8th Seminar for Homogenization and Quality Control in Climatological Databases and
3rd Conference on Spatial Interpolation Techniques in Climatology and Meteorology

Homogenization of monthly air temperature and monthly precipitation sum data sets collected in Ukraine

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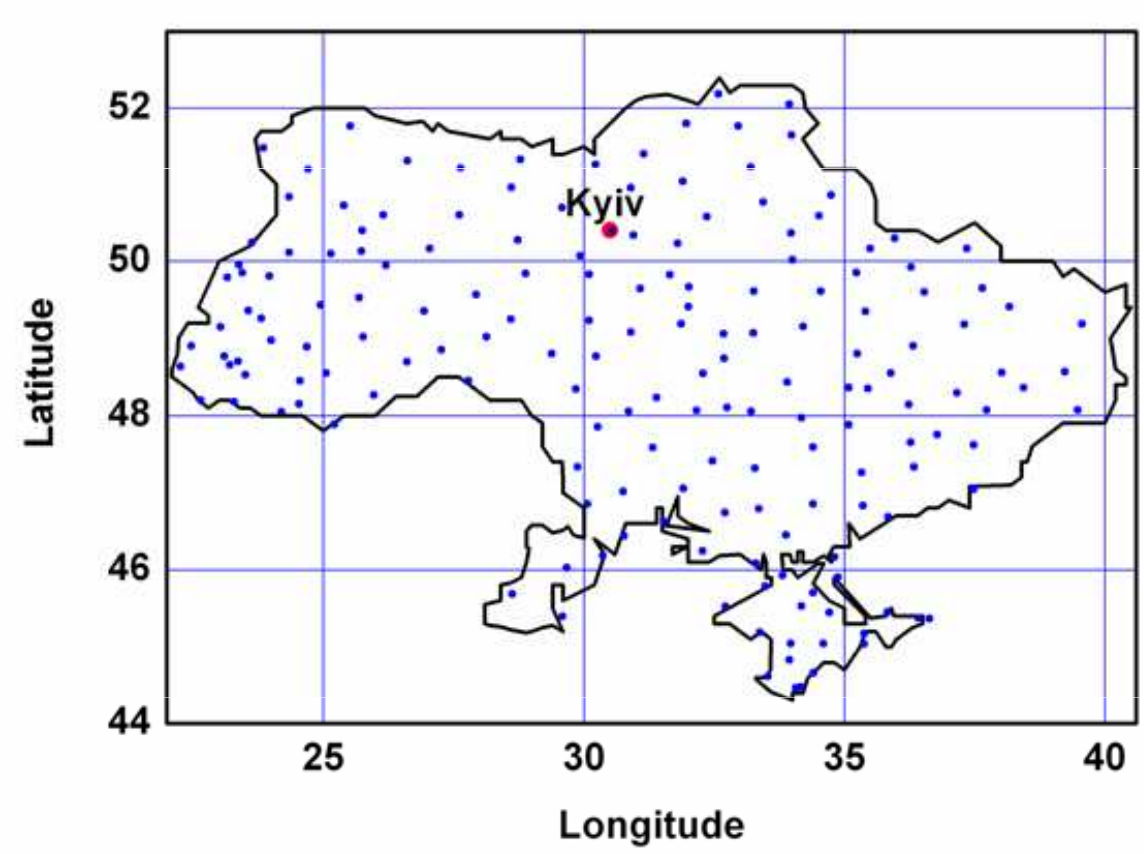
Data Information

Empiric data:



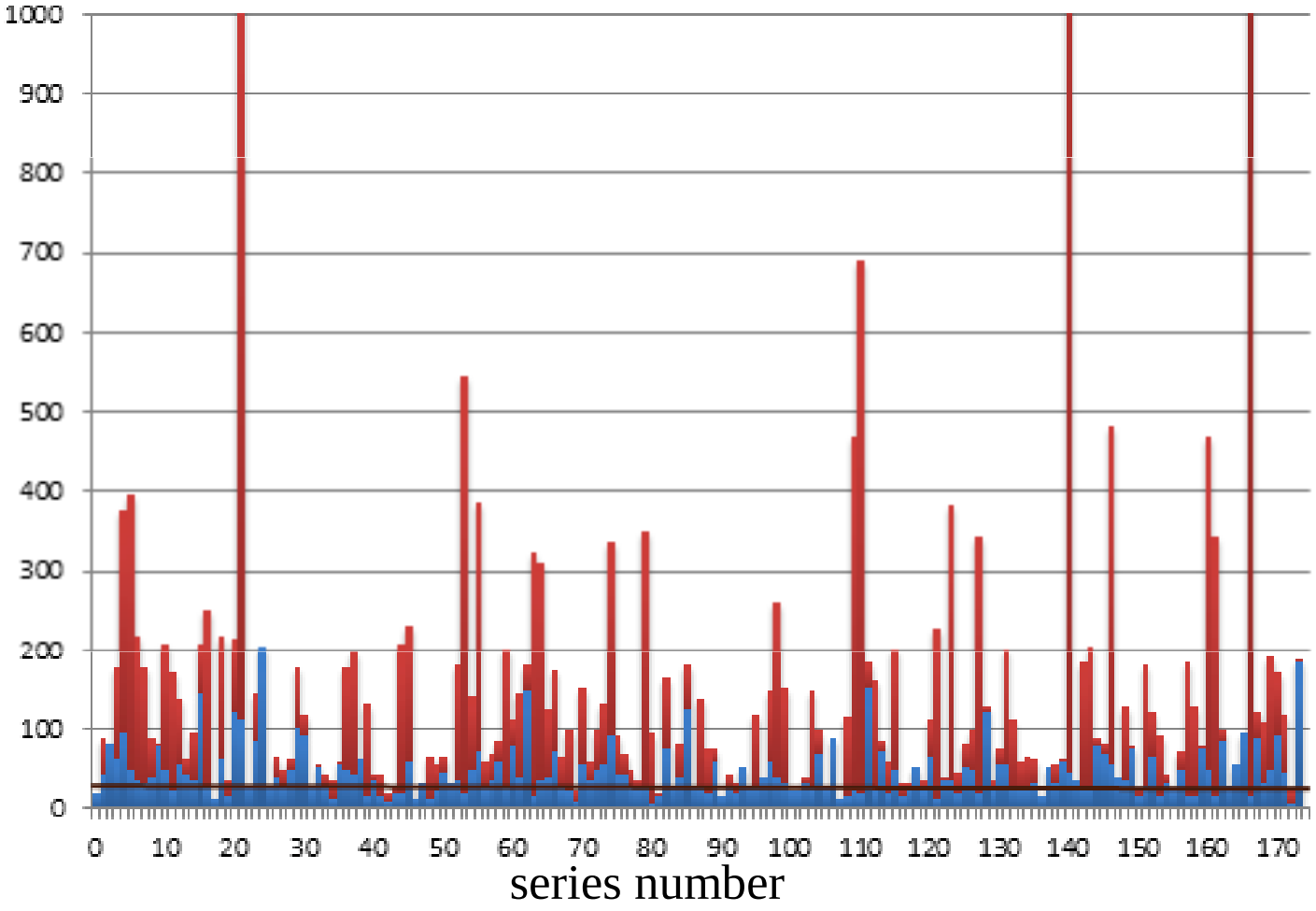
Number of stations:
174
Mean distance:
50 km (30 km)
Period of interest:
1961-2010 (2009)
Missing data:
less then 1%

