





Supplement of

Sensitivity studies with the regional climate model COSMO-CLM 5.0 over the CORDEX Central Asia Domain

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Figure 1. Mean bias of annual mean (left), winter mean (middle) and summer mean (right) near surface temperature (T2M, °C, top panel), precipitation (PRE, %, middle panel) and diurnal temperature range (DTR, °C, bottom panel) of the reference COSMO-CLM configuration (a), driven by ERAInterim reanalysis, with respect to 3 considered observational datasets (from top to bottom: CRU, UDEL and MERRA2), for the period 1995-2005.



Figure 2. Maps of bias calculated for the NCEP2-driven simulation with the reference configuration but different time step, against different observational datasets for the 3 considered variables. Every row presents the bias calculated for the different considered variables, from top to bottom, respectively, near surface temperature (T2M, °C, CRU), precipitation (PRE, %, GPCC) and diurnal temperature range (DTR, °C, CRU). From left to right, values of the biases for yearly, winter and summer mean climatologies over the period 1996-2005 are presented.



Figure 3. Skill Score (SS) derived from the MAE calculated over the monthly climatological values of the seasonal cycle of different COSMO-CLM simulations and observational datasets, taking into account an additional uncertainty source considering the effect on model simulations of a different time step and the ERA-Interim used as drivers instead of NCEP2. From top to bottom, the SS for each variable is displayed. The dotted vertical black line divides the simulations with the same configuration of the reference simulation plus a single change in the model setup (on the left) and the ones obtained through the combinations of the previous ones (on the right). Positive (negative) values indicate better (worse) performance of the considered simulations compared to the reference one.



Figure 4. Skill Score (SS) derived from the MAE calculated for each domain sub-region over the monthly climatological values of the seasonal cycle of different COSMO-CLM simulations and observational datasets. From top to bottom, each panel represents the results obtained for near surface temperature (T2M), for precipitation (PRE) and for diurnal temperature range (DTR). In each case the results obtained for different observational datasets are shown. Positive (negative) values indicate better (worse) performance of the considered simulations compared to the reference one.



Figure 5. Skill Score (SS) derived from the weighted MAE calculated for each domain sub-region over the monthly climatological values of the seasonal cycle of different COSMO-CLM simulations and observational datasets, taking into account an additional uncertainty source considering the effect on model simulations of a different time step and the ERA-Interim used as drivers instead of NCEP2. From top to bottom, each panel represents the results obtained for near surface temperature (T2M) using the CRU, for precipitation (PRE) using the GPCC and for diurnal temperature range (DTR) using the CRU as observational datasets. Positive (negative) values indicate better (worse) performance of the considered simulations compared to the reference one.