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Much has been underway at the IAEA Environment Laboratories from July to December 2017. The longstanding work on detecting and monitoring of mercury took on renewed importance as the Minamata Convention on Mercury entered into force in August. A report was also released in July which verified the reliability of data produced by Japanese laboratories analysing samples near the Fukushima Daiichi Nuclear Power Plant.

In addition, 2018 is the Third International Year of the Reef. Coral reefs, which provide diverse ecosystem services, are facing many problems from factors associated with climate change. Recent activities of the IAEA addressing these issues include a high-level workshop in Monaco on coral reefs and ocean acidification as well as working with Fiji where coral reefs are being degraded. All these projects, among others, are covered in this edition of the newsletter.

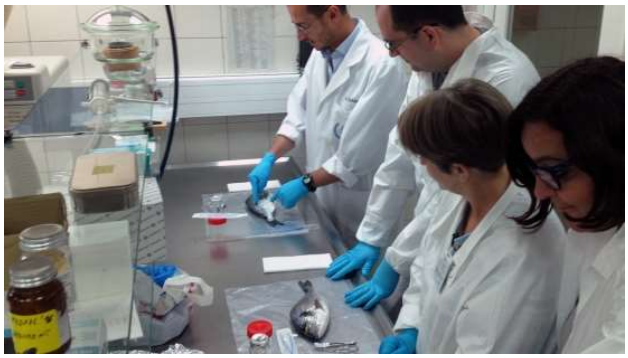
For more information on the activities of the IAEA Environment Laboratories, please visit www.iaea.org/nael

David Osborn
Director, IAEA Environment Laboratories

(Photos: J.L. Teyssié/IAEA)

Mercury in the marine environment and seafood

The IAEA's longstanding work with Member States on detection and monitoring of mercury in the marine environment has taken on added importance as the Minamata Convention on Mercury entered into force on 16th August 2017. The Convention prohibits production of numerous mercury-emitting processes and products and calls for limits to mercury emissions. Once the convention is ratified, Member States are required to establish and strengthen environmental mercury monitoring efforts. The convention was adopted in 2013, and so far has 128 signatories.



Scientists are trained on sampling techniques to monitor contaminants in fish. (Photo: R. Cassi/IAEA)

In high concentrations, mercury can have devastating health effects with impacts on the brain and nervous system. With global seafood consumption nearly doubling in the past three decades and over 1 billion people around the globe relying predominantly on marine food sources for their protein intake, monitoring of mercury ocean concentrations is of critical importance.

The IAEA Environment Laboratories in Monaco have been working for many years to increase Member States' capabilities to detect mercury and various mercury species including methylmercury and study transfer processes up the food chain. Nuclear and isotopic techniques have an important role to play in this. In fact, it is in part thanks to nuclear techniques that it was discovered that villagers in Minamata Bay, Japan—after which the Minamata Convention is named—had diets which were high in fish contaminated by mercury.

The IAEA's Marine Environmental Studies Laboratory, has developed and validated several analytical techniques for samples of water, fish, and sediment. To help with such analyses, the IAEA produces reference materials that include marine biota (organisms) and sediment. These can be used as part of quality control procedures to check the analysis of samples, to validate analytical methods and to establish traceability to internationally agreed references.

A scientist preparing a sample for analysis. (Photo: R. Cassi/IAEA)

The IAEA's Radioecology Laboratory uses tracers to study the accumulation of mercury in marine organisms and follow its transfer and bioaccumulation up the food chain. Specifically, it has studied its accumulation in important food sources such as clams, oysters, mussels and cuttlefish.

Mercury in the Environment

Released into the environment through industrial activities, coal power plants and artisanal and small-scale gold mining, mercury makes its way into the marine environment through various pathways such as rainfall and surface water. In addition, bacteria in sediment changes mercury to methylmercury, an extremely toxic element, which can have serious negative effects on organisms and tends to bioaccumulate as it is transferred up the food chain.

Japanese data on marine samples near Fukushima reliable

The IAEA, through its Environment Laboratories, released a report in July 2017 concluding that Japanese laboratories analysing seawater, marine sediment and fish samples from near the Fukushima Daiichi Nuclear Power Plant in Japan produce reliable data.

