

Applications of flying boat for ocean time-series observations

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A spatiotemporal network of observations is important for studying physical and biogeochemical processes in the ocean surface layer, as well as for validating satellite observations and model predictions, because there are many important processes that cannot be assessed from one-time (snapshot) observations. Repetitive observations by ships in the open ocean have provided some insights into these processes but remain rare because of difficulties associated with arranging observation vessels and staff. While, buoys attached to sensors and/or sediment traps in representative regions of the ocean are useful to obtain time-series dataset but need the expense of mooring tools and specific sensors. We propose that flying boats provide an important mechanism for enhancing the temporal resolution of ocean observations. In this presentation, we will provide examples of potential marine-science applications for a flying boat.

A flying boat can arrive to a sampling station in the open ocean more quickly than research vessels. Flying boats cannot be as extensively equipped with instruments as research vessels, but observations made from a flying boat are able to cover periods of time when ship observations are impossible. Thus, flying boats could enable collection of important time-series data on foundational biogeochemical observations that are easy to measure in the surface (euphotic) layer. Furthermore, a flying boat would allow investigation of moving phenomenon, which are difficult to track using traditional observation methods. For example, high primary productivity in cyclonic eddies are thought to be caused by nutrients supply associated with heaving of isopycnal surface. However, time-series observations of a moving eddy are challenging to obtain. A flying boat could permit high-resolution observations made from inside an eddy (with the location of the eddy estimate from sea surface height data). Overall, we believe that a flying boat for ocean observation would enable the collection of higher resolution time-series datasets than is currently possible, thus improving understanding of short term variations in physical and biogeochemical processes in the global material cycle.

Keywords: oceanography, flying boat observation, time-series observation, biogeochemical processes