Metadata was taken from historical description of Ukrainian climatological stations.

Software

- MASH
- MASH Monthly

Temperature



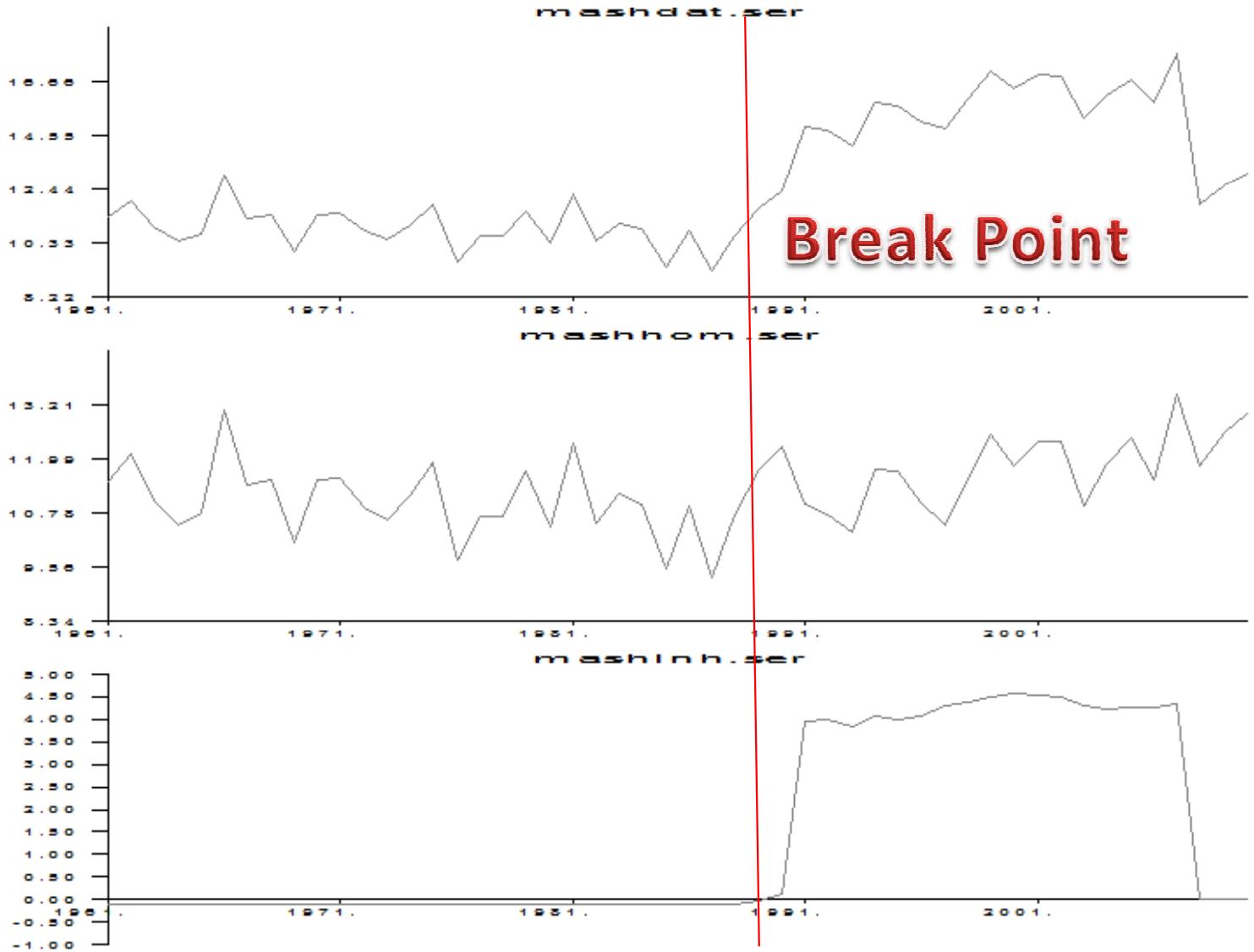
Red tables – TSB
Blue tables – TSA
Solid line – critical value

Average TSB = 301.33
Critical value = 20.86

In 82% of cases TSB decreased
In 18% of cases TSB increased.

