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Regional temperature, precipitation and runoff series in the Baltic countries

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Outline

- Purposes of the study
- Geographical and hydrometeorological description of Baltic regions
- Data and methods
- Regional series

  - Temperature, precipitation, runoff

- Conclusions

Purpose of the study

To do comparison of the Baltic regional series of temperature, precipitation and river runoff for period of last years (1991-2007) and past years (1931 – 1960) with data of reference period (1961-1990).

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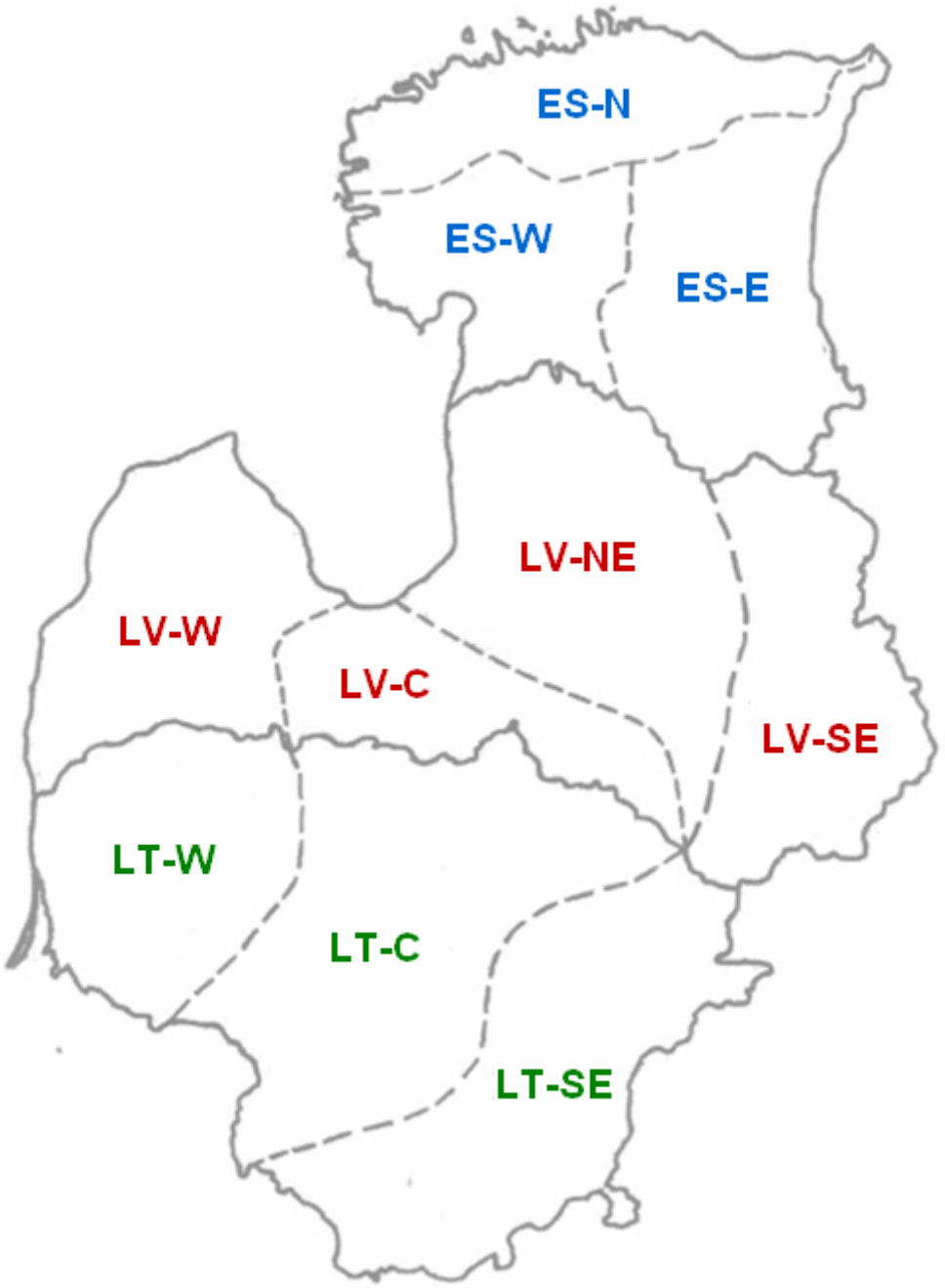
10 hydrological regions:

Western, Central and Southeastern Lithuania;
Western, Central, Southeastern and Northeastern Latvia;
Western, Northern and Eastern Estonia.



Geographical and hydrometeorological description of Baltic regions

- Lakes cover, forest cover, wetland cover, fields cover, %
- The average density of the river network, km/km2
- The density of the micro river network, km/km2
- Monthly average temperature, °C
- Annual precipitation, mm
- Snow cover duration, days
- River feeding sources
- Snow melt, %
- Groundwater, %
- Rainfall, %
- Average annual runoff, l/s·km2
- Runoff of the drought/dry period, l/s·km2

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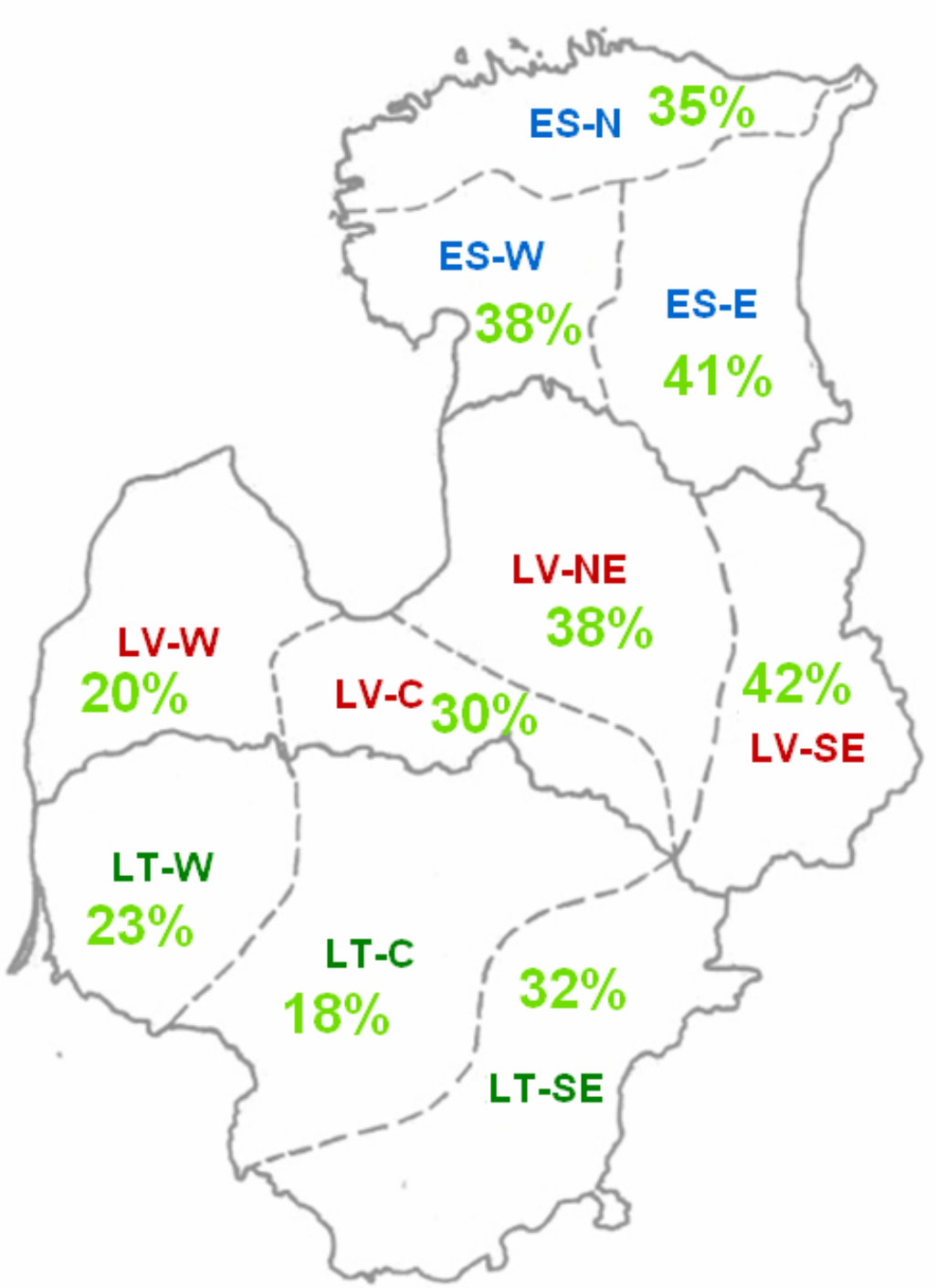
Forest cover, %



