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Director's Column

Welcome to Volume 5, Issue 1 of the Marine Environment Laboratories' (MEL) Newsletter. As you can see from the listing of topics on the left side of this page, it covers a wide range of activities at MEL. I hope you enjoy reading our MEL Newsletters and look forward to reading your comments.

MEL's new programmes and strategic outreach efforts (*e.g.* Mission visits, Newsletter, displays at IAEA's 50th General Conference...) have resulted this year in a record number of Marine Technical Co-operation (TC) projects. They increased from 17 in 2006 to 28 in 2007/08 and included 9 regional and 3 interregional projects, now directly benefiting 64 Member States (MS) (see page 9). This is clear evidence of increased interest by Member States to fully utilize the Agency's expertise to better understand and protect their diverse marine environments and resources. I would also like to thank MEL staff for rising to the challenge of supporting these new TC projects.

We are also pleased to report that in June 2007, we had a record number of Vienna-based Missions (22 representatives, see picture below) including the Chairman of the IAEA Board of Governors, the DDG, Mr. W. Burkart, and two Ministers from Monaco visiting MEL in Monaco.



The VIP delegates toured MEL's world class laboratories and concluded with a round table discussion on training MS in marine radioactivity and radioecology, on applying new isotopic tools for marine pollution and ocean climate change studies, and on investing in essential equipment at MEL.

I am also pleased to report that the IAEA Board of Governors have just approved the replacement of MEL's ageing High Resolution Inductively Coupled Plasma Mass Spectrometer (ICP-MS) now planned for 2008. Finally, I would like to extend a warm welcome to Mr. Emmanuel Bosc (see page 2) as a new Staff Member to MEL. Emmanuel will provide marine remote sensing products in support of our marine isotopic and radioactivity programmes, and our Inter-Agency (IOC, UNEP, ROPME...) partnerships on marine pollution.

New Satellite Imagery Analyst at MEL

Emmanuel Bosc has recently taken up the position of remote sensing specialist in the Radiometrics Laboratory at MEL.

Emmanuel was previously employed at NASA's Jet Propulsion Laboratory, CalTech, USA. He obtained his PhD in France while working at the Laboratoire d'Océanographie de Villefranche in the team for marine optics and remote sensing.

He brings with him over 5 years of research experience in ocean colour monitoring from space and its applications to biogeochemistry and the carbon cycle. Using satellite data, he was modelling the primary production of phytoplankton for ecosystems like the Mediterranean Sea (fig.1) and the California current system.

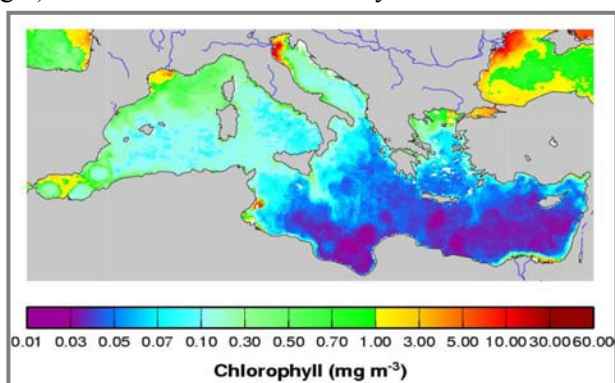


Figure 1: Phytoplankton bloom in the Mediterranean sea, expressed as chlorophyll a concentration. (SeaWiFS, May 2002.)

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Emmanuel Bosc

At RML, Emmanuel is planning to focus on the application of multi-sensor remote sensing measurement (chlorophyll concentration, turbidity, aerosol, sea surface temperature, sea level altimetry etc., see fig.2) for a synoptic understanding of marine processes, at small to meso-scales in space and time.

These parameters can be used to study the biogeochemical cycles of radionuclides. In addition to his duties at MEL, Emmanuel will further contribute to completing and developing the MARIS database. By using remote sensing tools, he will also participate in cruise management by assisting with the sampling strategy design.



Figure 2: Mississippi plume into the gulf of Mexico. (MODIS, true-colour high resolution image).

Multi-Radiotracers Show Differences in Contaminant Uptake

Do different types of fish have different capacities to accumulate metals, metalloids and radionuclides from their aquatic environment, with different repositories in their bodies? An answer to this question is important for both more predictive assessment of risks to seafoods from contaminant exposure and also radiological dose to the organisms themselves.

Our first experiments that compared a cartilaginous fish (spotted dogfish) with a bony fish (turbot), showed quite remarkable differences between the two 'models' in their capacities to absorb seven metal and radionuclide contaminants from the aquatic medium and in the way these contaminants were distributed throughout their bodies. For example, this study revealed the unexpected capacity of the dogfish skin to accumulate zinc and americium to high levels. A simultaneous, statistical assessment of the accumulation



Figure 3: Turbot, dogfish and seabass in an experimental aquarium of REL.

of all contaminants showed two very distinct fish models. The types of differences were consistent with their determination by particular anatomical and physiological characteristics of that taxonomic group.

