

Comparison of data measured at climatological and synoptic observation times

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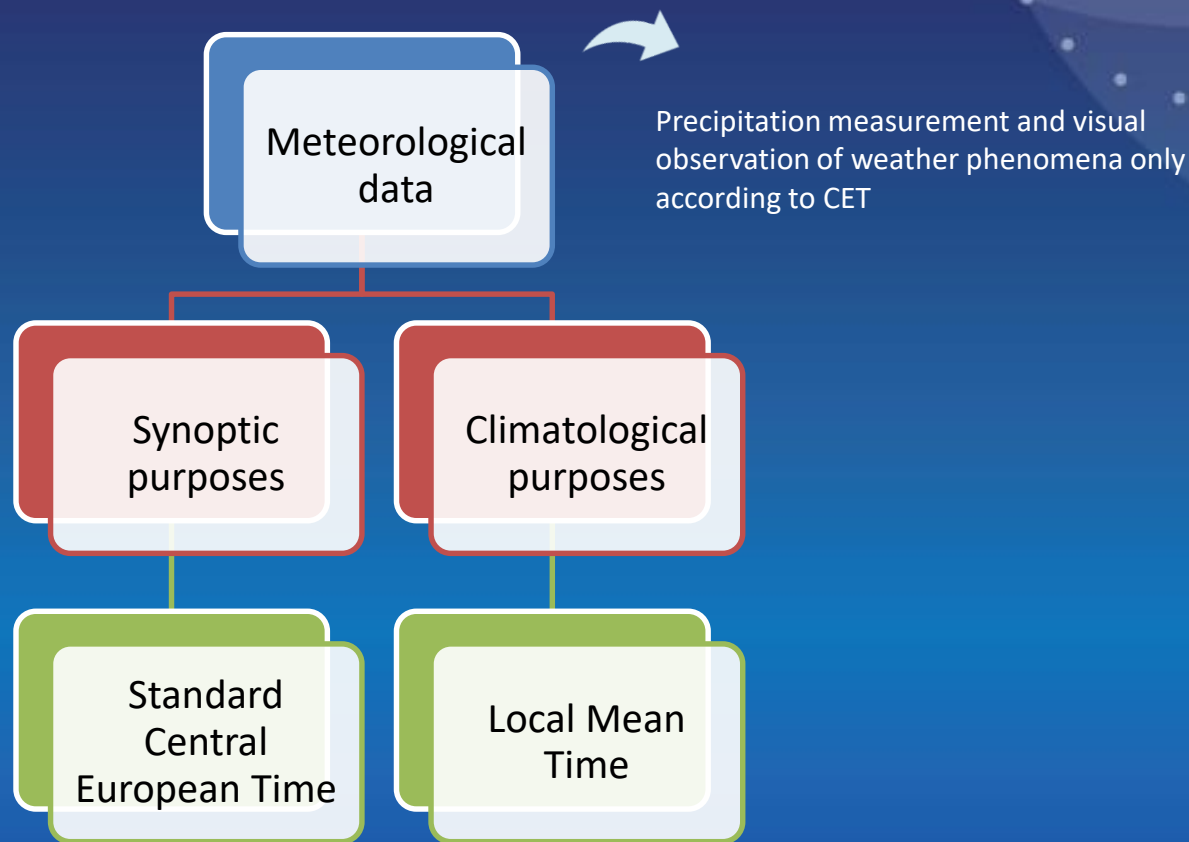
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Budapest, Hungary 9 – 11 May 2023