39% TSA are lower then critical value.

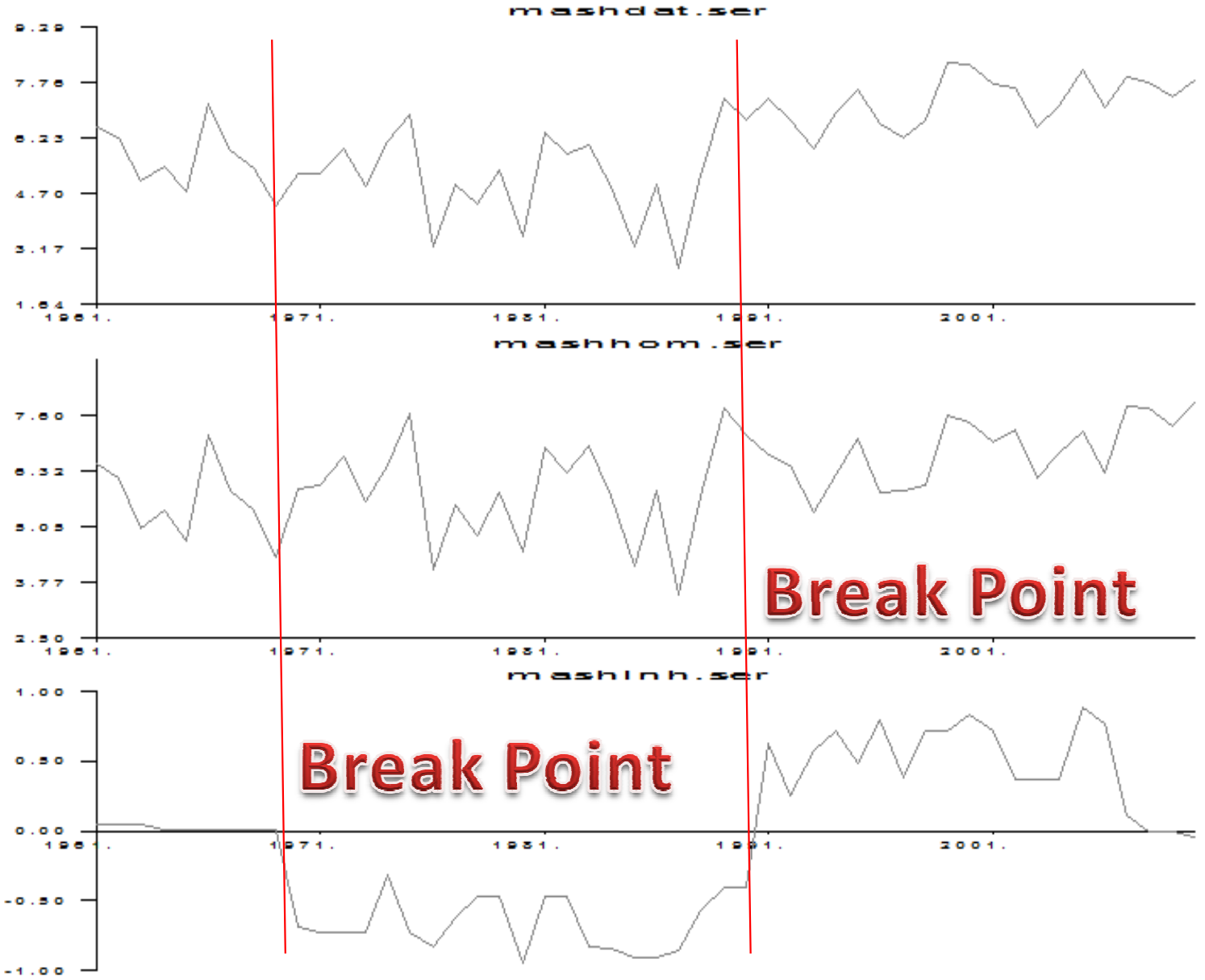
Vladyslavivka station (Autonomous Republic of Crimea)



TSB = 25661.19
(1230 times higher than critical value!)
TSA = 95.07
(4.65 times higher)

And NO available information to explain this break point!