"Following the six missions organized in 2014-2016, the IAEA confirms that Japan's sample collection procedures follow the appropriate methodological standards required to obtain representative samples," the report states. It further points out that the results obtained in interlaboratory comparisons "demonstrate a high level of accuracy and competence on the part of the Japanese laboratories involved in the analyses of radionuclides in marine samples for the Sea Area Monitoring programme."

Preparation of the fish samples before measurement of their radioactivity level. (Photo: IAEA)

Seven Japanese laboratories and three labs from outside Japan participated in the comparisons. The latter included the IAEA's Environment Laboratories in Monaco as well as laboratories from Ireland and New Zealand that are part of the network of Analytical Laboratories for the Measurement of Environmental Radioactivity (ALMERA), which provided additional international expertise and transparency.

"Over 98% of the results were not significantly different from each other, which means the Japanese laboratories involved in the programme demonstrate a high level of consistency amongst themselves and with laboratories in other countries and the IAEA," said Iolanda Osvath, Head of the IAEA's Radiometrics Laboratory.

The IAEA has worked with the Japanese laboratories since 2014, following a request by the Japanese Government to assist it in ensuring that its sea area monitoring around Fukushima Daiichi maintains a high quality, and is comprehensive, credible and transparent. The next steps will build on the already completed work and involve more interlaboratory comparisons and proficiency tests.

Exploring the impact of microplastics on marine organisms

As many as 5.25 trillion plastic particles weighing 250 000 tons are floating in the oceans, according to recent estimates. In addition, toxic pollutants dissolved in seawater can adsorb, or latch onto, these plastic fragments. To help understand the processes and evaluate potential risks for marine ecosystems and seafood safety, the IAEA Environment Laboratories brought together a working group of global experts in the field of marine plastics in September 2017 as part of a new three-year Peaceful Uses Initiative Project. The goal is to use nuclear and isotopic applications to gain a better understanding of both the effect of these micro-plastics on organisms, as well as evaluate any additional risks of contamination from associated pollutants.

"While the visible impact of large plastic debris on marine environments has been well documented, the potential harm caused by microplastics is much less clear" said David Osborn, Director of the IAEA Environment Laboratories.

Plastic debris including micro-plastics are now present everywhere in the ocean and may be ingested and bio-accumulated in diverse marine organisms where they can pose a health risk to humans. Photo credit: J.L. Teyssie/IAEA.

Research at the IAEA Environment Laboratories will examine whether in realistic scenarios, i.e. those found in the environment, microplastics attach pollutants and how they could act as an additional vector for the transfer of such contaminants to marine organisms. In addition to suffering from health effects due to the ingestion of plastic fragments themselves, further adverse effects may occur due to the contaminants being brought into the organisms in this way. This information will advance our understanding of the role

of microplastics and associated contaminants in societally and commercially important marine organisms and help strengthen Member State seafood safety programmes. Understanding to what extent microplastics can transfer hazardous contaminants to marine biota is an issue of global concern, in particular for countries that rely on fisheries as a source of food and income.

IAEA researchers are developing methods using nuclear and isotopic techniques to precisely quantify the movement, fate and impact of plastic particles and associated organic and inorganic contaminants on a range of aquatic biota such as fish and oysters under controlled laboratory conditions. By using radiotracers such as carbon-14, IAEA researchers can study how pollutants such as PCBs (polychlorinated biphenyls) "attach" themselves to microplastics in the environment and if they can dissociate or "detach" from the plastics when ingested by marine animals. Relatively low doses of these chemicals can be damaging to wildlife and can accumulate within the food chain, reaching humans through the consumption of seafood.

IAEA researchers will also use radiotracers to study the movement and fate of microplastics within the animals to understand how they are taken up, whether via the digestive system or through gills depending on the organism as well as whether they can be eliminated or if they clog different organs. If plastics accumulate in the gut, as this could give organisms a false sense of being full and negatively influence their feeding/nutrient intake.