Climatological observations in Croatia

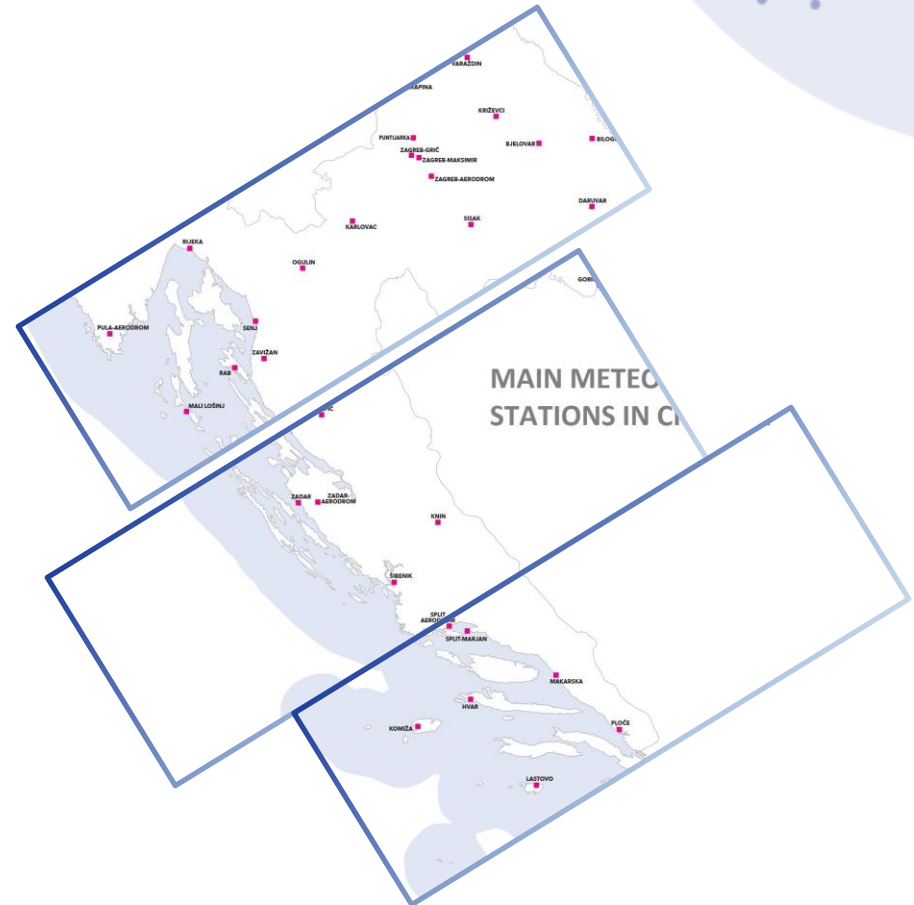
- According to Local Mean Time (LMT)
- Main meteorological stations: farther than $2,5^\circ$ from the 15th meridian & LMT – CET (Central European Time) > 10 min \rightarrow double observations

