

International Atomic Energy Agency Scientific Forum

THE BLUE PLANET

Nuclear Applications for a Sustainable
Marine Environment

17–18 September 2013, Vienna, Austria



**Boardroom D
C Building
4th Floor**



IAEA

International Atomic Energy Agency



THE BLUE PLANET

Nuclear Applications for a Sustainable Marine Environment

International Atomic Energy Agency Scientific Forum
17–18 September 2013, Vienna, Austria

NOTES:



Foreword

Protecting our oceans and our future

Human well-being and prosperity depend upon healthy oceans and seas. Most of the oxygen we breathe is generated by marine life, while ocean currents transfer heat, playing an important role in maintaining a moderate climate.

However, the marine ecosystems that keep the oceans healthy are subject to increasing stress. Many of the stress factors are either caused, or worsened, by human activities on land. As we burn more fossil fuels, more carbon dioxide is emitted, trapping heat that warms the oceans. Ocean waters absorb about a quarter of that carbon dioxide, which dissolves and increases ocean water acidity.

Physical and biological conditions in the oceans are deteriorating due to pollution. Coastal habitats are under threat from unsustainable development and resource exploitation.

Nuclear and isotopic techniques make an important contribution to improving our understanding of the challenges that threaten the health of our oceans. The IAEA 2013 Scientific Forum, entitled *The Blue Planet — Nuclear Applications for a Sustainable Marine Environment*, focuses on the IAEA's work with Member States and international partners in monitoring and evaluating the challenges facing our oceans, and in seeking solutions.

Scientists at the IAEA's Environment Laboratories in Monaco study biological processes to understand how marine organisms react to acidification and warming. They use isotopes to track the sources of pollution and its dispersion. The IAEA trains researchers from developing countries to use nuclear techniques to monitor pressures on the marine environment. It makes available precise and cost-effective tools to help both developed and developing countries to acquire the data needed to adapt strategies that mitigate pressures on the oceans.

I hope that the 2013 IAEA Scientific Forum will help to strengthen new cooperation between experts and policy-makers to protect and preserve the ecological balance that is vital for the survival of the marine environment.

Yukiya Amano
Director General



PROGRAMME

Tuesday, 17 September 2013

11.00-13.00 Opening Session

Welcome and introduction by the Scientific Forum Moderator **Ms Naga MUNCHETTY**

Performance of the **Austrian-Australian Choir**

Inaugural address by the IAEA Director General, **Mr Yukiya AMANO**

S.A.S. Le Prince Albert II de Monaco (video address),
introduced by **Mr José BADIA**, Minister of Foreign Affairs, Monaco

Mr Bernard BIGOT, Chairman of the French Alternative Energies and Atomic Energy Commission, France

Mr Vyacheslav PERSHUKOV, Rosatom Deputy Director General – Director of Directorate for Scientific and Technical Complex, Russian Federation

Mr Ronald JUMEAU, Ambassador for Climate Change and Small Island Developing State Issues, Seychelles

Ms Wendy WATSON-WRIGHT, Assistant Director General and Executive Secretary, UNESCO, Intergovernmental Oceanographic Commission (video address), France

Keynote Speaker: **Mr Frédéric BRIAND**, Director General, Mediterranean Science Commission, Monaco

13.00-14.00 Lunch break

14.00-15.00 Film: Tipping Point

15.00-18.00 Session I: Oceans of Change

Mr Sam DUPONT, Researcher, Coordinator of the Ocean Acidification Infrastructure Facility, Department of Biological and Environmental Sciences – Kristineberg, University of Gothenburg, Sweden

Mr Bill DEWEY, Public Policy and Communications Director, Taylor Shellfish Company, USA

Mr Rashid SUMAILA, Professor and Director, Fisheries Economics Research Unit at UBC Fisheries Centre, Aquatic Ecosystems Research Laboratory, University of British Columbia, Canada

Mr Denis ALLEMAND, Scientific Director, Centre Scientifique de Monaco, Monaco

Mr Paul HOLTHUS, President and founding CEO, World Ocean Council, USA

Mr Raphaël BILLÉ, Programme Director Biodiversity and Adaptation, Institute for Sustainable Development and International Relations, France

Mr Carlos ALONSO HERNANDEZ, Ministerio de Ciencia, Tecnología y Medio Ambiente, Laboratorio de Vigilancia Radiológica-Ambiental, Centro de Estudios Ambientales de Cienfuegos, Cuba

18.00-20.00 Reception at the Coffee Lounge Area on the second floor, C-Building



Wednesday, 18 September 2013

10.00-13.00

Session II: Hilltops-to-Oceans

Mr José Marcus GODOY, Associated Professor, Laboratório de Caracterização de Águas, Departamento de Química, Pontifícia Universidade Católica do Rio de Janeiro, Brazil

Mr Michio AOYAMA, Senior Scientist, Geochemical Research Department, Meteorological Research Institute, Japanese Meteorological Agency, Meteorological Research Institute, Japan

Mr Yimnang GOLBUU, CEO and Chief Researcher, Palau International Coral Reef Center, Republic of Palau

Mr Richard BANATI, Professor and Chair of Medical Radiation Sciences, Faculty of Health Sciences, University of Sydney, Director National Imaging Facility ANSTO – University of Sydney Node, Australia

