

Present and future ice mass loss of the North-Atlantic glaciers estimated from satellite observations

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Using two independent sets of remote sensing observations, satellite altimetry (ICESat and Cryosat-2) and gravimetry, we (GRACE) derive monthly estimates of the mass balance of the Glaciers and ice caps in the North-Atlantic Arctic region for 2003-2017. The two data sets show a remarkable agreement, and reveal that the North Atlantic glaciers have been losing ice at a rate of approximately 120 Gt/yr during this 15 year period. Strong regional interannual variability is observed, with mass loss shifting between eastern and western regions from year to year. Comparing the observations to output from regional climate models, we find that the majority of the mass loss can be explained by surface mass balance processes. Whereas precipitation has remained fairly constant during the observational period, melt and meltwater runoff during summer months has increased markedly in response to atmospheric warming. We use the strong relationship between near-surface temperature and observed ice loss to estimate the expected mass loss of the North Atlantic glaciers in the coming decades, and find that they may contribute roughly 4 to 8 cm to sea level rise by 2100, depending on the chosen RCP scenario.