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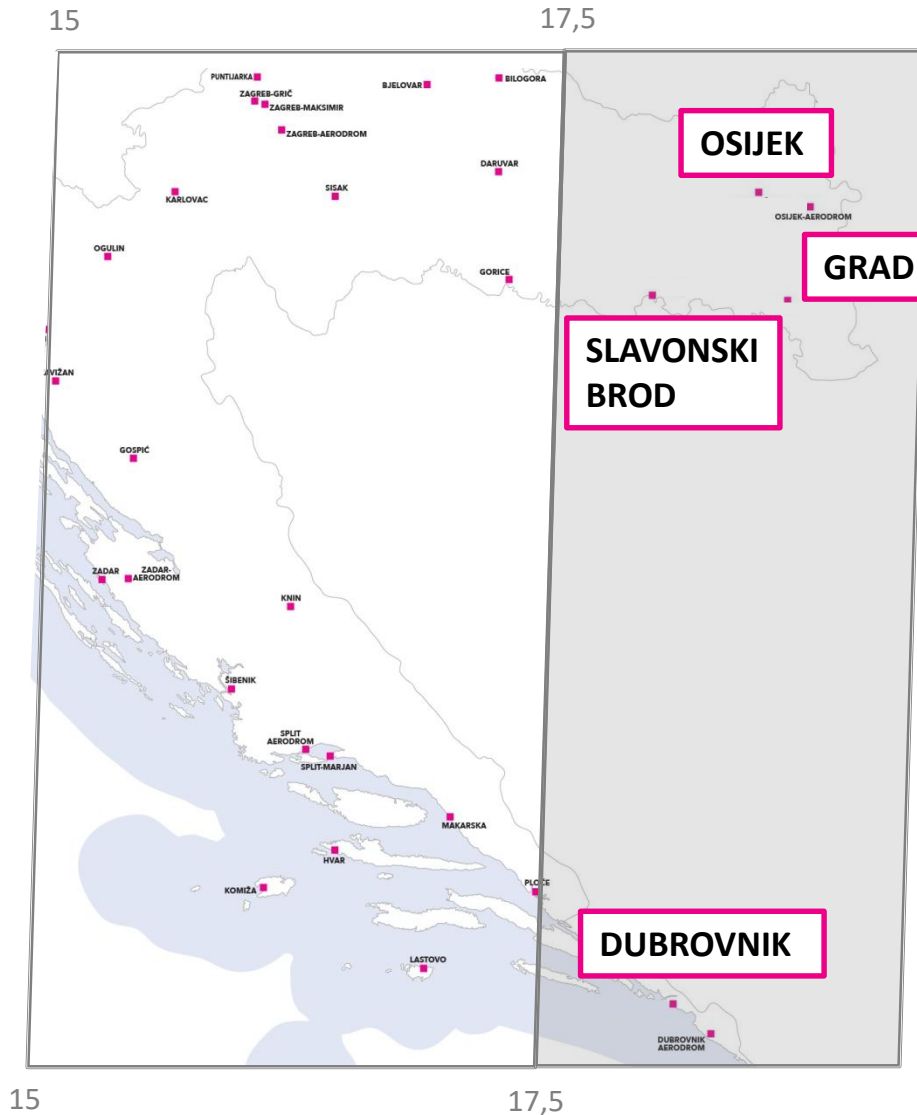


Problems

- Various database issues
- Quality control
- Observers have to observe twice in a short time interval



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Selected main meteorological stations

Climatological observations:

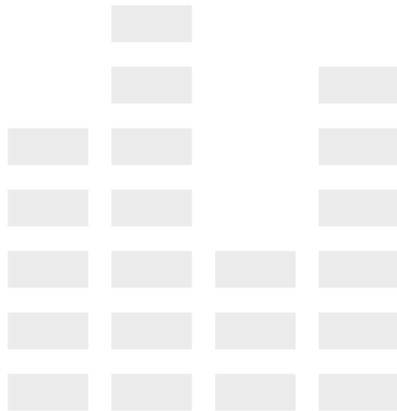
0645, 1345, 2045 CET
(0700, 1400, 2100 LMT)

Synoptic observations:

0700, 1400, 2100 CET

Data

- Temperature data – climatological and synoptic observations
– 10 years parallel measurements (2012 – 2022)
 - Manual network
 - Automatic sensors
- mean temperature in 10-minute interval
0650, 1350, 2050 CET (climatological)
0700, 1400 and 2100 CET (synoptic)



Statistical analysis

- Quantifying the difference in monthly mean air temperature between two observation times calculated from:
 1. manually collected data
 2. data from automatic sensors