Mr William COOPER, Professor of Civil and Environmental Engineering, Director of the Urban Water Research Center, University of California / Urban Water Research Center, USA

Mr Bumsoo HAN, CEO, EB-Tech, Republic of Korea

Mr Suresh PILLAI, Professor of Microbiology, Director, National Center for Electron Beam Food Research, Texas A&M University, USA

Mr Ashok GHOSH, Ex-Director, Health and Safety Group, Raja Ramana Fellow, Bhabha Atomic Research Centre, India

13.00-15.00

Lunch break

15.00-17.45

Session III: Shores of Resilience

Ms Jacqueline ALDER, Head, Freshwater and Marine Ecosystems Branch, United Nations Environment Programme, Kenya

Ms Catherine CHAGUÉ-GOFF, Research Fellow, Institute for Environmental Research, ANSTO and School of Biological, Earth and Environmental Sciences, University of New South Wales, Australia

Mr Fernando SIRINGAN, Professor, University of the Philippines, Marine Science Institute, Philippines

Mr Rudolf WU, Chair Professor and Director, School of Biological Sciences, University of Hong-Kong, China

Mr Ashley TOWNSEND, Deputy Director and Senior Research Fellow, Central Science Laboratory, University of Tasmania, Australia

Mr Elvis NYARKO, Head of Department of Marine & Fisheries Sciences, University of Ghana, Ghana

Mr Joan-Albert SANCHEZ-CABEZA, Universidad Nacional Autónoma de México, Instituto de Ciencias del Mar y Limnología, Mexico

17.45-18.15

Closing Session

Conclusions by **Mr David OSBORN**, Director, IAEA Environment Laboratories

Address by **Mr Yukiya AMANO**, IAEA Director General

Opening Session

Mr Yukiya AMANO

IAEA Director General



Yukiya Amano is Director General of the International Atomic Energy Agency. The IAEA, an intergovernmental organization based in Vienna, is the global centre for cooperation in nuclear applications, energy, science and technology. Established in 1957, the Agency works with its Member States and partners to promote safe, secure and peaceful nuclear technologies and prevent the proliferation of nuclear weapons.

Mr Amano served as Chair of the Agency's Board of Governors from September 2005 to September 2006. He was Japan's Resident Representative to the Agency from 2005 until his election as Director General in July 2009. He assumed his duties as IAEA Director General on 1 December 2009. In March 2013, the IAEA Board of Governors appointed him to a second four-year term. He has extensive experience in disarmament and non-proliferation diplomacy, as well as nuclear energy issues.

At the Japanese Foreign Ministry, Mr Amano was Director-General for the Disarmament, Non-Proliferation and Science Department from 2002 until 2005. He previously served as a governmental expert on the U.N. Panel on Missiles and on the U.N. Expert Group on Disarmament and Non-Proliferation Education. Mr Amano contributed to the 1995, 2000 and 2005 Nuclear Non-proliferation Treaty Review Conferences, and he chaired the 2007 Preparatory Committee for the 2010 Nuclear Non-proliferation Treaty Review Conference.

A graduate of the Tokyo University Faculty of Law, Mr Amano joined the Japanese Foreign Ministry in April 1972, when he began a series of international postings in Belgium, France, Laos, Switzerland, and the United States.

S.A.S. Le Prince Albert II de Monaco



H.S.H. Prince Albert II, Sovereign Prince of Monaco, is the son of Prince Rainier III and Princess Grace, née Kelly. Since 1984, H.S.H. Prince Albert had assisted his father in conducting the affairs of State and succeeded his father on 12th July 2005.

His Serene Highness is the founder and president of the Prince Albert II of Monaco Foundation, set up in June 2006 to protect the environment and promote sustainable development on a global scale. The Foundation's three priority areas are the Mediterranean basin, the Polar Regions and the Least Developed Countries.

A long-time ocean protection advocate, HSH strongly supported work to develop and adopt the Monaco declaration on Ocean Acidification, which united 155 leading marine scientists from 26 countries in a call for reduced CO2 emissions to avoid dangerous ocean acidification.

The Principality of Monaco has supported the IAEA Marine Environment Laboratories in Monaco since they opened in 1961. The Principality has been and remains an active partner in the Laboratories' development, and His Serene Highness Prince Albert II takes a strong personal interest in the Laboratories' work.

The Prince also chairs the Mediterranean Science Commission, an intergovernmental body with 23 member states, 20 of which are located along the Mediterranean coast. The Commission was created at the beginning of the century on the initiative of Prince Albert I.

Mr Bernard BIGOT

Chairman of the French Alternative Energies and Atomic Commission (CEA), France



Professor Bernard Bigot is the Chairman of the French Alternative Energies and Atomic Energy Commission, a position he has held since January 2009. He also is the President of the International Foundation "Maison de la Chimie" and the High French Representative for the realization of ITER.

A graduate of the Ecole Normale Supérieure de Saint-Cloud, Mr Bigot holds a doctoral degree in physical chemistry from Université Paris 11 (Orsay) and a doctorat ès sciences physiques from Université Pierre et Marie Curie (Paris). He holds the highest-level teaching diploma in France in physical sciences and the title of ancien auditeur at the French Institute of Higher National Defence Studies.

