

Western Siberia climate:

Results of the RegCM4 regional model

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Abstract

The first results of contemporary and future West Siberia climate modelling performed with the RegCM regional climatic model are presented. We discuss the results of the computer experiments set up to determine the influence of the domain size choice on the resulting near-surface air temperature and precipitation data, and the quality of reproduction of the contemporary climate by the model; and the parameters of the regional climate for 2010-2029. It's shown that the model can be used to determine the character of the future West Siberia climate change.

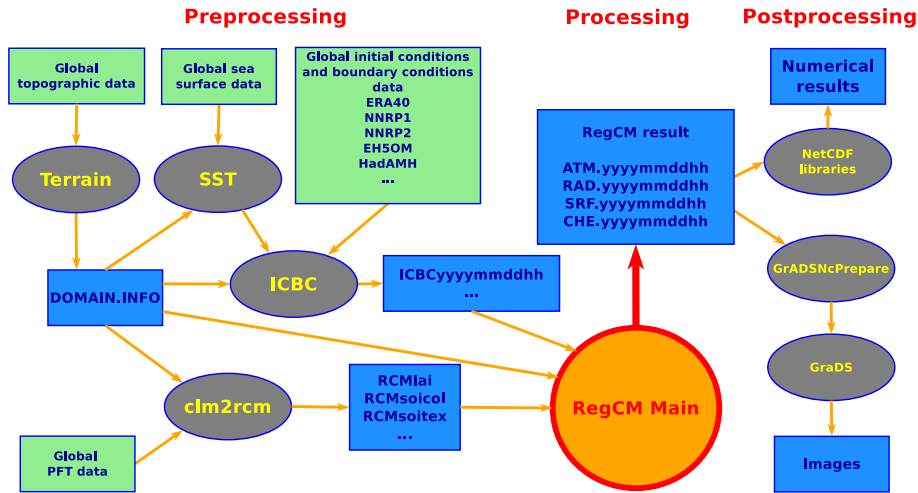
Regional climatic model RegCM

RegCM was developed in the Abdus Salam International Centre for Theoretical Physics, (ICTP, Trieste, Italy).

Main modules

- Terrain;
- SST (Sea Surface Temperature);
- ICBC (Initial Condition, Boundary Condition);
- RegCM;
- GrADSNCPrepare and GrADSNCPlot.

The sequence of simulation

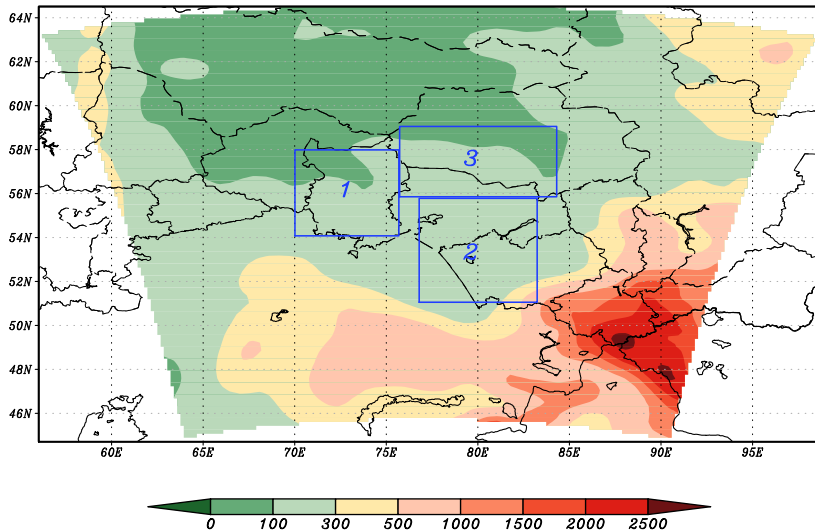


RegCM configuration

- 1 Cell size: 40 km,
- 2 projection: Lambert conformal conic,
- 3 characteristics of land surface with 30'' resolution,
- 4 initial and boundary data (Kalnay E. et al. // Bull. Amer. Meteor. Soc., 1996) or global climatic model EH5OM,
- 5 buffer zone: 12 cells,
- 6 18 sigma-levels, boundary layer model (Holtslag A.A.M. et al. // Mon. Wea. Rev., 1990),
- 7 cloud parameterization scheme (Grell G. // Mon. Wea. Rev., 1993),
- 8 the upper limit: 50 hPa, time step in the atmospheric model: 120 sec.

