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GRACE GRAVITY MODEL: ASSESSMENT IN TERMS OF DEEP OCEAN CURRENTS FROM HYDROGRAPHY AND FROM THE ECCO OCEAN MODEL.

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The horizontal slope of the difference between a Mean Sea Surface (MSS) and a Geoid model, in principle, yields the absolute geostrophic current at the ocean surface. If that same current is computed from the vertical integration of the specific volume of seawater 'relative' to a certain depth, one incurs an error by disregarding the current at this 'level of no motion'. Until now, however, global geoid models have been less accurate than the small error incurred by the 'level of no motion' assumption. Thus, one way to view the error of a geoid model for oceanographic applications is to ask 'for which depth is the error of this geoid model comparable to the error of a 'no motion' assumption ?'. Conversely, this is the ability of a geoid model to see deep currents.

Here we assess the new generation of gravity models, derived from GRACE data. The differences between a global geoid model (one from GRACE data and one the well-known EGM-96), minus a Mean Sea Surface derived from over a decade of altimetric data (Wang, 2001; Hernandez, 2001) are compared to hydrographic data from the Levitus compilation and to the ECCO numerical ocean model, which assimilates altimetry and other data. The new (GRACE) gravity models are sufficiently accurate to retrieve time-averaged currents at depth: a preliminary version dubbed GRACE 21 (dated November 2002), can accurately retrieve dynamic height and currents at least to 1000m in the Atlantic and Pacific, and to at least 3000m in the Antarctic Circumpolar Current region, which cannot be done with the older EGM-96 geoid. The geoid also provides new information to the ocean models, so assimilating its data

can improve the model. We expect the reprocessed GRACE data to be available in early 2003 to improve upon these early results.