

Geohazard: monitoring the threat to geosystem from coral reefs extinction

Workshop financed by the EPOS Geo-Inquire Project (ESFRI, EC)

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Workshopp description

Motivation, goals to be achieved, and methods to be used

The workshop is aimed at constituting of the Polish Working Group in the domain of reefology, which will develop a multifold monitoring of selected coral reefs in times of their environmental crisis and threat of extinction. Coral reefs form one of the most important global ecosystems, supplying the food to the more than half billion of people. Coral reef science is relatively a new domain of interdisciplinary research, which deals the ecosystem, understood as a mutual interaction of biotic and abiotic components. At present, the main international focus is oriented towards the reaction of reefs to the global climate change.

The goal of the program is the organization of a long-distance, multidisciplinary monitoring system, that will provide scientists, society and decision makers with a wide range of information on the changes within the reef environments in response to climate change and anthropogenic pression, as well as to governmental decisions undertaken for the natural environment protection.

The Workshop will focus on internal organization of the working group, and a scientific program to achieve the goal. During the event, invited scientists from several research institutions will get acquainted with each other, and will present their research methods, in the context of expected contribution to the reefology. They will also discuss future plans and possibilities to propose common scientific projects, and will take into consideration the establishment a research consortium, able to apply successfully for research grants.

The workshop, an original Polish research initiative, is funded by the Horizon Europe's Geo-Inquire EPOS program, which aims to overcome cross-disciplinary barriers, particularly of the land-sea-atmosphere environments, and leverage innovative data management techniques, modelling and simulation methods, artificial intelligence and big data development, and expand existing data infrastructure to disseminate these resources to the broader scientific community, including the European Open Science Cloud (EOSC) environment.

The interdisciplinary composition of the Polish Reefologic Working Group (RWG-PL), representing scientific entities from different Polish cities, both biotic and abiotic research (as to marine biology, space science, sedimentology, geochemistry and geophysics), and representatives of a Citizen Science activity, make it a natural partner for cooperation with other infrastructural or research programs of international dimension, as to ARGO-ERIC, LifeWatch-ERIC, International Marine Biodiversity Observation Network (ARMS-MBON), or Global Autonomous Reef Monitoring Structures (ARMS) Program, and, last but not least, the Horizon Europe.

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Logistics

- **Place:** Warsaw, Institute of Geophysics PAS, (IGF PAS) Ks. Janusza 64, room 213
- **Date:** June 6th, 2025
- **Duration:** one day 10:00h – 17:00h

Workshop programme

Opening words (10:00-10:15)

- Deputy Director for Scientific Affairs (IGF PAS, dr hab. **Rafał Junosza-Szaniawski**)
- Geo-INQUIRE WP9 leader (IGF PAS, prof. **Mariusz Majdański**)
- Introduction to the programme (IGF PAS, prof. **Marek Lewandowski**)

Presentations

Coral's life and structures: Present as a key to the past (10:15-12:15)

- **Biology and paleobiology:** Past and present life of corals, corals biodiversity in geological time and space, causes for their extinctions and revivals.
Leading scientists: Prof. **Jarosław Stolarski** (Dept. Environmental Paleobiology, Institute of Paleobiology PAS, Warsaw), Dr hab. **Przemysław Gorzelak** (Dept. Environmental Paleobiology, Institute of Paleobiology PAS, Warsaw)
- **Geology and Geochemistry:** Dynamics of reef basins evolution with focus on Vietnam reef environment; isotopic dating of reef structures.
Leading scientists: Prof. **Anna Wysocka**, Dr **Edyta Zawisza** (Institute of Geological Sciences, PAS, Warsaw)
- **Geophysics:** Coral reef distribution in geological time and space, with focus on post-Pangean time, using seismic and other selected geophysical methods
Leading scientists: Dr **Piotr Krzywiec**, Dr **Łukasz Słonka** (Institute of Geological Sciences PAS, Warsaw)
- **Mineralogy:** Examination of mineralogic composition of the abiotic environment of coral reefs, including impact of the dust transported from nearby lands.
Leading scientists: Prof. **Barbara Woronko**, Faculty of Geology, University of Warsaw
- **Oceanology:** Long-term reef monitoring using ARMS and imaging techniques: scientific diving and IO PAN's experience from Green Island Research Station, Taiwan (Academia Sinica)
Leading scientist: Dr **Piotr Bałazy** (Institute of Oceanology, PAS, Sopot)
- **Marine biology:** Coral reefs as animal forests.
Leading scientist: dr hab. Marta Ronowicz (Institute of Oceanology, PAS, Sopot)