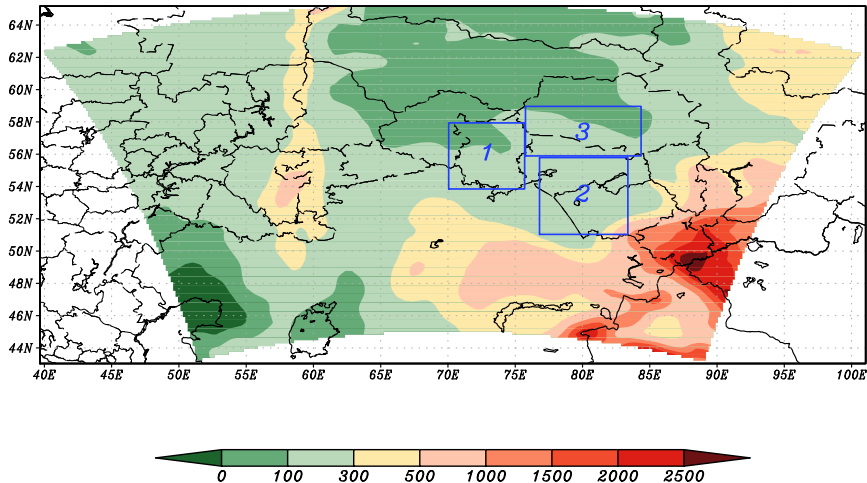
The topography of the experiment #1 (56×56 cells)

Border $\sim (45^\circ\text{--}65^\circ)$ N, $(60^\circ\text{--}95^\circ)$ E



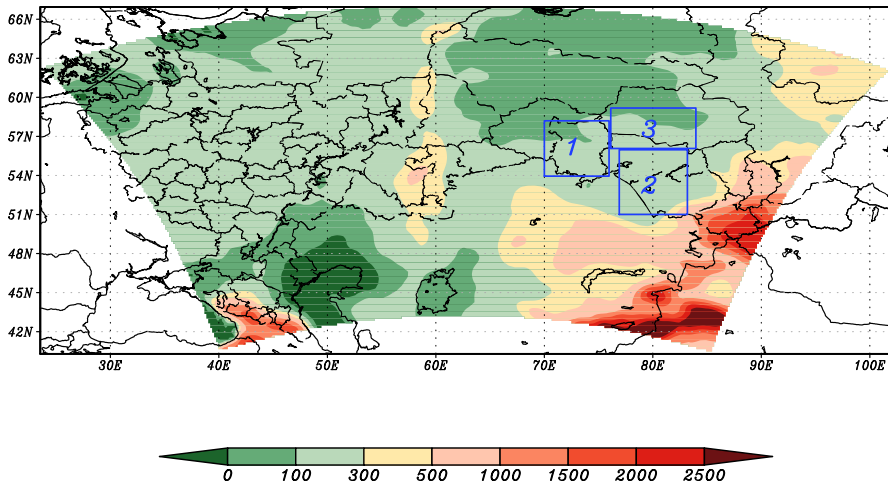
The topography of the experiment #2 (80×60 cells)

Border $\sim (45^\circ\text{--}65^\circ)$ N, $(45^\circ\text{--}95^\circ)$ E



The topography of the experiment #3 (100×70 cells)

Border $\sim (43^\circ\text{--}67^\circ)$ N, $(30^\circ\text{--}95^\circ)$ E



Reliability

The reliability of the regional climatic model was verified by a comparison of the results of the numerical simulation with the climatic data as available from Climatic Research Unit (CRU), University of East Anglia.

Results

The deviation of RegCM4 average annual surface air temperatures from CRU data for the 2nd analysis area

Year	Experiment #1		Experiment #2		Experiment #3	
	Mean	Std. dev.	Mean	Std. dev.	Mean	Std. dev.
1970	0.33	0.39	0.20	0.32	-0.11	0.36
1971	0.39	0.37	0.08	0.38	-0.12	0.42
1972	0.27	0.47	0.10	0.39	-0.06	0.43
1973	0.91	0.50	0.49	0.44	0.14	0.53
1974	0.87	0.54	0.68	0.48	0.51	0.49
1975	0.53	0.40	0.32	0.41	0.34	0.40
1976	0.76	0.50	0.46	0.46	0.29	0.42
1977	1.07	0.41	1.03	0.39	0.70	0.36
1978	1.04	0.61	0.80	0.58	0.22	0.62
1979	0.65	0.54	0.45	0.51	0.12	0.54

Results

Precipitations intensity anomalies. Our experiments vs. CRU. The 2nd analysis area