IAEA and UN agencies highlight ocean change at COP23

On 11 November, the IAEA Environment Laboratories participated in a UN Oceans side-event at the United Nations Framework Convention on Climate Change (UNFCCC) COP23 in Bonn on ocean and climate entitled "A Resilient Ocean for Future Generations". The objective was to present actions that countries are taking, with the support of the UN system, to address climate-related multi-stressors on the ocean through improved scientific capacity, the development of CO2 mitigation strategies and new innovative adaptation approaches.

Peter Thomson, the first UN Special Envoy for the Oceans, appointed in September 2017, provided remarks and stressed that "we have to talk of ocean change like we talk of climate change".

During the session, Mr Deon Terblanche from the World Meteorological Organization presented its latest Greenhouse Gas Bulletin, according to which carbon dioxide (CO_2) concentrations in the atmosphere have increased by 145% as compared to pre-industrial (before 1750) levels.

The IAEA Environment Laboratories were joined in the panel by representatives from UN Environment, World Meteorological Organization, International Maritime Organization, Food and Agriculture Organization, and UN-Oceans. (Photo: K. Isensee/IOC-UNESCO)

About a quarter of the CO_2 emitted through human activities is taken up by the ocean. This is causing a change in the ocean's chemistry, a process known as ocean acidification. Since the beginning of the industrial revolution, ocean acidity has increased by 26%, and the current rate of acidification is over 10 times faster than any time in the last 55 million years.

Recent research, including that done by the IAEA, shows that ocean acidification effects on fisheries, aquaculture and coral reefs are expanding, both in terms of geographical location and intensity. Some effects are direct such as on species' physiology: growth, reproduction and calcification, while others may be indirect: impact on food sources, habitat degradation, changes in the food chain structure, for example.

Peter Swarzenski, head of the Radioecology Laboratory at the IAEA Environment Laboratories, stressed that "we all have an important role to play in ocean action. IAEA research provides insight into ocean processes and can be used by Member States to make informed decisions and take action".

Moderator of the side-event Vladimir Ryabinin, Executive Secretary of the Intergovernmental Oceanographic Commission of UNESCO, highlighted how IOC-UNESCO and the Ocean Acidification International Coordination Centre (OA-ICC), hosted at the IAEA laboratories in Monaco, are collaborating closely to support the Global Ocean Acidification Observing Network (GOA-ON), a global platform launched in 2012 to bring together researchers working on ocean acidification monitoring.

Ultimately, these efforts contribute to equip countries to respond to Sustainable Development Goal 14 dealing with Ocean change, and it's Target 3, specifically addressing ocean acidification.

High-level workshop discusses ocean acidification and coral reefs

The IAEA, through its Environment Laboratories organised, in partnership with the Scientific Centre of Monaco (CSM), an international workshop on ocean acidification, which this year focused moving from science to solutions, as they pertain to coral reefs. Bringing together world experts including natural scientists, economists and sociologists, this fourth international workshop in the series "Bridging the Gap between Ocean Acidification Impacts and Economic Valuation" was held at the Oceanographic Museum in Monaco from 15-17 October 2017 with 60 participants from 22 countries including HSH Prince Albert II of Monaco.

With the consecutive bleaching episodes over the past couple of years, the focus of the workshop on coral reefs was timely. Ruth Gates, Director of the Hawaii Institute of Marine Biology at the University of Hawaii, estimates that 50% of the world's coral reefs have died. During the three days of plenary presentations and regional working groups, participants discussed the "value" of coral reefs. Whereas some of the economic valuations ranged in the trillions of dollars, several participants were keen to emphasize their societal and sociological value. Some countries have adapted to coral reef degradation, and have started eating different types of fish and even modifying their touristic activities to highlight other aspects of their coast.

However, not all countries have the same possibilities to change, and the consequences for the local culture could be significant. In some areas, such as small Pacific islands, the entire population's lifestyle centres around the coral reefs, including the food they eat, their art, and even elements of their language. The demise of the reef would lead to profound societal changes.

Participants in the workshop on ocean acidification, which this year focused on the impact on ecosystem services and coral reefs. (Photo: F. Pacorel/Oceanographic Museum, Monaco)

HSH Prince Albert II of Monaco in his closing remarks said that "environmental questions are not a luxury, but an absolute necessity".

