Submitted Abstract

ID IMC22-FSAbstr- 447

First Author First Name Last Name	 Alfonso (1) Fernández
Submitting Author First Name Last Name	 Alfonso Fernández
Correspondence	alfernandez@udec.cl
Co-Authors **>> E-Mails will be not listed**	Somos-Valenzuela, Marcelo (2,3); Manquehual-Cheuque, Francisco (2,3)
Organisations	1: Mountain Geoscience Group, Department of Geography, Universidad de Concepción, Chile 2: Butamallin Research Center for Global Change, Universidad de La Frontera, Chile 3: Department of Forest Sciences, Universidad de La Frontera, Chile
Country	Chile
Region	South America
Title	Climatic Geoengineering: A Silver Bullet? A View From The Andes.
Keywords	Climate Geoengineering, Glacier Mass Balance, Glacier Modeling, Andes
Type	List Of Focus Session
Focus Session ID	06

Abstract

Among the myriad of mitigation strategies for anthropogenic climate warming, Climatic Geoengineering is one of the most controversial proposals to limit projected trajectories of temperature increase for the rest of the 21st century. Numerical models that evaluate the sensitivity of the climate system to different types of climate engineering include those that simulate the effect of solar radiation management (SRM) in order to attenuate warming by decreasing the incoming shortwave radiation flux, the engine of the global energy balance. Under the umbrella of the IPCC, the Geoengineering Model Intercomparison Project (GeoMIP6, part of the CMIP6) provides a number of model output, with SRM among those. While many of these models indicate that Climatic Geoengineering is able to limit global warming to levels below 1.5º to 2ºC relative to pre-industrial conditions, little is known on the regional effects associated to these mitigation approaches. Here we present results from the analysis of the impacts of the G6Solar experiment over the Andes, including temperature, precipitation, and the effect on glacier mass balance. The G6Solar experiment is part of the GeoMIP6, and simulates a climate derived from decadal decreases of the solar radiation input. We compare this experiment with the CMIP6 SSP245 and SSP585 scenarios and use a glacier mass balance model forced by these different experiments. Our results show that while G6Solar produces cooling along the Cordillera, it is not necessarily better than the SSP245 or SPP585. However, precipitation shows a pattern of drying towards the south, suggesting that there might be unintended impacts of Geoengineering on mountain hydrology. In fact, the computation of glacier mass balance using G6Solar as model input shows that many glaciers will irremediably shrink, particularly in extratropical areas, although delaying full disappearance by about a decade or in some subregions. In addition to describing these results, in this work we put forward some dynamical arguments to explain the drying trend of the G6Solar. We also discuss implications for policy-making.