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Sensitivity of General Circulation Model of Russian Hydrometcentre to snow parameters variations (results of numerical experiments)

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This study was devoted to a comparison among integral and regional characteristics of snow cover modeling by three Russian and several world lead General Circulation Models (GCM) participated in AMIP-2 protocol experiments. Snow cover and snow mass over the North America and Eurasia were used as integral characteristics of snow reproduction. Same parameters were taken as regional characteristics over the basins of Ob, Enisey and Lena rivers. The snow climate data and results of NCAR and ERA reanalysis were also applied for comparison. Experiment results of Hydrometcentre of Russia (HMC) model were one of the best among compared models. Also a set of experiments with HMC model were carried out to investigate its sensitivity to variation of different snow characteristics. Three experiments were done with change of snow albedo within range of 0.5 to 1.0. Other experiments were aimed to investigate the sensitivity of GCM circulation characteristics to variation of snow thermal conductivity and snow cover threshold. Changes of surface air temperature, air humidity and precipitation were analyzed as dependent on snow albedo variation. The same analysis was also conducted for sensitivity of surface fluxes, snow cover and mass. It was ascertained that sensible heat flux has the 5-10% response in Eurasia during the period from autumn to spring and latent heat flux has about 20% response with the strongest value in spring. The changes of surface temperature in Siberia are up to 3˚C for winter, 5˚C for autumn. The sensitivity of air temperature monthly mean was detected as ± 8˚C, with 1.5˚Ñ at 500hPa and the one of humidity was +1,5 g/kg at 850hPa in autumn. Precipitation change over the oceans in Spring was –1 to –1.6 mm/day. The most snow cover depth response detected was 20 mm during the spring. The results reflects a high sensitivity of model to changes of snow albedo. This study has been partly

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