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Director's column

Dear colleagues,

Welcome to the fourth volume of our IAEA Marine Environment Newsletter.

The last six months have been a frenetically busy time for us in Monaco. Our Marine Programmes have been positively reviewed by the Standing Advisory Group on Nuclear Applications (SAGNA) and by an External Evaluation of our Programme. Both Groups report to the Director General, Mr Mohammed ElBaradei, and we hope that new investment in personnel and equipment may eventually result from their evaluations and feedback. We were honoured by the visit of His Serene Highness Prince Albert II of Monaco in March 2006 to our facilities (see page 8). HSH continues to take a personal interest in MEL's isotopic and pollutant analyses of biota and environmental samples from the Arctic environment which we sampled during His Highness' cruise in June 2005 (see Vol. 3. No 2. MEL Newsletter). This issue also shows that MEL has hosted several important workshops and meetings. The US Research Vessel *Endeavour* visited the port of Monaco in April and MEL hosted an informal reception for the crew. The visit was in connection with ongoing, joint MEL-US studies in ocean carbon sinks in the Mediterranean (the MEDFLUX programme). More recently, MEL has been involved in discussion with Gulf Member States for a Marine Radioactivity Baseline Study. Finally, I am pleased to note that our MEL Newsletter is clearly having a positive outreach with Member States, since we are currently witnessing a doubling in Member States requests through the TC Concept Proposals (2007-2008) for fellowships, courses and capacity building in marine environment. I hope you enjoy the updates in this issue and please do send us your comments.

US Research Vessel Endeavour visits Monaco

HSH Prince Albert II visits MEL

HSH Prince Albert II of Monaco receiving a commemoration of the Nobel Peace Prize award to the IAEA, presented by Director of IAEA Marine Environment Laboratory , Dr R Fauzi C Mantoura

To mark the centenary of his ancestor's arctic expedition, His Serene Highness Prince Albert II retraced a part of the original route in the vicinity of Svalbard Island before completing a trip to the North Pole by dog sled. The Svalbard expedition provided opportunities for MEL and other scientific organisations based in Monaco to undertake research at a remote location within the sensitive arctic environment. Members of the MEL team returned with samples of zooplankton for studies of the uptake and bioaccumulation of radionuclides and other contaminants. Samples of the Ocean Quahog, a very long-lived marine bivalve mollusc, were also subsequently sampled to study shell laminations which provide information as an archive of long-range contamination and changes in temperature of surface sea waters.

HSH Prince Albert II of Monaco tour of IAEA Marine Environment Laboratory, March 2006.

His Serene Highness visited the MEL facilities in March 2006 to be briefed on the progress of the scientific work stemming from his expedition.

DG awarded the Crans Montana Prize in Monaco

In June, IAEA Director General Mohamed ElBaradei will be awarded the Prix de la Fondation by the Crans Montana Forum in Monaco. Dr. ElBaradei will not be able to attend the award ceremony in person; it will be accepted on his behalf by Mr. Akira Omoto, Director of the Division of Nuclear Power.

The Crans Montana Forum was formed in 1989, as a way of bringing together leaders from government and the private sector to try to address issues arising from the end of the Cold War and the breakup of the USSR. Each year, it brings together roughly 1200 such leaders to deliberate on current global issues. The motto of the Forum, "Committed to a More Humane World", is characteristic of the very broad range of issues considered at its meetings.

The Forum gets its name from the original meeting place in the resort of Crans Montana in Switzerland. In 2005, the annual meeting was moved to Monaco, to be held loosely in conjunction with the "Monaco World Summit," for ease of access and mobility for participants.

The Director General has noted with appreciation the broad range of issues addressed by the Crans-Montana Forum, and how closely interlinked these issues are in the context of global security. At the IAEA, we have long been conscious of the direct linkage that exists between security and development, and how both are related to peace. If we are to build a more secure global society, it will clearly take active engagement on the part of groups like the Crans-Montana Forum — working to develop solutions to security issues. It is in this spirit that the Director General has agreed to accept the recognition of the Forum, as a vote of confidence in the work of the IAEA.

Guest article: The Western Indian Ocean programme: The perspective from CSIR, Durban

The WIO-LaB project, which is a four year programme, aims to intensify the battle against marine pollution by land-based activities as well as determine the extent and magnitude of pollution of coastal waters in order to develop systems that will counter the damage. The project is furthermore a direct follow-on to the 2002 World Summit for Sustainable Development (WSSD) and the related Johannesburg Plan of Implementation, which called for "advanced implementation of the Global Programme of Action for the Protection of Marine Environment from Land-based Activities."

The WIO-LaB project will establish information, in partnership with participating countries, towards the development of management guidelines. The WIO-LaB project encourages full participation of the participating countries in the researching and management of pollution impacts. To this end the project has included training courses on various aspects of marine chemistry.

The principal beneficiaries of the project are those who livelihoods depend on the marine and coastal resources of the WIO region. Governmental and non-governmental institutions will play a key role in the implementation of the project activities thus enhancing capacity within these institutions as well as complementing and strengthening existing national efforts.