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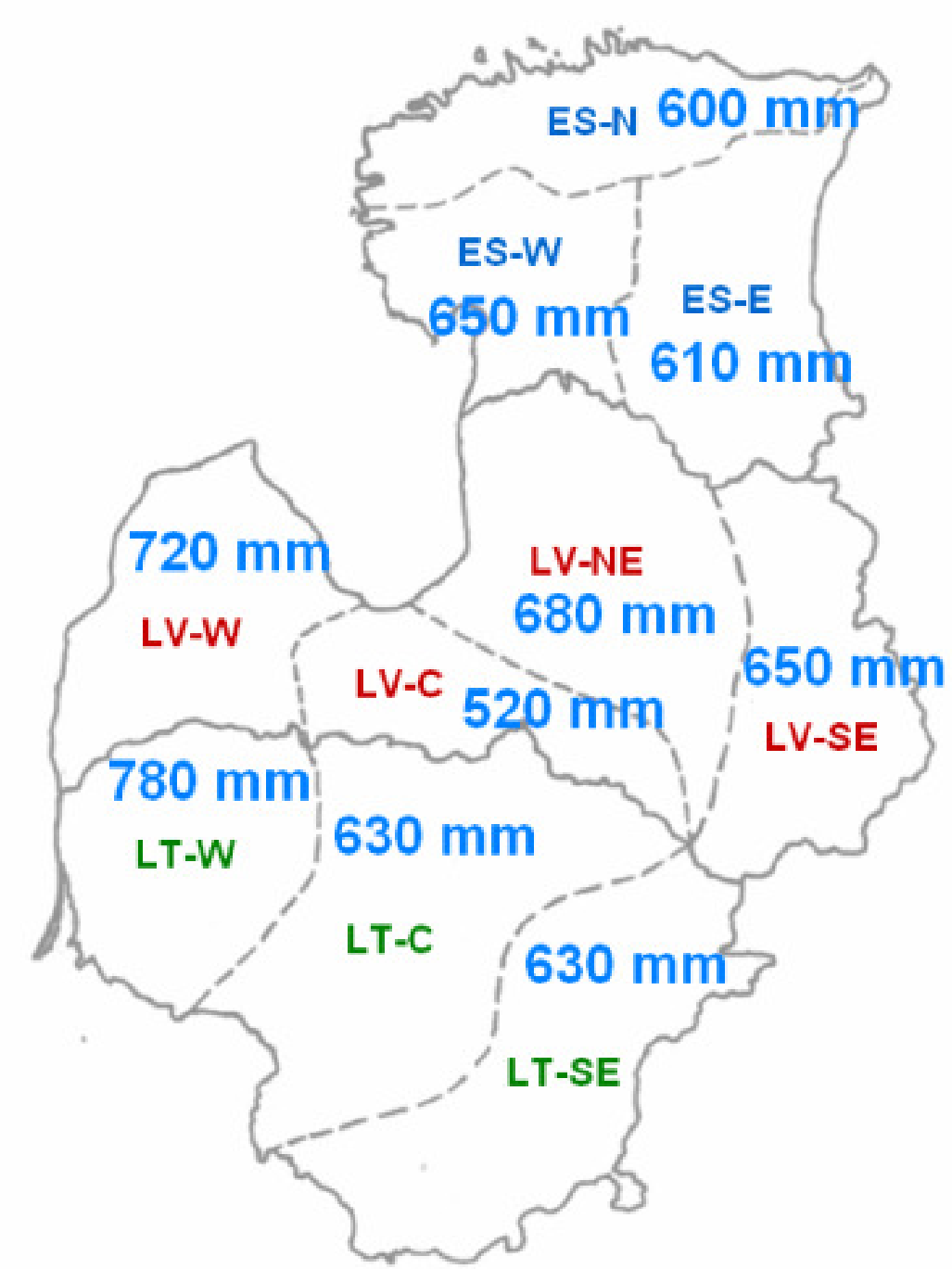
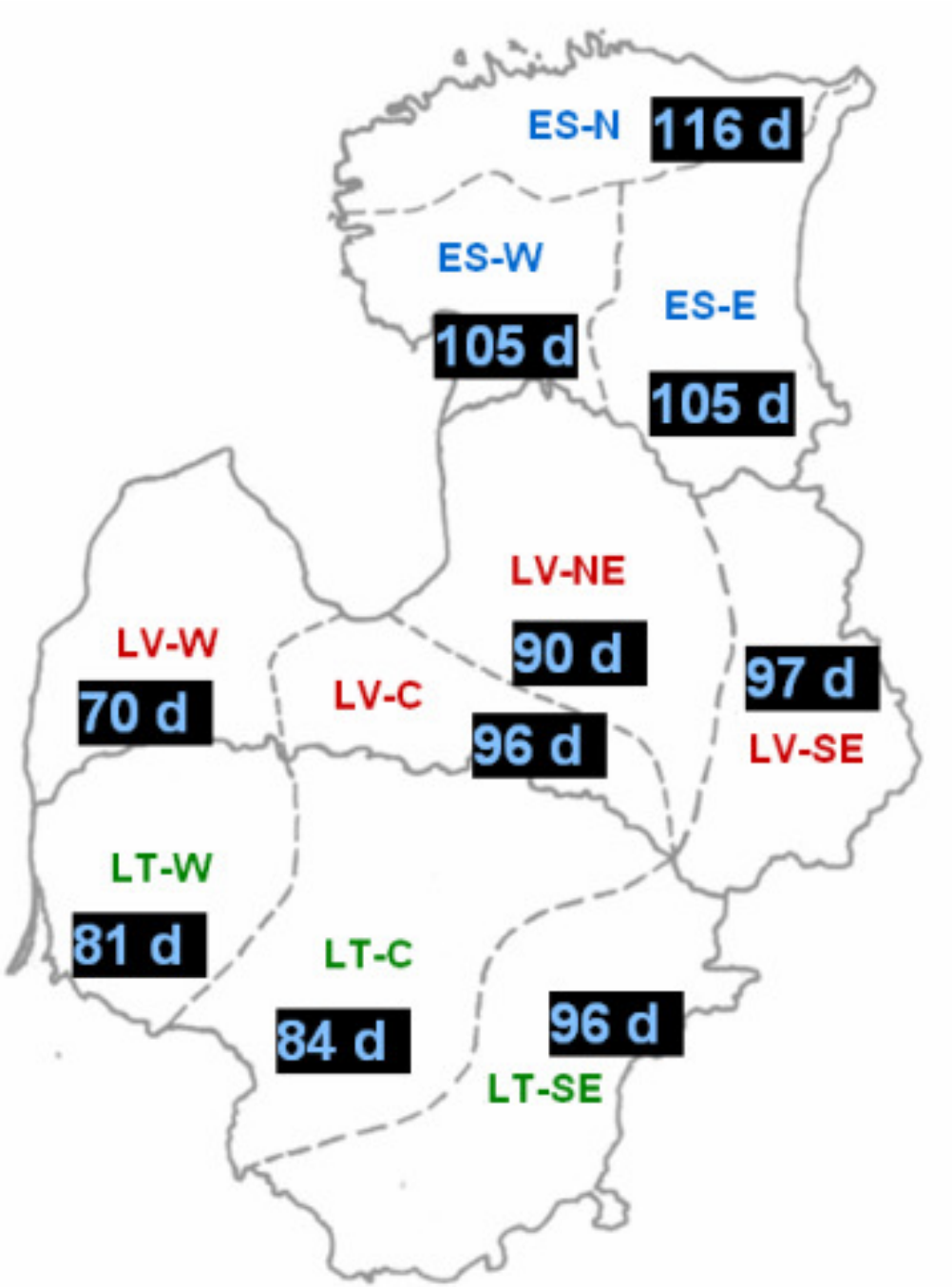
Annual precipitation, mm



