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Australia's Integrated Marine Observing System – perspectives on ecosystem assessment

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Australia's Integrated Marine Observing System (IMOS) has been operating as a national scale research infrastructure since 2007. IMOS is an 'integrated' system, supporting the creation of physical, biogeochemical and biological observational datasets and time series, across oceanic and coastal waters. Sustained observing of ocean physics for climate is very mature. Sustained ecological observing of oceans for society is far less well developed. International attention was focused on this challenge at the 2009 'OceanObs' conference in Venice, and IMOS has been at the forefront of efforts to implement sustained ecological observing over the last decade. The journey so far has involved three phases of development. In the initial phase, biological observing programs, complemented by physical and biogeochemical observations, were implemented at all trophic levels using proven technologies. Emphasis then shifted to the data, working on open access, quality control, and analyses and products. More recently, attention has been given to how the integrated marine observing system can co-evolve with ecosystem modelling systems, learning from successes with hydrodynamic and (more recently) biogeochemical modelling systems. Building datasets and time series at all trophic levels has proven to be highly valuable in its own right. It is, however, likely to be 'necessary but not sufficient' to deliver sustained ecological observing of oceans for society. Next steps include evaluating the readiness of exciting new developments in microbial oceanography and eDNA, for piloting in the sustained observing system, and uptake in ecosystem modelling systems.