Marcellin Rajaonarivony (Madagascar) receives his certificate from Ashley Naidoo (CSIR) watched by Mike Campbell (MEL and Roland David (CSIR)

The WIO-LaB Project addresses major land-based activities in the WIO region, and in this respect is designed to serve as a demonstration project for the "Global Programme of Action for the Protection of the Marine Environment from Land-based Activities" (GPA) of UNEP. The Project has three major objectives:

- Improve the knowledge base; establish and demonstrate regional strategies for the reduction of stress to the marine and coastal ecosystem by improving water and sediment quality;
- Strengthen the regional legal basis for preventing land-based sources of pollution, including through the implementation of the GPA;
- Develop regional capacity and strengthen institutions for sustainable, less polluting development, including through the implementation of the Nairobi Convention and its action plan.

The Council for Scientific and Industrial Research (CSIR) of South Africa's Natural Resources and Natural Environment Unit has been appointed as the Regional Activity Centre (RAC) for the Western Indian Ocean Land Based Sources of Pollution (WIO-LaB). As the RAC the CSIR will host training workshops and coordinate activities on research into and monitoring of water, sediment and biota quality and the impact on pollution on environment functioning in general. The CSIR, in its capacity as RAC, hosted the first training course. Dr Mike Campbell of the IAEA Marine Laboratory directed and delivered the course in the analyses of trace metals in marine sediments. The course was delivered between the 5 and 12 of May (2006) in Durban, South Africa, at the CSIR campus and was attended by all participating countries in the UNEP Project: Addressing Land Based Sources of Pollution to the Marine Environment in the Western Indian Ocean. The participating countries include Kenya, Tanzania, Mozambique, South Africa, Seychelles, Comoros, Mauritius and Madagascar.

The training course exposed the participants to current methodologies and a range of equipment. A specialist session was held to demonstrate "in the field" sampling and marine sediment collection techniques. Participants at the course were selected as these candidates performed related functions in their home laboratories. This made for useful discussion and allowed technicians to fully utilize the expertise of Mike and the CSIR personnel as valuable resources in trouble shooting some common and unique queries. The marine laboratory of IAEA will continue to play a role in the WIO-LaB programme by directing the next training course at the CSIR, to be held from 22 May 2006, with a focus on marine organic chemistry and further contribute to compilation of regional monitoring plans and synthesis reports.

Contributed by Ashley Naidoo and Roland David, CSIR, Durban

MESL: A New Partnership with the GEF Project in the Western Indian Ocean Region

WIO-LaB PROJECT

Addressing Land-based Activities in the Western Indian Ocean (WIO-LaB) is a UNEP-GEF project involving eight countries: Comoros, Kenya, Madagascar, Mauritius, Mozambique, Seychelles, South Africa, and Tanzania. WIO-LaB is a four-year project that has a primary focus on some of the major environmental problems and issues of the region associated with the degradation of the marine and coastal environment due to land-based activities. Some aspects of the implementation rely on establishing a regional monitoring programme. In this vein, technical assistance from Marine Environmental Studies Laboratory (MESL) was requested.

MESL will initially provide technical support to underpin the regional monitoring programme. Such assistance includes conducting regional training courses, running interlaboratory studies to judge regional laboratory performance, and the provision of expert advice on pollution assessment and planning oceanographic expeditions. MESL will also assist the WIO-LaB Project to set up a Regional Activity Centre for marine pollution monitoring.

NATIONAL ASSESSMENTS

The new collaboration with WIO-LaB started in the summer 2005 with two missions by Stephen de Mora to the Western Indian Ocean region:

i) South Africa, Mauritius, and Madagascar, July 24-August 7, 2005;

ii) Mozambique, Tanzania, Comoros and Kenya, August 14-26, 2005. The Seychelles was not visited.

The purpose of travel was to assess national marine pollution monitoring and assessment capabilities, and thereby make recommendations for capacity building and training needs in the region. Twenty-one laboratories and government agencies in seven countries were visited. Discussions centred on the mandate of the laboratory to carry out marine pollution monitoring and the monitoring programme that they do undertake, including parameters measured. The laboratories were toured to examine the general infrastructure and instruments and to evaluate the QA/QC procedures in place. He also attended two meetings of the WIO-LaB Regional Working Group on Water and Sediment Quality Assessment and Monitoring that were held in Durban, South Africa, August 4-5, 2005 and Réduit, Mauritius, February 8-10, 2006.

REGIONAL MEETINGS

Participants at the inception meeting included all eight WIO-LaB National Focal Points, various national experts, three people from UNEP, including Peter Scheren, the WIO-LaB Project Manager, and Stephen de Mora (MESL).