Snow cover duration, days



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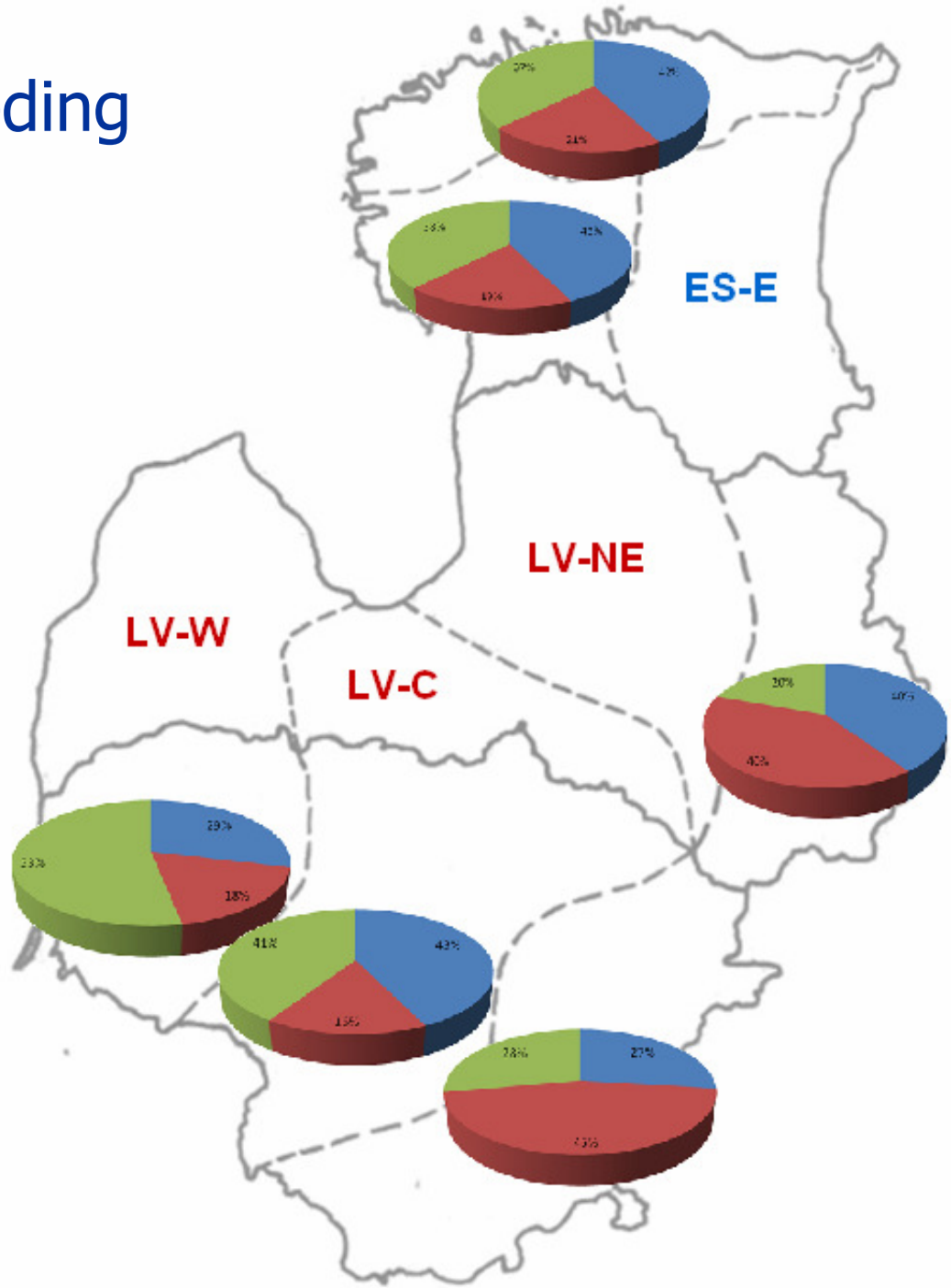
Sources of rivers feeding



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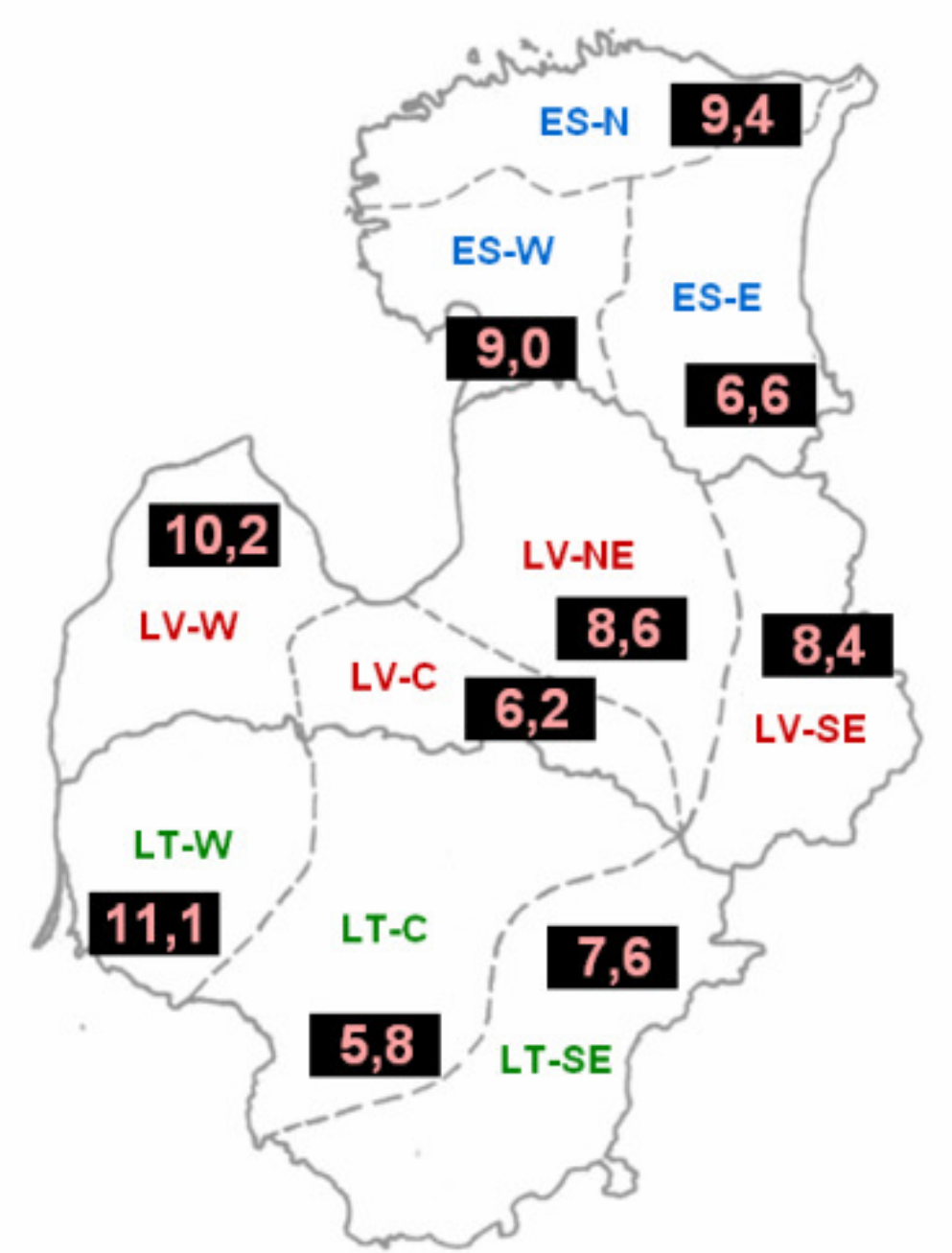
Average annual runoff, l/s·km2



10 regional series from Baltic States

Long-term regional series of temperature, precipitation and runoff were normalized with reference to the period of 1961-1990.