He directed the CNRS catalysis research institute for four years and the theoretical chemistry laboratory of ENS Lyon for 15 years. He has authored 70 scientific publications on quantum physical chemistry applied to photochemistry, heterogeneous catalysis, liquid phase reactivity and nuclear energy.

Mr Bigot helped set up the Ecole Normale Supérieure de Lyon, where he served as Deputy Director of Academics, Deputy Director of Research and School Director. Parallel to these academic responsibilities, he worked at the ministerial level as Head of the Scientific and Technical Mission, Director General of Research and Technology and Chief of Staff of the Research and New Technologies Minister.

He was High Commissioner for Atomic Energy from 2003 to 2009.



Mr Vyacheslav PERSHUKOV

State Atomic Energy Corporation “Rosatom”, Deputy Director General – Director of the Innovation Complex, Russian Federation



Vyacheslav Pershukov is the Vice-Chairman of the Presidium of Science and Technology Advisory Committee of “Rosatom” State Corporation.

He has served as Deputy Director General and Director of the Innovation Management Unit at Rosatom since April 2011, managing Rosatom’s Innovation Program, which includes 57 innovation projects in the field of power generation.

Mr Pershukov is conducting research in nuclear innovative development to increase the competitiveness of products and services on nuclear energy markets by modernizing existing technology and upgrading industrial assets. He is also researching the re-launch of the innovation cycle and creation of new technologies, products and services for the energy markets, as well as gradual diversification due to technology transfer for the new non-energy related markets.

Mr Pershukov has authored/co-authored four monographs and more than 100 articles in Russian and International Journals and he has lectured at The State University of Management, Moscow. His career includes 15 years in the oil and gas industry, management positions in international public companies and research at the Krzhizhanovsky Institute of Energy Research. He received a PhD in thermo physics in 1995.

Mr Ronald JUMEAU

Ambassador for Climate Change and Small Island Development State Issues, Seychelles



Ronald Jumeau has been the New York-based roving Ambassador for Climate Change and Small Island Developing State Issues of the Republic of Seychelles since 2012. He started his career as a journalist and then Chief Editor of the Seychelles Nation daily newspaper. He became Secretary to the Cabinet in the President’s Office in 1992 before holding several ministerial posts from 1998 to 2007 including that of Minister for Environment and Natural Resources, which included responsibility for climate change, water, agriculture and fisheries. Ambassador Jumeau was posted to New York in 2007 as Seychelles’ Permanent Representative to the United Nations and Ambassador to the United States, Canada, Brazil and several Caribbean islands until 2012 when he became a globe-trotting activist for the survival of his and other island nations.

Ms Wendy WATSON-WRIGHT

Executive Secretary Intergovernmental Oceanographic Commission, Assistant Director General of UNESCO, France



Wendy Watson-Wright is the Executive Secretary and Assistant Director General of the Intergovernmental Oceanographic Commission of the United Nations Educational, Scientific and Cultural Organization (IOC-UNESCO). Headquartered in Paris, IOC-UNESCO has the mandate within the United Nations system for ocean science, observations, data and information exchange and services, including global tsunami warning systems. It is also the competent international organization for marine science under the United Nations Convention on the Law of the Sea.

From 2001 to 2009, she was Assistant Deputy Minister, Science, for Fisheries and Oceans Canada in Ottawa where she was responsible for providing the policy direction and scientific leadership for all science activities in the department’s fifteen science institutes throughout Canada.

She is or has been a member of several boards including the Canadian Foundation for Climate and Atmospheric Science, Ocean Networks Canada, ArcticNet and the Strategic Advisory Board for the EU Joint Programming Initiative on Oceans (JPI Oceans).

A Killam scholar, Ms Watson-Wright holds a Ph.D. in Physiology from Dalhousie University in Halifax, Nova Scotia, Canada.

Mr Frédéric BRIAND

Mediterranean Science Commission, Monaco



Mr Frédéric Briand is the Director General of the Mediterranean Science Commission. A promoter of international 'marine peace parks' based on co-governance of the 'marine commons', he is a leading advocate of lending United Nations control over all migratory species in the High Seas. He currently serves as Whaling Commissioner at the International Whaling Commission, and Adviser to various EU-Programmes and represents the Mediterranean region on the UN Committee on the Health of the Oceans (GESAMP).

He is the founder and editor of the reputed GIESM Monograph Series on Mediterranean Marine Sciences (now reaching 45 volumes).

Professor Briand studied oceanography and economics in Paris, and marine ecology (Ph.D.) at the University of California. He spent his early university career investigating the dynamics of marine systems in the north Pacific, the north Atlantic and the Caribbean Sea. The discoverer of invariants in the architecture of global food webs - now a full research sector on its own – Professor Briand is the author of noted papers on the cybernetics, conservation and management of complex ecological systems.

Prior to his current post, Mr Briand managed sectors of multi-disciplinary research in international agencies (the United Nations Educational, Scientific and Cultural Organization and the International Union for Conservation of Nature), with leadership of overseas programs in Africa.

The Mediterranean Science Commission is an Intergovernmental Organisation of 22 Member States headquartered in Monaco which federates 5100 researchers based in 450 institutes.

