REANALYSIS DATA VALIDATION USING THE ANNUAL VARIATION OF DAILY CLIMATIC CHARACTERISTICS AS COMPARED TO STATION OBSERVATIONS

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Seasonal hydrodynamic ensemble forecasting, performed at the North Eurasia Climate Center (NEACC, Moscow) with perspective of weekly issuance, should use daily resolved climatic values in observations, model hindcasts, as well as in "reference" reanalysis archives [3].

For comparing the annual variation of daily surface air temperature norms and standard deviations over the Eurasian territory of the former USSR, we applied station observations [1] and the nearest point data of the NSEP-NCAR reanalysis grid [2]. Characteristics were calculated over the 1979-2008 period with special attention to stations representative for six main climatic regions of the FU.

Figure 1 demonstrates a substantial discrepancy in daily normals (a) *in winter time*, e.g. for *Moscow* with a temperate climate the reanalysis yields 1°-2°C lower temperatures, and (b) *in Central Asia*, e.g. the reanalysis underestimates 8°-10°C for *Tashkent* through the whole year. The reanalysis annual amplitude in some regions with sharp-continental climate (*Verchoyansk*) is diminished, whereas in other regions with similar climate conditions (*Kustanay*, Northern Kazakhstan) the agreement is quite satisfactory. The two curves also coincide for the monsoon region of the Far East (*Khabarovsk*).

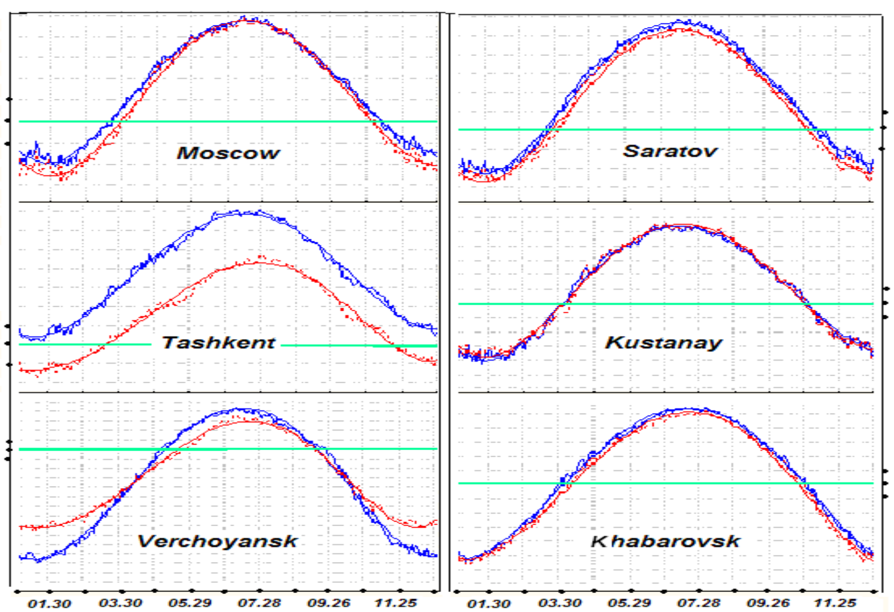

Figure1. Annual variation of daily surface air temperature normals at stations (blue) and at nearest reanalysis points (red). Points at the vertical coordinates indicate 4°C intervals around the zero value (green line). The date coordinate depicts 30 days intervals. Curves are approximated by the 5^{th} order polynomial.

Figure 2 demonstrates the annual variation of daily standard deviation from the sample norms calculated over the given period. Significant similarity in global extremes is obvious revealing minimum variability in summer and maximum variability in winter. However the amplitude diversity during the year is also remarkable (*Verchoyansk*).

Another prominent feature should be noted. The majority of stations in the European part of Russia up to the Urals reveal a second local maximum by the end of spring (e.g. Figure 2, *Ekaterinburg*), which can be interpreted as climatic ‘spring cold wave’ due to the so called ‘ultra-polar air intrusions’. This feature is either absent or insignificant to the east of the Urals. These local maxima can usually be found in reanalysis data verifying to some extent their climatological character.