Precipitation and runoff were normalized by division with mean values.

Temperature was normalized by subtraction with the mean and division of the standard deviation.

The regional series are estimated as the average of the standardized individual series.

Data

Long-term series of temperature (49 stations), precipitation (72 stations) and runoff (64 stations) were used for composition of regional series in the Baltic countries.

Regional series were developed on monthly, seasonal and annual bases. All series were normalised with reference period of 1961-1990.

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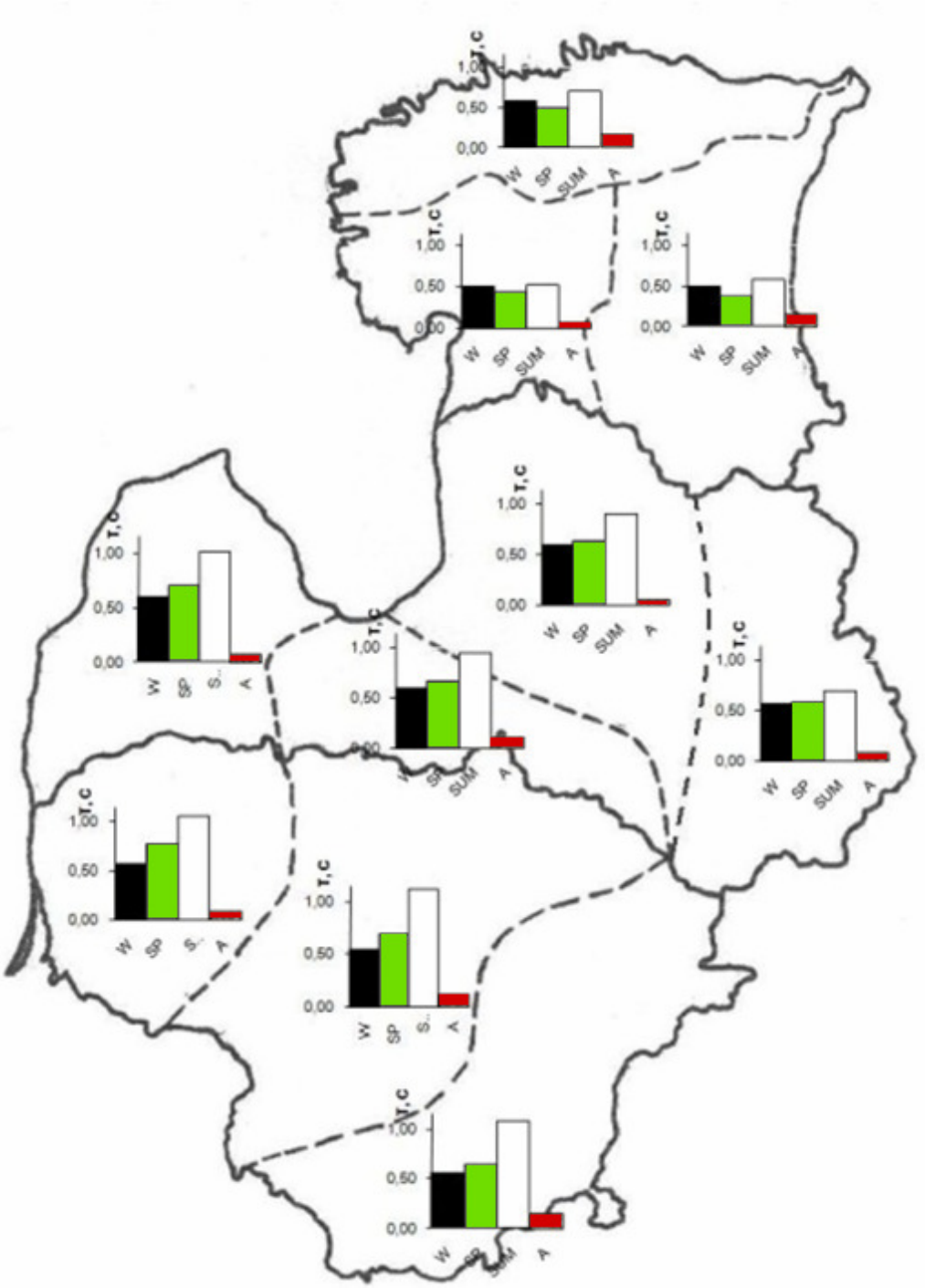
Seasonal differences of temperature anomaly (ºC) between 1991-200 and 1961-1990



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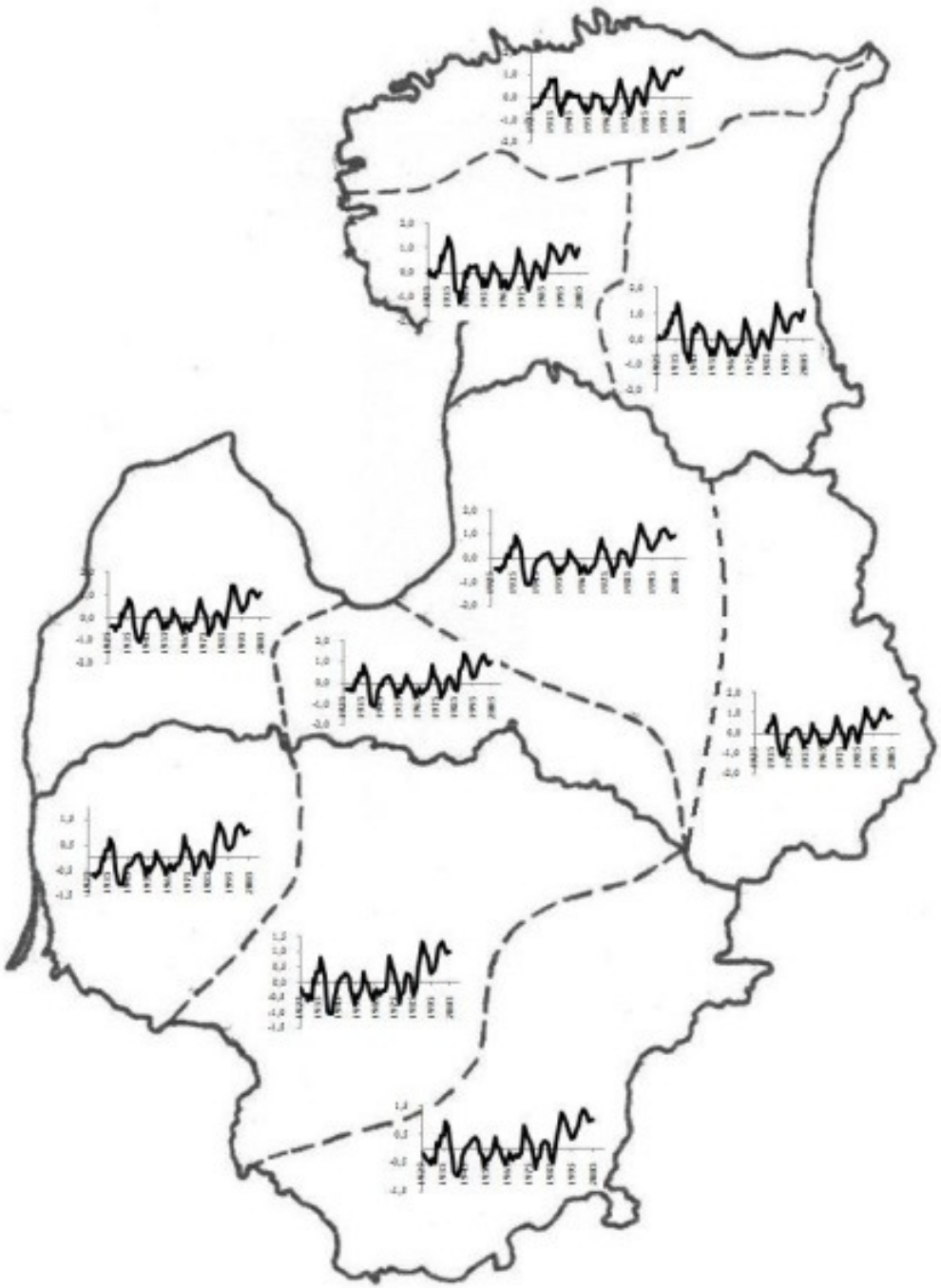
Variation of annual T anomaly (ºC) between 1991-2007 and 1961-1990