Session I: Oceans of Change

Mr Sam DUPONT

University of Gothenburg, Sweden



Sam Dupont is Coordinator of the Ocean Acidification Infrastructure Facility, Sven Lovén Centre for Marine Sciences and a researcher at the Department of Biological and Environmental Sciences of the University of Gothenburg, Sweden. He is an ecophysiologicalist working on a range of topics from the impact of global changes to stem cell biology. His research interests are: impact of climate change on marine organisms; ecological genomics of regeneration; education and communication with stakeholders, and data analysis and modelling. He acquired his education in sciences at the University of Louvain, Belgium. He was toxicologist assistant at Procter & Gamble, a research assistant for the Belgian National Research Council, and a fellow at the Royal Swedish Academy of Sciences.

Mr Dupont is currently developing a research group and organizing facilities with the necessary experimental infrastructure to study the impacts of climate change using near future predicted scenarios (IPCC). Each year, he coordinates experiments designed to investigate the impact of climate change on early developmental processes that allow different teams to work in collaboration and share material.

Mr Bill DEWEY

Taylor Shellfish Company, USA



Bill Dewey has worked 32 years as a shellfish farmer in Washington State. He is Manager of Public Policy and Communications for Taylor Shellfish Company, the largest producer of farmed shellfish in the United States, and owns and operates his own Manila clam farm in Samish Bay. Mr Dewey has worked throughout his career on environmental and human health regulations as they affect the shellfish farming community. He serves on a number of boards and committees. In 2012 he was appointed to serve on the Ocean Research Advisory Panel (ORAP) which advises the National Ocean Research Leadership Council. Mr Dewey received the National Oceanographic and Atmospheric Administration's Environmental Hero award in 2008 in recognition of his work to help develop and implement public policy that protects water quality, marine resources and supports sustainable aquaculture.

Mr Dewey has served on the Pacific Shellfish Institute Board of Directors since 1995, including as the board president. He is a graduate of the University of Washington, School of Fisheries. He serves on the Puget Sound Partnership Ecosystem Recovery Board, the Pacific Coast Shellfish Growers Association Government Relations Committee. He also serves on the Board of Directors for the National Aquaculture Association and the Skagit Conservation Education Alliance, and the Mason County Planning Advisory Commission.



Mr Rashid SUMAILA

University of British Columbia, Canada



Rashid Sumaila is a professor of ocean and fisheries economics at the University of British Columbia and director of the Fisheries Economics Research Unit in Vancouver. His research focus is on how economics integrated with ecology and other disciplines can be used to ensure that environmental resources are sustainably managed for the benefit of all generations. Mr Sumaila has experience working in fisheries and natural resource projects in Norway, Canada and the North Atlantic region, Namibia and the Southern African region, Ghana and the West African region and Hong Kong and the South China Sea. Mr Sumaila has been recognized for merit with a variety of awards, including the American Fisheries Society 2013 Excellence in Public Outreach Award, the Leopold Leadership Fellowship, the Pew Fellowship for Marine Conservation, and the Peter Wall Institute Early Career Scholar Award. He has given talks at meetings of the United Nations, the White House, the U.S. Congress, the Canadian Parliament, the U.K. House of Lords and the World Trade Organization. His work has been cited by the Economist, the Boston Globe, the International Herald Tribune, the Financial Times, CBC News, and others.

Mr Denis ALLEMAND

Centre Scientifique de Monaco, Monaco



Denis Allemand is the Scientific Director of the Centre Scientifique de Monaco (CSM), a Monegasque public research agency. He is a professor of Biology at the University of Nice-Sophia Antipolis. His main area of research is related to comparative and conservation physiology of marine organisms such as cnidarians, sea urchins. He has co-authored over 120 science articles and numerous book chapters and supervised 12 doctoral students. He is a member of different scientific boards (Oceanography Institute, Foundation Albert I – Prince of Monaco; Foundation Prince Albert II de Monaco; CNRS-Institute of Ecology and Environment; École Pratique des Hautes Études)

Mr Allemand's current work focuses on the physiology of corals with an emphasis on two major biological functions: biomineralization and symbiosis. In biomineralization, his studies encompass the mechanism of formation of the coral skeleton and the effect of ocean acidification on the process of biomineralization. Concerning symbiosis, his work focuses on the mutual adaptation of both partners of the symbiosis (host animal and the unicellular algae called zooxanthellae) and especially the molecular relationship between zooxanthellae and their host.

He received his PhD in pharmacological science and endocrinology at the University of Montpellier II (France).

Mr Paul HOLTHUS

World Ocean Council, USA



Paul Holthus is founding CEO of the World Ocean Council – the international business leadership alliance on ocean sustainable development. He works with the private sector, responding to market forces to develop practical solutions for achieving sustainable development and addressing environmental concerns, especially for marine areas and resources.

His experience ranges from working with the global industry associations or directors of UN agencies to working with fishers in small island villages. He has been involved in coastal and marine resource sustainable development and conservation work in over 30 countries in Europe, Asia, the Pacific, Central America and Africa. As a consultant on sustainable development and environmental management, he has worked with companies, industry associations, UN agencies, international NGOs and foundations on sustainability, especially in the areas of oil/gas, fisheries, aquaculture, standards and certification.

