



PLATE 1 One component of the OOI is a global network of 15-20 moored buoys, linked to shore via satellite, that support measurements of air-sea fluxes, physical, biological, and chemical water properties, and geophysical observations on or below the seafloor. Figure courtesy of John Orcutt, Scripps Institution of Oceanography.

Enabling Ocean Research In The 21st Cent

**United States. Commission on Ocean
Policy**



Enabling Ocean Research In The 21st Cent:

Enabling Ocean Research in the 21st Century National Research Council, Division on Earth and Life Studies, Ocean Studies Board, Committee on the Implementation of a Seafloor Observatory Network for Oceanographic Research, 2003-12-14 As the importance of the oceans to society grows so does the need to understand their variation on many temporal and spatial scales This need to understand ocean change is compelling scientists to move beyond traditional expeditionary modes of investigation Observing systems will enable the study of processes in the ocean basins over varying timescales and spatial scales providing the scientific basis for addressing important societal concerns such as climate change natural hazards and the health and viability of living and non living resources along our coasts and in the open ocean The book evaluates the scientific and technical readiness to move ahead with the establishment of a research driven ocean observatory network and highlights outstanding issues These issues include the status of planning and development factors that affect the timing of construction and installation the cost and requirements for maintenance and operations needs for sensor development and data management the impact on availability of ships and deep submergence facilities and the role of research based observatories within national and international operational ocean observing systems being developed and implemented

Enabling Ocean Research in the 21st Century Committee on the Implementation of a Seafloor Observatory Network for Oceanographic Research, Ocean Studies Board, Division on Earth and Life Studies, National Research Council, 2003-11-14 As the importance of the oceans to society grows so does the need to understand their variation on many temporal and spatial scales This need to understand ocean change is compelling scientists to move beyond traditional expeditionary modes of investigation Observing systems will enable the study of processes in the ocean basins over varying timescales and spatial scales providing the scientific basis for addressing important societal concerns such as climate change natural hazards and the health and viability of living and non living resources along our coasts and in the open ocean The book evaluates the scientific and technical readiness to move ahead with the establishment of a research driven ocean observatory network and highlights outstanding issues These issues include the status of planning and development factors that affect the timing of construction and installation the cost and requirements for maintenance and operations needs for sensor development and data management the impact on availability of ships and deep submergence facilities and the role of research based observatories within national and international operational ocean observing systems being developed and implemented

Atlantic Salmon in Maine National Research Council, Division on Earth and Life Studies, Ocean Studies Board, Board on Environmental Studies and Toxicology, Committee on Atlantic Salmon in Maine, 2004-10-07 Because of the pervasive and substantial decline of Atlantic salmon populations in Maine over the past 150 years and because they are close to extinction a comprehensive statewide action should be taken now to ensure their survival The populations of Atlantic salmon have declined drastically from an estimated half million adult salmon returning to U S rivers each year in the early 1800s to

perhaps as few as 1 000 in 2001 The report recommends implementing a formalized decision making approach to establish priorities evaluate options and coordinate plans for conserving and restoring the salmon **Future Needs in Deep Submergence Science** National Research Council,Division on Earth and Life Studies,Ocean Studies Board,Committee on Future Needs in Deep Submergence Science,2004-04-05 Deep diving manned submersibles such as Alvin which gained worldwide fame when researchers used it to reach the wreck of the Titanic have helped advance deep ocean science But many scholars in this field have noted that the number and capabilities of today s underwater vehicles no longer meet current scientific demands At the same time the relative value of manned and unmanned vehicles is often disputed The report finds that new submersibles both manned and unmanned that are more capable than those in the current fleet are needed and would be of great value to the advancement of ocean research **Shared Oceans, Shared Future , Earth System Monitoring** John Orcutt,2012-12-12 Modern Earth System Monitoring represents a fundamental change in the way scientists study the Earth System In Oceanography for the past two centuries ships have provided the platforms for observing Expeditions on the continents and Earth s poles are land based analogues Fundamental understanding of current systems climate natural hazards and ecosystems has been greatly advanced While these approaches have been remarkably successful the need to establish measurements over time can only be made using Earth observations and observatories with exacting standards and continuous data The 19 peer reviewed contributions in this volume provide early insights into this emerging view of Earth in both space and time in which change is a critical component of our growing understanding