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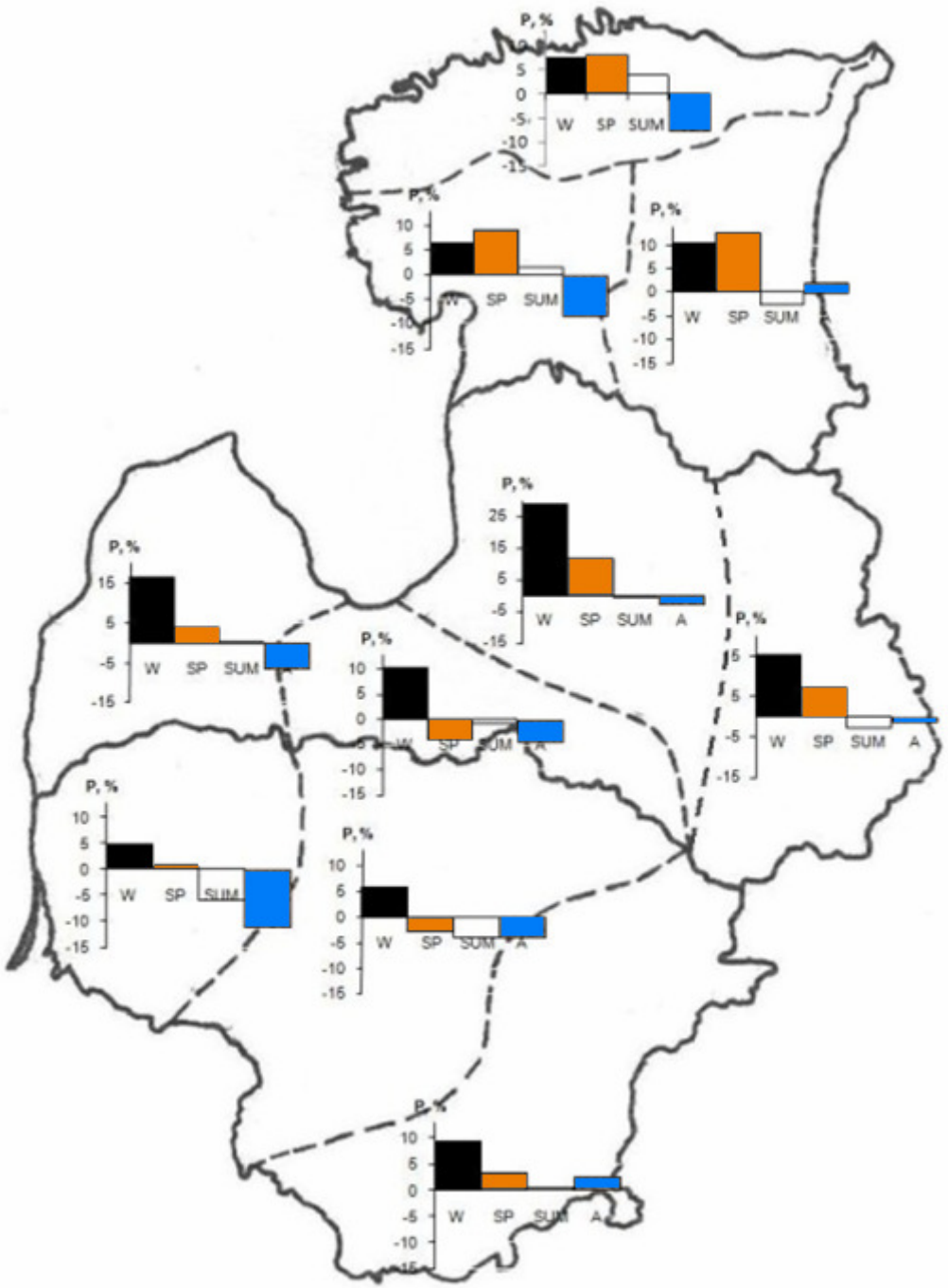
Seasonal differences of P anomaly (in %) between 1991-2007 and 1961-1990



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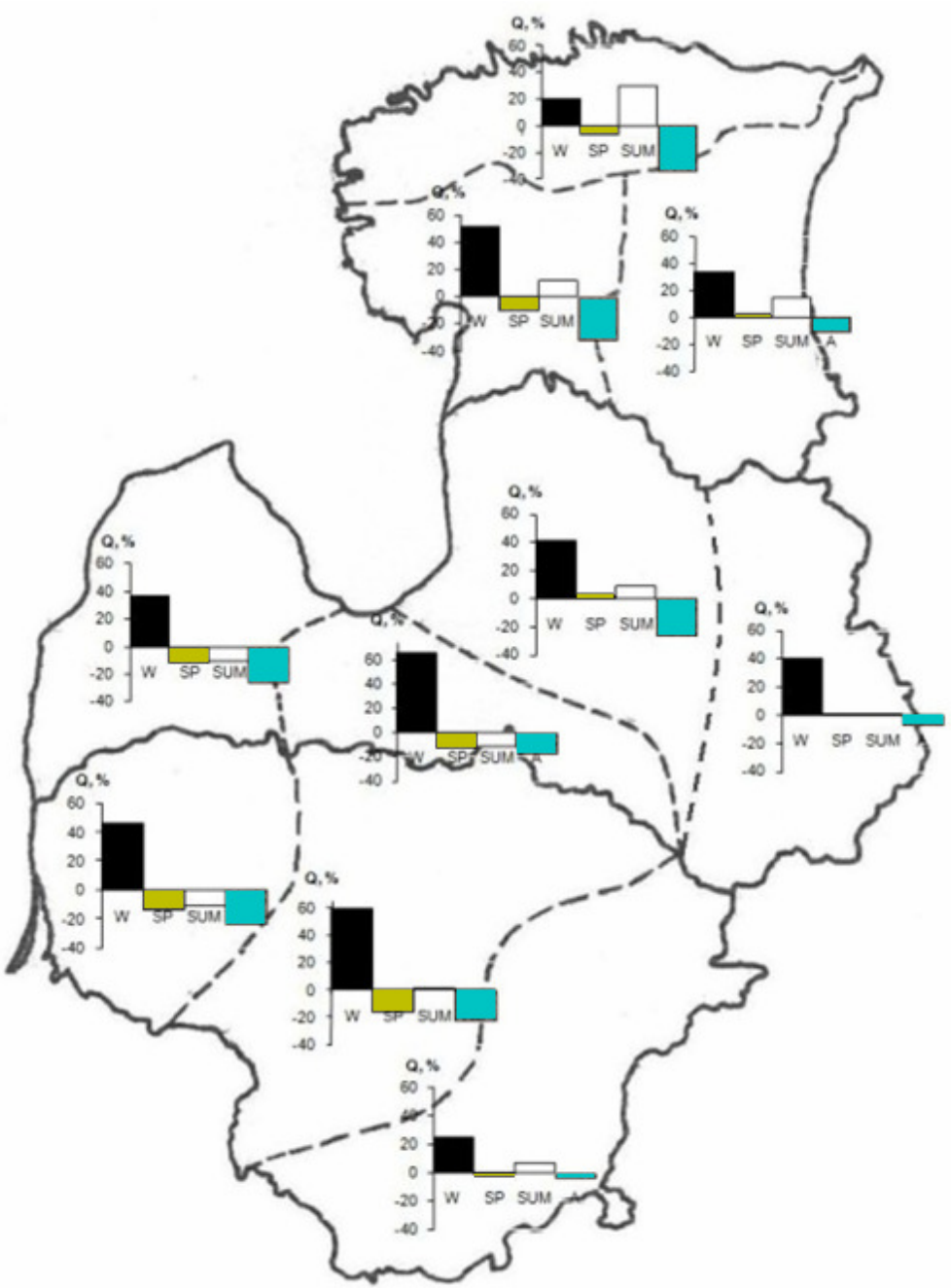
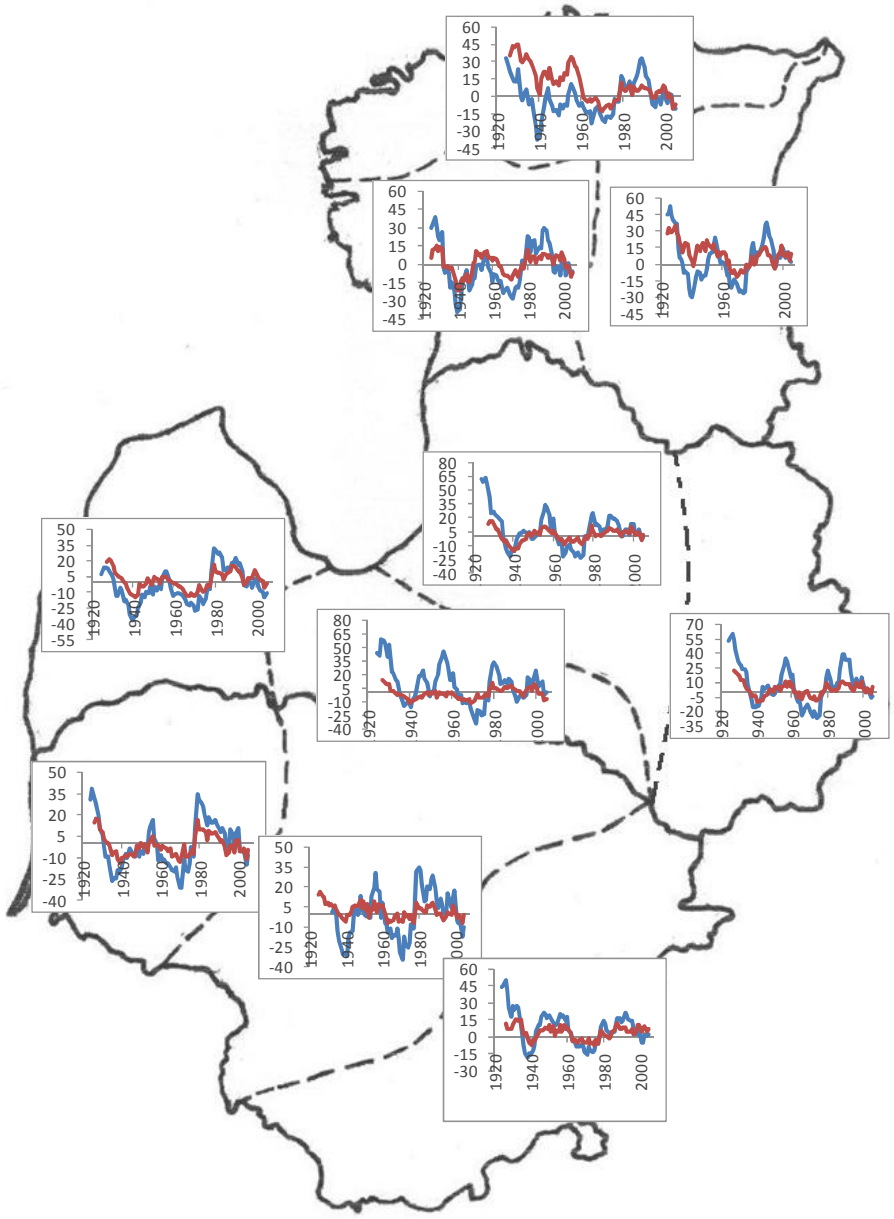
Seasonal differences of Q anomaly (in %) between 1991-2007 and 1961-1990



