



Control of salinity on the mixed layer depth in the world ocean

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Using instantaneous temperature and salinity profiles, including the recent ARGO database, a global ocean climatology of monthly mean properties of the "barrier layer" (BL) phenomenon is constructed. This climatology is based on the individual analysis of instantaneous profiles in contrast with previous large-scale climatologies derived from gridded fields. We distinguish three types of regions: BLs are semi-permanent in the equatorial and western tropical Atlantic and Pacific, the Bay of Bengal, the eastern equatorial Indian Ocean, the Labrador Sea and parts of the Arctic and Southern Ocean. In the northern subpolar basins, the southern Indian Ocean, the Arabian Sea, and equatorward of salinity maxima, BLs are rather seasonal. Finally, BLs are almost never detected between 25 and 45 latitude in each basin, with however two interesting exceptions offshore California in Pacific Ocean and offshore Rio de la Plata in south-west Atlantic Ocean. Away from the deep tropics, the analysis reveals strong similarities between the two hemispheres and the oceanic basins in terms of BL seasonality and formation mechanism. Seasonality of the BL in the equatorial Pacific is revisited and a formation mechanism is proposed for the BLs located in the vicinity of the salinity maxima. Temperature inversions below the surface layer are often associated with BLs. Their typical amplitude, depth and seasonality are also described here.