Is it too late?

One of the resounding messages during the three-day workshop was a message of hope. It is not too late, and a variety of solutions exist. When faced with the choice of where to focus our efforts first, Ruth Gates summarised: "Do something, and do something now". She stressed that solutions as simple as installing mooring buoys over coral reefs, as opposed to having people throw anchors, could have immediate positive impacts.

What are the solutions?

Several participants provided overviews of their work on coral reef restoration and rehabilitation. Frank Mars, member of the Board of directors of Mars Inc., known for its eponymous chocolate bars, and former Global President of Mars Symbioscience, discussed some of the organisation's successes in coral reef rehabilitation in Indonesia. Their participative projects, which see the involvement of local populations, have already been successful on a small scale and have seen two hectares rehabilitated between 2012 and 2017. Though small progress, this has had an impact on local populations who have seen fish catches from the reef increase, and Mr Mars argues that such projects are scalable and can be successful on a larger scale. "Solutions exist, but we need to start seeing more involvement from policy-

makers and private companies to enact change" said Mr Mars.

The Science

Nuclear and isotopic techniques are powerful tools for studying ocean acidification and have contributed widely to investigating past changes in ocean acidity and potential impacts on marine organisms. Researchers at the IAEA Environment Laboratories use calcium-45 to examine the growth rates in calcifying organisms such as corals, mussels and other molluscs, whose skeletons and shells are composed of calcium carbonate. Tracers are also used to determine how ocean acidification is affecting the physiology of marine organisms, as well as the impact of a combination of stressors, such as ocean acidification, increases in temperature and contaminants.

Towards better, more accurate radioactivity measurements in Africa

Project representatives and officials from Bostwana on the opening day of the meeting (Photo: A.Pitois/IAEA)

From 4 to 8 December 2017, 29 laboratory representatives from 29 countries gathered in Botswana for a coordination meeting of an IAEA technical cooperation project on strengthening regional capabilities for measuring environmental radioactivity (RAF7017). The project involves several training courses on both measurement of specific radionuclides in environmental samples as well as the main pillars of quality assurance programmes. The Botswana Radiation Protection Inspectorate hosted the meeting to review the implementation of the project activities and to fine-tune the upcoming activities for the participating laboratories. Currently 32 out of 54 African countries are participating in the project which collaborates with the IAEA's network of Analytical Laboratories for the Measurement of Environmental Radioactivity (ALMERA).

The IAEA and UN Environment work together to enhance the capacities of Mediterranean laboratories to monitor pollution. This includes for example training on how to prepare and analyse fish, sediment and seawater samples. Photo: D. Huertas / IAEA

The project will help African scientists to improve their skills and competence while ensuring data consistency. As mining and food import and export are key industries for some economies in the region, it is crucial that laboratories are able to determine radionuclides in environmental and food samples in a reliable and timely manner. The IAEA Environment Laboratories will work with laboratory representatives on improving radioanalytical techniques and quality assurance programmes which bolster the results which the laboratories produce, providing greater certainty and trust.

Monitoring pollution in the Mediterranean with UN Environment

From 30 October to 10 November 2017, the IAEA Environment Laboratories in Monaco held two training courses for Mediterranean scientists on techniques to measure and monitor pollutants in the marine environment. These courses, part of ongoing work with UN Environment (UNEP) on the Mediterranean Action Plan MED POL, UN Environment's programme on pollution in the Mediterranean, are the latest activities in a collaboration which has spanned over 40 years.

During the two-week period, the IAEA hosted scientists from Mediterranean countries and provided a combination of both theoretical and practical training, which included sessions on sampling and analytical methods, in biota such as fish or mussels, for organic pollutants like chlorinated pesticides and petroleum

hydrocarbons, and inorganic pollutants such as metals like mercury and cadmium.

UN Environment and the IAEA started working together in 1973 with the organisation of an interlaboratory comparison (ILC) on trace metals (e.g. mercury, cadmium and lead), and was followed by one on chlorinated pesticides (e.g. DDT) in 1976.