Science at Sea National Research Council,Division on Earth and Life Studies,Ocean Studies Board,Committee on Evolution of the National Oceanographic Research Fleet,2009-11-23 The U S academic research fleet is an essential national resource and it is likely that scientific demands on the fleet will increase Oceanographers are embracing a host of remote technologies that can facilitate the collection of data but will continue to require capable adaptable research vessels for access to the sea for the foreseeable future Maintaining U S leadership in ocean research will require investing in larger and more capable general purpose Global and Regional class ships involving the scientific community in all phases of ship design and acquisition and improving coordination between agencies that operate research fleets **Charting the Future of Methane Hydrate Research in the United States** National Research Council,Division on Earth and Life Studies,Board on Earth Sciences and Resources,Ocean Studies Board,Committee to Review the Activities Authorized Under the Methane Hydrate Research and Development Act of 2000,2004-11-14 Methane hydrate is a natural form of clathrate a chemical substance in which one molecule forms a lattice around a guest molecule with chemical bonding In this clathrate the guest molecule is methane and the lattice is formed by water to form an ice like solid Methane hydrate has become the focus of international attention because of the vast potential for human use worldwide If methane can be produced from hydrate a reasonable assumption given that there are no obvious technical or engineering roadblocks to commercial production the

nation's natural gas energy supply could be extended for many years to come. This report reviews the Department of Energy's DOE Methane Hydrate Research and Development Program, the project selection process and projects funded to date. It makes recommendations on how the DOE program could be improved. Key recommendations include focusing DOE program emphasis and research in 7 priority areas, incorporating greater scientific oversight in the selection, initiation, monitoring, and assessment of major projects funded by the DOE, strengthening DOE's contribution to education and training through funding of fellowships, and providing project applicants with a set of instructions and guidelines outlining requirements for timely and full disclosure of project results and consequences of noncompliance.

Setting Priorities for Large Research Facility

Projects Supported by the National Science Foundation National Research Council, Division on Engineering and Physical Sciences, Board on Physics and Astronomy, Policy and Global Affairs, Committee on Science, Engineering, and Public Policy, Committee on Setting Priorities for NSF-Sponsored Large Research Facility Projects, 2004-06-15. In 1995 the National Science Foundation (NSF) created a special account to fund large-scale research facilities. Over the years, these facilities have come to represent an increasingly prominent part of the nation's R & D portfolio. Recently, concern has intensified about the way NSF is selecting projects for this account. In 2003, six U.S. Senators, including the chair and ranking member of the Senate Subcommittee on VA, HUD, and Independent Agencies Appropriations, expressed these concerns in a letter to the NRC asking it to review the current prioritization process and report to us on how it can be improved. This report presents a series of recommendations on how NSF can improve its priority setting process for large research facilities. While noting that NSF has improved this process, the report states that further strengthening is needed if NSF is to meet future demands for such projects.

Alien Ocean Stefan Helmreich, 2009-01-05. Alien Ocean immerses readers in worlds being newly explored by marine biologists: the deep sea, the microscopic realm, and oceans beyond national boundaries. Working alongside scientists on ships at sea, in coastal research labs, and at undersea volcanoes, Stefan Helmreich charts how revolutions in genomics, bioinformatics, and remote sensing have pressed marine biologists to view the sea as animated by its smallest inhabitants: marine microbes. Thriving in astonishingly extreme conditions, such microbes have become key figures in scientific and public debates about the origin of life, climate change, biotechnology, and even the possibility of life on other worlds. Cover

Biological Sampling in the Deep Sea Malcolm R. Clark, Mireille Consalvey, Ashley A. Rowden, 2016-04-18. The deep sea covers over 60% of the surface of the earth, yet less than 1% has been scientifically investigated. There is growing pressure on deep-sea resources and on researchers to deliver information on biodiversity and the effects of human impacts on deep-sea ecosystems. Although scientific knowledge has increased rapidly in recent decades, there exist large gaps in global sampling coverage of the deep sea, and major efforts continue to be directed into offshore research. *Biological Sampling in the Deep Sea* represents the first comprehensive compilation of deep-sea sampling methodologies for a range of habitats. It reviews the real-life applications of current and, in some instances, developing deep

sea sampling tools and techniques In creating this book the authors have been able to draw upon the experiences of those at the coal face of deep sea sampling expanding on the existing methodological texts whilst encompassing a level of technical detail often omitted from journal publications Ultimately the book will promote international consistency in sampling approaches and data collection advance the integration of information into global databases and facilitate improved data analyses and consequently uptake of science results for the management and conservation of the deep sea environment The book will appeal to a range of readers including students early career through to seasoned researchers as well as environmental managers and policy makers wishing to understand how the deep sea is sampled the challenges associated with deep survey work and the type of information that can be obtained

