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Climate-driven accelerated sea level rise since 2011

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Sea level changes are a result of global warming, ice melting, anthropogenic activities and climate changes. The rate of global mean sea level (GMSL) rise has increased significantly since 2011, 5.8±0.58 mm/yr over 2011-2015 compared to 2.5±0.32 mm/yr during 2005-2010. To reveal the reasons for the sea level rise increasing after 2011, we analyze the influence of all above factors separately based on multi-source datasets from satellite altimetry, satellite gravimetry, ocean reanalyses and precipitation datasets, and a reconciled sea level budget is estimated. Human-driven land water storage changes are estimated at the rate of 0.3±0.11 mm/yr sea level equivalent during 2005-2015 based on a linear relationship between the variation in water storage and precipitation. The long rate of seawater expansion, caused by global warming, is calculated at the value of 0.5±0.02 mm/yr. After excluding the above two factors and the contributions of ice melting, climate-driven slowed sea level rise at the value of -0.6±0.44mm/yr between 2005 and 2010, whereas accelerated at 2.4±0.73 mm/yr during 2011-2015. Climate-driven changes are decisive in the increase of sea level rise rate since 2011.