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ECHAM5/MPI-OM simulations for the Fourth Assessment Report of IPCC

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The Max Planck Institute for Meteorology is currently performing global climate simulations for the Fourth Assessment Report of IPCC. The model used for the experiments consists of the atmosphere model ECHAM5 coupled to the ocean model MPI-OM without flux adjustments. The resolution is T63L31 for the atmosphere and 1.5°L40 for the ocean. The water cycle is closed by computing river runoff with a hydrological discharge model. Results are presented from a multi-century control simulation of the pre-industrial climate and from ensemble simulations with prescribed forcing (greenhouse gases and aerosols) for the 20th century, the 21st century (SRES scenarios A1B, A2, and B1), and also from commitment experiments for the 21st and 22nd century. It is shown that the observed temperature evolution, since about 1950, is well captured by the model. Commitment experiments for the 21st century show that the global warming trend becomes negligibly small (about 0.03°C /decade) when atmospheric concentrations are kept constant at the respective levels in the year 2000. However, assuming zero emissions after 2000 results in a rapid initial warming of about 0.8°C during the first decade, because the (negative) aerosol forcing is lost almost instantaneously after cutting the emissions due to the short lifetime of tropospheric aerosols.