Stephen de Mora (centre) visiting the Waste Water Laboratory in Réduit, Mauritius

Peter Scheren gave a broad overview of the project. The chief outcome anticipated for the two meetings was expected to be a framework for a regional marine pollution-monitoring programme, together with broad agreement on an implementation strategy. Stephen de Mora gave a presentation describing the expertise and experience of MESL as regards assisting regional monitoring programmes. Next there were national reports that outlined ongoing marine monitoring programmes, laboratory facilities and, in some cases, described in-house QA/QC procedures and pollution hot spots. Importantly, the participants agreed to a proposal to establish a Regional Activity Centre, in Durban, South Africa.
Stephen de Mora presented a talk entitled "A Strategy for a Regional Monitoring Programme" (RMP) and then facilitated a discussion on establishing an RMP in the context of the WIO-LaB Project. The participants agreed to two components: i) a water quality survey to measure standard water quality parameters, nutrients, chlorophyll *a*, and standard microbial water quality indicators; ii) a sediment contaminant survey to measure metals (Cd, Cr, Cu, Hg and Pb), total petroleum hydrocarbons and polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs) and chlorinated pesticides. Further details were elaborated at the second meeting in February and will be finalized in April, 2006. The first regional proficiency test for nutrients in seawater, metals in sediments and organic contaminants in sediments was completed in January 2006.

Contributed by Stephen de Mora

For more information, contact J.P.Villeneuve @iaea.org
(Stephen de Mora left the IAEA in May 2006)

Building analytical chemistry capacity in the WIO Region

In support of the UNEP-GEF WIOLab project (see page 3-4), staff from the Marine Environmental Studies Laboratory at MEL were asked to conduct two training courses for the sampling and analysis of sediments and biota for petroleum hydrocarbons and organochlorine compounds and trace element analysis by Atomic Absorption Spectrometry (AAS).

Training course participants

Durban, a city of some four million souls, is home to the largest ethnic Indian population outside of the sub-continent and also boasts the busiest port in South Africa. The city lies on the shores of the Indian Ocean in the Kwazulu-Natal region and is an important centre for tourism, with "the bush" and safari lodges just thirty minutes drive distant.

Amongst many other activities, Consultancy, Scientific and Industrial Research (CSIR) in Durban is responsible for monitoring water quality for microbiological, organic and heavy metal pollutants within the harbour and beach areas; providing reassurance to tourists that bathing is safe.

CSIR in Durban is located on the campus of the University of Kwazulu-Natal and they played host to the WIOLab trace analysis training course. The course attracted participants from Seychelles, Mauritius, Kenya, Mozambique, The Comoros and Tanzania. It covered aspects such as why trace analysis is important; basic concepts; quality control and quality management; marine sediment sampling; practical and theoretical aspects of AAS; proficiency tests and an introduction to elemental speciation. The lectures were supplemented and illustrated from my experiences of 11 years working for the IAEA both in Monaco and Seibersdorf (Austria). The practical sessions focused on hot-plate and microwave digestion methods, calibration and pipetting precision and, of course practical analysis of real samples by both flame and graphite furnace AAS. Without doubt, the highpoint of the course was the outing to Richards Bay Harbour (Durban) to see sediment collection demonstrated (by Roland David, CSIR) at three sites within the harbour – Roland's tales of a 3m Zambezi Shark once sighted within the harbour kept us all focused on the task at hand!

Once the initial regional sediment hotspot monitoring

Durban beach front

programme has been completed for the WIOLab project, the member states will be expected to develop national monitoring programmes. For this reason, networking within the project is very important and both CSIR and MEL made it clear that they would continue to offer advice and support long after the course ended. Judging by the excellent relationships rapidly established amongst the participants, networking will be highly effective within this project.

Launching the boat for sediment sampling

The organic analysis training course will be conducted shortly by Jean-Pierre Villeneuve.

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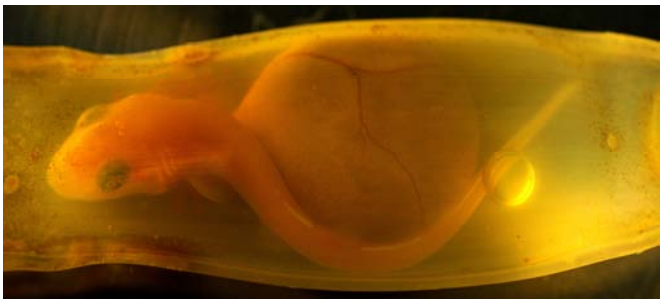
Radioembryology studies at the Radioecology Laboratory

The embryological stage of an organism's life cycle is typically more vulnerable to radiotoxic and chemotoxic impacts of contaminants in its environment, as the embryo advances through appreciable changes in its anatomy and physiology to adulthood. An experimental programme is investigating the degree of exposure of the embryos of marine organisms to water-borne contaminants, during their development to hatching.