Recently, in a more complete experiment, we tested if these differences hold for other species of cartilaginous and bony fishes (fig.3). This experiment compared the accumulation from seawater of eight contaminants among the cartilaginous electric rays, thornback rays and spotted dogfish with the bony seabass, seabream and turbot.

Preliminary results from this experiment are already showing similarities among the bony fishes in their patterns of

accumulation and tissue distributions, in agreement so far with the hypothesis that there are bioaccumulation characteristics in fish that are taxonomically based. Watch this newsletter for further findings from these studies.....

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Long Term Study of Particulate Carbon Sequestration in the Mediterranean

The flux of sinking particles in the sea is a core topic in studying the role of the oceans in the carbon cycle and the fate of anthropogenic CO₂. The downward flux of carbon can be either measured directly using sediment traps (fig. 4) or estimated indirectly using the disequilibria between natural radionuclides such as ²³⁸U/²³⁴Th.

Since the mid 80's, MEL has been working in the French DYFAMED program (DYnamique des Flux Atmosphériques en MEDiterranée), in close collaboration with the Observatoire Océanologique de Villefranche-sur-Mer (OOV), for assessing the vertical flux of carbon in the open NW Mediterranean. The DYFAMED station is one of the few long-term sampling sites of sinking particulate matter in the world and the only biogeochemical time-series in the Mediterranean, allowing the study of seasonal and annual variability of carbon flux into the ocean and the response of the system to climatic changes over the last two decades.

The first deployment of moored sediment traps took place in spring 1986 and coincided with the Chernobyl accident. Initial results showed the rapid transfer of particle-reactive radionuclides of atmospheric origin through the ocean water column and the role that organisms play in this transfer. These unique results encouraged the development of the station into a time-series site, which became part of France-JGOFS (Joint Global Ocean Flux Study) in 1991 and, since 1995, an integrated Observation Site of the French CNRS/INSU. At the end of 2005, IAEA-MEL passed on the responsibility of this long term study to OOV, which took over the mooring maintenance.



Figure 4: Sediment traps (1 m² collection surface) Technicap PPS5 used to collect carbon containing sinking particles in the NW Mediterranean.

The DYFAMED sediment trap time-series mainly comprises data from 200 and 1000 m depth. Variability in particulate carbon fluxes over time result from the interplay of different processes, such as atmospheric (Saharan) dust deposition, physical mixing of the upper water column in winter and the plankton spring bloom. These controlling factors are more evident at 200 m depth, although a reasonably good agreement exists between particle fluxes at both depths over the years, indicating a relatively efficient transport of particles from the upper ocean to the deep sea.

Total particle flux has been increasing during the last 2 decades at both depths although the causes are not fully elucidated yet but likely related to recent environmental changes. This tendency is more noticeable at the deeper horizon (1000 meter depth, upper graph in fig. 5). However, when only particulate organic carbon (POC) is considered, the mean annual flux at 1000 m remained stable around an approximate value of 1.5 g POC m⁻² yr⁻¹ (lower graph in fig. 5), whereas at 200 m it was around 3 g POC m⁻² yr⁻¹. Extrapolated to the surface of the whole Mediterranean Sea, this would amount to a drawdown of some 480 kt of carbon per year. These results suggest that, even if the production of sinking particles is enhanced in the upper ocean as a response to increased atmospheric CO₂ levels, the sequestration of anthropogenic carbon in the deep ocean is not straightforward, and seems to be modulated by more complex processes which are currently under study.

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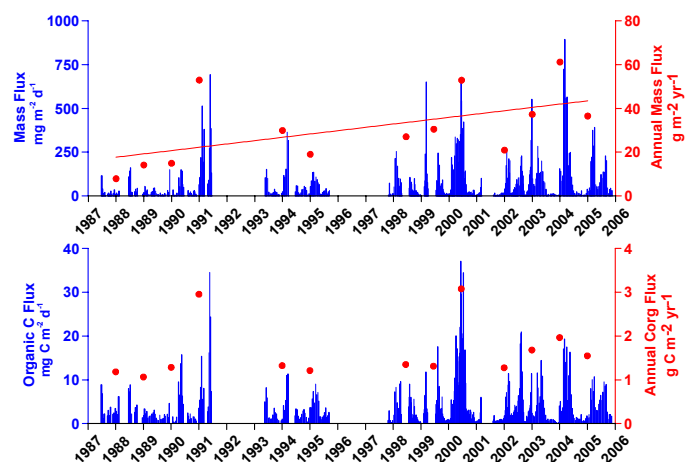


Figure 5: Time-series of total mass and organic carbon flux in the deep ocean (1000 m; 1987-2005) and trends over time.