Daily mean air temperature → monthly mean air temperature

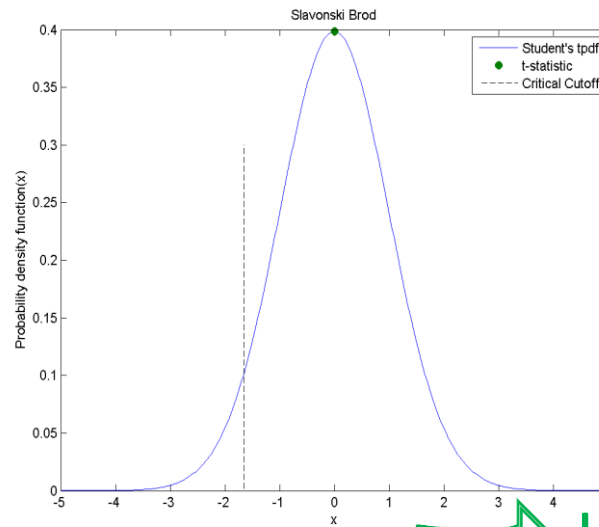
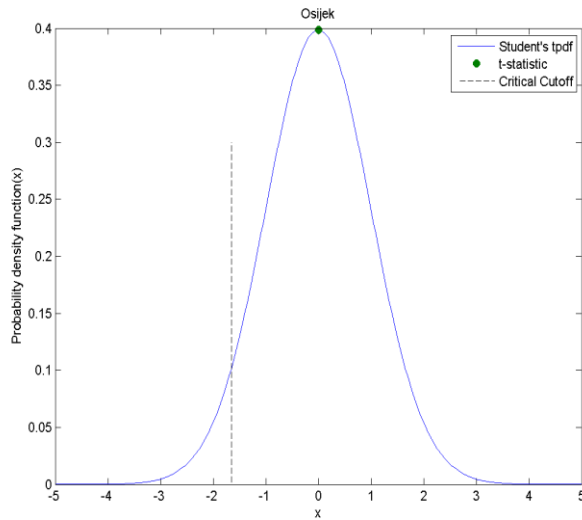
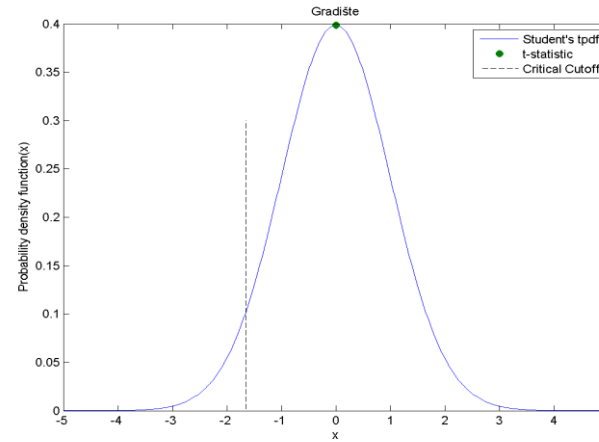
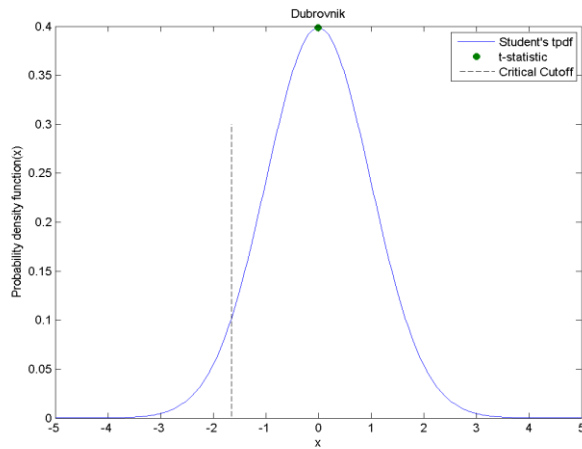
$$\text{daily mean temperature} = \frac{7h+14h+2*21h}{4}$$

- Comparison of results between manual and automatic measurement network

T – test

- $\alpha = 0.05$
- $H_0 =$ no statistically significant difference in monthly mean temperatures between two observation times