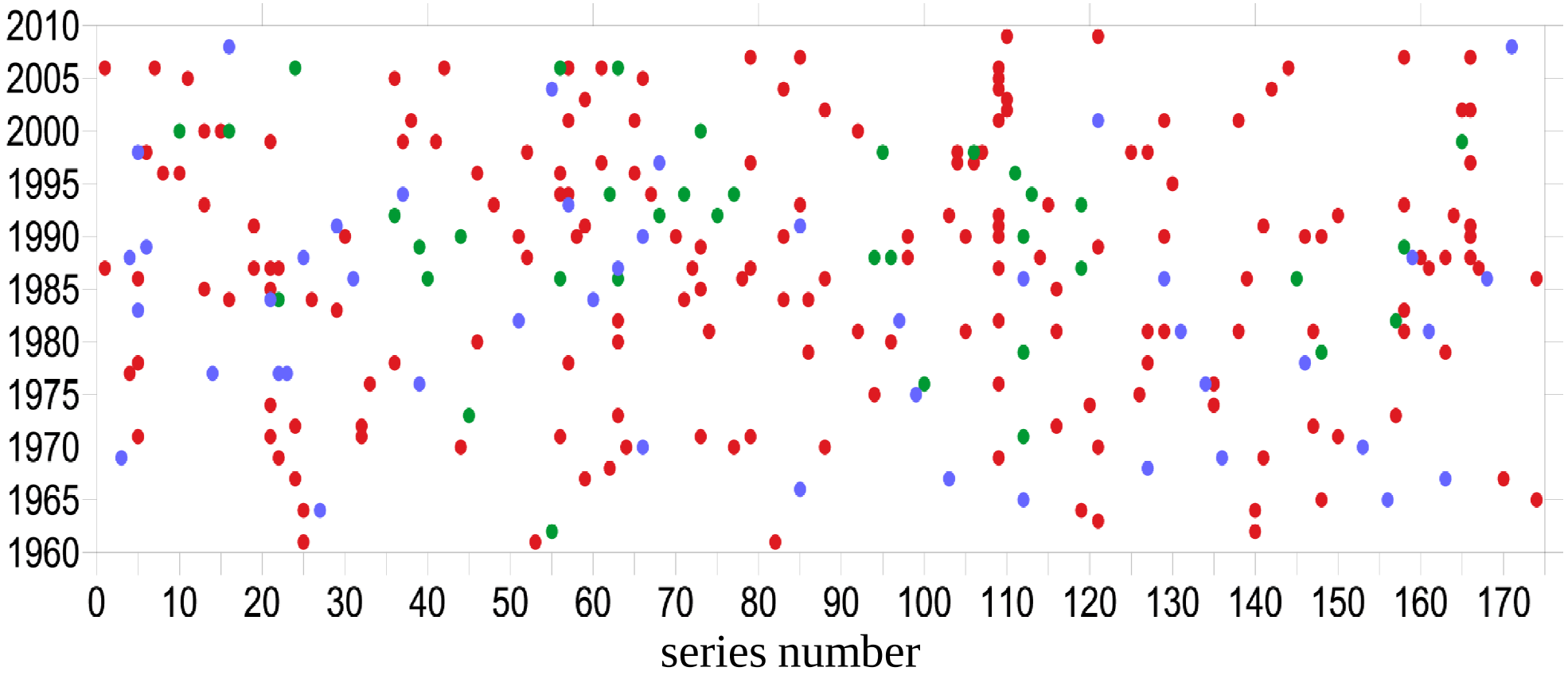
Druzhba station (Sumy region)



TSB = 463.23
(23 times higher than critical value)
TSA = 15.88
(less than critical value)

And NO available information to explain both break points!

Estimated Break Points and Shifts



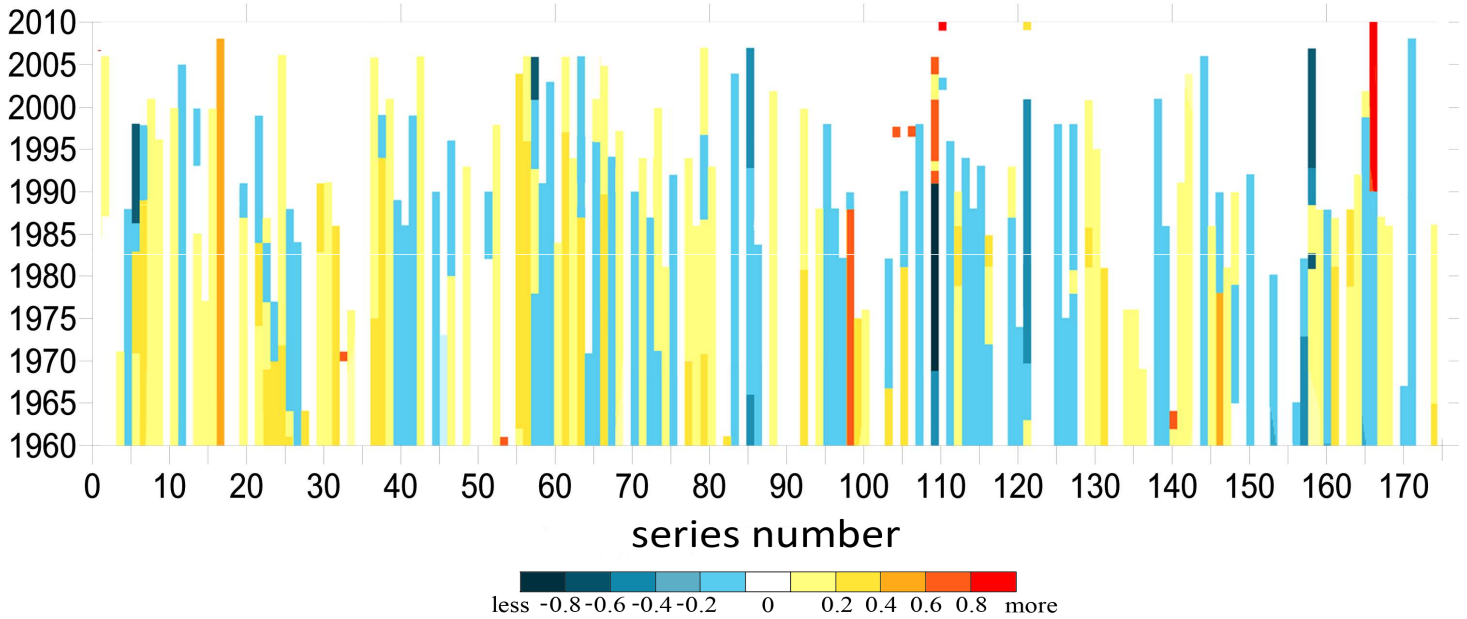
Total number of break points: 269
Mean number of break points: 1,5
Total number of stations which include break points: 129