Past positions include: Deputy Director for the Global Marine and Coastal Program of – The World Conservation Union; founding Executive Director of the Marine Aquarium; Senior Officer in the Asia-Pacific Program of The Nature Conservancy; and Senior Programme Officer of the UNEP South Pacific Regional Environment Programme. Mr Holthus is a graduate of the University of California and the University of Hawaii, with advanced degrees in coastal/marine resources and international business.

Mr Raphaël BILLÉ

Institute for Sustainable Development and International Relations, France



Raphaël Billé has been leading the development and management of the Biodiversity and Adaptation Programmes at the Institute for Sustainable Development and International Relations in Paris since 2006. In this capacity, he plans and oversees activities on a wide variety of topics ranging from high seas biodiversity governance to tropical deforestation, from climate adaptation policies to biodiversity economics. His personal research focus includes ocean and coastal management, the economics of biodiversity, evaluation of environmental policies, and analysis of decision-making processes.

His background is in environmental management and environmental economics. Mr Billé started his career as Scientific Attaché at the French Embassy in Pakistan, before joining United Nations Development Programme in Indonesia as a Junior Professional Officer. In charge of the Biodiversity and International Waters focal areas, he then developed several Global Environment Facility projects and supervised grants programmes. Mr Billé later established himself as an independent consultant and was contracted by International Union for Conservation of Nature as well as the French and Dutch cooperation.

Mr Billé is a regular lecturer at Sciences Po (Paris Institute of Political Studies) on "Biodiversity policies" and an occasional lecturer at several other French universities.

Mr Carlos ALONSO HERNANDEZ

Cienfuegos Environmental Research Centre, Cuba



Carlos Alonso Hernandez is a radioecologist at the Environmental Research Centre of Cienfuegos (CEAC), Cuba. His education was in nuclear sciences at Instituto Superior de Ciencias y Tecnologías Nucleares, Havana, Cuba. He was the Director of CEAC for 15 years. He was a Fellow at the ENEA, Italy and Research Associate for the International Centre for Theoretical Physics (ICTP). Mr Alonso Hernandez was member of the Group of Experts on the Scientific Aspects of Marine Environmental Protection in 2005-2007. Since 2008, he is the national coordinator of the applications of nuclear and isotopic techniques in marine environment in Cuba. He applies his analytical skills to marine environmental problems. Since 2005, he has been the coordinator of national and regional projects supported by the IAEA Technical Cooperation Programme, related to the use of nuclear and isotopic technologies to address the management of coastal zones in the Caribbean Region (Pollution, Harmful Algal Blooms and Climate Change). Currently, he is coordinating a new regional initiative for establishing the Caribbean Observing Network for Ocean Acidification and its impact on Harmful Algal Blooms, using nuclear and isotopic techniques.

Session II: Hilltops-to-Oceans

Mr Jose Marcus GODOY

National Commission of Nuclear Energy, Brazil



Jose Marcus Godoy is an executive committee member of the International Union of Radioecology and associate professor at the Pontifical Catholic University of Rio de Janeiro. He was a senior researcher at the National Commission of Nuclear Energy from 1977 to 2012. He served as a member of the Advisory Committee to Brazil's National Council of Technological and Scientific Development, CNPq from 2009 to 2011 in the field of Nuclear Engineering and as Vice President of the Brazilian Society of Radiological Protection from 2009 to 2012.

Mr Godoy has supervised numerous master's theses and doctoral dissertations and has published 80 articles in indexed journals. He has experience in the application of radioisotopes in environmental studies, including dating of sediments with Pb-210 and radium isotopes in water mixture. In recent years, he has been devoted to the study of sources in particular matter in the air, water quality and sediment and application of isotopes, including stable isotopes in environmental studies.

He holds a PhD in Radiochemistry from Technische Universität München, a Masters in Nuclear Engineering from the Federal University of Rio de Janeiro and a BS in Chemistry from Pontifical Catholic University of Rio de Janeiro.



Mr Michio AOYAMA

Meteorological Research Institute, Japan



Michio Aoyama is a senior scientist at the Geochemical Research Department, Meteorological Research Institute (Japanese Meteorological Agency, Japan). He joined the institute in 1995. He works in the field of chemical oceanography, reference materials of nutrients in seawater, and changes of nutrients and biogeochemical parameters in shallow and deep oceans.

He organized four international inter-laboratory comparison studies of reference materials of nutrients in seawater, held in 2003, 2006, 2008 and 2012. He also held several workshops related to chemical reference materials in ocean science.

Through his roles in various international projects, Mr Aoyama coordinates international collaboration to establish global comparability and traceability of the nutrient data in the world oceans.

He has conducted more than 20 cruises to study ^{134}Cs and ^{137}Cs released from the accident at TEPCO's Fukushima Daiichi Nuclear Power Plant in the North Pacific Ocean since April 2011, and he has developed a marine radioactivity database, HAM, on anthropogenic radio nuclides in the world ocean. The HAM database now includes radionuclides data from Fukushima accident.

Mr Aoyama has published more than 100 papers in recognized scientific journals.