Guest Article: Marine Sediments as a High-Resolution Archive of Climate Variability

The “debate” in the global climate debate arises partly because of uncertainty about natural variability in global climate. The instrumental record (daily temperature, pressure and rainfall measurements, supplemented more recently by satellite imagery, upper atmospheric monitors and marine buoys) only extends back to the middle of the nineteenth century, and the perennial question is “how certain can we be that this record contains all possible or relevant variation?” To look further back in time, researchers in the discipline of palaeoclimatology study records (proxies) of climate change preserved in rock, sediment or biological materials. A well-known example of a proxy in the natural environment would be the changes in the thickness or density of tree rings in response to changes in precipitation. Most individual proxies have ambiguous interpretations with respect to climate and it is necessary to investigate several from the one location (called a multiproxy study) in order to unravel the complete story. To construct a global picture of prehistoric climate change, scientists must study proxies from a range of surface habitats, from marine to terrestrial and tropical to polar, just as it is necessary to have a number of weather stations to build up a picture of regional or national rainfall distribution.

Six criteria of an ideal palaeoclimate-record: **1.** high resolution, preferably annual or seasonal, **2.** responsive to small changes in climate variables, **3.** closed system, **4.** record a continuous time series, **5.** globally distributed **6.** be datable.

The current suite of natural archives includes corals, ice cores, tree rings, varved sediments and speleothems, but none meet all of the ideal criteria. Therefore it is necessary to cross correlate both records and proxies, thereby increasing uncertainty in interpretation. Corals contain seasonal or sub-seasonal growth rings that record variables such as sea surface temperature and salinity, but are generally short in their time span with individual colonies living no more than about 100-150 years. Ice cores and tree rings have annual or sub-annual “growth” patterns, and can persist continuously for 10s to 100s of thousand years but are restricted in their geographic range, as indeed are corals. Still, these sources have proved invaluable in increasing our knowledge of climate variability beyond the instrumental period.

Sedimentary records of climate change have mostly proved less than ideal as high-resolution climate records. The pattern of accumulation of sediments is generally not a linear, consistent or complete record of time. This is particularly true in the deep oceans where the rate of sedimentation is so slow that decadal or even centennial-scale resolution is often impossible and even then this record can be further smeared by the activity of benthic microbes churning the sediments. Deep marine sediments have, however, yielded an excellent global picture of millennial climate variability. At this scale waxing and waning of climate can now be confidently attributed to regular variations in the pattern of the Earth’s movement around the sun and on its axis. Orbital forcing has been a major driver of glacial advance and retreat over at least the past 2 million years.

In some parts of the ocean though, physical and chemical conditions combine to allow the accumulation of high-resolution, long time series records. One such location is the upwelling zone located along the tropical Pacific coast of South America. Here, a combination of oceanographic conditions linked with regular oscillations in the pattern of atmospheric circulation in the eastern equatorial Pacific Ocean, produce the feared climate phenomena known variously as El Niño, El Niño-Southern Oscillation, or ENSO.

In one of the projects of CRP K41009 (Nuclear and Isotopic Studies of the El Niño Phenomenon), we are studying the sedimentary history and chemistry of biogenic layers formed over the past 20,000 years, the period since the end of the last glaciation. From the instrumental record we know that ENSO events occur reasonably regularly every 2 to 7 or so years and on average they last for eighteen months. The

layers in our sedimentary record (fig.6) yield a pattern of interannual accumulation, and geochemical data support a warming of sea surface temperature associated with the darker layers. Both are consistent with an

ENSO interpretation.

Once an ENSO origin of layers is established, it is necessary to tightly constrain their age. In this case we have extracted organic matter from the sediments at regularly spaced intervals for radiocarbon dating. These



Figure 6: Split core from ODP Site 201-1227B, showing the interval from 21-64 cm below sea floor. Age of sediments is about 16,000 years. Image is contrast enhanced to highlight sedimentary layering.

data have defined a geochronological sequence back to 20,000 yrBP (fig.7) and show that sediment accumulation rates remain consistent for periods of up to 3000 yr. During two periods (the past 2000 years, and immediately after the last glacial zenith) layers are at sub-decadal temporal resolution, well within the range of known ENSO variation. Time series analysis reveals a consistent pattern of ENSO activity characterised by periods of relative stability of the interannual frequency mode separated by sudden switches in the mode. The periods of stability fall in the range of 200-500 years, with the mode switch taking place during a single ENSO event. The implications are that pre-industrial ENSO seems to be characterised by periods of century scale mode stability, separated by sudden changes in frequency and intensity.

