

Reflections on past, present and future challenges in deep-sea research

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In this presentation I will give an overview of my contribution to more than two decades of international deep-sea research. First I would like to illustrate the context in terms of state-of-the-art of our knowledge in the beginning of the nineties, how European projects within three consecutive MAST programmes allowed us to contribute to one of the longest abyssal time series, and how deep-sea science gradually evolved from multidisciplinary to fully interdisciplinary. In addition we contributed to the exploration of recently discovered deep-sea habitats (Hydrothermal vents near Fiji) and of new geographical areas such as the Central Arctic Ocean, never sampled before for benthic organisms. From 2000 onwards benthic deep-sea research moved into new dimensions through the more general use of ROV technology. It allowed us not only to investigate small-scale heterogeneity and to perform *in situ* observations and measurements, but now we could also run experiments *in situ* at the bottom of the deepest ocean basins. The use of ROV technology in combination with high resolution measurements further stimulated us to shift our research from unravelling biodiversity patterns into more fundamental questions on deep-sea ecology such as understanding trophic interactions, the relationship between biodiversity and ecosystem functioning and the connectivity between isolated and remote deep-sea habitats. The continuous exploration of new deep-sea habitats, in which we participated from cold water coral reefs, to cold seeps, canyons, seamounts and trenches, and new geographical areas such as the Weddell Abyssal plain, many of these considered as hot spots of biodiversity, coincided with the growing awareness that human impact on the deep sea will have major consequences for global ecosystem functioning. We are now moving into an era where deep-sea mining will become a prominent activity whereas only a fraction of the deep-sea floor is explored so far (as illustrated by the outcome of the Census of Marine Life project 2000-2010). In this way the 'Anthropocene' is leaving its footprint already even in the most remote parts of our planet.