

**The Community Earth System Model: Evaluation and CMIP5 simulations. Activities of the Land Ice Working Group**

William Lipscomb<sup>†</sup>; Stephen Price; Jesse Johnson; Miren Vizcaïno Trueba

<sup>†</sup> Los Alamos National Laboratory, USA

Leading author: [Lipscomb@lanl.gov](mailto:Lipscomb@lanl.gov)

The Land Ice Working Group (LIWG), formed in 2009, is the newest CESM working group. The mission of the LIWG is to develop and apply improved models of ice sheets and glaciers in CESM, in order to provide useful, physically-based estimates of land-ice evolution and resulting sea-level changes. LIWG efforts led to the inclusion of the Glimmer Community Ice Sheet Model (Glimmer-CISM) in the initial version of CESM in 2010. CESM also includes a new surface-mass-balance (SMB) scheme for ice sheets in the Community Land Model. Initial simulations have focused on the Greenland ice sheet. The simulated present-day SMB for Greenland is in good agreement with observations and regional models. We present results from a suite of CMIP5 simulations (pre-industrial, 20th century, and RCP 8.5) evaluating the sensitivity of Greenland's SMB to changes in climate forcing. We also show how the equilibrium state and subsequent evolution of the ice sheet depend on model physics and climate forcing. In particular, we compare an older "shallow-ice" version of Glimmer-CISM to an improved version with higher-order dynamics. Finally, we describe plans for future model development, including ice-sheet/ocean coupling (which will enable simulations with a dynamic Antarctic ice sheet) and a model for the evolution of glaciers and ice caps.