These studies have begun with the embryo of the spotted dogfish *Scyliorhinus canicula* that has a long developmental phase of 4-6 months to hatching, following its laying into the aquatic environment. Radiotracer exposures to six radionuclides and metals (^{241}Am, ^{109}Cd, ^{57}Co, ^{134}Cs, ^{54}Mn and ^{65}Zn) showed that the encased embryos absorbed all six radioisotopes directly from seawater during short-term experimental exposure, demonstrating the permeability of the egg-case to these contaminants. Among different components of the encased embryo the egg case was the major repository (69-99%) of all six radioisotopes that were distributed throughout its wall. Egg case concentrations were as high as 10^3 for ^{57}Co and ^{65}Zn greater than their levels in water, making the egg case the major source of gamma radiation exposure to the embryo and potentially of radioisotopes for continued absorption by the embryo, following their absorption from the aquatic medium.



The encased embryo of the spotted dogfish

For further information, please contact
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SCOR UNESCO Workshop

The Scientific Committee on Oceanographic Research (SCOR) and the UNESCO Intergovernmental Oceanographic Commission convened a workshop involving 24 experts from 11 Member States to update the SCOR-UNESCO monograph on "Phytoplankton Pigment in Oceanography" (1998, Edited by S. Jeffrey, F. Mantoura, S. Wright). Pigment analyses (Chlorophylls and carotenoids by HPLC, with fluorescence detection) are unique and sensitive markers of phytoplankton, photosynthesis and fertility in the ocean and have become the most frequently measured marine ecological variable. The monograph was in high demand and two reprints have been sold out. The workshop was held at Marine Environment Laboratory (8-11 April 2006) and chaired by MEL Director Fauzi Mantoura. The delegates agreed the revised contents and selected the appropriate authors and editors. The new lead editor will be Dr Susanne Roy (Suzanne Roy [suzanne_roy@UQAR.QC.CA]).

Farewell to Steve de Mora, MESL Section Head

After seven distinguished and productive years at MEL Mr Steve de Mora, Head of the Marine Environmental Studies Laboratory has recently departed. During his time at MEL Steve had many important achievements including the following. He played a major role in designing and implementing the UNDP & ROPME environmental survey of shipwrecks in the waterways of Kuwait and Iraq and in co-ordination of the IAEA/UNEP/UNESCO-IOC Inter-agency Programme on Marine Pollution. He also secured very appreciable and stable extra budgetary funding for MESL. These financial resources maintained the viability of MESL and salaries of several staff members, including his own. To achieve these revenues Mr de Mora secured new funding partners and also formulated new collaborations with several Global Environmental Facility (GEF) Projects in the Caspian Sea, Black Sea, Red Sea/Gulf of Aden and Western Indian Ocean. We wish him well in the development of his own environmental consultancy company.

Steve de Mora can be contacted at stephen.demora@gmail.com

Studying the oceanic dispersion of radionuclides: A contribution to GEOTRACES

The oceanic circulation is one of the key processes controlling our climate. Therefore it is vital for understanding and for predicting climate change to learn about the processes controlling the formation of water masses, their spreading into the different ocean basins as well as the variability of these processes with time.

Natural and anthropogenic radionuclides are useful tools for the understanding of this circulation. For instance, the release of anthropogenic radionuclides like ^{90}Sr and ^{137}Cs from the Sellafield and Le Hague nuclear reprocessing facilities has tagged the water masses which spread into the Norwegian-Greenland Sea and Arctic Ocean. By measuring the isotopes along the flow path, one can estimate the transit times of the waters, for instance.

Recently the radionuclides ^{99}Tc and ^{129}I have become the focus of scientific research. This is because they were released in relatively recent times from the reprocessing plants, they behave conservatively in sea water and have longer half-lives than ^{137}Cs and ^{90}Sr and thus make it possible to observe their spreading over longer periods of time. ^{99}Tc, first released in the '70's, has now reached the central Arctic Ocean and this characteristic spreading helps to validate ocean circulation models.

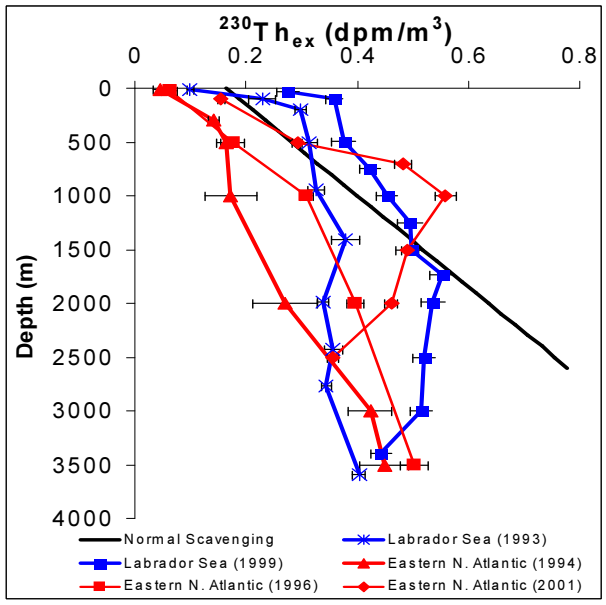

Figure 1: Changes in ^{230}Th concentrations in the North Atlantic between 1993 and 2001; black line indicates the predicted ^{230}Th distribution if thermohaline circulation in the North Atlantic would further slow down (Labrador Sea. Moran et al., EPSL 203,2002).