Contributed by Greg Skilbeck, University of Technology, and David Fink, ANSTO, Sydney, Australia

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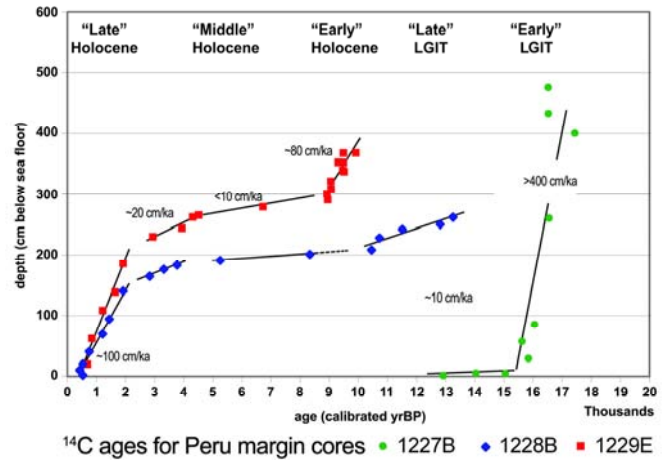


Figure 7: Diagram showing the time-depth relationships defined by radiocarbon dating of organic material in three Peru margin cores. Numbers in graph are sediment accumulation rates in cms per thousand years.

Isotopic Tracking of Cold Seeps in the Black Sea

A huge amount of water is stored in ocean sediments as well as in cracks and fissures of the oceanic crust. Due to gradients in density, pressure and temperature these fluids are mobile and emanate at the ocean floor. As these fluids have reacted with the sediments and oceanic rocks these fluids are enriched in several elements and thus can be an important source of matter influencing the oceans geochemical balance. During the past decades discharges of fluids (or cold seeps) at continental margins have been widely reported. Meteor (fig. 8) cruise 72/1 (principal investigator: Dr. R. Seifert, University Hamburg, Germany) investigated cold seeps in Ukraine waters of the Black Sea from 6-20 February 2007.

The major objective of the cruise was the observation and sampling of cold vents using the ROV (remote operating vehicle) QUEST (University Bremen,

Germany) (fig. 9). Furthermore, detailed water column sampling as well as sediment coring (investigation of sediment pore water) was conducted. The Marine Environment Laboratories participated in the cruise with the following objectives:

1. Measurements of radium isotopes (^{223}Ra , ^{224}Ra , ^{226}Ra , ^{228}Ra) for the determination of fluid emanation rates.
2. Sampling of surface waters along the cruise track for radium isotopes for estimating Submarine groundwater discharges.
3. Sampling of a water column ^{137}Cs profile and comparison of concentrations with previous measurements to investigate the evolution of ^{137}Cs concentrations.

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Figure 8: Research vessel R/V Meteor at sea.



Figure 9: QUEST launch from R/V Meteor (© MARUM, Univ. Bremen)

Newly Revitalized GESAMP



The UN Joint Group of Experts on Scientific Aspects of Marine Environmental Protection (GESAMP) was established in 1969 specifically to advise several UN bodies on the growing problems of marine pollution. Over the years, more than 500 scientists have participated in GESAMP and its working groups, and the UN advisory body has produced some 45 technical reports on a wide spectrum of marine environmental issues, including four broad assessments of the state of the global marine environment (see: www.gesamp.org). In 2000, the eight sponsoring agencies commissioned an independent review to evaluate how GESAMP could be improved and be more relevant to the UN, regional and non-governmental organizations, Member States and a wider segment of the marine scientific community. The review, completed in 2001, strongly recommended that GESAMP be continued but that it should incorporate many changes in the way it operates, its products, product delivery and its sponsorship, all of which was aimed at making GESAMP the world's first choice for marine environment protection advice and guidance.

As part of the revitalization process, an agreement was signed by IMO and IAEA in December 2006 under which both agencies agreed to work jointly in the implementation of certain activities aimed at giving the Group a new corporate image and improving its means of interaction with a greater number of Member States, organizations and environmental scientists dealing with the marine issues. These activities focus primarily on two major tasks: 1) re-structuring of the GESAMP web-site, and 2) development and operation of a GESAMP Pool of Experts. Collaborative work on these tasks has been carried out by an IAEA-MEL consultant who oversees the project, an IAEA-MEL IT specialist, and an IMO GESAMP officer who is based in London. The results presented at the 34th session of GESAMP

held in Paris (7-11 May), were well received by the GESAMP members and the Executive Committee, and GESAMP now has for its use an interactive web-site which will greatly facilitate the future work programme of GESAMP and allow qualified marine environmental scientists to register as potential GESAMP experts in the newly created Pool of Experts database. Other new features currently being developed and designed by the team in collaboration with IAEA's Publishing Section are the new GESAMP logo (see above), a promotional leaflet, poster and power-point presentation, and a standard publication style and layout for GESAMP reports and studies.