Variation of annual P and Q anomaly (%) between 1991-2007 and 1961-1990



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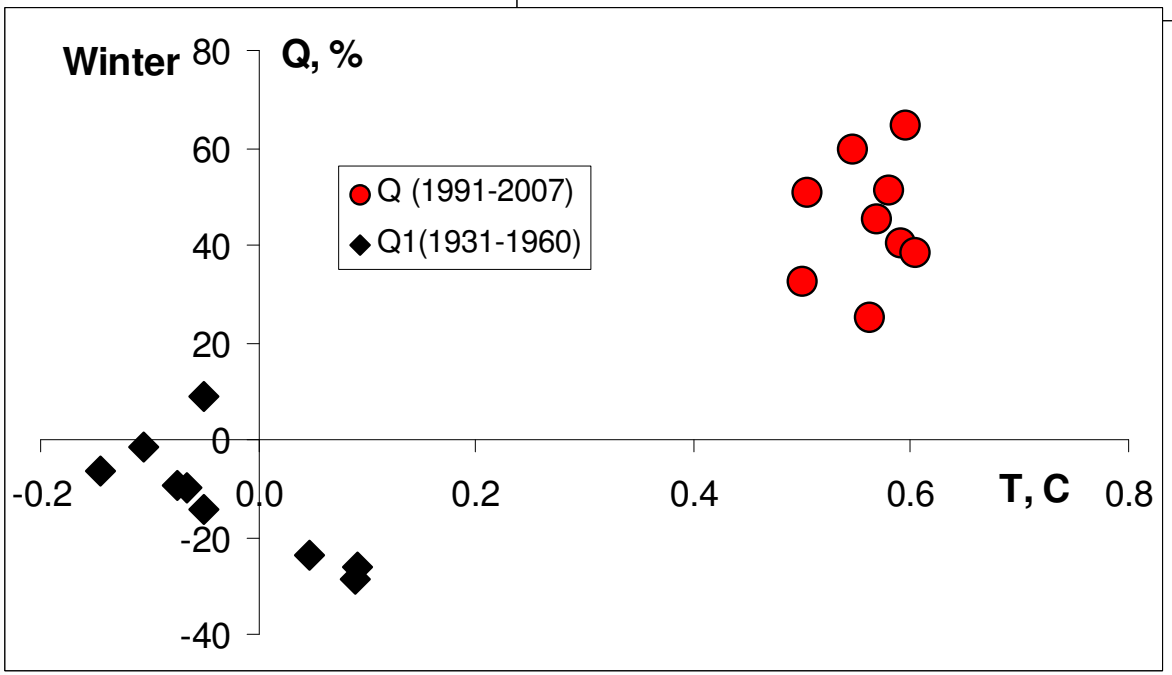

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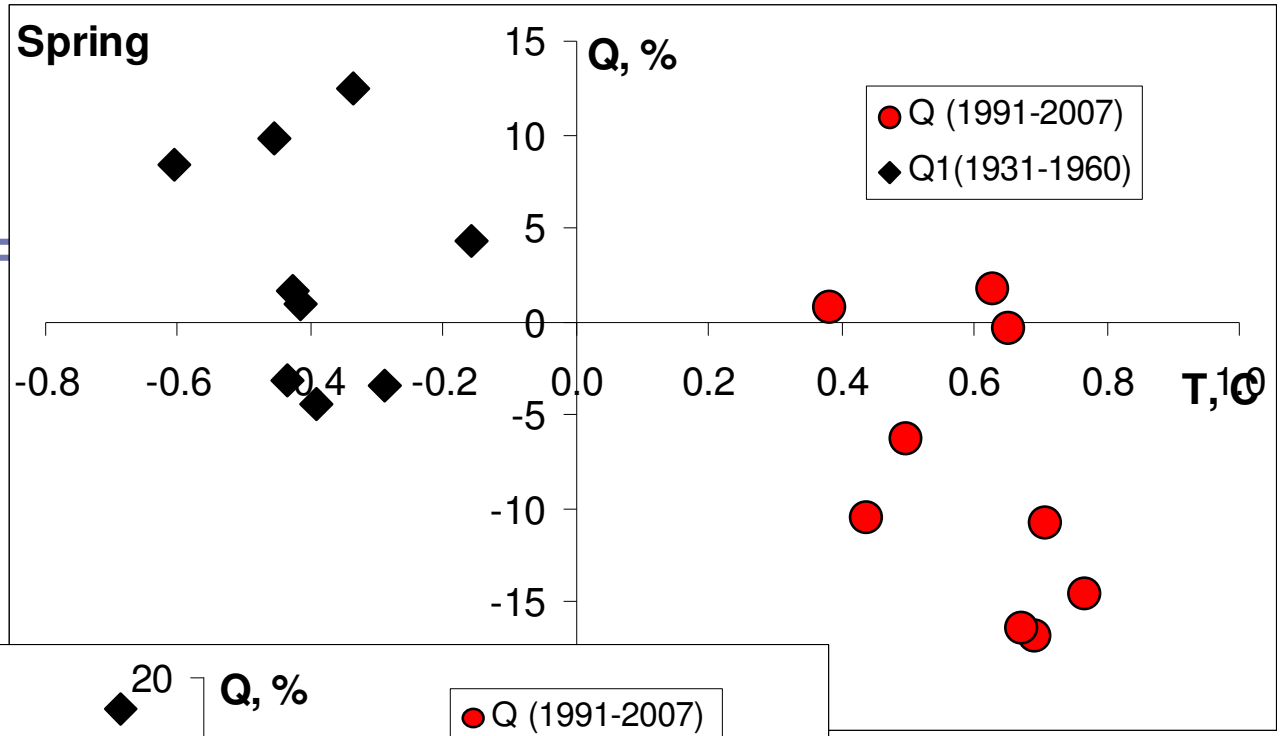