Mr Yimnang GOLBUU

Palau International Coral Reef Center, Republic of Palau



Yimnang Golbuu is working on coral reef ecology, education and conservation. His professional experience includes serving on the Palau National Commission of UNESCO, chairing the Northern Reef Management Planning Team of Palau, serving as board member of the Palau Conservation Society, acting as program leader for the Natural Resource and Environmental Education Division at Palau Community College-Cooperative Research and Extension, and working as the chief researcher and CEO at the Palau International Coral Reef Center. His work on coral reefs includes research projects throughout Micronesia, including Yap, Guam, and Pohnpei.

Mr Golbuu earned a Ph.D. in marine sciences from the School of Environmental Science and Management at Southern Cross University in Lismore, New South Wales, Australia in 2012, becoming the first Palauan citizen to hold such a degree. He recently joined the Richmond Lab as a post-doctoral research fellow, where he will continue his work on coral reef ecology and devising ways to apply and translate his research to help conservation efforts.

His current research focus is looking at how disturbances at multiple scales affect coral reef communities, with a particular emphasis on coral bleaching, land-use change and their effects on coral reef communities.

Mr Golbuu is acting CEO of the Palau International Research Center and has served as the Chief Scientist there for the past four years.

Mr Richard BANATI

Australian Nuclear Science and Technology Organisation, Australia



Richard Banati researches into the responses of the innate immune system to stress and injury, using non-invasive nuclear methodologies to image subtle pathological tissue changes in life. As part of a cross institutional life sciences team, Mr Banati focuses on an evolutionarily conserved mitochondrial pathway that is activated during inflammation, tissue development and regeneration.

Using the X-ray Fluorescence Microprobe at the Australian Synchrotron and neutron activation analysis at the OPAL research reactor, Mr Banati and colleagues have studied the distribution of atomic elements in migratory marine birds. They have uncovered daily variations in vital trace elements, such as zinc, that are laid down in regular patterns during feather development. Such time dependent variations – like tree rings – allow a retrospective insight into the stresses that a bird has been exposed to during development, such as the ingestion of marine plastic debris.

Mr Banati is Director of the University of Sydney node of the National Imaging Facility and holds an ANSTO Distinguished Researcher Fellowship since 2008. His career also includes appointments at the Max-Planck-Institute for Neurobiology in Munich, Germany, Imperial College and the MRC-Cyclotron Unit, London. His work is cited and published in specialist journals as well as high-impact multidisciplinary journals.

Mr William COOPER

Urban Water Research Center, University of California Irvine, USA



William J. Cooper is the Director of the Urban Water Research Center at the University of California Irvine, where he also is a Professor of Civil and Environmental Engineering.

He has appointments in Chemical Engineering, and the Department of Policy, Planning and Design in the School of Social Ecology. His research interests include carbon cycling in oceanic and fresh waters, the application of free radical chemistry for the treatment and environmental photochemical fate of emerging chemicals of concern pharmaceuticals and disinfection by-products, as well as the application of advanced oxidation processes for the ship-board (oil tanker) control of invasive species. His recent studies, in the environmental fate of pharmaceuticals, suggest that constructed wetlands may offer a low-cost sustainable approach to treating pharmaceuticals and other emerging chemicals of concern.

Mr Cooper holds a Ph. D. in Marine and Atmospheric Chemistry from the University of Miami. He has published more than 200 papers in peer-reviewed journals and 45 chapters in books, and edited eight books. He was elected a Fellow of the American Association for the Advancement of Science in November 2011.

Mr Bumsoo HAN

EB-Tech. Co. Ltd., Republic of Korea



Mr Bumsoo Han is the CEO and President of EB-Tech. Co. Ltd., a company engaged in manufacturing of industrial electron beam accelerators. In addition, Dr. Han is the Chief Technology Officer of Pele Technology U.S.A.

One of his major interests is the use of radiation technology for environmental remediation. Mr Han was instrumental in setting up the first industrial scale electron beam treatment facility for treatment of textile dye waste water at a textile industry consortium. Recently, Mr Han and his associates developed a mobile electron beam facility that can be taken to site locations to demonstrate the applicability of electron beam technology under working conditions to end users.

Mr Han has won several awards including the IR-52 Industrial Research Award from Ministry of Science and Technology, Korea New Technology Honors from the Republic of Korea's Government and Excellent Achievement Honors at Samsung Techno-Fair '97. Mr Han is Editor of Nuclear Engineering & Technology and has been serving as a Board member of Korea Radioisotope Association since 2009.

Mr Han received his PhD in Metallurgical Engineering from the Colorado School of Mines. He was a visiting Scientist at the Budker Institute of Nuclear Physics, Russia in 1995. He also has worked at Samsung Heavy Industries Co.

Mr Suresh PILLAI

National Center for Electron Beam Research, Texas A&M University, USA



Suresh D. Pillai, Ph.D. is the Director of the National Center for Electron Beam Research at Texas A&M University. He is also a Professor of Microbiology and Texas AgriLife Research Faculty Fellow at Texas A&M University. He holds a joint appointment in the Departments of Nutrition and Food Sciences and Poultry Science. He has over 200 scientific publications and serves on the editorial board of the Journal of Food Protection and Microbiology Spectrum. He is a Fellow of the International Forum on Industrial Bioprocesses.

