【Research experience】

In the past four years, I have been involved in works about sea surface salinity (SSS) observed by Aquarius. The Aquarius SSSs retrieved by different algorithms were evaluated by comparing them to in situ SSS measurements and global gridded SSS fields. Though I do not describe the detailed results here, the study estimates accuracy of the Aquarius SSS and discusses its error structures in terms of sea surface temperature, surface wind speed (ocean roughness), ascending minus descending bias. The evaluation results obtained from different Aquarius products are also compared with each other. These results are summarized as a paper and it has recently been published in JGR-Ocean (Abe and Ebuchi 2014, Journal of Geophysical Research). In the process of the evaluation, our results also reveal a problem to use in situ data, such as Argo data, which is assumed to provide true value of salinity on the "sea surface". Figure 1 shows comparisons of monthly averaged Aquarius Level 3 SSS (V3.0) with outputs from the JAMSTEC* optimal interpolation (OI) system using Argo data. As indicated in Fig. 1, negative SSS bias is detected along the Inter Tropical Convergence Zone (ITCZ). The near-surface salinity stratification caused by the precipitation, which cannot be detected by Argo float, is a possible reason.

*JAMSTEC: Japan Agency for Marine-Earth Science and Technology

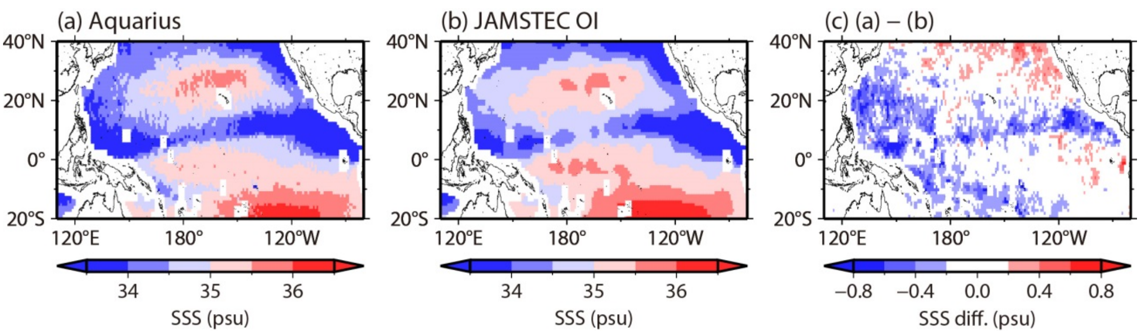

Figure 1. Monthly averaged sea-surface salinity (SSS) of (a) Level 3 Aquarius V3.0, (b) JAMSTEC OI at 10 dbar, and (c) their difference on September 2012.

On the other hand, I also have studied on the ITCZ in the eastern tropical Pacific in order to investigate a dynamic effect of the ITCZ to the ocean using satellite altimeter data. As is well known, the eastern Pacific ITCZ is characterized by zonal band of convective cloud, and its strong precipitation freshens sea water under it. The convective cloud band is formed by convergence of North-easterly winds and South-easterly winds, but from the oceanographic view point, the winds induce Ekman transport to the north and to the south, which result in divergence of the Ekman transport. This Ekman pumping along the ITCZ then bring formation of trough of sea surface height (SSH), implying formation of North Equatorial Current and Equatorial Counter current along the northern slope and southern slopes of the SSH trough, respectively. Meridional position of the ITCZ, in response to the ENSO, changes dramatically on an interannual time scale, and difference in the meridional position of the Ekman upwelling induces oceanic Rossby waves, which propagates westward and brings fluctuation of oceanic currents in the eastern/central North Pacific such as Hawaiian Lee Countercurrent, subtropical countercurrents, and North Equatorial Current (Abe et al. 2013, Journal of Oceanography). In addition to the function as the rain band to lead freshening of the ocean, this study revealed the dynamic role of the ITCZ for generating oceanic currents as well as oceanic waves. This paper was published in Journal of Oceanography last year (Abe et al. 2014, Journal of Oceanography). This idea of the paper for proposing new function of the ITCZ was valued by the Oceanographic Society of Japan (Young Author Award 2015). To advance this new finding, I am now studying a dynamic impact of anomalous atmospheric field during El Nino on the underlying oceanic height variation by focusing on both eastern North Pacific and South Pacific (Abe et al. Journal of Physical Oceanography, in prep.).

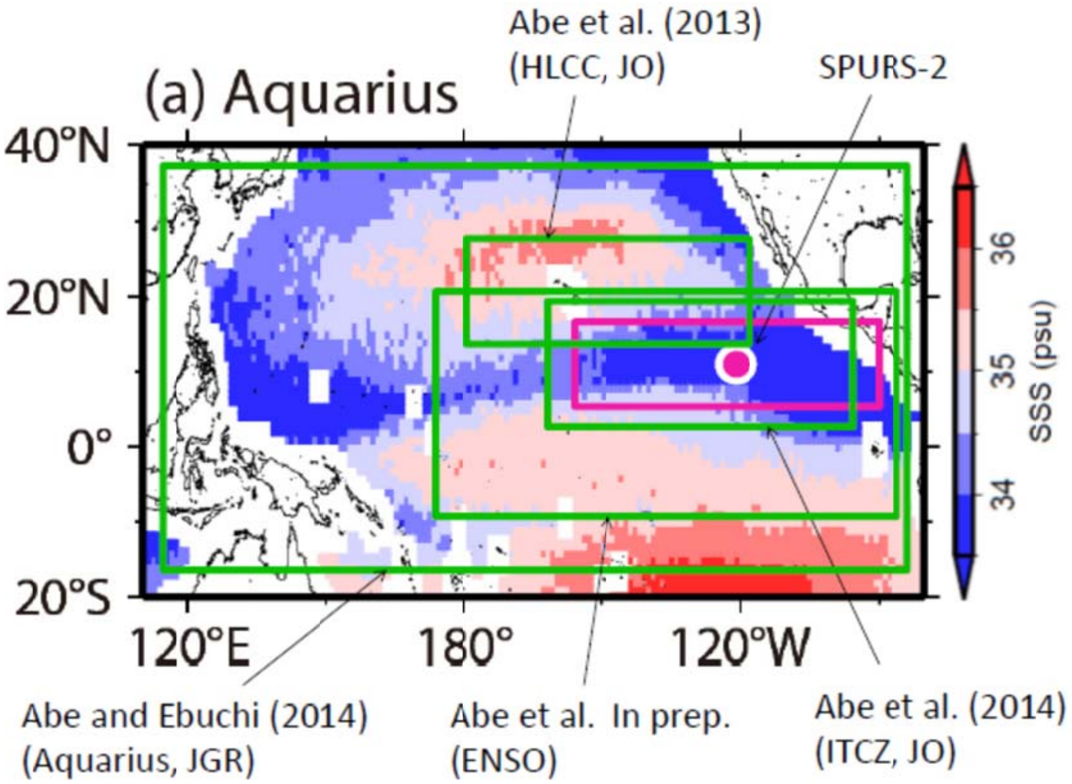

Figure 2. Target areas of my studies.