

Deep-sea ecosystem dynamics: long-term observations and evolving approaches

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Technological challenges, limited access and high costs associated with deep-sea studies, led to large knowledge gaps in our understanding of temporal change in the deep. As the limited number of deep-sea time-series stations reveal more about bathyal and abyssal dynamics, ecological variations from seconds to decades are being revealed. Faced with the increasing exploitation of ocean resources, and political and societal demands, there is a recognition of the urgent need for a comprehensive assessment of the status and trends of deep-sea ecosystems. Our ability to distinguish natural variations from anthropogenic changes requires a long-term multidisciplinary observing of these environments. Understanding their natural dynamics is key to assessing and predicting the impacts and responses of these ecosystems to large-scale disturbances caused by natural processes, climate change and human activities. Through a combination of repeat observation and sampling, deep-sea observatories, and autonomous vehicles, long-term time-series of transdisciplinary data (e.g. geological, physical, chemical, ecological) are being produced over a wide range of temporal scales with resolution from seconds to decades. In particular, new advances in biogeochemical, biological observing are advancing scientific understanding, as well as ways to apply ecosystem-level management for deep marine protected areas and industrial activity. This special session will provide a framework to not only share research findings acquired from long-term studies, remaining knowledge and technology gaps, but also recent developments and innovations for ocean observing.