Also during the 34th Session, GESAMP sponsored a unique, one day workshop on "Identification of Themes of Mutual Interest between GESAMP and Regional Organizations". The workshop brought together representatives of some 18 regional organizations interested in GESAMP's activities. Not only did this event introduce GESAMP to organizations unfamiliar with GESAMP activities, but it was very useful for the new GESAMP to learn at first-hand, the regional organizations' specific needs in the area of marine environmental advice, assistance and specific training. Other highlights of GESAMP 34 were the nomination of seven new GESAMP members, three of whom have had close working relationships with IAEA-MEL, and the establishment of four new Working Groups covering newly emerging issues of deep water fisheries, offshore mariculture, threats posed by persistent organic pollutants (POPs), and atmospheric input of chemicals in the ocean. Both the GESAMP Session, the first held in four years, and the special regional workshop were very much appreciated by the organizers and participants and all agreed that the "New GESAMP" has been successfully launched.

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Training Course in the Kingdom of Bahrain

Within the **Regional Organization for the Protection of the Marine Environment (ROPME)** programme, MESL was requested to conduct national training courses on the analysis of organic pollutants such as chlorinated pesticides and petroleum hydrocarbons in all of the Gulf countries. The 2007-2008 programme started with a training course in Qatar (fig.10).



Figure 10: Official opening of the training course in Qatar

In April-May another course was organized in the Kingdom of Bahrain. The laboratory of the General Directorate for Protection of Environment and Wildlife (fig.11) requested a training course on the use of their new GC-MS for the quantification of the poly-aromatic hydrocarbons (PAHs) in the marine environment.

Despite the Kingdom's abundant resources in petroleum hydrocarbons, one can observe big efforts for preserving the quality of their environment.

A most spectacular example is the construction of a twin tower building for offices and apartments that will be largely self-sufficient in energy via 3 wind propellers shown in figure 12.



Figure 12: "Wind-tower" with the 3 propellers that provide the electricity for the building.



Figure 11: Dr. H. Juma working with the GC/MS in the laboratory

The towers are built in front of the sea and the marine breeze will be enough to activate the propellers. This technique, if efficient, could be used in many other countries to reduce CO₂ and the atmospheric pollution from burning fossil fuels.

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Workshop: Isotopic Dating of Polluted Sediments

The TC funded Regional Workshop on "Reference Methods and Procedures in the Use of Nuclear Techniques to Address Management Problems of Coastal Zones in the Caribbean Region" (RLA 7012) took place in the headquarters of the Oceanographic Institute of Venezuela, Universidad de Oriente, from 14-18 May 2007. This workshop was focused on the methodologies needed to reconstruct the pollution history for heavy metals, hydrocarbons and pesticides, from dated sediment profiles. As a result of the workshop, a harmonized IAEA guidebook is being prepared for the sampling and analysis of marine sediment cores from the region, taking into account the available regional capabilities. The Workshop, organized by the IAEA, was attended by experts from Cuba, Mexico, Nicaragua and Venezuela.



Participants to the workshop, Oriente Venezuela, 14-18 May 2007

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Second SHOTS Workshop

Scientists from Japan, Slovakia and the IAEA met in Monaco from 25-29 June 2007, to discuss recent advances and future activities of the Southern Ocean Hemisphere Tracer Studies (SHOTS). The use of tritium and radiocarbon is a well-established technique nowadays to trace ocean circulation and deep water formation in the oceans. Joint studies have also revealed that ^{137}Cs and ^{239}Pu appear to track the intrusion of North Pacific waters to the Southern Ocean. Differences between bomb fallout radiocarbon and other anthropogenic radionuclides show that these can provide further insights in the global circulation in the southern hemisphere.

The workshop participants shared recent results derived from the BEAGLE 2003 cruise (organized by JAMSTEC, Japan) and discussed the opportunity to present them as a Special Issue of a well known oceanographic journal. New results might have important implications on the CO_2 absorption capacity of the deep ocean and therefore in climate change mitigation.



Participants to the 2nd SHOTS workshop, IAEA Monaco, 25-29 June 2007

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Meeting of ARASIA Member States

The TC project RAS/7/018 assists its members to develop national capabilities to monitor and assess marine radioactivity. Marine resources are important to these countries and the Governments of the ARASIA Member States have addressed the issue of environmental protection including the Marine environment through their environment protection laws. Therefore, the setup of a functional monitoring programme became an important strategic objective for the governments. Moreover, the assessment and control of marine pollution, in particular transboundary pollution, require a regional approach. The project objectives are:

- To assist ARASIA Member States to coordinate their efforts to protect and rehabilitate the marine environment.
- To harmonize sampling and analytical methodologies on a regional scale to be made or kept consistent with capabilities developed in regional technical co-operation projects in other areas of the World Ocean, such as the Black Sea, the Mediterranean and the Caribbean.

- To maintain the skills developed through training via a regular monitoring programme, which will feed validated data into a regional database and then into the Agency's global web-based MARIS database.