Change in the location or height

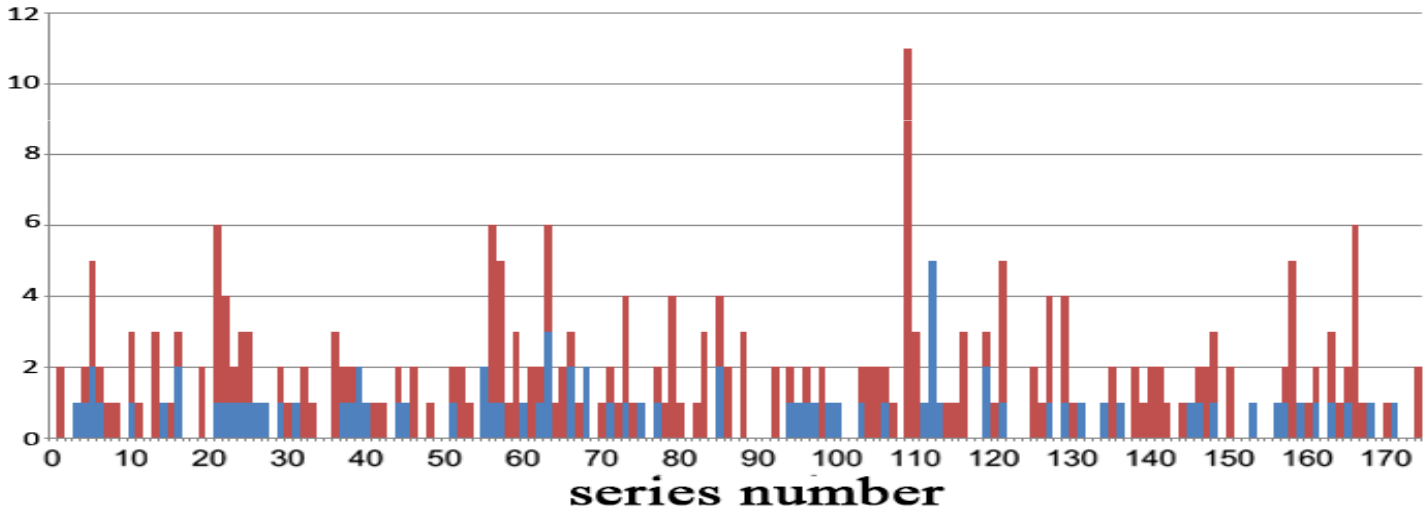
Change in the surrounding area

information N/A

Estimated Break Points and Shifts

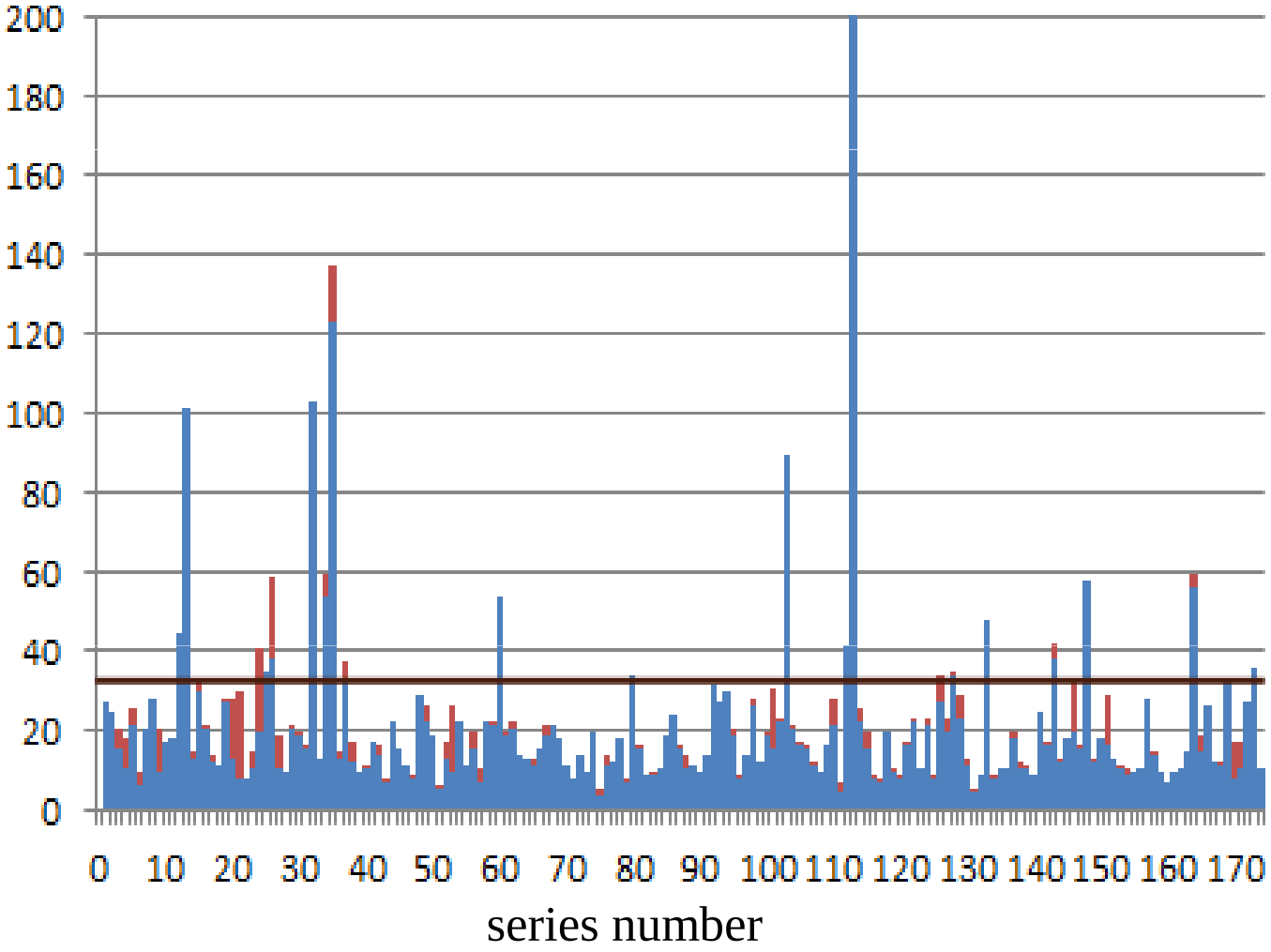


Inhomogeneity of series is mostly low
[-0,2; 0,2]°C (80%)
[-0,4; 0,4]°C (90%)
53% have positive inhomogeneity;
47% have negative inhomogeneity.



