



The Importance of Continued Satellite Gravity Missions for Understanding Ocean Mass Variability

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Global gravity observations from satellite missions such as GRACE are unique in the way that they observe mass exchanges among the ocean, cryosphere, and land, as well as mass exchanges from one ocean basin to another. No longer does one need to patch together disparate measurements (e.g., sea level, in situ temperature measurements, glacier and ice sheet surface mass balances, unknown land hydrology) to infer changes in the global ocean mass. For the first time, we can directly measure it. We can also observe local fluctuations in the ocean mass caused by changes in wind stress and ocean circulation, not all of which can be modeled accurately. We will review recent results for global ocean mass variability and ocean mass exchange between basins and point out problems with inferring these by other means, such as combinations of altimetry and in situ temperature profilers and from global ocean models. We have only recently been able to appreciate the unique information on low-frequency fluctuations in local and global ocean mass that can be gained from satellite gravity missions. It would be a shame to lose this important new data in the coming years and return to process of inferring ocean mass variability rather than measuring it.