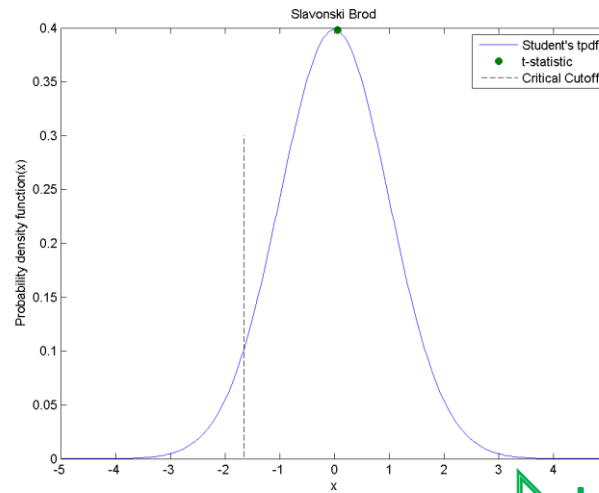
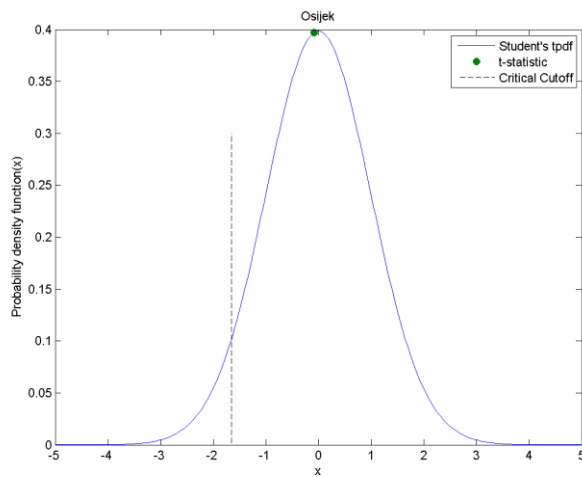
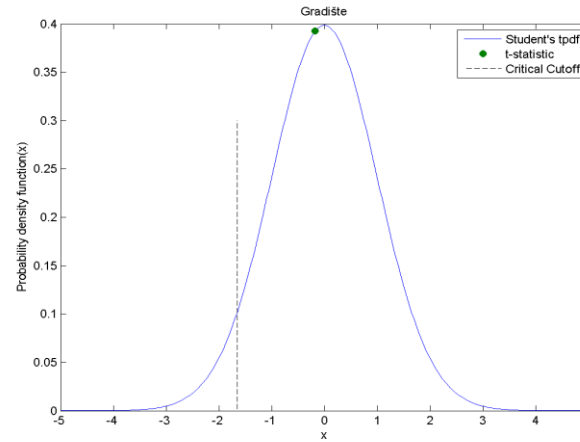
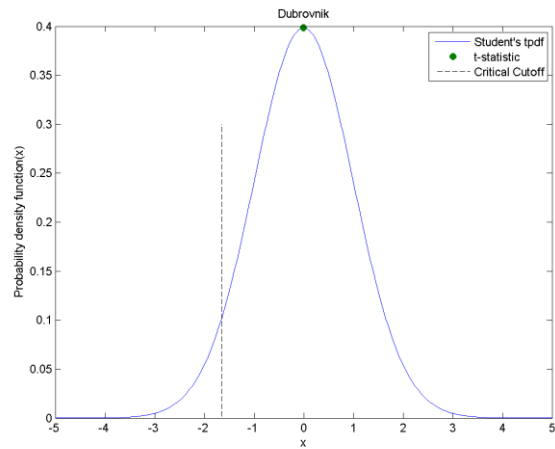
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Manual
network

