EGU2020-11888
https://doi.org/10.5194/egusphere-egu2020-11888
EGU General Assembly 2020

Projections and simulation of water balance in the Southern Ice Field, Patagonia, Chile

Catalina Jerez Toledo and Ximena Vargas Mesa
Universidad de Chile. Santiago, Chile (xvargas@uchile.cl)

The Southern Ice Field (CHS) corresponds to one of the largest continental ice plains, representing a water source for the entire globe. It extends from 40°20' S to 51°30' S, covering an area of approximately 16.800 km^2 and consisting of 49 glaciers distributed in the southern territory of Chile and part of the Argentine Patagonia. Due to climatic change, the CHS has been affected, like all the ecosystems that compose the planet, generating disturbances in their natural state, consequently, the systems that constitute the CHS tend to look for a new balance. However, the new state(s) of equilibrium can present a great deal of variability, which is why the Intergovernmental Panel on Climate Change (IPCC) has drawn up the Representative Concentration Pathways (RCP), which aim to account for the effects of climate change by representing the total radiative forcing calculated for the year 2100 and including the net effect of Greenhouse Gases (GHG), in addition to other anthropogenic forcing. Based on this, the main objective of the present study is to give an account of a projection and simulation of the water balance in the CHS, informing about the physical processes occurred in the historical period (1970 - 2005), the current period considering a near past and future (2006 - 2050) and a projection to the distant future (2051 - 2100). The simulation of the water balance considers two General Circulation Models (GCMs: MPI-ESM and CSIRO-Mk3-6-0), which are numerical models frequently implemented to simulate the effects of climate change. These models are evaluated under two RCP scenarios 4.5 and 8.5, giving the most unfavorable results under the latter scenario when evaluating the CSIRO-Mk3-6-0 model, since temperature increases of up to 8°C and an oscillating precipitation regime are observed. On the other hand, the MPI-ESM model indicates increases of 1.5°C and 2.5°C accordingly to each scenario and decreases of ± 1/3 of the current observed precipitation. Both models, when evaluated in the previously mentioned scenarios, indicate that the basins that make up the CHS present an emptying to a greater or lesser degree according to the scenario, for which reason, the ice mass that makes up the CHS will follow the behavior it has experienced up to now and will continue to detach itself. To this last, we must add the effect of the decreases in precipitations that reach an average deficit of 30 mm by year 2050 and increases in temperature that exceed the values reported by the IPCC (2019), which they look for to control the effects of the climatic change in the present situation.