

"Charting Antarctic Ice Sheet evolution via the ice sheet's internal stratigraphy – CHARIBDIS."

Abstract

CHARIBDIS will address a key research challenge which was prominently highlighted in the latest assessment report of the IPCC, namely the reduction of the large uncertainties in model-based projections of Antarctic sea level contributions. To achieve this, a novel methodology to calibrate ice sheet models will be developed using geophysical observations of the internal layering of the Antarctic Ice Sheet. This will reduce longstanding uncertainties associated with model-based estimates of past and future Antarctic Ice Sheet evolution and sea level contributions. The internal scaffold of Antarctica is built by ice layers which have been formed by past simultaneous deposition of snow and impurities at the surface of the ice sheet. These continuous structures, also called isochrones (layers of equal age) are formed by millennia of changing climate conditions and ice flow and therefore embody all physical drivers which led to the current state of the Antarctic Ice Sheet. Isochrones, thus, have the potential to be the most rigid observational target for the calibration of ice sheet models but so far, they have not been utilized for this purpose. The goal of CHARIBDIS is to change this and integrate the entire Antarctic isochronal record to improve and constrain the forcing and parameterization of a state-of-the-art ice sheet model. The isochronally calibrated ice sheet model will then be employed to reconstruct the evolution of the Antarctic Ice Sheet from the penultimate interglacial up until the present day, and project its future sea level contribution throughout the full range of climate scenarios available.