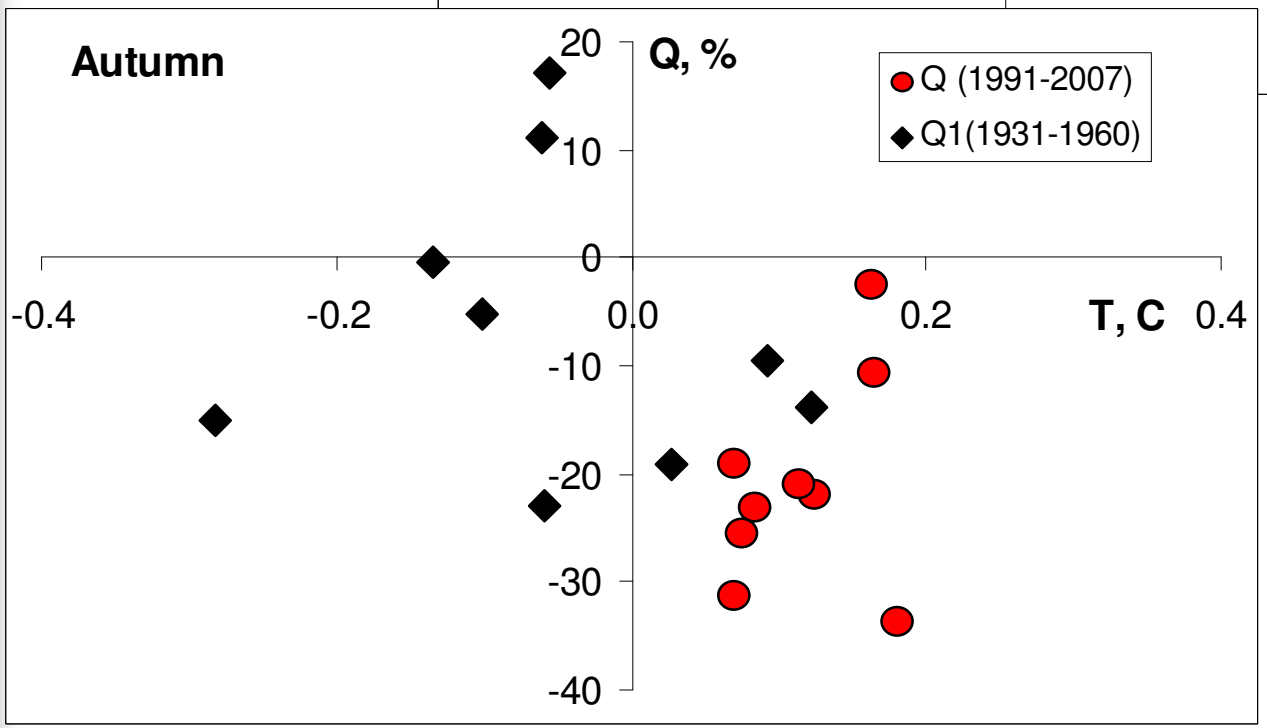

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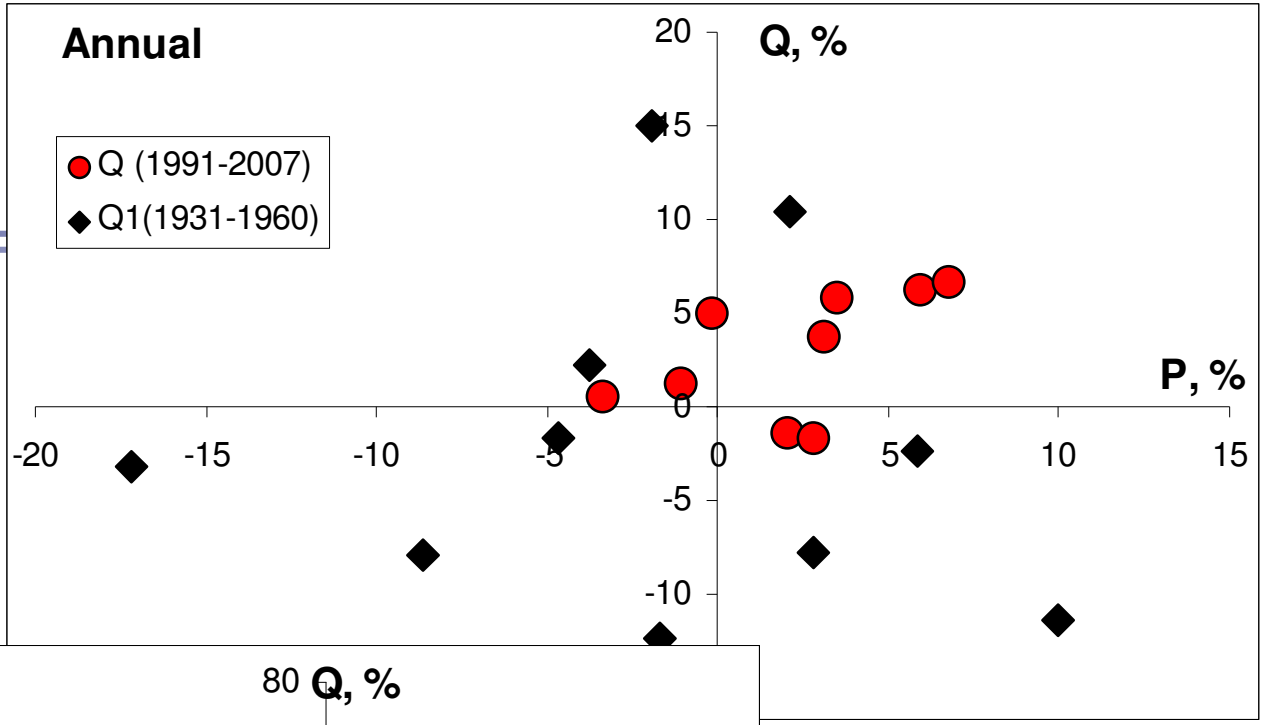