➡ H_0 confirmed

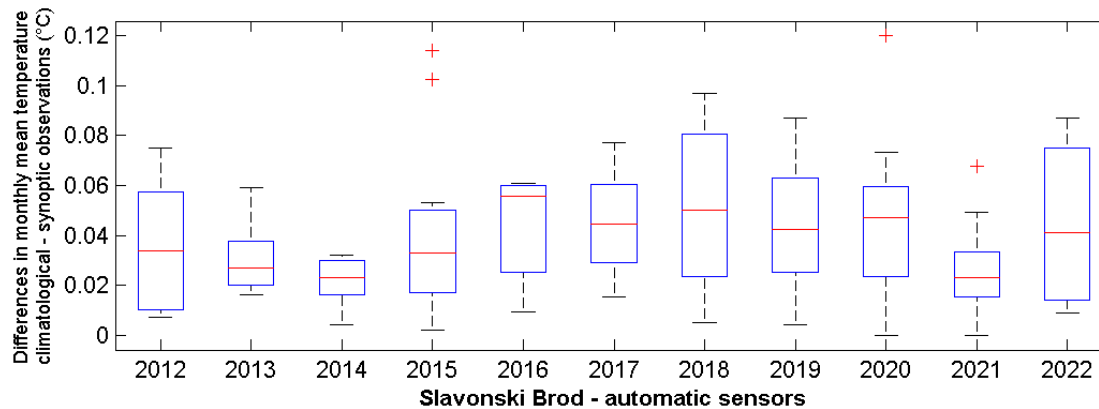
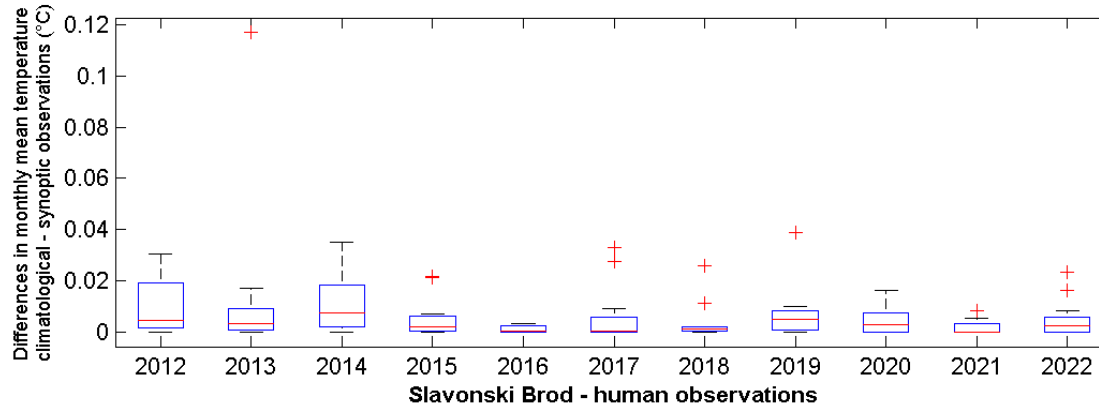
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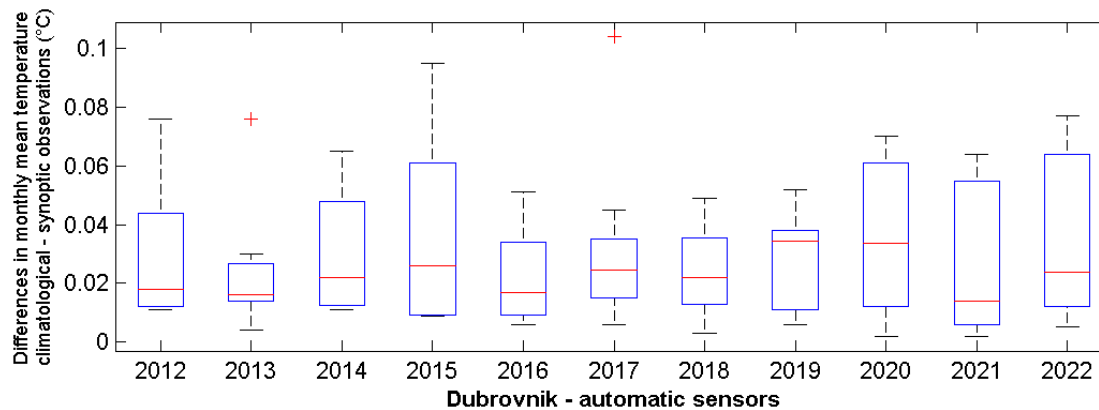
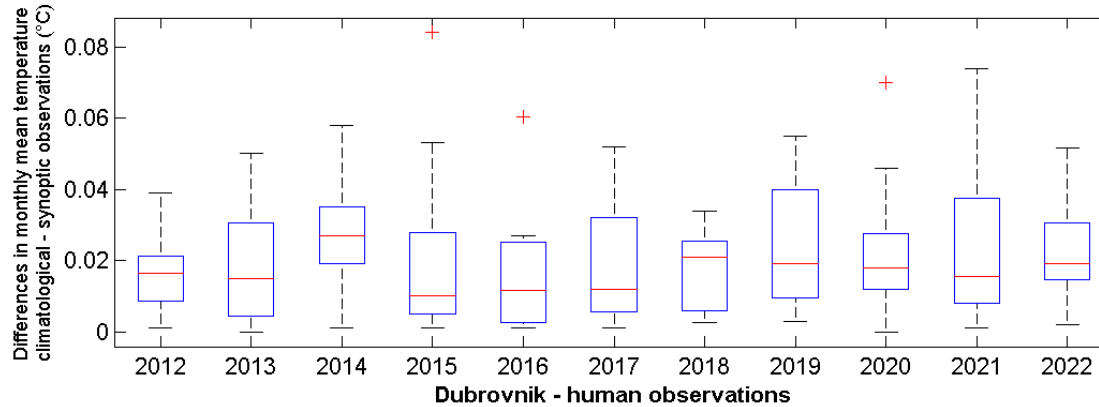
Automatic network