The National Center for Electron Beam Research at Texas A&M University brings together academic, industry, and government researchers from across the United States and overseas to advance machine sources such as E-Beam and X-ray technologies to benefit mankind in different areas. The E-Beam Center actively promotes these technologies worldwide as part of its mission to "heal, clean, and feed the world and beyond". The Center has developed eBeam solutions for the medical industry, wastewater industry and the food industry and is actively working with NASA to develop foods for long duration space missions.



Mr Ashok GHOSH

Department of Atomic Energy, India



Ashok Kumar Ghosh is a Raja Ramanna Fellow in Department of Atomic Energy, India, and a Senior Professor at Homi Bhabha National Institute.

Mr Ghosh recently retired from his position as Director, Health, Safety and Environment Group, Bhabha Atomic Research Centre, following a career of over 40 years during which he worked on addressing a variety of aspects related to safety of nuclear reactors and radiological safety. He also provided leadership to development of computer codes for reactor and radiological safety as well as earthquake motion and seismic analysis. He has vast experience in leading the Project Design Safety Committees for a variety of Nuclear Power Plants including Prototype Fast Breeder Reactors and the Critical Facility for Advanced Heavy Water Reactor.

Mr Ghosh is providing research guidance to doctoral and masters students. He has published more than 100 articles in journals and participated in numerous conferences. He has been honoured with Department of Atomic Energy's Award for Excellence in Science and Technology.

Session III: Shores of Resilience

Ms Jacqueline ALDER

United Nations Environment Programme, Division of Environmental Policy Implementation, Nairobi, Kenya



Jacqueline Alder is the Coordinator of the Freshwater and Marine Ecosystem Branch at the United Nations Environment Programme (UNEP). She is responsible for UNEP's Water Ecosystems Programs, which includes the Regional Seas Conventions and Action Plans and the Global Programme of Action for the Protection of the Marine Environment from Land Based Activities. She leads a team of dedicated professionals located throughout the world working on topics from Blue Carbon, Green Economy and Oceans, Small Island Developing States, marine debris to marine spatial planning, and wastewater and water quality.

Before joining UNEP, Ms Alder was a Marine and Fisheries Policy Analyst and Researcher at the Fisheries Centre at the University of British Columbia in Vancouver, Canada (2001-2008) and Edith Cowan University in Perth in Australia (1995-2001). She has extensive experience in working with governments, researchers, NGOs and coastal communities throughout the Asia and Pacific Regions, Australia and Canada. She has published numerous articles in a range of peer-reviewed journals and books. She holds a PhD from James Cook University of North Queensland, Australia.

Ms Catherine CHAGUÉ-GOFF

Australian Nuclear Science and Technology Organisation & University of New South Wales, Australia



Catherine Chagué-Goff is a Research Fellow in the Australian Nuclear Science and Technology Organisation's Institute for Environmental Research and at the University of New South Wales.

Her research presently deals with multi-proxy studies of historical and palaeo-tsunami and cyclone deposits, particularly in the Pacific region, with emphasis on geochemistry, geochronology (^{137}Cs , ^{210}Pb , ^{14}C), geomorphology/geology, sedimentology and micropalaeontology. She focuses on the development of chemical and isotopic signatures to help identify and distinguish between palaeotsunami and storm deposits, and for improving our understanding of past inundation and run-up. Her field of research also includes multi-proxy studies of natural and anthropogenic changes in coastal lagoons, wetlands and estuaries, as well as in inland lakes and wetlands, and geochemistry/hydrology of natural and constructed wetlands.

Ms Chagué-Goff has published more than 50 refereed research articles in international journals, more than 70 reports and several book chapters. She has delivered talks at numerous conferences and meetings, including the American Geophysical Union Fall meeting, 2011, 2012.

She holds a PhD in Earth Sciences from the University of Western Ontario, Canada, an MSc in Geology from the University of Cologne, Germany, and a BSc in Earth Sciences from the University of Clermont-Ferrand, France.

Mr Fernando SIRINGAN

Marine Science Institute, University of the Philippines, Philippines



Fernando Siringan is a professor at the Marine Science Institute of the University of the Philippines (UP). A major focus of his research is deciphering environmental changes and their drivers at geologic to historical time-scales. The need to understand coastal flooding and erosion, harmful algal blooms, and degradation of coral reefs piqued Mr Siringan's interest in groundwater research.

He also works on reconstructing the short and long term evolution of Philippine coastal environments and establishing the role played by the relative sea level and climate changes in the development of present day coastal environments.

Mr Siringan, who obtained his PhD degree at Rice University in Texas, has published numerous journal articles and have presented at national and international conferences. In 2010, he was admitted as a member of the National Academy of Science and Technology of the Philippines in recognition of his accomplishments in the area of environmental changes and processes from geological to historical time scales that have helped local and national leaders and environmental managers reach informed decisions.

Mr Rudolf WU

School of Biological Sciences, the University of Hong Kong, China



Rudolf Wu is the Chair Professor and the Director of the School of Biological Sciences as well as Director of the Centre for Marine Environmental Research and Innovative Technology.

Mr Wu's research focuses on the molecular, biochemical, physiological and ecological responses of marine animals to environmental stresses, with emphasis on hypoxia and xenobiotics. The overall objectives are to unravel the toxic mechanisms involved and to develop novel biomarkers for detecting impending damages and predicting environmental changes. He has published more than 200 journal papers and has given plenary or keynote lectures at 30 major international conferences. Mr Wu is the associated editor of four international journals and was the Chief Guest Editor of six special issues of the Marine Pollution Bulletin.

