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Impact of ARGO data on an ocean data assimilation system

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The implementation of ARGO will enrich the observations through measurement of the subsurface vertical structure of T and S. It will provide a quantitative description of the evolving physical state of the upper ocean and the patterns of ocean climate variability. The issue how much ARGO will contribute in the data assimilation becomes necessary. The aim of this work is to assess the impact of ARGO on our current data assimilation system through the comparison with XBT and T/P/Jason-1.

Four assimilation experiments are carried out. The experiment assimilating XBT, T/P/Jason-1 and ARGO is taken as the control one. The other three experiments are formed by assimilating any two of observations. Results show that XBT observations produce relatively distinguished effects on temperature analysis because of the large number. Moreover, T/P/Jason-1 can also do where the XBT observations are sparse. No salinity information is included in XBT observations, so its effects on the salinity assimilation are less than that of T/P/Jason-1. Although ARGO includes the subsurface observations, the relatively less number makes its contribution to the assimilation system the least. With the increase of ARGO observations, the results of this work will change.

For a 3DVAR scheme, the background error covariance is fixed. When doing the above experiments of assessing data impact using 3DVAR, the background error covariances should be different in different expeiments because there are different quantity of data used in different experiments. More data assimilated should yield smaller background error covariance. This factor is also discussed in this presentation.

Key Words: Data assimilation; 3DVAR; background error covariance.