Geophysical Research Abstracts
Vol. 13, EGU2011-12136, 2011
EGU General Assembly 2011

Comparison of satellite altimetry sea level anomalies and hydrographic observations in the Mediterranean Sea

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Understanding the processes that drive sea-level variability is a complex issue, as it involves various local, regional and global features with different time scales, some of them still poorly understood. Significant efforts have been devoted to increase our understanding of such processes in the Mediterranean Sea with the aim of reducing the uncertainties associated with current sea-level projections. Ocean observations of thermohaline properties provide some of the most valuable information on one of the major forcing factors of sea-level, namely the steric changes. However, due to the irregular sampling density of the hydrographic observations and the lack of statistical stationarity, interpolated fields widely used may provide an unrealistic representation of the steric sea level component. Moreover, global ocean climatologies are designed for resolving large scale features and hence are highly smoothed and not suitable for enclosed basins such as the Mediterranean Sea. In this study the steric component of sea-level is calculated directly from in-situ temperature and salinity profiles and compared with satellite altimetry sea level anomalies (SLA) with the aim of describing the Mediterranean sea-level variability for the period 1993-2010 in terms of the steric and non-steric components. Using in-situ profiles we are capable of resolving not only basin-wide scales but also regional ones. Results show that SLA from altimetry and the steric contribution agree remarkably well during certain periods (e.g., 1993-2000), however, large differences are found during other periods (2001-2010). Moreover results appear to be regionally dependent.