Mr Wu has served on numerous working and expert groups of international organizations, including the United Nations, the International Maritime Organization and the Intergovernmental Oceanographic Commission. He is part of the UN Group of Experts on Scientific Aspects of Marine Environmental Protection, Director of the "Regional Centre of Excellence in Marine Pollution" of the UN's Regional Programme of the East Asian Seas and a member of the Scientific Advisory Panel of UK's Environment Agency. He has conducted more than 20 international/regional training programs for UN organizations and the IAEA.

Mr Ashley TOWNSEND

University of Tasmania, Australia



Ashley Townsend is a Deputy Director and Senior Research Fellow responsible for the University of Tasmania Central Science Laboratory's magnetic sector (or high resolution) Inductively Coupled Plasma Mass Spectrometry (ICP-MS) facility.

Mr Townsend's research interests have a strong environmental focus and include developing monitoring procedures and analytical strategies for environmental assessment, the analysis of samples at low levels from local and other pristine wilderness areas, and the study of anthropogenically impacted regions. He is the author/co-author of more than 50 research articles and has acted as an independent referee of nearly 250 articles and theses.

Mr Townsend is a member of four journal Editorial or International Advisory Boards, including the leading journals Science of the Total Environment and Journal of Analytical Atomic Spectrometry.

Mr Townsend has held many senior positions with the Royal Australian Chemical Institute, the professional body of Chemists in Australia, of which he is a Fellow. He is also a Fellow of the Royal Society of Chemistry.

Mr Townsend received a prestigious University of Tasmania Vice-Chancellor's Exceptional Performance Award in 2006.



Mr Elvis NYARKO

University of Ghana, Legon, Ghana



Elvis Nyarko is the Head of Department of Marine and Fisheries Sciences of the University of Ghana, Legon. Mr Nyarko has over 16 years' experience in marine environmental science research. He is specialized in coastal pollution monitoring and seafood safety issues, assessment of environmental impacts of oil and gas installations on the marine environment, ships ballast water management and coastal management. His professional activities include teaching, research, mentoring, and consulting on marine environmental issues. He has served on several University of Ghana Boards and Committees and is a member of the Academic Board and the Business and Executive Committee.

Mr Nyarko is the National Co-ordinator of an IAEA Technical Co-operation Project on supporting an integrated approach for marine pollution monitoring using nuclear analytical techniques (RAF/7/009) and served as the National Co-ordinator of an IAEA Technical Co-operation Project on enhancing regional capability for the assessment of contamination in the marine environment (RAF/7/008). Mr Nyarko serves as the National Co-ordinator of the GloBALLAST project, a joint initiative by the Global Environment Facility, the International Maritime Organization and the UN Development Programme to control the spread of marine invasive species via ships' ballast water. He is widely published in international and local journals and has participated in 22 international and national conferences and workshops.

Mr Joan-Albert SANCHEZ-CABEZA

Universidad Nacional Autónoma de México, México



Joan-Albert Sanchez-Cabeza is a Senior Researcher at the Marine Sciences and Limnology Institute of the Universidad Nacional Autonoma de Mexico. He is a specialist in many aspects of the use of radionuclides and isotopes as tracers of environmental processes, with special emphasis in the marine environment: biogeochemical processes in the water column and sediments, recent radiochronology, records of environmental change, including pollution and sedimentary processes, fluxes and impacts of pollutants.

His current research focus includes global and climate change, from recent environmental records to the quantification and understanding of key environmental processes.

From 2004 to 2009, Mr Sanchez-Cabeza led the Radiometrics Laboratory at the IAEA's Marine Environment Laboratories in Monaco. He also represented the IAEA in the UN Joint Group of Experts for the Scientific Aspects of the Marine Environment Protection. He also has served as a professor in the Physics Department at the Universidad Autónoma de Barcelona, Spain, and he is a member of the Institute of Environmental Science and Technology and the Research Group on Marine Geosciences in Catalonia.

A widely published author, Mr Sanchez-Cabeza has directed eight PhD theses, and he is Editor of Earth-Science Reviews (Elsevier) for Environmental Geochemistry.

Closing Session

Mr David OSBORN

Director, IAEA Environment Laboratories, Monaco



David Osborn joined the International Atomic Energy Agency as Director, Environment Laboratories, in Monaco on 11 January 2013. A national of Australia, his qualifications are in environmental science and environmental law.

Formerly with the United Nations Environment Programme (UNEP) in Nairobi and The Hague, he was Coordinator of the 1995 Global Programme of Action for the Protection of the Marine Environment from Land-Based Activities and Coordinator of UNEP's Ecosystem Management Programme. He has also held director posts at the Great Barrier Reef Marine Park Authority and at the Australian Government's Department of the Environment and Water Resources. He has served as an Advisor to the Australian Government Minister for the Environment and was formerly an officer in the Royal Australian Navy.



IAEA

International Atomic Energy Agency

International Atomic Energy Agency
PO BOX 100, Vienna International Centre
1400 Vienna, Austria
Tel.: (+43-1) 2600-0
Fax: (+43-1) 2600-7
www.iaea.org