→ H_0 confirmed

A display of distributions of differences in monthly mean temperature between climatological and synoptic observations



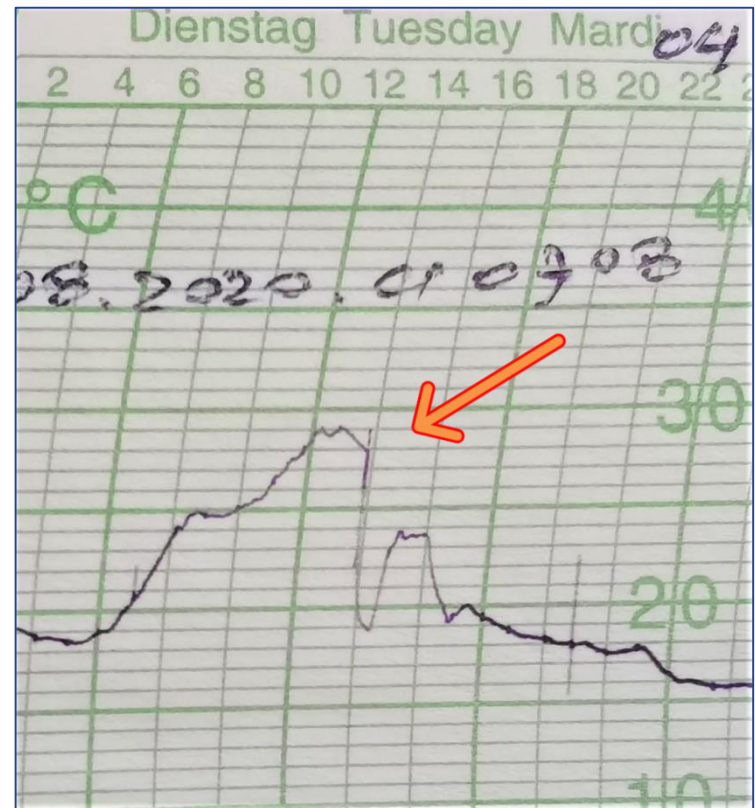
A display of distributions of differences in monthly mean temperature between climatological and synoptic observations



Values of differences are quite small for all stations, both for manual and automatic network.

Meteorological station Osijek

- 4.8.2020. 1400 CET
- Automatic network: 1350 CET - 28,2°C
1400 CET - 21,1°C
- Manual network: 1345 CET – 27,0°C
1400 CET - 27,0°C



Summary

- In Croatia, at the main meteorological stations farther than 2,5° from the 15th meridian, weather observations are taken both at climatological and synoptic hour
- Results show no significant change in temperature values nor the difference in monthly mean temperature measured at the synoptic hour and at the climatological observation time only 15 minutes earlier
 - ➡ **no need for double conventional observations at the main meteorological stations**
- DHMZ is currently in the process of modernization and automation of meteorological stations in the whole country and that is another reason why such practice is not needed anymore