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The importance of land hydrology changes in sea level rise on decadal time scales: results from 2002-2014 using GRACE

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Climate-driven changes in land hydrology and their contributions to sea level rise have been absent from IPCC sea level budgets owing to challenges in observing global land water storage. In a review of recent and ongoing work, we show that recent advances in the measurement of time variable gravity from space using Gravity Recovery and Climate Experiment (GRACE) mission observations, combined with reconciled global glacier loss estimates, enable a disaggregation of continental water mass trends and a quantification of this climate-driven term. We find that between 2002 and 2014, can additional 3200 +/- 900 Gt of water was stored on land in snow, soils and groundwater, likely due to climate variability. This gain partially offset water losses from ice sheets, glaciers, and groundwater pumping, slowing the rate of sea level rise by 0.71 +/- 0.20 mm yr-1, and consistent with observations of slowing over the recent decade. We also discuss possible causes and contributors to these trends and their implications for decadal variability. These findings highlight the importance of climate-driven changes in hydrology when assigning attribution to decadal changes in sea level.