Ultimately, this will ensure comparability of data with a wider network of marine laboratories, allowing a more comprehensive assessment of baselines, sources and potential contamination events.

The main purpose of the first coordination meeting, held at the IAEA Marine Environment Laboratories from 18-20 April 2007, was to review and amend the work plan of the project in order to harmonize and coordinate the member states' on-going national efforts and to facilitate and promote joint work during 2007/2008. The national project coordinators presented Country Reports on the current priorities and focus areas of their national programmes in the field of marine monitoring. The meeting agreed to conduct a first "Regional Advanced Training Course on Sampling, Sample Preparation and Analysis for the Measurement of Radionuclides in the Marine Environment" in Monaco.

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Marine Technical Co-operation (TC) Projects

PROJECT ID	PROJECT TITLE	MEMBER STATES ¹	TECHNICAL OFFICER
AZB9004	Development of National Capabilities for Radionuclide Monitoring	AZB	Iolanda Osvath
CHI7010	Application of Receptor Binding Assays for Mapping and Monitoring of Shellfish Toxins	CHI	Florence Boisson
CHI7011	Development of Nuclear Technologies and Information Technologies for an Early Warning Environmental Observatory Centre for Red Tide	CHI	Florence Boisson
CUB7006	Strengthening the National Environmental Monitoring System in the Marine Ecosystem	CUB	Michel Warnau
ELS7002	Detection of Marine Toxins through the Use of the Radioassay Method in El Salvador	ELS	Florence Boisson
GUA7002	Strengthening the National Environmental Monitoring System in the Marine Ecosystem	GUA	Michel Warnau
INT7014	Transfer of Neurotoxin Receptor Binding Assay	AUL, CPR, MAL, NAM, PAK, PHI, SAF, USA	Florence Boisson
INT7015	Transfer of Receptor Binding Assay for Harmful Algal Toxins	AUL, CPR, MAL, NAM, PAK, PHI, SAF, USA	Florence Boisson
INT7016	Receptor Binding Assay for Harmful Algal Toxins	ANG, AUL, CHI, CPR, KEN, MAL, NAM, NZE, PAK, PHI, ROK, SAF, THA, TUN, URT, USA, VIE	Florence Boisson
JOR2005	Marine Radioactivity Assessment of Aqaba Gulf Area	JOR	Iolanda Osvath
JOR7005	Assessment of the Marine Radioactivity in the Area of the Gulf of Aqaba (Phase II)	JOR	Iolanda Osvath
KUW2004	Measurement and Assessment of Radionuclide Concentrations in the Coastal Marine Environment	KUW	Mats Eriksson
MAG5013	Assessment of the Environmental Degradation of the Antsiranana (Diego Suarez) Bay in the North of Madagascar	MAG	Mike Campbell
MOR7003	Remote Environmental Monitoring of the Upper Sea in the Strait of Gibraltar	MOR	Iolanda Osvath, Mats Eriksson
PAK7003	Monitoring of Water Pollution in Terrestrial and Marine Environment	PAK	Jean-Pierre Villeneuve
RAF7005	Coastal Zone Management, Phase I (AFRA II-6)	ANG, MAR, NAM, NIR, SAF, URT	Florence Boisson
RAF7007	Coastal Zone Management, Phase II (AFRA II-11)	ANG, KEN, NAM, SUD, URT, ZAF	Florence Boisson
RAF7008	Enhancing Regional Capability for the Assessment of Contamination in the Marine Environment	URT	Mats Eriksson and others
RAS7011	Enhancing the Sustainability of the Marine Coastal Environment (RCA)	AUL, BGD, CPR, IND, INS, MAL, PAK, PHI, ROK, SRL, THA, VIE	Ross Jeffree
RAS7016	Establishing a Benchmark for Assessing the Radiological Impact of Nuclear Power Activities on the Marine Environment in the Asia-Pacific region (RCA)	AUL, BGD, CPR, IND, INS, MAL, MON, MYA, PAK, PHI, SIN, THA, VIE	Ross Jeffree
RAS7018	Upgrading Regional Capability to Assess Marine Contaminants in the ARASIA Member States	IRQ, JOR, LEB, SAU, SYR, UAE, YEM	Jan Scholten Mats Eriksson Iolanda Osvath
RAS8095	Improving Regional Capacity for Assessment, Planning, and Response to Aquatic Environmental Emergencies (RCA)	AUL, BGD, CPR, IND, INS, MAL, MON, MYA, PAK, PHI, ROK, THA, VIE	Jan Scholten
RER7003	Marine Environmental Assessment of the Mediterranean Sea	ALB, BOH, CRO, CYP, GRE, MAT, SCG, SLO, TUR	Iolanda Osvath, Jae Oh
RLA7012	Use of Nuclear Techniques to Address the Management Problems of Coastal Zones in the Caribbean Region	COL, COS, CUB, DOM, FRA, GUA, HAI, HON, JAM, MEX, NIC, PAN, VEN	Joan Albert Sanchez-Cabeza
SAU7002	Radiological Monitoring of the Marine Environment	SAU	Mats Eriksson Jan Scholten
THA7003	Use of Nuclear Based Techniques for the Study of Shellfish Biotoxins	THA	Florence Boisson
UAE7002	Environmental Monitoring Programme: Radioecology of the Coastal Environment	UAE	Mats Eriksson Jan Scholten

