C51C-1293 - Sea level projections using ice sheet model based on RCP scenarios at David Glacier, East Antarctica

Friday, 13 December 2019

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Moscone South - Poster Hall

Abstract

Changes in ice mass discharge at glacier grounding lines, or in ice sheet surface mass balance (SMB) can both result in mass change and therefore sea level rise. In addition, basal mass balance and frontal mass balance can also change the glacier dynamics, and therefore the ice discharge significantly. The ice mass discharge can be calculated by an ice sheet numerical model, while the SMB is generally produced by coupled global climate model (CGCM). The projected surface mass balance has large discrepancies among models due to uncertainties in physical parameterizations or coarse model resolution in the polar regions. Here, we conduct a series of future projection experiments using the Ice Sheet System Model (ISSM), forced by RCP-based SMB scenarios from 19 CMIP5 CGCMs, with total of 177 ensemble members for investigating the contribution of ice mass change of David Glacier, East Antarctica to global sea level rise upto 2100 and 2300. Recently, an ice radar survey was performed over the study area and merged with previous datasets to produce a new bed geometry based on mass conservation, which reveals a sharp subglacial ridge above sea level, stabilizing the ice flow. We therefore only focus on the effect of change in SMB on the sea level change. A gradual increase in ice volume due to CGCMs' SMB increase is shown in most ice sheet model projections, however, projections forced by GISS-E2-R and IPSL-CMA5A-MR SMB with RCP8.5 scenario display an increase in sea level equivalent of 0.72 mm and 0.31 mm, respectively, from 1950 to 2100. A total mean of sea level equivalent from 177 ensemble projections is -0.70 mm (sea level decrease) for RCP4.5 and -1.51 mm for RCP8.5 until 2100 year. RCP8.5 scenario until 2300 projection exhibit sea level decrease of -4.66 mm owing to continuous increase in SMB at study area.

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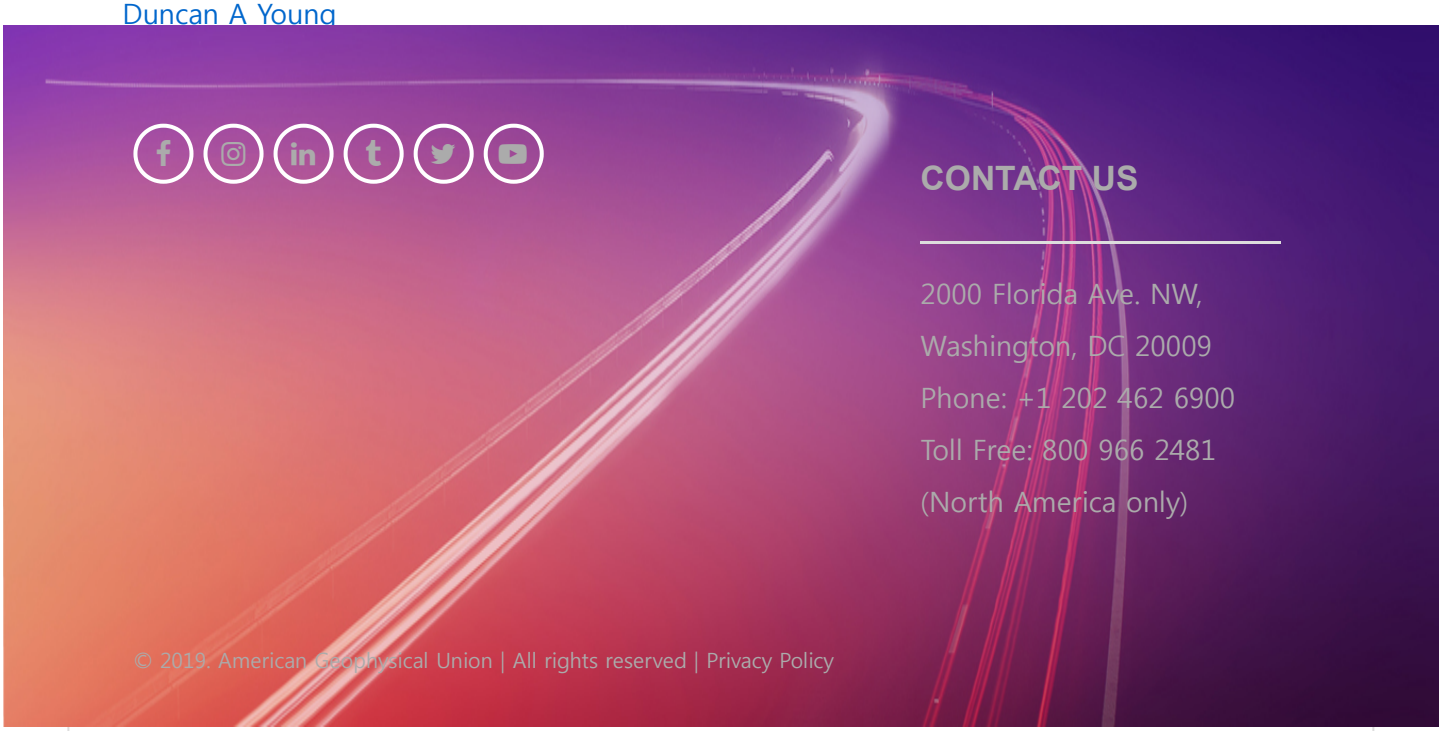

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