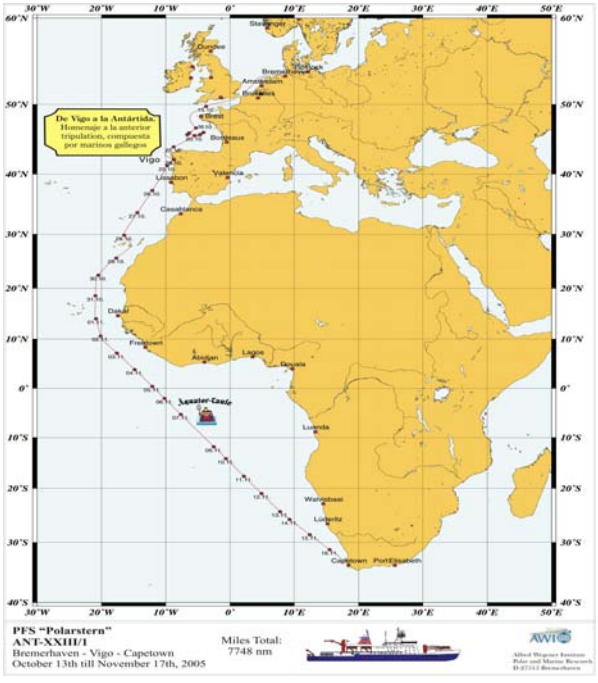

Figure 2: Course of the POLARSTERN XXVII-1 Cruise

Also, natural radionuclides like ^{231}Pa and ^{230}Th play an important role in assessing oceanic circulation. The advantage of these isotopes is that they are produced in the water column by the decay of uranium isotopes at a constant and well known rate. In comparing this production rate with their distribution in the water column, information on, for example, ventilation time scales, can be deduced. In certain areas of the North Atlantic the concentrations of ^{230}Th has increased by up to a factor of 3 in the past ~ 10 years, an effect which can be related to a slow down of the formation of new water masses in the Labrador Sea, a very important process influencing our climate (Fig. 1).

GEOTRACES Pre-Pilot Study

Our ability to use radionuclides as tracers for oceanic processes is, to a large extent, driven by recent advances in clean sampling and analytical techniques as well as high precision mass spectrometry measurements. These modern techniques have been one of the stimuli of the recently implemented international research programme GEOTRACES which aims at a coordinated research on oceanic cycling of trace elements and their isotopes. As a GEOTRACES pre-pilot study the POLARSTERN cruise ANTXXIII-1 (13 October – 17 November 2005) was intended to test a "GEOTRACES principal"; to measure a wide range of isotopes and trace elements in parallel in the same water mass. Such a sampling strategy allows a mutual interpretation of trace elements and isotopes and thus would significantly increase our understanding of geochemical cycling. The MEL Radiometrics Laboratory sampled surface waters during this cruise which will be measured for anthropogenic (^{238,239,240}Pu, ^{137}Cs, ^{90}Sr, ^{241}Am, ^{99}Tc, ^{129}I) as well as natural (^{232,230}Th, ^{231}Pa, ^{210}Po, ^{210}Pb) radionuclides. As the cruise track of POLARSTERN (Fig. 2) covered gradients in aeolian dust supply as well as bioproductivity, this sampling campaign will allow us to investigate the behavior of trace elements and isotopes in diverse oceanic environments

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Assuring the Quality of organic contaminants data for MEDPOL

In 1988, in parallel with the commencement of Phase II of the MEDPOL project, a programme of Quality Assurance visits to participating laboratories from the Mediterranean Sea area was initiated, aimed at improving the quality of the data reported. During the Phase II period, from 1988 to 1996, I made 20 visits to laboratories in charge of the MEDPOL organic pollutants monitoring programme. These visits were concentrated in the following countries: Albania, Croatia, Egypt, Lebanon, Morocco, Syria and Tunisia; Chantal Cattini (MESL) made one visit to Slovenia. Ben Oregioni (MESL, retired) also traveled to these countries for complementary Quality Assurance activities associated with trace metal analysis.

Since 1996, the MEDPOL policy about these QA visits had changed and now the request should be initiated by the laboratory itself, sent to their National MEDPOL coordinator for further submission to MEDU in Athens. To date, only one request for such assistance had been received, from a laboratory in Tunisia, related to the installation of an on-column injector in their gas chromatograph.

Now, a new Phase (Phase IV) of the monitoring programme is starting, and in order to assure the accuracy of the data reported to MEDPOL, I was asked to prepare a questionnaire to be sent to all participating laboratories to identify potential problems. I was also requested to visit two laboratories in Turkey (a country that I had never visited during the second phase of the project): the Institute of Marine Sciences and Technology of the Dokuz Eylul University in Izmir and the Institute of Marine Sciences of the Middle East Technical University in Erdemli, Mersin.

