



The role of Argo steric sea level within the global sea level budget

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Precise estimations of global ocean indicators (GOIs) such as global ocean heat content (GOHC) and global steric sea level (GSSL) are necessary to observe the ocean's role in the Earth's climate system. To improve accuracy of these estimations, our knowledge of deep ocean and regional contributions to GOIs needs to be quantified. Data from the global Argo array are used here to analyze these contributions during the period 2005 to 2010. GOHC/GMSH rise increases by 25% /35% for the upper 2000m depth compared to the upper ocean 700m depth. A comparison of Argo steric sea level to total sea level from satellite altimetry (AVISO) and ocean mass (GRACE) is performed during this period. We could close the global and regional sea level budgets for 2005 to 2010 in terms of 6-year trends. Results show that largest correlation of global GSSL, ocean mass and global total sea level can be observed in the global tropical basin. Differences of the 6-year trend between global mean total sea level and GSSL in this basin are mostly explained by Argo sampling issues, especially in the – by Argo under sampled - Indonesian Archipelago. The differences of the 6-year trend in the Southern Ocean can be attributed to mass changes and deep ocean steric changes, whereas in the Northern Ocean mass changes clearly dominate decadal and longer-term variability. The results are only valid under the assumption that no systematic errors remain in either one of the global observing systems, although the comparison of all three observing systems indicates that these errors appear to be small during the years 2005 to 2010.