Precipitation in Antarctica : comparaison between Cloudsat observations and the LMDz global climate model.

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The Antarctic continent is a vast desert, the coldest and the most unknown area containing the main fresh water reservoir. Current global warming could threaten this ice cap, leading to a sea level rise. A main goal of the APRES3 (Antarctic Precipitation, Remote Sensing from Surface and Space) project is to document and understand current precipitation over the south polar cap, knowing that current climate models are reaching to a over-estimation of the snowfall rate values. Remote sensing observations of the coastal regions and the continent using Cloudsat radar [Palerme et al. 2014] give a snowfall rate of 153 mm/year whereas the LMDz model gives a higher rate of 172 mm/an. A comparison between radar observations and solid precipitation modeled by LMDz could bring a better understanding of climate observations over the ice cap. Indeed, there is a fair annual-mean agreement between the model and Cloudsat observations. Nevertheless, there are serious biases concerning the seasonal variabilities, marked by a strong continental and coastal over-estimation. There is also an inverted seasonal variability on the continental plateau between observations and our model. Using a set of LMDz simulations run in different modes (forced by SST, nudged, coupled), we suggest a multi-scale exploration of the physical and dynamical processes that are the sources of these biases and propose ways to improve climate models.