SEAFLOOR OBSERVATORIES Paolo Favali, Laura Beranzoli, Angelo De Santis, 2015-05-05 The oceans cover 70% of the terrestrial surface and exert a pervasive influence on the Earth's environment but their nature is poorly recognized Knowing the ocean's role deeply and understanding the complex physical biological chemical and geological systems operating within it represent a major challenge to scientists today Seafloor observatories offer scientists new opportunities to study multiple interrelated natural phenomena over time scales ranging from seconds to decades from episodic to global and long term processes Seafloor Observatories poses the important and apparently simple question How can continuous and reliable monitoring at the seafloor by means of Seafloor Observatories extend exploration and improve knowledge of our planet The book leads the reader through the present scientific challenges to be addressed with seafloor observatories the technical solutions for their architecture an excursus on worldwide ongoing projects and programmes some relevant scientific multidisciplinary results and a presentation of new and interesting long term perspectives for the coming years Current results will yield significant improvements and exert a strong impact not only on our present knowledge of our planet but also on human evolution

Elements of a Science Plan for the North Pacific Research Board National Research Council, Polar Research Board, Ocean Studies Board, Committee on a Science Plan for the North Pacific Research Board, 2004-04-06 The North Pacific Research Board NPRB was established in 1997 as custodian to a pool of funds intended for the study of the North Pacific Ocean Bering Sea and Arctic Ocean The success of the NPRB is the development of a high quality long range science plan that provides a better understanding of ecosystems and their fisheries in the region This report provides a framework to help the NPRB identify appropriate science themes and mechanisms for administering and distributing the funds It contains extensive input from residents of Alaskan communities to help scientists understand and address issues of importance to the local communities The book makes specific recommendations on long term research priorities the NPRB management structure and the development of future programs

Remote Sensing of Aquatic Coastal Ecosystem Processes Laurie L. Richardson, Ellsworth F. LeDrew, 2006-02-02 The aquatic coastal zone is one of the most challenging targets for environmental remote sensing Properties such as bottom reflectance spectrally diverse suspended sediments and

phytoplankton communities diverse benthic communities and transient events that affect surface reflectance coastal blooms runoff etc all combine to produce an optical complexity not seen in terrestrial or open ocean systems Despite this complexity remote sensing is proving to be an invaluable tool for Case 2 waters This book presents recent advances in coastal remote sensing with an emphasis on applied science and management Case studies of the operational use of remote sensing in ecosystem studies monitoring and interfacing remote sensing science management are presented Spectral signatures of phytoplankton and suspended sediments are discussed in detail with accompanying discussion of why blue water Case 1 algorithms cannot be applied to Case 2 waters Audience This book is targeted for scientists and managers interested in using remote sensing in the study or management of aquatic coastal environments With only limited discussion of optics and theory presented in the book such researchers might benefit from the detailed presentations of aquatic spectral signatures and to operational management issues While not specifically written for remote sensing scientists it will prove to be a useful reference for this community for the current status of aquatic coastal remote sensing

Dynamic Changes in Marine Ecosystems National Research Council, Division on Earth and Life Studies, Ocean Studies Board, Committee on Ecosystem Effects of Fishing: Phase II – Assessments of the Extent of Change and the Implications for Policy, 2006-06-26 Recent scientific literature has raised many concerns about whether fisheries have caused more extensive changes to marine populations and ecosystems than previously realized or predicted In many cases stocks have been exploited far beyond management targets and new analyses indicate that fishing has harmed other species including marine mammals seabirds sea turtles and sea grasses either directly through catch or habitat damage or indirectly through changes in food web interactions At the request of the National Oceanic and Atmospheric Administration the National Research Council conducted an independent study to weigh the collective evidence for fishery induced changes to marine ecosystems and the implications of the findings for U S fisheries management *Dynamic Changes in Marine Ecosystems* provides comprehensive information in regard to these findings

