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Oceanic Mass Variability Observed by Bottom Pressure Sensors and GRACE Satellites

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The GRACE satellite mission observes the gravity field of the Earth with unprecedented accuracy. Gravity field products provided by the GRACE Science Data System allow to assess both the static geoid, as well as time-varying signals associated with changes of global water mass distribution. For estimating the capability of space-borne gravity measurements to detect the temporal variability of oceanic mass distribution and currents, the GRACE data is validated against in-situ measurements of ocean bottom pressure (OBP) provided by Pressure Sensors / Inverted Echo Sounders (PIES) located at the sea floor. Here, a comparison of the latest reprocessed GRACE data with in-situ OBP measurements from a moored PIES array in the tropical North-West Atlantic at 16°N (MOVE, Meridional Overturning Variability Experiment) is presented. The capabilities and future potential of GRACE to observe geostrophically balanced ocean currents are investigated.

In the framework of a joint BMBF project, the study is to be extended to other regions and a global OBP network will be established. Joint analysis of the data provided through the OBP network will be used in the future to validate GRACE satellite derived gravity field data on a global scale. In particular OBP measurements for high-latitude sites as in the Southern Ocean, are expected to improve validation. Here, high variability in mass transport gives a much better signal- to-noise ratio than in low latitudes. The OBP data base will allow a global ground-truth validation of GRACE gravity field products. In addition it offers means for monitoring deep-ocean flow field variability.