A science perspective on Mário Ruivo's legacy: future challenges for European marine research in a global context

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Strongly advocating for a Mission Ocean under the upcoming ninth framework programme for research and innovation (FP9), the European Marine Board (EMB) has begun the work on the fifth edition of its flagship series, Navigating the Future V (NFV). This position paper will provide robust, independent scientific advice and expert opinion on future seas and Ocean research to 2030 and beyond. The EMB is in dialogue with the Intergovernmental Oceanographic Commission of UNESCO to consider key areas of marine science and promote holistic and integrated approaches to develop the common Implementation Plan for the UN 'Decade of Ocean Science for Sustainable Development' (2021-2030).

NFV will reflect Professor Mário Ruivo's legacy in bringing ocean affairs, marine science and environmental issues to the fore in political discourse both nationally and internationally. Prof. Ruivo was an active Delegate of the EMB for many years. The EMB community knew him as a passionate, constructive and forward looking champion of ocean issues. We remember and miss his generosity of spirit, his integrity and his vast historical knowledge. First and foremost, he was a scientist, but he was also a gifted politician, putting his political skills to use in advancing better management and governance of ocean resources. Prof. Ruivo was very active in developing and promoting cooperation in marine science at the European level, notably through his long and active participation in EMB and EurOcean. He also served with the Intergovernmental Oceanographic Commission, as a Delegate for Portugal, as Executive Secretary and as vice-Chair.

The EMB experts identified 5 key areas of marine science to guide both the research and the science policy agendas at the global, European and national levels:
- Improve knowledge of the 4-Dimensional Ocean (a volume that changes in the time dimension) and its role in the earth and climate system, including the human component;
- Assess impacts of multiple and cumulative human stressors to the dynamic, non-linear and rapidly changing Ocean system;
- Improve understanding and predictability of extreme events through an integrated approach, including natural hazards and climate induced impacts affecting the Ocean;
- Advance capabilities in ocean technologies leading to wider developments in Information Technology and Artificial Intelligence;
- Foster sustainability science integrated with marine science as a core component of natural and social sciences.