Izmir:

In Izmir, the laboratory is equipped with the necessary glassware for the extraction and treatment of samples. They have separate rooms for sample preparation and analysis of organics, although the sample preparation room is shared for the organic and for the inorganic work, the two instruments (GC and AAS) are located in different rooms. The only problem with their equipment is the very old, 1991 "Chrompack" gas chromatograph (Chrompack was long since bought by Varian and the instrument is no longer supported); it is impossible to find spare parts for this machine. The electron capture detector had become heavily contaminated with use and consequently, the response was very low. Enis Darilmaz (picture 1) and I tried to clean it, but I did not succeed within the limited time that I was staying there.

Stop Press: I am pleased to say that MEDPOL have responded positively to Izmir's request to support the procurement of replacement equipment and that an order has now been placed.

Picture 1: Mr. Enis Darilmaz (from Izmir laboratory) helping with the connection of the electrode to the electron capture detector.

Erdemli:

In Erdemli (picture 2), one of the technicians was a graduate of a training course in Monaco on the analysis of chlorinated pesticides and PCBs. The laboratory has received a brand new gas chromatograph equipped with an electron capture detector and a flame ionisation detector and they are well equipped with the glassware for the extraction and treatment of the samples. I discussed details of the analytical methodology with the team and was able to advise them on the brand and mesh size of the florisil, silica and alumina powder which would enable them to perform these kinds of analysis with better accuracy and precision.

Picture 2: Mr. Doruk Yilmaz (from Erdemli laboratory) translating my explanations to the young staff members from his team into Turkish.

For further information, please contact
Jean-Pierre Villeneuve, J.P.Villeneuve@iaea.org

EurOceans Workshop on Long-term Marine Observatories

IAEA-NAML hosted the European workshop on long-term fixed marine observatories that took place from 26-28 April 2006. The workshop was organized within the framework of work-package "Observing systems" of EurOceans. The European Network of Excellence for Ocean Ecosystem Analysis (EurOceans) is co-funded by the 6th Framework Programme (FP6) for Research and Technological Development of the European Community. The workshop's aim was to foster coordination of research activities at fixed observatories in the Atlantic, Baltic and Mediterranean seas (including the Black Sea); and the basic objectives of the workshop were (1) to learn from each other's experience and identify problems, (2) to develop collaborative links and (3) to establish a framework for future mutually supportive activities. The meeting covered a fairly broad range of associated activities from the technical and operational to data management, QC, data assimilation, modelling, funding and public outreach. During the first day and half of the meeting, activities and results from the 10 existing long-term European observatories were presented and plans for new observatories soon to be launched were discussed. Recent developments in American fixed observatories were also presented and EU funding of observatories discussed at length. Most observatories record data on physical and chemical parameters such as temperature, salinity, currents, oxygen, nutrients, etc. and a few also have a significant focus on the biogeochemistry of the upper ocean. This is the case of the Dyfamed observatory in the NW Mediterranean that NAML has been involved with for over 15 years, which measures particulate fluxes of several elements. During the second half of the meeting, the participants broke out into 3 discussion groups covering (1) moorings, sensors and telemetry; (2) data management and modelling; and (3) science, outreach and funding; to identify the factors that are preventing the full exploitation of the resources available. At the end of the workshop, in plenary session, the 3 groups reported on their discussions and development of plans for future opportunities in EU-FP7 were addressed. The workshop was attended by 32 scientists from 10 countries (France, Germany, Greece, Italy, Monaco, Netherlands, Norway, Spain, United Kingdom, USA) plus an EU-FP6 representative and 2 IAEA-NAML staff members. The workshop was of great success, stimulating significant exchanges between participants and serving as the seed for future developments of time-series observatories which can also serve as platform for training of partners from the region.

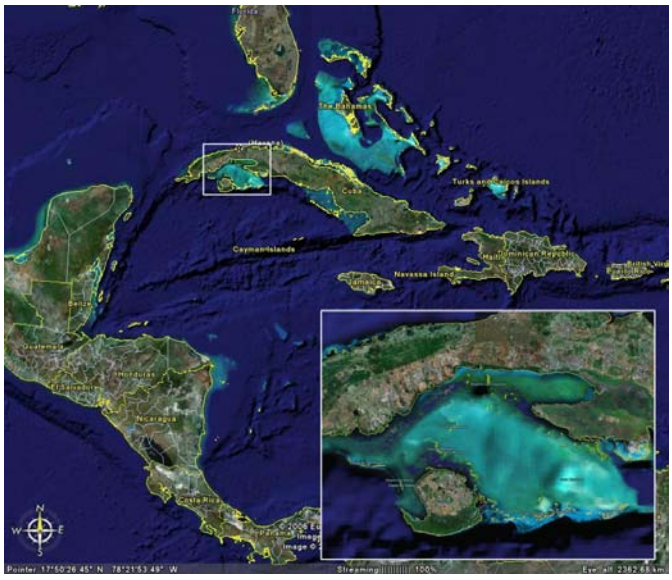
For further information, please contact J.C.Miquel@iaea.org

Participants to the EurOcean workshop at NAML

Recent changes in environmental conditions in Batabanó Gulf (Cuba) and possible impact on fisheries

By Misael Díaz Asencio and Marianella Mesa Albernas, Centro de Estudios Ambientales de Cienfuegos, Cuba.

