

Foreword

Environmental radioactivity plays a key role in many research activities, from Solid and Fluid Earth Dynamics to Neutrino detection and Dark Matter search as well as Radioecology, Nuclear Metrology, Health Physics, Nuclear Safety, Safeguards, and Nuclear Non-proliferation.

Cosmogenic, primordial and anthropogenic radionuclides are powerful tracers in Environmental Sciences for better characterisation of the Earth's atmosphere, oceans, and overall hydrological processes. Primordial radionuclides are also fundamental probes for studying the Earth's interior, opening new scenarios in the Earth's heat flow modelling as well as geodynamical processes in the upper mantle and lithosphere. Environmental radioactivity represents itself as a synergy crossover in space and time from all Environmental Sciences: radionuclides and radioactive decays are bridging past, present and future processes, and linking the Earth's environmental dynamics.

This volume published by the Italian Physical Society (Società Italiana di Fisica - SIF) contains selected papers presented at the International Conference on Environmental Radioactivity - New Frontiers and Developments, organized in Rome (Italy) from 25th to 27th October 2010 by the National Institute of Nuclear Physics and the Department of Physics of the University of Roma Tre with the Patronage of the International Atomic Energy Agency, and support by The Abdus Salam International Centre for Theoretical Physics (www.environmentalradioactivity2010.com). Around 130 participants presented almost fifty lectures, including six keynote lectures, and over ninety posters, in the highest Italian cultural institution Accademia Nazionale dei Lincei, Rome (the world's oldest scientific Academy, founded in 1603). The Honorary President of the Accademia Nazionale dei Lincei,

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Emeritus Professor Giorgio Salvini, eminent Physicist and *Magister* to several generations of Physicists, reviewed recent developments and trends in environmental radioactivity which have been associated with a wide range of multidisciplinary research carried out in natural, life and technical sciences.

More than two thousand years ago, a famous Roman Orator, Marcus Tullius Cicero, affirmed in his *De oratore* that “*Memoria est thesaurus omnium rerum et custos*”: Memory is the treasury and guardian of all things (historical events). Therefore, in the opening lecture Prof. Luciano Maiani (President of the Italian National Research Council) gave a tribute to fundamental scientific discoveries of Professor Nicola Cabibbo - Physicist and Science Manager, who passed away just before the Conference (he was also the President of the International Scientific Committee of the Conference).

The keynote speakers covered wide areas of recent developments in nuclear technologies, radioecology and applications of radionuclides as tracers for the investigation of environmental processes. Prof. Carlo Rubbia, Nobel Laureate in Physics (CERN and the National Institute of Nuclear Physics) presented new ideas on the new generation of safe, clean and efficient nuclear reactors, focusing specifically on the future of fission breeding reactors. Prof. Werner Burkart (International Atomic Energy Agency, United Nations) discussed the role of nuclear sciences and their sustainable contribution to the United Nations millennium development goals. Prof. Francesco Calogero (University of Roma “La Sapienza” and INFN Roma, Italy) presented prospects of nuclear non-proliferation in the transition to a nuclear weapons free world. Prof. William C. Burnett (Florida State University, USA) discussed applications of natural radon and radium isotopes as tracers of environmental processes. Prof. Walter Kutschera (University of Vienna, Austria) presented new developments in analytical technologies, based on a transfer from counting of radioactive decays to direct counting of atoms in Accelerator Mass Spectrometry studies of environmental radioactivity. Prof. Francois Bréchnignac (Institute for Radioprotection and Nuclear Safety, France), presented an overview on the present challenges of radioecology, focusing on the protection of the total environment against radioactive contamination.

The oral and poster presentations covered a wide range of topics on environmental radioactivity, including developments in radioanalytical techniques (underground laboratories, accelerator mass spectrometry, low energy mass spectrometers, quality assurance, radiochemical separation methods, etc.), radioecological investigations for the protection of humans, fauna and flora, assessment of both natural and anthropogenic radionuclides in the environment, applications of radionuclide tracers in studying atmospheric,

soil, aquatic and marine processes.

Guest Editors would like to thank all authors for their effort during the preparation of the papers, as well as to all reviewers who anonymously donated their time and expertise to improve the quality of the presented papers. They also thank the SIF Editorial Office and Production Staff for editorial assistance and for the realization of the book, and acknowledge the collaboration with EDP Sciences, SIF publishing partner, for the online publication of the volume on the EPJ Web of Conference: www.epj-conferences.org.

Hopefully the publication of this volume will stimulate further work on environmental radioactivity studies and applications of radionuclides as tracers of environmental processes.

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