¹ For full names of Member States abbreviations see: http://tc.iaea.org/tcweb/abouttc/terminology/Country_codes.pdf

Reference Material & Intercomparisons

MEL has a unique and long experience in running programmes of intercomparison (IC) exercises and proficiency tests for the analysis of radionuclides, organic contaminants and metals in various marine media at regional to global scale from few up to 150 laboratories. IC exercises allow laboratories to evaluate their performance and improve the quality of their data. Regional proficiency tests involving MS from the Black Sea, the Mediterranean Sea, the Caspian Sea, the Baltic Sea, Yellow Sea and the West Indian Ocean regions have been accomplished. Intercomparison materials are distributed free of charge to participating laboratories.

For further information, please contact S.Henry@iaea.org

SAMPLE	MATRIX	ORIGIN	STATUS
IAEA-384	Radionuclides in sediment	Fangataufa lagoon	Available; Report published soon
IAEA-385	Radionuclides in sediment	Irish Sea	Available; Report published shortly
IAEA-414	Radionuclides in fish flesh	Irish and North Seas	Available
IAEA-437	Radionuclides in mussel	Mediterranean Sea	Report finished; Process of ascribing property values started
IAEA-443	Radionuclides in sea water	Irish Sea	Exercise in progress in collaboration with OSPAR
IAEA-446	Radionuclides in fucus	Baltic Sea	Sample preparation in progress in collaboration with HELCOM
IAEA-418	¹²⁹ I in sea water	Mediterranean Sea	Exercise in progress
IAEA-158	Trace metals and methylmercury in marine sediment	Coastal UK	Available; Report published shortly
IAEA-436	Trace metals and methylmercury in tuna fish homogenate	Mediterranean Sea	Available; Report published, February 2007
IAEA-159	Organic contaminants in marine sediment	Coastal UK	Available; Report published; June 2007
IAEA-435	Organic contaminants in tuna fish homogenate	Mediterranean Sea	Available; Report published, February 2007

Training Courses

MEL has a long history of organizing training courses for Member States, regional organizations and other UN organizations. They cover a range of topics related to the application of radionuclides in marine studies and the analysis of non-radioactive pollutants. Applications should be made up to six months in advance through Governmental official channels. Recent and upcoming courses are listed below.

For further information, please contact S.Henry@iaea.org

HOST/LOCATION	PROJECT TITLE/IDENTIFIER	DATE
Training Centre of Karlsruhe Research Centre, Karlsruhe, Germany	Analytical Methods and Quality Management in Marine Environmental Radioactivity Studies RAS7018 "Upgrading Regional Capability to Assess Marine Contaminants in the ARASIA Member States"	July 2008
MEL, Monaco	Training course on organic pollutants	November 2007
MEL, Monaco	Determination of Heavy Metals in Marine Samples by Atomic Absorption Spectrometry	November 2007
Centro de Estudios Ambientales, Cienfuegos, Cuba	Sampling, Sample Preparation and Analysis for the Measurement of Radionuclides in the Marine Environment RAS7018 "Upgrading Regional Capability to Assess Marine Contaminants in the ARASIA Member States",	September 2007
Training Centre of Karlsruhe Research Centre, Karlsruhe, Germany	Analytical Methods and Quality Management in Marine Environmental Radioactivity Studies RER/7/003 "Marine Environmental Assessment of the Mediterranean Sea"	June 2007
Centre for Marine Research, Rudjer Boskovic Institute, Rovinj, Croatia	Sampling, Sample Preparation and Analysis for the Measurement of Radionuclides in the Marine Environment RER/7/003 "Marine Environmental Assessment of the Mediterranean Sea"	May 2006

Selected 2007 Publications from MEL

MEL publications for previous years are listed on the MEL website: <http://www-naweb.iaea.org/naml/publish.asp> . Below is a list of selected 2007 papers published in international peer reviewed journals.

