

A Big Idea from OceanObs'19: Formation of an Integrated Surface Ocean Observing System

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A "Big Idea" that came out of OceanObs19 was for the formation of an integrated surface ocean observing system (ISOOS). Combining recommendations from more than a dozen community white papers, the envisioned ISOOS would be multidisciplinary and multifunctional, for among other things: (1) tracking ocean uptake of carbon dioxide and resulting ocean acidification; monitoring surface ventilation processes resulting in deoxygenation and denitrification of the ocean ["a healthy & resilient ocean", "a sustainable productive ocean"], (2) monitoring and predicting the ocean's influence on global climate on subseasonal-seasonal-interannual-decadal timescales ["a safe ocean", "a predictable ocean"]. This requires sustained observations of the heat, freshwater and momentum exchange between the ocean and atmosphere, which have many of the same requirements as for air-sea gas fluxes. And, (3) monitoring and predicting weather over and within the ocean ["a safe ocean", "a predicted ocean"]. This requires a subset of the above Essential Ocean Variables, but observed at higher resolution. We note that better ocean and atmosphere weather fields could lead to improved mapping of marine debris ["a clean ocean"]. The ISOOS is envisioned as being a multi-scale integrated observing system, with satellites that are optimized for marine boundary layer observations, and tuned and validated against a global network of in situ platforms. This will result in a sea-change increase of boundary layer data that will lead to revolutionary improvement in the understanding of air-sea interactions and their representations in forecast models. These boundary layer data will also be used to constrain these improved numerical models. Global coverage of the in situ network at the desired resolution and accuracy will be achieved through consolidation and expansion of existing networks and introduction of new sustainable ocean technologies, such as autonomous surface vehicles and a new generation of chemical and physical sensors. This presentation will discuss the path forward and ways in which researchers can get involved. In particular, a special collection focused on "Energy, Water, and Carbon Dioxide Fluxes at the Earth's Surface" will be hosted by *Frontiers in Marine Sciences* and *Frontiers in Earth Sciences*. Its deadline for submissions is September 30, 2020. Please consider submitting to this special collection. For more information on this, see: <https://www.frontiersin.org/research-topics/12257/energy-water-and-carbon-dioxide-fluxes-at-the-earths-surface>