In 1986, the IAEA set up the Marine Environmental Studies Laboratory within the Environment Laboratories to act as a specialised coordinating centre for the Regional Seas Programmes and to be the regional analytical centre for the Mediterranean Action Plan MED POL.

Since the beginning of this collaboration with UN Environment, the IAEA, with its Environment Laboratories, has jointly organised to date 56 training courses and 34 Proficiency Tests with representatives from the majority of Mediterranean countries to strengthen pollution monitoring in the region.

Training in Indonesia on radioactivity monitoring

A regional training course on sampling and basic analytical techniques (RAS7028) was held from 14-25 August 2017 in Jakarta, Indonesia and hosted by the Center for Technology for Radiation Safety and Metrology at the country's National Nuclear Energy Agency, as part of an IAEA project to enhance regional capabilities for marine radioactivity monitoring and assessment of the impact of releases from nuclear facilities in the Asia-Pacific marine ecosystem (RAS7028).

In collaboration with the Australian Radiation Protection and Nuclear Safety Agency and with support from the host organisation, the IAEA Environment Laboratories provided background and training on radiochemical analyses of two of the common radioactive markers: artificial radionuclide caesium-137 in seawater and naturally-occurring polonium-210 in marine biota. Caesium-137 can be produced from nuclear reactors and weapons and is an important source of long-term contamination in case of nuclear accidents or releases. Polonium-210 has a tendency to bioaccumulate and can therefore be transferred up the food chain from one marine organism to another and end up on our plates.

Presentations at the course covered a wide range of topics such as the occurrence and behaviour of Polonium-210 and Caesium radionuclide occurrence and behaviour in the environment, their impact to radiation doses and the importance of monitoring their levels.

Indonesian scientists learn about preparing and pre-treating seawater samples. Photo: M. Johansen/ANSTO

Through the laboratory exercises, participants learned preparation and pre-treatment techniques for biota and seawater, pre-concentration and purification techniques of caesium and polonium from marine samples, preparation of sources for measurements and calibration of counting equipment.

Baseline study of contaminants in Namibian waters

A preliminary project report providing a baseline of marine radioactivity and selected contaminants in the was released to the Namibian government in September 2017.

A Namibian researcher working with seawater samples used to determine radionuclide and trace metal levels in his country's coastal waters. (Photo: IAEA)

Beginning in 2014, at the request of Namibia's Ministry of Fisheries and Marine Resources (MFMR), the IAEA Environment Laboratories began collecting a diverse range of marine samples off the coast. Growing coastal activities mean new regulations are needed to monitor and manage natural and anthropogenic (i.e. human-caused) radionuclides and trace metals that may contaminate the marine ecosystem—and with it, seafood.

Gathering marine samples allows researchers to obtain baseline measurements of contaminants; these measurements, are necessary to monitor pollutants in the marine environment and in the food chain, which can cause harm to humans and other organisms and affect seafood exports which form a large part of Namibia's economy.

This research provides valuable information on radioactive and trace elements in an area where information is scarce. In studying the presence of natural and anthropogenic radionuclides and trace metals (such as lead, copper, cadmium, and arsenic) off Namibia's seaboard, a critical knowledge gap on the world map is being filled in.

Visit of the Swedish Minister for the Environment and other dignitaries

Ms. Karolina Skog, the Swedish Minister for the Environment, together with Ambassadors to Austria, Permanent Representatives to the UN in Vienna, and other diplomats representing nineteen Member states, learnt how nuclear and isotopic techniques can contribute to protecting the environment, during a visit to the IAEA Environment Laboratories in October.

During the visit, staff from the IAEA Environment Laboratories explained how they work with Member States to conduct precise baseline studies of various contaminants in their environment, for example before starting new mining or industrial initiatives. This information can be used to monitor any changes due to human activities, and provides valuable information to Member States.

The visit included a tour of the Radioecology Laboratory. With 9000 litres of aquaria, the laboratory can run experiments in controlled settings, and by changing parameters, such as increasing the temperature or the acidity of the water, and studying how marine organisms would react under future climate scenarios.