And only **30%** of break points can be explained by metadata.

Precipitation



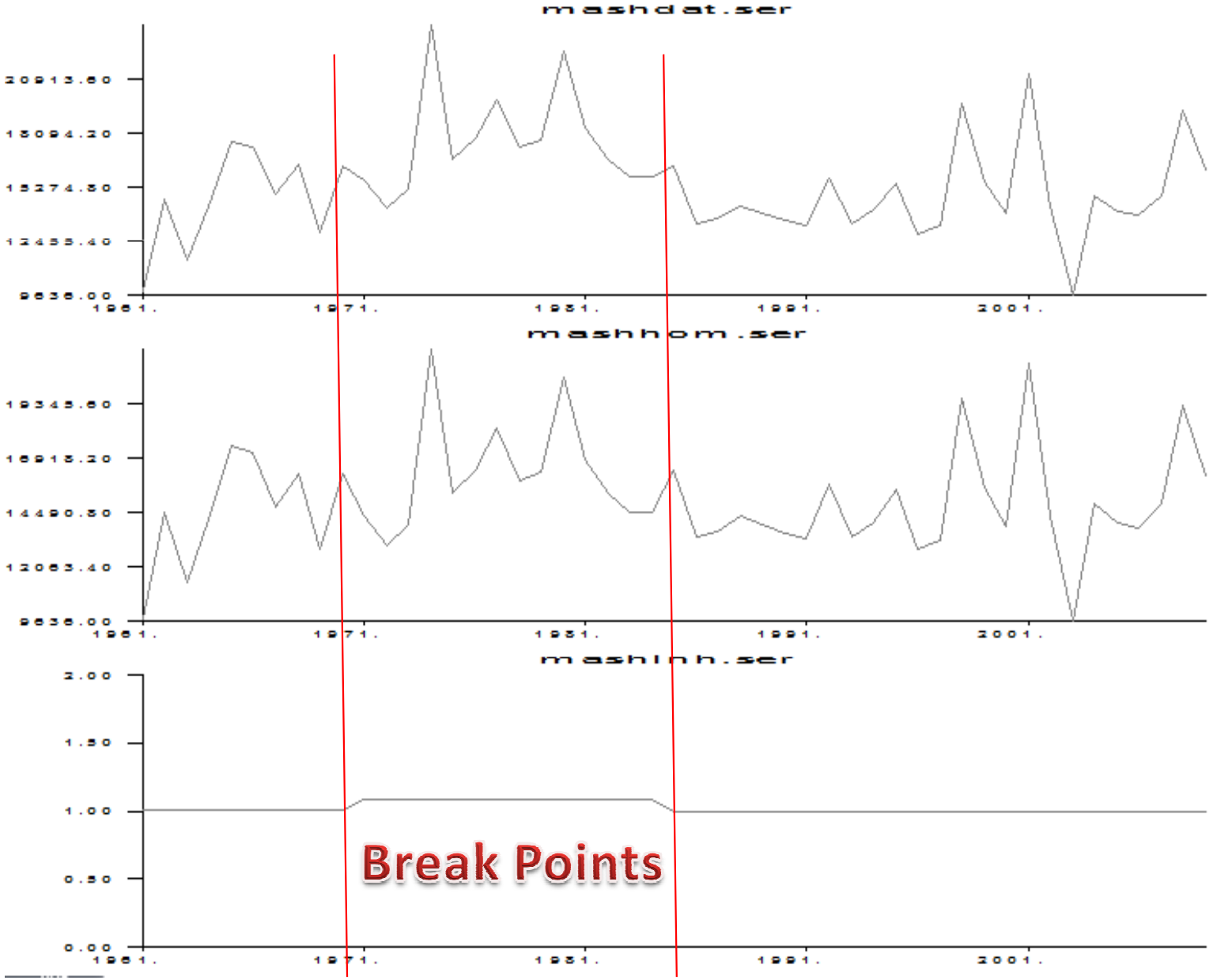
Red tables – TSB
Blue tables – TSA
Solid line – critical value

Average TSB = 23.15
Critical value = 31.00

In 45% of cases TSB decreased
In 1% of cases TS stayed the same.
In 54% of cases TSB increased.

92% TSA are lower then critical value.