Under the IAEA's Technical Cooperation project "Strengthening of the National System for Environmental Emergency of the Cuban Marine Ecosystem" (CUB/7/006) the authors have initiated a study of the changes in environmental conditions of Batabanó Gulf, one of the most important fishing areas in the Caribbean Sea, especially for lobsters. Batabanó Gulf is a reef lagoon with an average depth of 6 m and covers an area of 20,850 km^2. It is surrounded by small keys, coral reefs and sea grass beds and constitutes an important reserve of natural marine resources. In recent years mean lobster stocks have been decreasing, thus causing significant socio-economic problems in the region. The average catch has decreased from about 7000 t y^{-1} in the 80's to about 5000 t y^{-1} in the 90's. Possible reasons to explain this decline include fisheries management issues, fish diseases, the potential impact of pollution, changes in nutrient inputs to the bay and climate change.



Location of the Batabanó Gulf, Cuba

By using nuclear and isotopic techniques, the authors have attempted to investigate environmental changes that might be responsible for the observed trends. With the assistance of the IAEA's Marine Environment Laboratory in Monaco (MEL), the authors are reconstructing recent environmental changes in the Bay, such as changes in sedimentation rates and patterns, and pollution (by organic pollutants and heavy metals). In November 2005, several surface sediments and sediment cores were collected from representative zones of the Bay, under the direction of Dr. Mats Eriksson (research scientist at MEL's, Radiometrics Laboratory) and with the support of Cuban specialists from the Centro de Investigaciones Pesqueras and the Centro de Estudios Ambientales de Cienfuegos.

The authors were granted IAEA Technical Cooperation fellowships to learn and apply some of the many analytical techniques used for this project by MEL scientists. One of us (Misael Díaz Asencio) has been working, under the supervision of Dr. Joan-Albert Sanchez-Cabeza (Head of the Radiometrics Laboratory at MEL) on the characterization and dating of sediment cores. The work has included sample preparation, grain size analysis, elemental composition by X-ray fluorescence, ^{210}Po radiochemical analysis and counting by alpha spectrometry, and gamma spectrometry for the determination of ^{137}Cs and ^{226}Ra. Mean accumulation rates and sediment dating are performed by the application of a number of mathematical models. The second author (Marianella Mesa Albernas) has been working under the supervision of Dr. Imma Tolosa (Marine Environmental Studies Laboratory at MEL) on the determination of organic substances (natural and anthropogenic) in the sediments from the Bay. Other analyses performed at MEL include trace metals by ICP-MS, and carbon and nitrogen contents of sediments.

This work has required the integration of several of the analytical and technical capabilities of MEL and shows the great value of this laboratory to Member States. It would have been almost impossible to carry out this project in our country in a reasonable period of time and we are very grateful to all the staff at MEL who have helped us to acquire new analytical and technical knowledge, to carry out the research, to contribute to solving an important environmental and socio-economic problem in our country, and to demonstrate the usefulness of nuclear and isotopic techniques for integrated coastal zone management.

Sediment core sampling by divers

A long way to Pectinids

By Marc METIAN (PhD student).

My first contact with IAEA, and MEL in particular, was via an e-mail I read whilst studying for my bio-engineering degree at the Free University of Brussels, Belgium. This e-mail was sent to the scientific community of the university by my future supervisor, Mr Michel Warnau, who had recently left the university to take up a post in the Radioecology Laboratory (REL) section of MEL. This message described the activities and scopes of MEL and its involvement in training both young and experienced scientists in the application of nuclear techniques for studying the marine environment. The chance to carry out environmental protection studies using state-of-the-art technologies in an international and multicultural scientific environment was an incredible opportunity. I immediately decided to contact him and discuss the possibilities of research at MEL. A few weeks later, I was in Monaco, visiting the MEL facilities. This was totally amazing and, to me, had nothing in common with what I knew from my university environment. Entering the REL laboratories was like a revelation: up-to-date equipment, a clean and beautiful lab where everything had its place, small and large aquaria perfectly suited to the organism size that were in acclimation - a place where any ecotoxicologist would dream of working. Definitely, that was the place where I wanted to conduct the research for my Master's thesis. Thanks to the IAEA and the staff of REL, that was just what I was given the opportunity to do.

During my internship, I worked on bioaccumulation of radionuclides in a tropical bio-indicator species in the framework of a collaboration between REL and the French Research Institute for Development, New Caledonia. After six months at MEL, I presented my final MSc paper which was very well received at my home institution. But I hadn't had have enough radioecology. I wanted more! Therefore I decided to return to Monaco for a longer internship to broaden my skills and experience. During almost one year, I had the opportunity to work on lots of different aspects: geochronology and CHN analyses of sediment cores from Kuwait (^{210}Po dating) and studies on metal bioaccumulation and fate in marine organisms in samples obtained from highly contrasting environments (Antarctica, temperate and tropical zones).

