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Antarctic Ice Sheet mass balance over the past decade from 2005 to 2016

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Global warming has become a world concerned issue which draws increasingly attention of the scientific community. Sea-level rise is an important indicator of Global warming as it integrates many factors of climate change including ice sheet melting. The accurate assessment of the Antarctic ice sheet mass balance is applied to deeply explore the impact of minor change in Antarctic ice sheet on sea level rise. Based on multi-source remote sensing product, we finely estimated the mass balance of the Antarctic ice sheet and discussed dynamics and climatological causes of the fluctuations from 2005 to 2015 by IOM (Input-Output-Method).

In our study, the calculation method of ice flux on the grounding line is improved. We also precisely evaluate the ice flux as an output component. The result shows that: (1) The Antarctic ice sheet was continuously losing mass during the period of 2005-2016. (2) The mass loss of the Antarctic ice sheet was dominated by West Antarctica when East Antarctica was in a positive mass balance, but some basins also occurred significant mass loss. The Antarctic peninsula fluctuated in a state of zero balance. (3) The change in the mass balance of the ice sheet was dominated by the surface mass balance as a whole, and was mainly affected by the interannual variation of climatological factors. From a small-scale perspective, ice shelf thinning and glacier calving causes the change of ice flux on the grounding line. That change leads to the severe mass loss in the region it happened. Therefore the mass loss in the year of the disintegration event happened increases.