Plaiy station

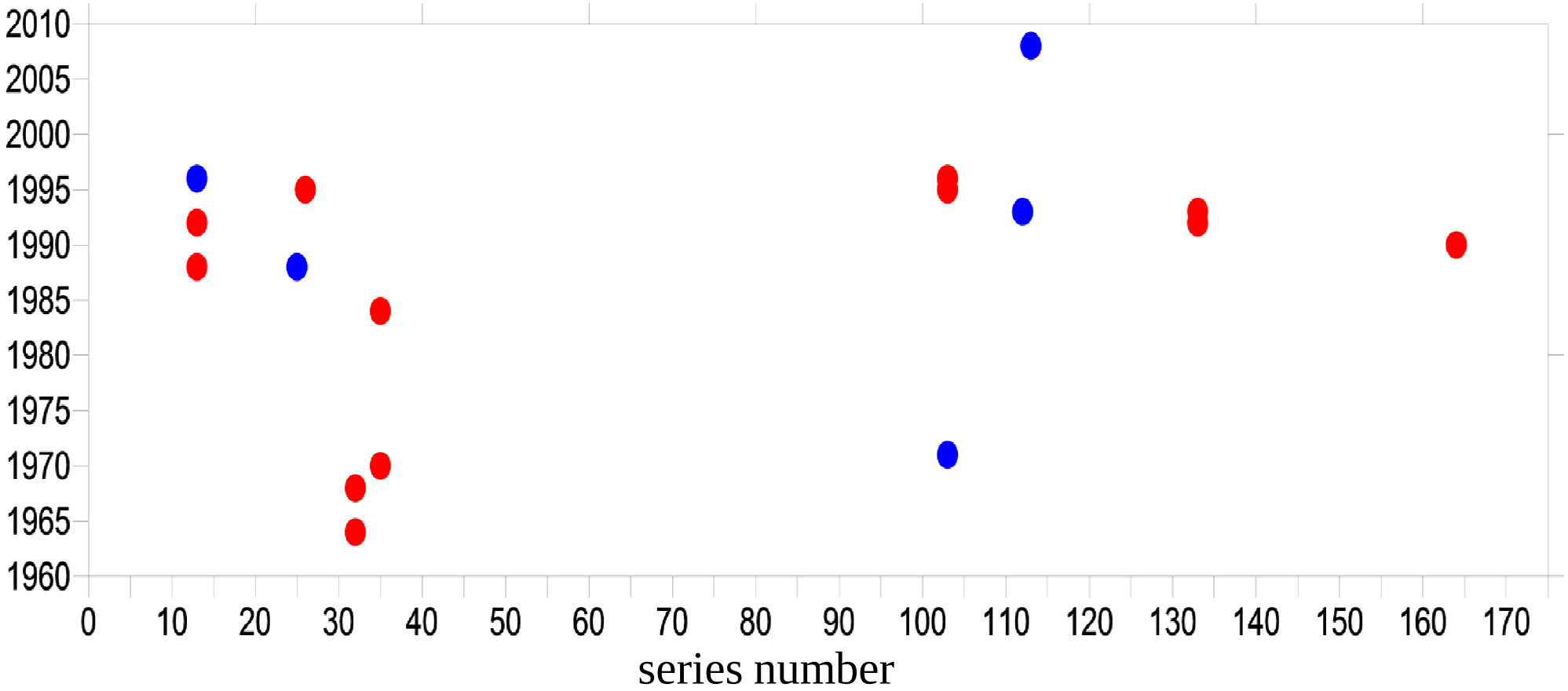


TSB = 367.07
(11.8 times higher than critical value)

TSA = 88.90
(2.87 times higher than critical value)

And NO available information to explain both break points!

Estimated Break Points and Shifts

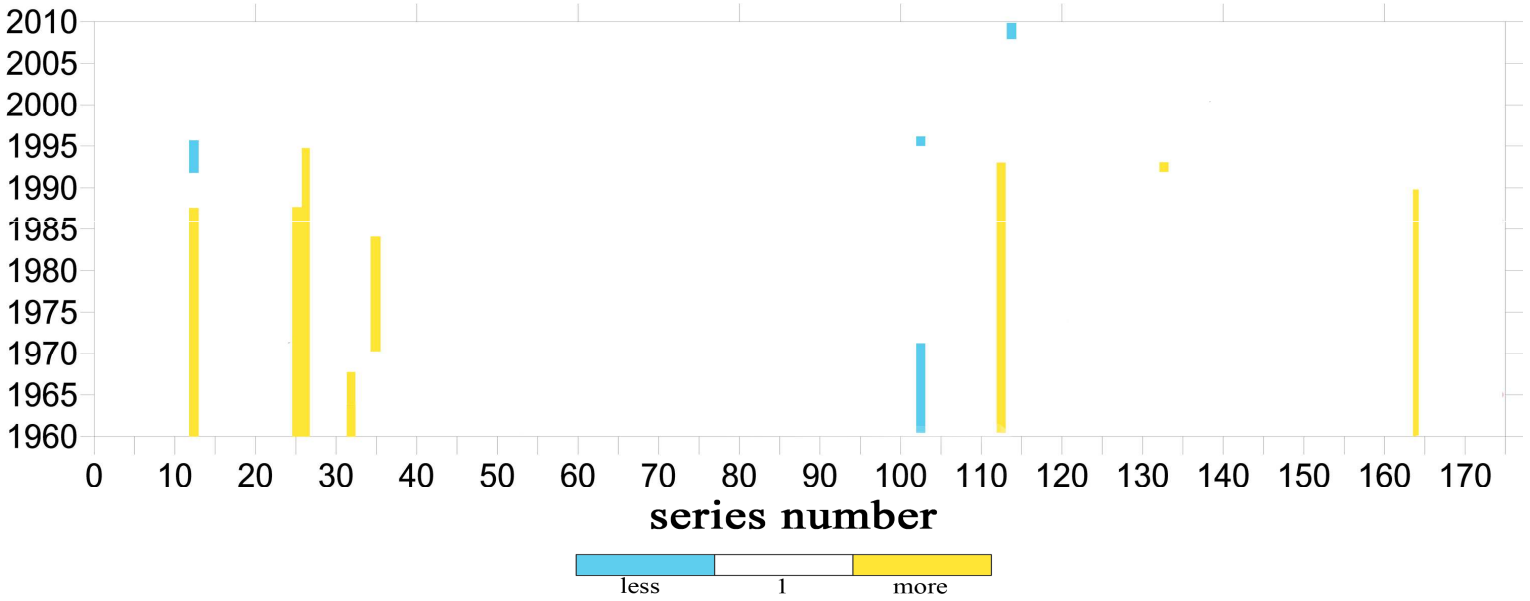


Total number of break points: 17
Total number of stations which include break points: 10