During that time, I also devised a PhD project in collaboration with REL, but this meant I had to find a scholarship (definitely the main difficulty in Science these days!). Later, the day arrived! I found the subject as well as a scholarship thanks to another collaboration between my supervisor and his friend and colleague Mr. Paco Bustamante from La Rochelle University, France.

My PhD research deals with bioaccumulation and detoxification of radionuclides and heavy metals in edible scallop species (Pectinids) which are known to be extremely efficient bioaccumulators of pollutants. This work has three main objectives, viz. (1) to understand how these commercially important species bioaccumulate and, possibly, detoxify metals; (2) to identify general trends in bioaccumulation behaviour among scallop species from temperate and tropical regions; and (3) to assess the potential risk related to their consumption by human populations (taking into account both local and global consumption patterns). This study is being conducted both in the laboratory under controlled conditions and also in the field. Eighteen months down the line, the results appear to be very interesting and look set to support my PhD thesis with some valuable scientific publications published in highly rated international marine science journals.

Warmest thanks to MEL !

News and Announcements

World wide intercomparisons and AQCS activities

MESL is running two intercomparisons, IAEA-158 and IAEA-159 on the determination of trace elements and methyl mercury and trace organic contaminants in marine sediment samples. As always, both exercises are open to all MS laboratories; the reporting deadline for IAEA-158 is set to 30th September 2006 whereas IAEA-159 will conclude in the first quarter of 2007.

Update on the progress of RML AQCS activities: The reference material IAEA-414, Radionuclides in Irish and North Seas fish, is undergoing the final certification process. The report of the Worldwide Intercomparison Exercise IAEA-385, Radionuclides in Irish Sea sediment, is available and the material is in the process of final certification.

Training Courses

MESL will conduct two training courses on behalf of the MED POL programme on the analysis of organic contaminants and heavy metals in marine samples. The courses will be held at MEL and participation is via nomination by the respective MED POL National Co-ordinators only.

Co-ordinated Research Projects (CRP) and meetings

A Consultants Meeting in relation to the planned CRP, "Applications of Radiotracer and Radioassay Technologies to Seafood Safety Risk Assessment" will be held by REL at Monaco from 25-27 September 2006.

RML will be conducting a coral sampling expedition to the Raja Ampat islands, Indonesia, in 2006 as part of the CRP, "Nuclear and Isotopic Studies of the El Niño Phenomenon in the Ocean." The objective is to study the El Niño signal in the Western Pacific region.

In collaboration with the Helsinki Commission (HELCOM), MEL hosted the 11th meeting of the Monitoring of Radioactive Substances in the Baltic Sea (MORS) from 30 May – 2 June 2006 (see report below).

Forthcoming cruises

Barents Sea Project: In collaboration with the Bundesforschungsanstalt für Fischerei, Institut für Fischereiökologie (Germany) MEL will participate in a sampling cruise to the Barents Sea in 2006. The main objectives are to study i) the spatial and temporal changes of anthropogenic radionuclides within the Barents Sea (including the effect of deep water mass formation), ii) the interaction of transuranics with suspended matter and iii) the chronology of the deposition of anthropogenic radionuclides to bottom sediments.

HELCOM MORS-PRO meeting

The Secretariat officers and National Delegates (Denmark, Estonia, Finland, Germany, Latvia, Lithuania, Poland, Russia, Sweden) of the Helsinki Commission's subgroup on Monitoring of Radioactive Substances (HELCOM-MORS) meeting with marine scientists at the IAEA Marine Environment Laboratories.

Radionuclides have been closely monitored in the water, sediments, fish, aquatic plants and benthic biota of the Baltic Sea by the Helsinki Commission's Project for Monitoring of Radioactive Substances (HELCOM MORS-PRO) since 1984. The work is based on HELCOM Recommendation 26/3 and supports the Monitoring and Assessment Group (HELCOM MONAS). MEL has a long standing collaboration with HELCOM MORS-PRO, through analytical quality support, joint research and, more recently, data base development.

The eleventh meeting of the MORS Project was hosted by MEL in Monaco from May 30th to June 2nd, 2006. The meeting validated the data held in the HELCOM environmental and discharge databases and analysed results of intercomparison exercises and proficiency tests. The meeting welcomed the offer of IAEA-MEL to organise a proficiency test for the MORS laboratories using a fish reference material. It was agreed to further carry out a feasibility study for collaboration between HELCOM and MEL on the collection and preparation of a reference material for radionuclides in Fucus.

The HELCOM Indicator Fact Sheets on radioactivity in seawater, fish and sediment were updated during the meeting. Additionally the HELCOM Sediment Baseline Study was finalised and a work plan to produce a thematic assessment of long-term changes in radioactivity in the Baltic Sea covering the period 1984-2006 was developed. MEL will be responsible for the preparation of the chapter which sets the Baltic Sea radioactivity levels in the context of other regions of the World Ocean.

For further information visit http://www.helcom.fi

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