Real-time Coastal Observing Systems for Marine Ecosystem Dynamics and Harmful Algal Blooms Babin, Marcel, Roesler, Collin S., Cullen, John J., 2008-06-05 The proliferation of harmful phytoplankton in marine ecosystems can cause massive fish kills contaminate seafood with toxins impact local and regional economies and dramatically affect ecological balance Real time observations are essential for effective short term operational forecasting but observation and modelling systems are still being developed This volume provides guidance for developing real time and near real time sensing systems for observing and predicting plankton dynamics including harmful algal blooms in coastal waters The underlying theory is explained and current trends in research and monitoring are discussed Topics covered include coastal ecosystems and dynamics of harmful algal blooms theory and practical applications of in situ and remotely sensed optical detection of microalgal distributions and composition theory and practical applications of in situ biological and chemical sensors for targeted species and toxin detection integrated observing systems and platforms for

detection diagnostic and predictive modelling of ecosystems and harmful algal blooms including data assimilation techniques observational needs for the public and government and future directions for research and operations **O Quarto**

Paradigma Tony Hey, Stewart Tansley, Kristin Tolle, Publicado em parceria com a Microsoft Research este livro apresenta pela primeira vez as pesquisas para a formulação do chamado Quarto Paradigma uma nova metodologia de desenvolver ciência baseada no uso intensivo de dados e na utilização de computação avançada para interpretar essas informações e criar novo conhecimento Ao avaliar os novos campos de colaboração entre tecnologia e ciência esta obra procura apontar tendências além de inspirar uma nova geração de cientistas **River Basins and Coastal Systems Planning Within the U.S. Army Corps**

of Engineers National Research Council, Division on Earth and Life Studies, Water Science and Technology Board, Ocean Studies Board, Committee to Assess the U.S. Army Corps of Engineers Methods of Analysis and Peer Review for Water Resources Project Planning, Panel on River Basin and Coastal Systems Planning, 2004-09-18 The U S Army Corps of Engineers the Corps has played a large and important role in shaping water resources systems in the United States since Congress first tasked it in 1824 to improve navigation on the Ohio and Mississippi Rivers Since then rivers have been modified for navigation and flood control harbors have been dredged for shipping and coastlines are routinely fortified against erosion and beach loss Recent decades have seen an overall decline in budgets for civil works project construction yet the range of objectives for water resources projects has broadened as society places more value on environmental and recreational benefits Thus the Corps portfolio of water resources projects has changed considerably There is a reduced emphasis on traditional construction projects and an increased focus on maintenance and reoperation of existing projects such as locks dams and levees and on environmental restoration projects An integrated approach to water resources planning at the scale of river basins and coastal systems is widely endorsed by the academic and engineering communities The Corps mission expertise and experience give it immense potential to alter the structure and functioning of the nation's waterways and coasts As might be expected in a large and complex organization answering to a range of public and private demands implementation of these new policies and objectives is neither consistent nor complete River Basins and Coastal Systems Planning within the U S Army Corps of Engineers recommends improvements in the Corps water resource project planning and review process This report compares economic and environmental benefits and costs over a range of time and space scales suggests multiple purpose formulation and evaluation methods and recommends integration of water development plans with other projects in the region The Comprehensive Nuclear Test Ban Treaty National Research Council, Policy

and Global Affairs, Committee on Reviewing and Updating Technical Issues Related to the Comprehensive Nuclear Test Ban Treaty, 2012-04-29 This report reviews and updates the 2002 National Research Council report Technical Issues Related to the Comprehensive Nuclear Test Ban Treaty CTBT This report also assesses various topics including the plans to maintain the safety and reliability of the U S nuclear stockpile without nuclear explosion testing the U S capability to detect locate and

identify nuclear explosions commitments necessary to sustain the stockpile and the U S and international monitoring systems and potential technical advances countries could achieve through evasive testing and unconstrained testing Sustaining these technical capabilities will require action by the National Nuclear Security Administration with the support of others on a strong scientific and engineering base maintained through a continuing dynamic of experiments linked with analysis a vigorous surveillance program adequate ratio of performance margins to uncertainties This report also emphasizes the use of modernized production facilities and a competent and capable workforce with a broad base of nuclear security expertise

An Ocean Blueprint for the 21st Century United States. Commission on Ocean Policy,2004

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