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# Quantifying uncertainties in the land ice contribution to sea level from ISMIP6 and GlacierMIP

**Tamsin Edwards**[1] and the ISMIP6, GlacierMIP and friends[*]
[1]King's College London, Geography, United Kingdom of Great Britain and Northern Ireland (tamsin.edwards@kcl.ac.uk)
[*]A full list of authors appears at the end of the abstract

**The land ice contribution to global mean sea level has not yet been predicted for the latest generation of socio-economic scenarios, nor with coordinated assessment of uncertainties from the various computer models involved (climate, Greenland and Antarctic ice sheets, and global glaciers). Two recent projects generated a large suite of projections but used previous generation scenarios and climate models and could not fully explore uncertainties. Here we estimate probability distributions for their projections, using statistical emulation, and find uncertainty does not diminish if greenhouse gas concentrations are reduced: the sea level contribution of land ice is 28 [5, 57] cm from 2015 to 2100 under no mitigation (median and 90% range), and 16 [-5, 46] cm under very stringent mitigation. Greenland is projected to contribute around 2.5 cm/°C of global warming, and Alaskan and Arctic glaciers a total of around 2 cm/°C, but Antarctic uncertainties are too large to determine temperature-dependence. Knowing future global mean temperature exactly for a given socio-economic scenario would reduce the uncertainty for glaciers by up to two thirds (6 cm) but have little effect for ice sheets. Quantifying how ice sheet margins respond to ocean warming would reduce uncertainty by up to one third (Antarctica 15 cm; Greenland 7 cm). The remaining uncertainty for a given scenario is dominated by the climate and glaciological models themselves. Improved modelling and observations of polar regions, rather than global warming and glaciers, would therefore have the greatest effect in reducing uncertainty in future sea level rise.**

**ISMIP6, GlacierMIP and friends**: Sophie Nowicki, Heiko Goelzer, Hélène Seroussi, Ben Marzeion, Christopher J. Smith, Nicolas C. Jourdain, Donald Slater, Christine M. McKenna, Erika Simon, Ayako Abe Ouchi, Jonathan M. Gregory, Regine Hock, Eric Larour, William H. Lipscomb, Antony J. Payne, Andrew Shepherd, Cécile Agosta, Patrick Alexander, Torsten Albrecht, Brian Anderson, Xylar Asay-Davis, Andy Aschwanden, Alice Barthel, Andrew Bliss, Reinhard Calov, Christopher Chambers, Nicolas Champollion, Youngmin Choi, Richard Cullather, Joshua Cuzzone, Christophe Dumas, Denis Felikson, Xavier Fettweis, Koji Fujita, Rupert Gladstone, Nicholas R. Golledge, Ralf Greve, Tore Hattermann, Matthew J. Hoffman, Angelika Humbert, Matthias Huss, Philippe Huybrechts, Walter Immerzeel, Thomas Kleiner, Philip Kraaijenbrink, Sébastien Le clec'h, Victoria Lee, Gunter R. Leguy, Christopher M. Little, Daniel P. Lowry, Jan-Hendrik Malles, Fabien Maussion, Mathieu Morlighem,

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