

Release of Deep Argo floats' salinity correction dataset

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Introduction

Thanks to the broad-scale global array of temperature/salinity profiling floats, known as Argo, temperature and salinity data from sea surface to 2000dbar, which is half of the average ocean depth, has been accumulated, and the temporal changes in ocean heat storage etc. have become apparent. On the other hand, ship-based high-quality hydrography such as GO-SHIP have revealed that the effects of changes in the deep ocean are not negligible to the global environment.

For this reason, the necessity of broad-scale monitoring of the deep ocean has been recognized, and as one method, profiling floats for deep ocean have been recently developed. The Japan Agency for Marine-Earth Science and Technology (hereafter, JAMSTEC) has developed and is operating deep-sea profiling floats "Deep NINJA" with Tsurumi-Seiki Co., Ltd. In addition, in order for monitoring up to 6000dbar, JAMSTEC has deployed another deep-sea profiling floats "APEX-Deep" developed in the United States since November, 2017. As of 14 February, 2020, 23 APEX-Deep floats are in operation in Pacific, Indian and Southern Oceans.

APEX-Deep float has a CTD sensor developed for deep-sea profiling floats. It was recently found that the anomaly between salinity measured by this CTD sensor and the ship-board salinity at float deployment has negative pressure dependence (Kobayashi and Sato (in preparation)). Therefore, we corrected the salinity data measured by APEX-Deep floats. Here, we introduce the dataset and report the temporal variation of salinity anomaly.

APEX-Deep floats

APEX-Deep floats are profiling floats for deep sea manufactured and sold by TELEDYNE MARINE, USA. APEX-Deep float can measure up to 6000dbar and have the CTD sensor for deep sea, SBE61, manufactured by Sea Bird Scientific of the United States.

APEX-Deep salinity correction method

We compared salinity measured by APEX-Deep with ship-board salinity data at float deployment. As a result, we confirmed negative pressure dependence (the higher pressure, the lower salinity) (Kobayashi and Sato (in preparation)). Since salinity anomaly and pressure are close to a linear relationship, salinity measured by APEX-Deep were corrected by assuming a regression line of the pressure. As a result, corrected salinity deeper than 2200dbar had an accuracy of ± 0.001 . In addition, the salinity anomaly in the deep layer was stable for about 3 months.

APEX-Deep floats' salinity correction dataset

We release the salinity dataset corrected by the method described above. Of the APEX-Deep floats deployed so far, floats with obvious defects in the CTD sensors have been excluded from correction

targets. Furthermore, for floats in which a failure occurred in the CTD sensors during operation, profiles acquired after the failure occurred were excluded from correction targets. The dataset included APEX-Deep floats data for which the ship-board CTD data at their deployments are available. As soon as ship-board CTD data at float deployment is available, salinity measured by APEX-Deep will be corrected and added to this dataset. Since many APEX-Deep floats are in operation, the dataset should be updated once a month. The dataset will be released in two formats, csv and netcdf. We will introduce URL of dataset in our presentation.

Keywords: Argo floats, Deep sea, Salinity