



Sensitivity of regional climate studies over Kazakhstan to physical parameterizations

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The seasonal predictions of climate are very important for Kazakhstan. The climate of Kazakhstan is highly continental, with wide variations throughout the territory. There is a shortage of precipitation, and the cultivation of most of crops is only possible in the north, northeast and in a narrow foothill area in the southeast of the country. So, agriculture of Kazakhstan is considerably vulnerable to climate related stresses. Kazakhstan has a complex topography, the mountain regions occupy about 10% of its territory.

High resolution regional climate model (RegCM3) was selected to carry out the regional simulations. The model offers a wide range of physical parameterizations which makes it a good candidate for this study. Different parameterizations lead to a wealth of options in the model design that affects the model results. The RegCM3 simulation domain includes the whole Kazakhstan and has 60 km of horizontal resolution with 18 vertical sigma levels.

A total of 24 simulations were carried out for the different seasons of the period 1991-2000 by nesting the RegCM into the NCEP/NCAR Reanalysis. The experiments varied the parameterizations of convective precipitation (the Grell scheme with two closures (Fritsch-Chapell and Arakawa-Schubert) and the new Emanuel scheme).

The main interest is to compare the RegCM results of precipitation and air temperature with observational data set (from CRU) on a monthly basis. The strengths and weakness of the parameterization schemes employed in the model were investigated for the flat and mountain regions of Kazakhstan. The results show that there is not a best combination of parameterizations for the whole Kazakhstan, for every season or even for every variable tested. But the study is useful to select a parameterization for

a smaller area or for specific season.