



## **Multi-mission satellite altimetry in Antarctica: Separating long-term trends from interannual variations**

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The contribution of the Antarctic Ice Sheet to present-day sea level change still contains large uncertainties. Several outlet glaciers experience a rapid dynamic thinning, especially in West Antarctica, while in East Antarctica the rates are relatively small. Here, different missions see different patterns of elevation changes which can be attributed to interannual variations in precipitation. The time period of a single satellite altimetry mission is not long enough to distinguish between interannual variations in elevation and the long-term trend. Therefore, we apply a multi-mission approach to combine the observations of different missions and thus are able to create a joint long-term elevation time series. We show that a consistent reprocessing of ice sheet altimetry from different missions is not only a prerequisite for the combination, but also improves the accuracy and precision of conventional pulse limited radar altimetry by about 50%. We discuss which special aspects have to be considered when combining conventional radar altimetry with the high resolution SARIn-mode data of CryoSat-2 and the high precision ICESat laser altimeter measurements. Therefore we present a novel approach to create a joint time series. Our results provide an unprecedented insight into the variations of the interior of East Antarctica and help to separate the long-term trends from interannual variations.