



# **Ocean Circulation and Climate: Chapter 3. In Situ Ocean Observations: A Brief History, Present Status, and Future Directions (International Geophysics)**

*John Gould, Bernadette Sloyan, Martin Visbeck*

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**Ocean Circulation and Climate: Chapter 3. In Situ Ocean Observations: A Brief History, Present Status, and Future Directions (International Geophysics)** John Gould, Bernadette Sloyan, Martin Visbeck Observations at and below the surface of the oceans are essential for understanding the ocean system and the role played by the ocean in earth's climate, for documenting changes and for initializing, validating, and improving ocean models. It is only since the late twentieth century that, thanks to advances in microelectronics, battery technology, and satellite communication, in situ observations (together with satellite observations) have reached a volume and spatial distribution that allow us to track a wide range of global and regional phenomena. This review traces the development of in situ ocean observations primarily from a physical standpoint and describes the internationally coordinated observing networks that now supply these observations. It considers the enormous changes that have occurred in the volume and distribution of these observations and the implication of these changes for defining the evolving state of the global ocean. Finally, there is discussion of the prospects for further improving sustained ocean observations and for the delivery of integrated information from interrelated observing networks.



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