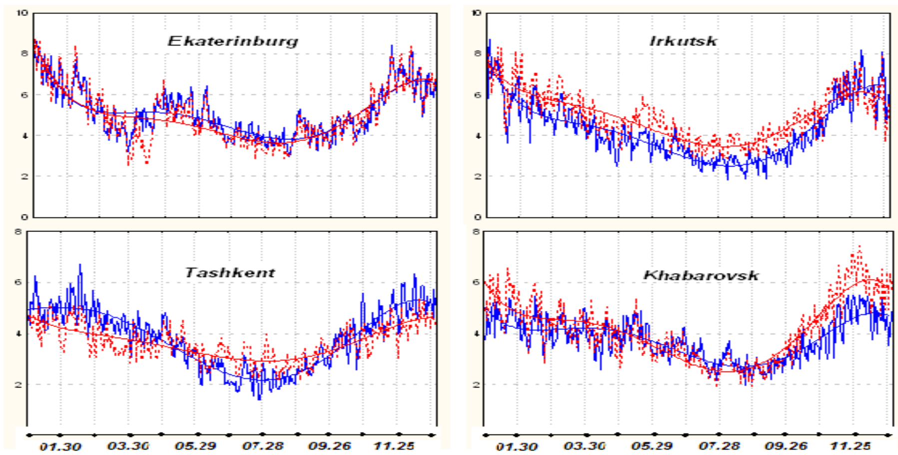

Figure 2. Annual variation of daily surface air temperature deviations at stations (blue line) and at nearest reanalysis grid points (red line). Curves are approximated by the 5th order polynomials.

Figure 3 shows spectral filtering of the annual variation of daily surface air temperature deviations at station *Moscow*. Three Fourier components (Fig.3, S07 in legend) are quite sufficient for the filter to ‘pass’ this local variability maximum. The question still remains: which local extreme is ‘climatic’, and which should be filtered as ‘non-climatic noise’?

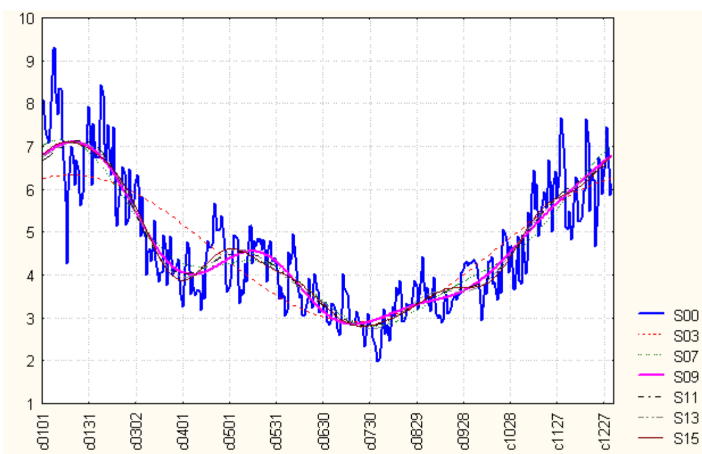

Figure 3. Annual variation of daily surface air temperature deviations at station Moscow (blue line). The initial series is approximated by increasing number of the Fourier components. The legend shows numbers equaling doubled component number plus one.

1. VNIIGMI-archive, Russian Inst. for Hydrometeorological Information, 2007: http://meteo.ru/english/.
2. Kanamitsu, M., and Coauthors, 2002. NCEP–DOE AMIP-II Reanalysis (R-2) // Bull. Amer. Met. Soc., **83**, 11, p.1631–1643.
3. Schemm, J-K., and Coauthors., 1998: Construction of daily climatology based on the 17-year NCEP-NCAR reanalysis. Proc. of the 1st WCRP Intern. Conf. on Reanalyses. Silver Spring, Maryland, USA. 290-293.