3rd International Conference on Earth System Modelling
Vol. , 3ICESM-356, 2012
3rd International Conference on Earth System Modelling


# Surface Climate Change in the CMIP5 simulations: Northern winter response and the role of Stratospheric Variability

E. Manzini (1), A.Y. Karpechko (2), and the SPARC/DynVar Team

(1) Max Planck Institute for Meteorology, Hamburg, Germany (elisa.manzini@zmaw.de), (2) Finnish Meteorological Institute)

The aim of this work is to assess the stratospheric changes and their potential surface signatures in the Coupled Model Intercomparison Project – phase 5 (CMIP5) ensembles of models. Specifically, we focus only on a few aspects of stratosphere -troposphere climate: Changes occurring during Northern hemisphere winter and late spring. The questions addressed are if the stratospheric polar vortex changes during these seasons are consistent among the CMIP5 models and if so what are their consequences for Northern hemisphere surface climate change. It is found that the CMIP5 and CMIP5 versus CMIP3 analysis provide further evidence that the lower stratospheric polar winds weaken and the vortex expand; and that some fraction of the SLP surface change is related to changes in stratospheric dynamics. The most robust difference in surface change found in the CMIP5 model set that is consistent with the influence of stratospheric dynamics is a polar reduction of the SLP change. An exploratory FM-DJ analysis provides suggestive evidence that the effective stratospheric influence on tropospheric climate change is not only restricted to very high latitudes, but may have a broader latitudinal extent, as previously demonstrated in more constrained comparisons. At middle latitudes, the CMIP5 inter-comparison has shown that other factors, very likely related to how non-stratospheric processes are modeled, appear overtake the signal coming from the stratosphere.