on specialized technical fields.*
- *Open letter sent to 3,700 members of Society. Responses to working groups for evaluation*
- *Looked primarily at large technology NASA/NSF initiatives.*

Early suggestion of report outline

- **Cover Letter.** *The early days, Stratton Commission, period of discovery, formation of the committee and manner of operation.*
- **Introduction.** *The ocean and the earth. Evolution of exploration and understanding. Established infrastructure. The present opportunity.*
- **Recommendations of the Committee.** *TBD.*
- **Reports of the Working Groups.** *TBD.*
- **Established and Approved Programs.** *e.g. ODP, RIDGE, etc.*
- **Criteria for new Research Initiatives.** *Technical feasibility. Status of theory and data analysis. Laboratory skills. Computational support. Value to society.*
- **New Programs.** *Large Scale (e.g. CLIVAR), Medium Scale (e.g. IRONEX, Time Series), Small Scale (e.g. Instruments, systems and methods).*

Early suggestion of report outline (continued)

- **Training and Education of new scientists**
- **Programs in need of development. *Important concepts now lacking in some criteria for establishment as a new research initiative. Links to other areas (e.g. Polar).***
- **Appendices. *e.g. Relation to mission agencies. Organization, education and training. Membership. Sources.***

Interdisciplinary Themes Selected

- *Role of the Ocean in Climate Change (Turekian)*
- *The Ocean Beneath the Sea Floor – Fluids, Chemistry and Life in the Ocean Crust (Deming)*
- *Coastal Ocean Perturbations and Processes (Mayer)*
- *Turbulent Mixing and Bio-Chem Physical Interactions (Davis)*
- *Non-Equilibrium System Dynamics (Werner)*
- *Dynamics of the Ocean Lithosphere (Silver)*
- *Ocean Prediction (Bleck)*
- *TBD - Ocean Carbon Cycle (?)*

Draft Report Outline

- ***Preface: Background, Disciplinary Reports, Charge etc.***
- ***Executive Summary***
- ***Introduction: History, Exploration, National Defense, etc.***
- ***New Frontiers in Ocean Science: Working Group themes***
 - Climate & Oceans*
 - Turbulent Mixing Interactions*
 - Ocean Prediction*
 - Non-Equilibrium Ecosystem Dynamics*
 - Coastal Ocean Perturbations and Processes*
 - Fluids, Chemistry and Life in the Ocean Crust*
 - Dynamics of the Ocean Lithosphere*
- ***New Approaches and Cross Cutting Issues: The time domain***
- ***Resources and Partnerships: Facilities and technologies. Manpower***

Examples of what we will not consider

- ***Design and Timing of NASA Ocean Missions. e.g. EOS AM1, TPFO etc.***
- ***Fate of Navy Acoustic Systems.***
- ***Extra-terrestrial oceans.***
- ***Future use of Navy operational submarines.***
- ***Design and support of purely operational systems. e. g. GOOS***

But note that the development of sensors and techniques for enhancement of these systems has been a critical partnership role for NSF that should continue.



OCE SCIENCE SYNTHESIS *DRAFT CHARGE*

⊕ How?

This activity will be led by a community-based steering committee with well-balanced membership - balanced by discipline, gender, participation in the disciplinary workshops, research approach, etc., etc.

All appropriate recent planning documentation will be provided to the group which will determine the process by which it will achieve it's goals. For example, it is not clear that a major workshop is an essential part of this process - but maybe.....

If gaps are identified, this group will propose ways to fill them.

At the appropriate time, the committee must take steps to establish community buy-in of the results (workshop, meetings, web sites etc. - whatever is deemed appropriate.)

⊕ Context

Based on this document a long-range implementation plan for the Division will be constructed. This plan will be developed internally to the Division and will be followed by an opportunity for community comment and a thorough Advisory Committee review. A description of the Division's Education priorities will be integrated into this plan.

The science synthesis document will also be used as the basis for a series of public outreach documents.



OCE SCIENCE SYNTHESIS DRAFT CHARGE

⊕ Motivation:

It is essential that all our plans be built upon a sound intellectual foundation. In making budgetary arguments/justifications both inside and outside NSF we need a high quality source for the science justification - this document is it!

The Division's future implementation plans and priorities will be based upon this document. We need an authoritative overview to help us, internally, to see the full picture of opportunities in the Ocean Sciences, and therefore understand the implications of prioritization that occurs (during later development of implementation plans).

It could be argued that the primary benefit is the process not the product - that the most important contribution is the insight that everyone gains from participating in the difficult process of identifying the most exciting opportunities for the future.



OCE SCIENCE SYNTHESIS DRAFT CHARGE

⊕ Objectives:

The objective of this activity is to develop a clear and compelling description of the most important and promising opportunities for discovery and new understanding in the ocean sciences over the next decade. The product will be a succinct (~100-150pp) report written for community and agency readership.

The most challenging task is integration - we need an original vision of the future of the ocean sciences over the next decade presented (as far as possible) as an integrated whole.

The foundation of the report will be the four disciplinary science reports, plus, as appropriate, other recent planning documents from special focus programs.

Efforts will be made to identify gaps or omissions.

Boundaries with other disciplines will be explored, multidisciplinary efforts will be identified and fully developed.

The report will be a description of the research topics - the science problems.

While avoiding specific implementation issues, a section of the report will be devoted to the identification of technology and facilities requirements.