- Reference material for radionuclides in sediment IAEA-384 (Fangataufa Lagoon sediment), Povinec, P.P. *et al.*, *Journal of Radioanalytical Nuclear Chemistry*, 273 (2) 383-393 (2007).
- Accumulation and transport behaviour of ²⁴¹americium, ⁶⁰cobalt and ¹³⁴cesium by eggs of the spotted dogfish scyliorhinus canicula, Jeffree, R.A., Oberhansli, F., Teyssié, J.-L. *Marine Pollution Bulletin*, 54, 912-920 (2007).
- Exploring the connection between ²¹⁰Po and organic matter in the northwestern Mediterranean, Stewart, G., Cochran, J.K., Xue, J., Lee, C., Wakeham, W.G., Armstrong, R.A., Masque, P. Miquel, J.C. *Deep-Sea Research I* 54, 415-427 (2007).
- Regional calibration of erosion radionuclides (²¹⁰Pb and ¹³⁷Cs): Atmospheric fluxes to soils (Northern Spain), Sanchez-Cabeza, J.A., Garcia-Talavera, M., Costa, E., Pena, V., Garcia-Orellana, J., Masque, P., Nalda, C., *Environ. Sci. Technol.*, 41, 1324-1330 (2007).
- Particulate organic carbon: natural radionuclide ratios in zooplankton and their freshly produced fecal pellets from the NW Mediterranean (MedFlux 2005). Rodriguez y Baena, A.M., Fowler, S.W., Miquel, J.C. *Limnology & Oceanography*, 52, 966-974 (2007).
- Barium fluxes and export production in the Mediterranean Sea. Sternberg, E, Jeandel, C. Miquel, J.C., Gasser, B., Souhaut, M., Arraes-Mescof, R., François, R. *Marine Chemistry* 105, 281-295 (2007).
- Arsenic: Is it worth monitoring in the Mediterranean Sea?. Warnau M., Gómez-Batista M., Alonso-Hernández C., Regoli, F. In: *Marine Sciences and Public Health - Some Major Issues*. CIESM Workshop Monographs n°31, Monaco, 83-86 (2007).
- Holocene fine-grained sediments from the Balearic abyssal plain: sedimentological and geochemical evidences of a size-graded turbidite. Zúñiga, D., Garcia-Orellana, Fabres, J., Calafat, A., Price, N.B., Sanchez-Vidal, A., Masque, P., Canals, M., Sanchez-Cabeza, J.A. *Marine Geology* 237, 25-36 (2007).
- Contribution of ²³⁰Th measurements to the estimation of the abyssal circulation. Marchal, O., Francois, R., Scholten, J. *Deep Sea Research* 54, 4, 557-585 (2007).

News and Announcements

Co-ordinated Research Projects (CRPs), meetings, cruises

In November 2007, MEL will coordinate the Regional Training Course "Use of Nuclear Techniques to Address the Management Problems of Coastal Zones in the Caribbean Region", which will be hosted by the Centro de Estudios Ambientales de Cienfuegos, Cuba. The course will be attended by about 25 fellows from the Caribbean countries.

The first meeting of the new Coordinated Research Project "Applications of Radiotracer and Radioassay Technologies to Seafood Safety Risk Analysis" will be held at MEL, Monaco, from 20-23 November 2007. Twelve Member States have already submitted proposals to join this CRP that is being coordinated by the Marine Environment Laboratory with the joint IAEA/FAO Division of Nuclear Techniques in Food and Agriculture.

In 2008 the Agency will initiate a Coordinated Research Project (CRP) on "Benchmarking calibration for low-level gamma spectrometric measurements of environmental samples", under joint coordination of the Monaco and Seibersdorf Laboratories. The CRP aims to co-ordinate the development of validated calibration methods relying on combined experimental and modelling approaches and to establish traceability of results through comprehensive quantification of measurement uncertainties associated with low-level gamma spectrometric analyses of environmental samples. The CRP is expected to run for 5 years. For further information contact i.osvath@iaea.org or p.martin@iaea.org

Second Symposium on the Ocean in a High-CO₂ World

The Scientific Committee on Oceanic Research,
the Intergovernmental Oceanographic Commission of UNESCO,
the International Atomic Energy Agency,
and the International Geosphere-Biosphere Programme
are planning a second Symposium
on the Ocean in a High-CO₂ World.



**The symposium
will be held in
Monaco on
6–8 October 2008**

**Registration and
abstract submissions
will be possible
starting 31 March 2008**

**The symposium will feature invited and contributed
oral and poster presentations on the following topics:**

- scenarios of ocean acidification
- effects of changes in seawater chemistry on nutrient and metal speciation
- ocean carbon system from deep-time to the present to the distant future
- palaeo-chemistry
- mechanisms of biocalcification
- impacts on benthic and pelagic calcifiers
- physiological effects, from microbes to fish
- adaptation and (micro)evolution
- fisheries, food webs, and ecosystem impacts
- biogeochemical consequences and feedbacks to the Earth system
- economic consequences
- CO₂ disposal

**Information about the meeting will be posted at
www.ocean-acidification.net, as it becomes available.**

**For additional information, please contact James Orr (J.Orr@iaea.org)
or one of the sponsors' representatives:
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