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Interactive comment on "From satellite altimetry to Argo and operational oceanography: three revolutions in oceanography" *by* P. Y. Le Traon*

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This discussion paper provides an excellent review of 20 years of progress in oceanography, via three three major "revolutions" : the development of satellite altimetry and the Argo float network, both of which provide the cornerstones of the present ocean observing system, and how these observations have been used to enable the development of global operational oceanography programs. The author, Pierre-Yves Le Traon, has been a key player in the development of these three systems, starting with the development of user-friendly, multi-mission weekly maps of altimetric sea surface height and currents. The paper presents a historical overview of the development of the individual altimetric missions, and of the need to develop consistent algorithms and error reduction between the different altimetric missions, in order to construct the precise multi-mission altimetric maps that are used today by thousands of scientists worldwide. The author has also played a key role in helping to establish the global

Argo network of autonomous floats, today with more than 3000 floats providing vertical profiles of the ocean's temperature and salinity structure within the ocean interior (0 – 2000 depth). This international program, set up from contributing nations, shares the vertical profile data in near real time and is freely available to scientific users. Monitoring of the ocean interior with Argo, and the ocean surface topography with altimetry, provide two complementary observing systems. The paper describes how together, these two observing systems have allowed enormous progress in our understanding of regional and global ocean heat and freshwater storage, and its impact on sea level rise. The review paper provides particular insight into the historical development and organization of the Argo program in its initial phase, and how the European component of Argo has evolved under the author's stewardship. Finally, these two complementary observing systems paved the way for the development of operational oceanography, via the Global Ocean Data Assimilation Experiment (GODAE) and its successor GODAE Oceanview. The paper describes the early stages of the GODAE development, and how the availability of near real time altimeter and Argo observations, at high spatial and temporal resolution, were pre-requisites for the development of sophisticated global assimilation schemes. The historical development of regional and global operational oceanography systems is described. An important component is the constant re-assessment and intercomparison of observing systems to understand and reduce the errors and drifts in each system. The paper presents a good short overview of three rather complex systems providing a valuable contribution in oceanography today. The paper also helps us understand the importance of having visionary scientists guiding the development, putting into place an efficient and open-access system that has brought far-reaching scientific benefits and societal applications, even wider than what was originally envisaged. This is an inspiring read for young oceanographers everywhere.

Interactive comment on Ocean Sci. Discuss., 10, 1127, 2013.