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Geodetic signals from recent and future deglaciation

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Since the end of the 19^{th} century glaciers have been retreating. One main interest is the contribution to sea level changes due to the effect of mountain glacier melt. Based on previous calculations, sea level from this cause has been rising globally by 0.2 to 0.4 mm per year in the last century (IPCC, 2001). Our calculations show similar results. In addition we have calculated the spatial variability of the change caused by changes in the gravity field and the isostatic response to the change in the glacier load. The main input parameters in the calculation of melting rates of mountain glaciers are temperature and precipitation. In order to calculate the change in ice volume, formulas given in the paper by Zou and Oerlemans (1997) have been used with different observed and modelled input data sets in order to check the sensitivity of the results. Furthermore the effects of different shapes of the glaciers on the spatial variability have been investigated. Climate simulations for the future have been used in order to make projections of future loss of mass from mountain glaciers and hence the effects on sea level. Not only is sea level affected by the melting process of glaciers, but also radial (vertical) displacements of the surface occur due to this loading effect. These are of the order of less than 1 mm per year. For the calculation a global model of 100 mountain glaciers was used, but first results showed that the glaciers from 4 areas are representing more than 90% of the total melting ice volume. These areas are Patagonia, the Himalaya region, Alaska and Canada, and the arctic sea with Iceland, Spitsbergen and Franz Josef Land.

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