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Last century Greenland ice sheet surface mass balance projections from IPCC AR4 global models

B. Franco (1), X. Fettweis (1) and M. Erpicum (1)

(1) Département de Géographie, Université de Liège (bruno.franco@ulg.ac.be / Phone : +32 4 3665267 / Fax : +32 4 3665722)

Results from atmosphere-ocean general circulation models (AOGCM's) for the IPCC 4th Assessment Report are used to investigate surface mass balance (SMB) future projections of the Greenland ice sheet (GrIS). The most efficient models for the GrIS climate modelling are chosen by comparison between the 1970-1999 outputs (averages and trends) from the Climate of the twentieth Century Experiment (20C3M) and reanalyses (ECMWF, NCEP) as well as climatology. The SMB is estimated from the summer temperature (from which is deduced the runoff) and annual snowfall from the well-adapted AOGCM's and validated with 1970-1999 results from the regional climate model MAR by interpolating the AOGCM's outputs on the MAR grid. However, large uncertainties remain in these SMB projections predicated on simplified physics and huge model outputs. High resolution simulations made with the MAR model (which simulates explicitly the SMB by taking into account the surface feedbacks) forced at its boundaries by a GrIS well-adapted AOGCM could bring more precise brief replies.