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Mass changes in earth's global water reservoirs

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Water storage changes in Earth's land, ocean, atmosphere and ice reservoirs vary on time scales ranging from instantaneous to geologic Until recently, the lack of a consistent, single monitoring framework has hampered efforts to track shorter-term (e.g. monthly, seasonal-interannual (S-I) and decadal-scale) of these storage changes, which are essential for enhanced weather and climate prediction, and for monitoring global change impacts on the hydrologic cycle. Since early 2002, the launch of the Gravity Recovery and Climate Experiment (GRACE) satellite mission offers a tremendous new opportunity to monitor water storage changes in Earth's major reservoirs. Here we use primarily GRACE observations of time-variable gravity to provide a global assessment of monthly water storage changes in Earth's ocean, ice, land and atmosphere reservoirs. We discuss the emergence of short-term trends for the continents and some major river basins, as well as issues of global water balance closure.