Ms. Karolina Skog (right), the Swedish Minister for the Environment, at the IAEA Environment Laboratories in Monaco. (Photo: S. Jones-Couture/IAEA)

The official delegations also visited the IAEA underground laboratory. Below 11 metres of rock, the facility is set up to reduce the signal coming from cosmic rays - radioactive rays from outer space - and houses large, ultra-sensitive germanium gamma-ray detectors. These enable IAEA researchers to detect very low levels of radioactivity in a range of environmental samples including seawater, fish and sediment samples. The information provided from this specialised facility supports Member States in gaining accurate information on their environment and the potential presence of contaminants in the environment.

Data call on marine radioactivity

A call for data on levels of radionuclides in the marine environment has been issued to organisations and research institutions across the globe as part of the initial phase of a Coordinated Research Project (CRP) at the IAEA Environment Laboratories called LAMER (Levels and Assessment of Marine Environmental Radioactivity). The aim is to get data for an up-to-date assessment of levels of radionuclides in the oceans across the world. The last such global assessment was done in 2005. All marine radioactivity data is welcome, with particular importance given to data on caesium-137, strontium-90, plutonium-239,240, polonium-210 or iodine-129 in sea water and in marine sediments and biota performed over the last decade. A list of all data

providers will be included in the CRP website and final report, an IAEA publication, a joint paper where data providers will be listed as authors, and with a certificate or letter of recognition from the IAEA upon request.

LAMER aims to provide Member States with guidance on undertaking assessments of marine radioactivity using methodologies developed in the CRP. Furthermore, the project will highlight the use of natural and anthropogenic radionuclides as tracers of different oceanographic processes and how such knowledge can extend our understanding of the fate and behaviour of radionuclides in the marine environment.

One of the scientists in the Coordinated Research Project LAMER (Levels and Assessment of Marine Environmental Radioactivity) collects seawater samples. (Photo: J. Gwynn/NRPA)

Radionuclides released into the environment enter the oceans directly or indirectly via the atmosphere and surface and groundwater. Certain industrial processes such as offshore oil and gas extraction can also lead to increased fluxes of naturally occurring radionuclides to the marine environment. The nature of such releases (i.e. type of release, location, magnitude and duration) as well as physical, chemical and biological processes in the global oceans mean that levels of anthropogenic and naturally occurring radionuclides can vary significantly from one marine area to another and change over time. For IAEA Member States which rely on the marine environment and marine resources, such knowledge is important in order to evaluate the risk of any economic, social, human and environmental health impacts.

Helping Fiji monitor marine contaminants and toxins

Fiji's marine and coastal ecosystems have seen their resources decreasing over the last years. Coral reefs are being degraded, leading to loss of biodiversity and erosion of coastlines, likely due to factors associated with climate change and pollution from land-based activities such as mining. Furthermore, toxins in seafood are a serious public health issue and were even responsible for the deaths of four Fijians in a remote village in January 2017. Seafood is an important part of the country's diet and economy, yet precise methods to measure and monitor the amount of toxins in seafood are lacking.

A representative from Fiji talks with IAEA Environment Laboratories scientists to build capacity to monitor biotoxins & contaminants in seafood & the ocean (Photo: S. Jones-Couture/IAEA)

In the context of an IAEA technical cooperation project which aims to tackle some of these issues (FIJ7001), the IAEA Environment Laboratories in Monaco hosted Dr. Nanise Kuridrani Tuqiri from Ministry of Fisheries of the Government of Fiji for a short visit in December 2017 to discuss together priority areas for work.

The IAEA is supporting Fiji in setting up a laboratory there with instruments to measure radionuclide and non-radioactive contamination and to build capacity in laboratory personnel for using nuclear and isotopic techniques to monitor and assess the marine environment. Nuclear and isotopic techniques can assess contamination by radionuclides and non-radioactive contaminants (such as toxins produced by harmful algal blooms). The use of these techniques can also help scientists obtain information on past contamination history (such as through paleo-dating in sediments and coral cores) and have a better understanding of pollution history in Fiji's marine coastal ecosystems.

