



The effects of stratosphere-troposphere coupling on the decadal predictability of the climate system

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The coupled ocean-atmosphere CMCC-CMS model is used to investigate the influence of the stratosphere on the decadal predictability. As part of the EU-funded COMBINE Project, a set of decadal prediction experiments are performed for the 1960-2005 period, following the CMIP5 protocol using historical radiative forcing conditions, followed by RCP4.5 scenario settings from 2006 onward. The decadal predictions consist in 3-member ensembles of 10-year simulations starting at 5-year intervals, with the ocean initial states provided by ocean reanalyses differing by assimilation methods and assimilated data. A purpose of this work is to assess the impact of the initialization to reproduce climate variations with respect to an uninitialized climate simulation performed for the same time period of the predictions using identical forcing conditions.

Focus is also laid on the differences between simulations by high-top configuration (CMCC-CMS), including a well-resolved stratosphere and equivalent simulations using a low top model differing only in vertical extent and vertical resolution, to estimate how the inclusion of a well-represented stratosphere could impact climate predictability on the decadal time scale. The stratospheric predictability was further examined by focusing on the statistics of sudden stratospheric warming (SSW) events considered one of the most important stratosphere-troposphere dynamical coupling processes.