Environmental pollution (12:30-14:10)

- **Coral Reefs Environmental Protection:** Invertebrate Zoology and Hydrobiology.
Leading Scientists: *Prof. Magdalena Błażewicz (Faculty of Biology and Environmental Protection, University of Lodz), Dr Andrea Desiderato, (Faculty of Biology and Environmental Protection, University of Lodz), Dr Serena Mucciolo, (Faculty of Biology and Environmental Protection, University of Lodz)*
- **Environmental magnetism:** Application of rock magnetism methods to recognize magnetic solids as proxies of environmental pollution of anthropogenic origin.
Leading scientists: Dr **Sylwia K. Dytłow** (Institute of Geophysics, PAS), Prof. **Marek Lewandowski** (Institute of Geophysics PAS)
- **Analytical chemistry:** method development/determination of PFAS (per- or polyfluoroalkyl substances) and heavy metals in coral reef environment.
Leading scientists: Dr hab. **Zofia Kowalewska** (Warsaw University of Technology, Płock Division)
- **Organic chemistry:** Aromatic hydrocarbons - anthropogenic impactor on coral reefs environment.
Leading scientists: Dr **Dominika Kubica** (Institute of Industrial Chemistry, Łukasiewicz Centre, Warsaw), mgr **Małgorzata Walkiewicz** (Institute of Industrial Chemistry, Łukasiewicz Centre, Warsaw)
- **Environmental Chemistry:** Potential threats from the presence of microplastics in the environment.
Leading scientists: *Dr hab. ing. Małgorzata Kida, mgr ing. Wojciech Strojny (Rzeszów University of Technology, Rzeszów - if present),; Dr hab. Ing. Magdalena Mrokwowska, Dr Maciej Bartosiewicz (Institute of Geophysics, PAS, Warsaw)*

Advanced technologies and reef sampling on-site (14:30-16:30)

- **Earth Observations:** Satellite monitoring of coral reefs and their environment, including thermal state of the ocean, and sea-level variations.
Leading scientists: Dr hab. **Stanisław Lewiński** (Space Research Centre, PAS, Warsaw), dr hab. **Edyta Woźniak** (Space Research Center, PAS, Warsaw), dr ing. **Anna Foks-Ryznar** (Space Research Center, PAS, Warsaw), **Marek Ruciński** (PhD, Space Research Center, PAS, Warsaw)
- **Machine Learning** (Artificial Intelligence, AI): AI for the rescue of coral reefs - application of Deep Learning models
Leading scientist: Dr **Przemysław Głomb**, Institute of Theoretical and Applied Informatics, Polish Academy of Sciences, Gliwice
- **Mechanical Engineering and Robotics:** Autonomous and automatic instruments for coral reefs monitoring.
Leading scientist: Dr ing. **Ryszard Olszewski** (Faculty of Mechanical Engineering and Robotics, AGH University of Krakow.), MS Ing. **Malwina Cieśla** (Faculty of Mechanical Engineering and Robotics, AGH University of Krakow.)
- **Research on Red Sea coral reefs:** Outline of a Strong, Weak, Opportunities and Treats (SWAT) analysis for carrying research at the Red Sea area.
Leading person: *Eslam Mohamed Roshdy (PhD, Institute of Geophysics PAS, University of Cairo - if present).*
- **Sampling coral reefs:** Citizen Science contribution of professional divers to collect samples from selected coral reefs environment

Leading person: **Tomasz Lemański, Dariusz Kurzyk** (Art of Dive, Gliwice), *Michał Kosut* (CEO, Deepspot Diving Center, Mszczonów - if present),

- **Science for coral reefs wellbeing:** *Scientific strategies to protect and restore coral reefs.*
Leading scientist: *Prof. Radosław K. Kowalski* (Institute of Animal Reproduction and Food Research, Polish Academy of Sciences, Olsztyn - if present).
- Special guest: Cpt. dr **Eugeniusz Moczydłowski:** r/y Magnus Zaremba and its potential for expeditions to coral reefs – see <https://periplus.pl/kto-jest-kim-r-y-magnus-zaremba>

Q&A - open discussion on various aspects of reefology (16:30 – 17:00)

Summary and final words from organizers