Dr. Kuridrani Tuqiri's visit included a tour of the Environment Laboratories and discussions with staff on continued avenues of cooperation between the IAEA and Fiji. She also gave a Scientific Seminar on issues Fiji faces with regards to seafood poisoning from toxins produced by harmful algal blooms.

14th Coordination meeting of the ALMERA network

Seventy-four laboratory representatives from 44 countries participated in the *14th Coordination Meeting of the IAEA's Network of Analytical Laboratories for the Measurement of Environmental Radioactivity* (ALMERA) hosted by the Swedish Radiation Safety Authority (SSM) in Stockholm, Sweden. The annual meeting which took place from 23 to 25 October 2017 provided a platform for representatives of ALMERA laboratories to build upon their expertise by sharing best practices within the extensive network.

ALMERA laboratory representatives on the opening day of the meeting. (Photo: S. Tarjan/IAEA)

Among the topics discussed in the meeting were plans to support the preparation of new reference materials for the upcoming years, such as seaweed, mushrooms, shrimp or anchovies. These were chosen because as commonly eaten foods, they can be important contributors to radionuclide intake and are relevant to assess radiation exposure through food consumption for the general public.

The latest ALMERA proficiency test took place this year on the determination of natural and anthropogenic radionuclides in water, milk powder and NORM (Naturally Occurring Radioactive Material) samples. In addition, results of the first-ever rapid sample measurement and reporting exercise organised during the IAEA's ConvEx-3 emergency response exercise were presented and discussed. These special samples and short-deadline reporting exercises help ALMERA laboratories improve their emergency response capabilities and their overall emergency preparedness.

Intern spotlight

Ms Matea Krmpotic was awarded an internship at the IAEA Environment Laboratories from 2 October to 31 December 2017. Originally from Zagreb, Croatia, she is pursuing a PhD in chemistry at the Faculty of Science, University of Zagreb, while also working as a research assistant at Laboratory for Low-level Radioacitivities of Ruder Boskovic Institute. At the Radiometrics Laboratory (RML) in Monaco, Matea's work involves optimising the analytical methodology for sequential determination of anthropogenic radionuclides in large volume seawater samples.

Matea's work involved the use of larger seawater samples to be able to reach the detection limit for marine radioactivity. (Photo: T. Misra/IAEA)

Before they can be measured and quantified by nuclear techniques, radionuclides in samples must first be pre-concentrated and further purified by highly selective chemical procedures. Matea worked on simplifying the existing methodologies used at RML and enabling faster purification if possible.

"As a radiochemist, I have never had the chance to have so many resources at my disposal, organised so effectively for me to hit the ground running from the first day," remarked Matea reflecting on her internship at the IAEA Environment Laboratories in Monaco. "So far I had worked with naturally occurring radionuclides, but at the RML, I got to learn about anthropogenic radionuclides determination to the point where I can now work on these methods independently."

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Upcoming events

Dates	Description	Location
13 April 2018	Joint IAEA-IOC-FAO-WHO Meeting on an Inter-Agency Global Ciguatera Strategy	IAEA Environment Laboratories, Monaco
20-24 April 2018	Second Research Coordination Meeting on Radioanalytical and Isotopic Studies of Climate Trends and Variability in Marine Paleo-records	Colombo, Sri Lanka
30 April – 11 May 2018	Training Course on the Theory and Practical Application of RESRAD-BIOTA and Other Codes in the RESRAD Family for the Determination of Dose, Risk and Authorized Limits at Radioactively Contaminated Sites	Argonne National Laboratories, IL, USA
14 June 2018	Technical Meeting on the Coordination of International Ocean Acidification Activities in 2019 and Beyond	IAEA Environment Laboratories, Monaco
25-27 June 2018	Technical Meeting on the Study of temporal trends of pollution in selected coastal areas by the application of isotopic and nuclear tools	IAEA Environment Laboratories, Monaco
25-29 June 2018	Second Research Coordination Meeting on the Study of Temporal Trends of Pollution in Selected Coastal Areas by the Application of Isotopic and Nuclear Tools	IAEA Environment Laboratories, Monaco

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