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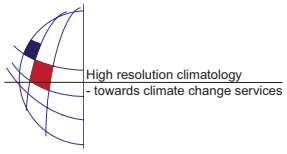

Homogeneity of Latvian temperature and precipitation series

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During previous years and decades the homogenization of Latvian monthly temperature and precipitation data series was based on the direct homogenization methods which relayed on metadata and studies of the effects of specific changes in time of observation as well as methods of observation. However, the method is not effective for temperature and precipitation data series shifts detection caused by measurement's place relocation or environmental changes. The both climatological temperature and precipitation records are significantly affected by a number of non-climatological factors (station moves, changes in instrumentation; introduction of different observing practices like a different observing time or introduction of wetting corrections for precipitation, changes in the local urban environment). If these non-homogeneities are not accounted for properly, that makes the data unrepresentative to be used for analyses of climate state, variations and changes.

Monthly and daily Latvian station series (1950-2008) of surface air temperature and precipitation are statistically tested with respect to homogeneity. Two homogeneity tests are applied to evaluate monthly series. The multiple analyses of series for homogenization MASHv3.02 has been applied to 23 Latvian mean, maximum and minimum daily and monthly data series and daily and monthly precipitation series. The standard normal homogeneity tests (SNHT) has been applied to monthly mean temperature and precipitation series. During the tested period the station network is dense enough for efficient homogeneity testing.

It has been found that all the time series contain the homogeneity breaks at least during one of the month. For some stations the multiple breaks were found. For mean temperature time series the 80 % of the breaks are generally less than $\pm$0.20C. The largest detected homogeneity breaks in the mean monthly temperatures are up to $\pm$1.00C, in mean monthly maximum temperature are up to $\pm$1.30C and for mean monthly minimum temperature are up to $\pm$1.40C. The largest sizes of the breaks have been found for the summer months caused by station relocation. For precipitation time series almost 80% of inhomogeneities were caused by changes in instruments (new gauge type), introduction of wetting corrections and changes in the immediate environment (trees, buildings). In general, the results have shown that the changes in the operation of the stations account for inhomogeneity in 70% of cases, mostly due to the relocations of stations. Besides, the use of the MASH method allowed revealing technical errors that occurred while digitizing or calculating observation data. In general, the results of the SNHT and MASH tests were identical with minute differences in the correction factors identified.

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