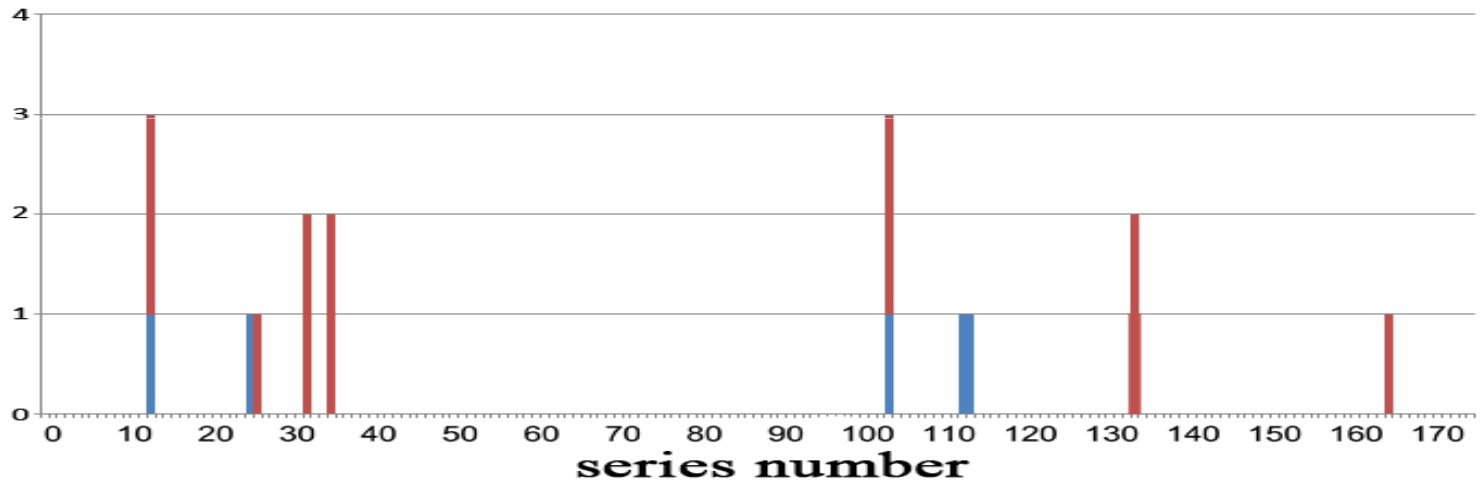
Change in the location or height

information N/A

Estimated Break Points and Shifts

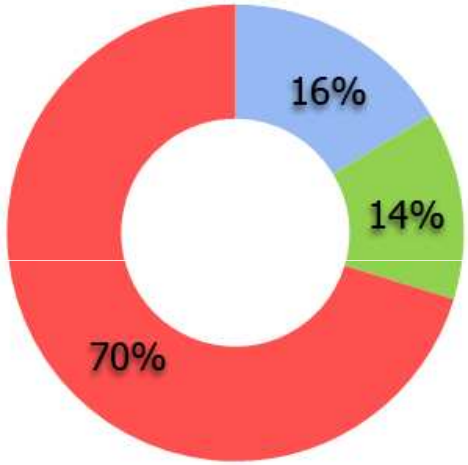


Series are mostly homogeneious. Inhomogeneity in 99% of cases is lower than 0,3%

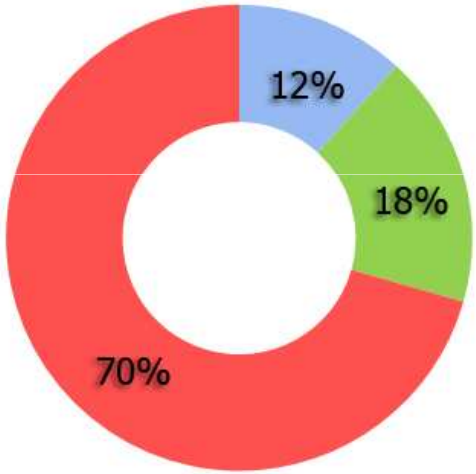


And only **30%** of break points can be explained by metadata.

Representativity of data



Monthly air temperature



Monthly precipitation sum

	Temperature	Precipitation
Average data representativity	0.92	0.51
Percent of cases higher than 0.95	39	0
Percent of cases higher than 0.80	97	0

- Change in the location or height
- Change in the surrounding area
- information N/A

Conclusions

- MASH software is suitable enough for series homogenization.
- Comparison of break points detected by MASH with metadata has shown that approximately 30 % of detected break points can be explained by metadata.
- The homogenized time series can serve as a good base for further studies of current state of regional climate in Ukraine
- The book “Air temperature dynamic in Ukraine”

  (V.I. Osadchyi,V.M. Babichenko, Y.B. Nabyvanets,

  O.Y. Skrynnyk) was published on the basis of this data.