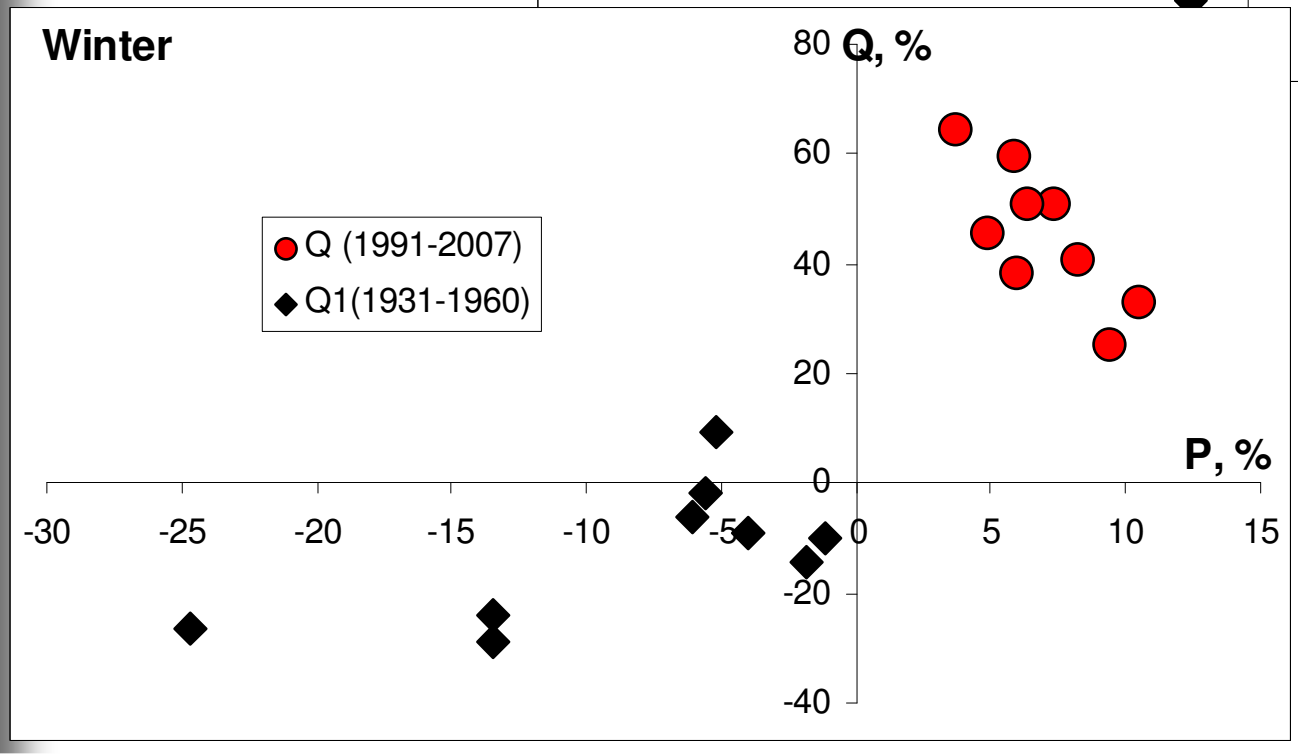

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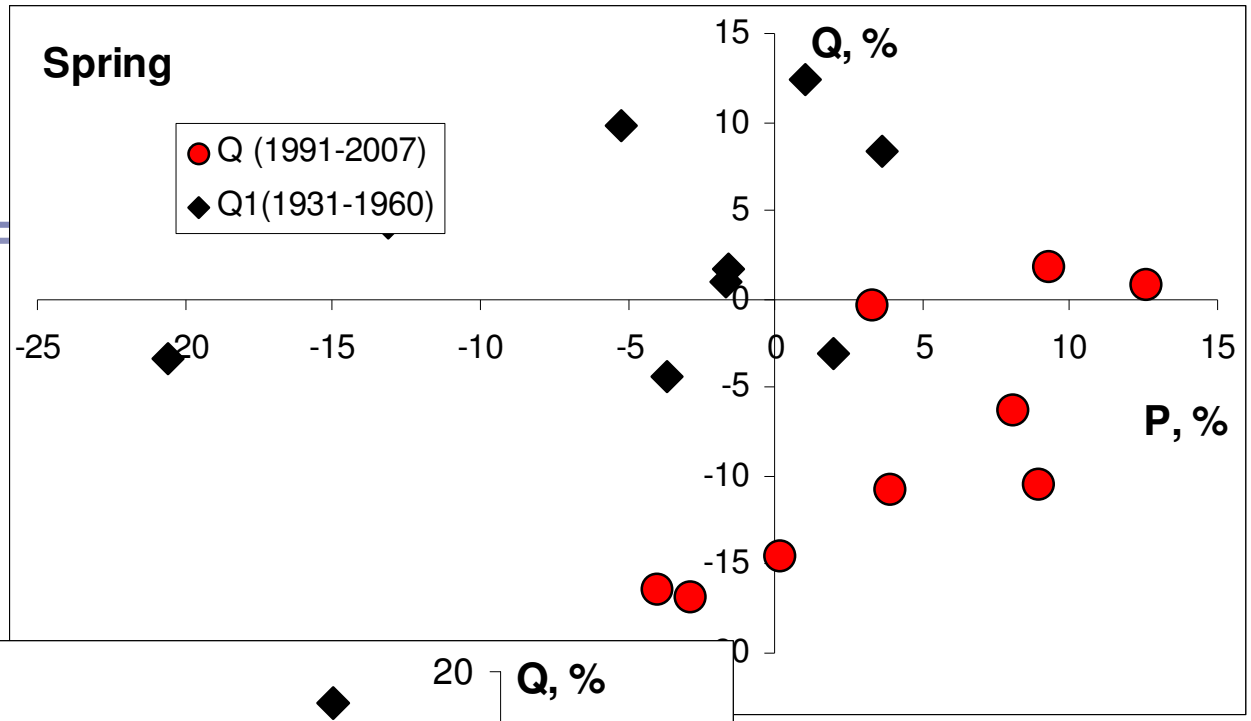

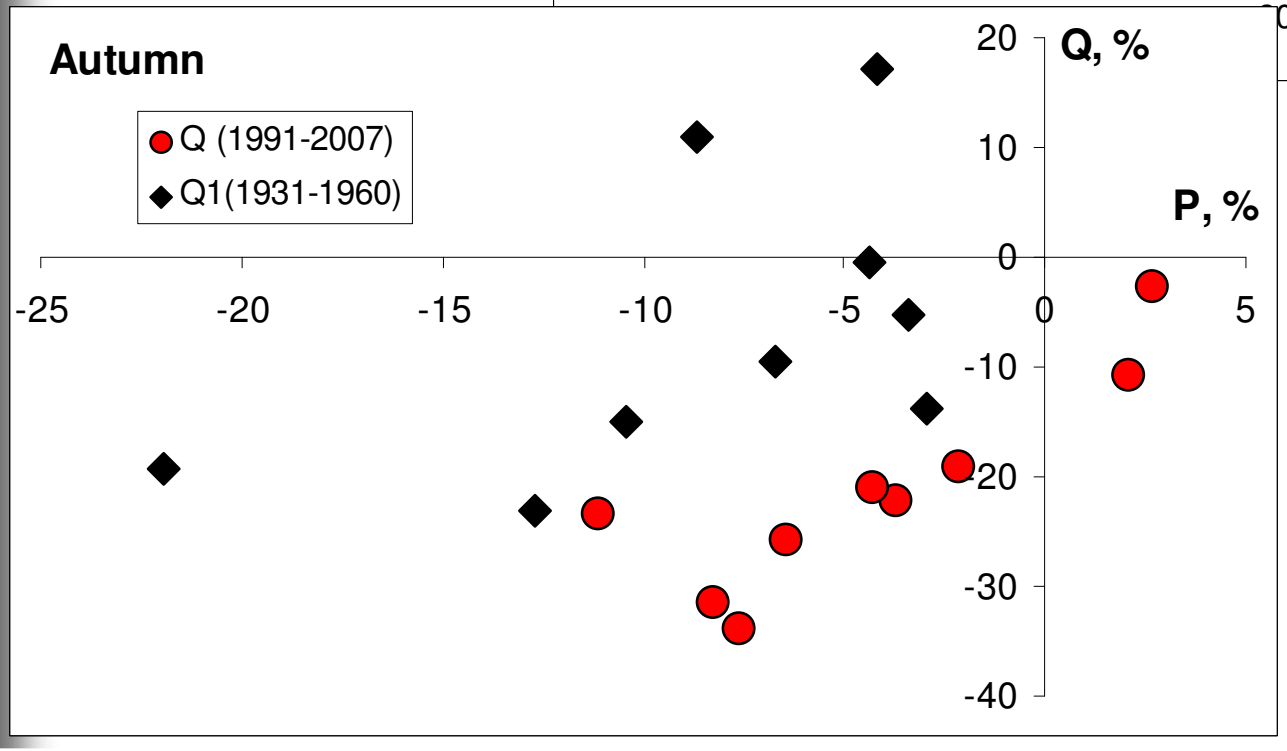

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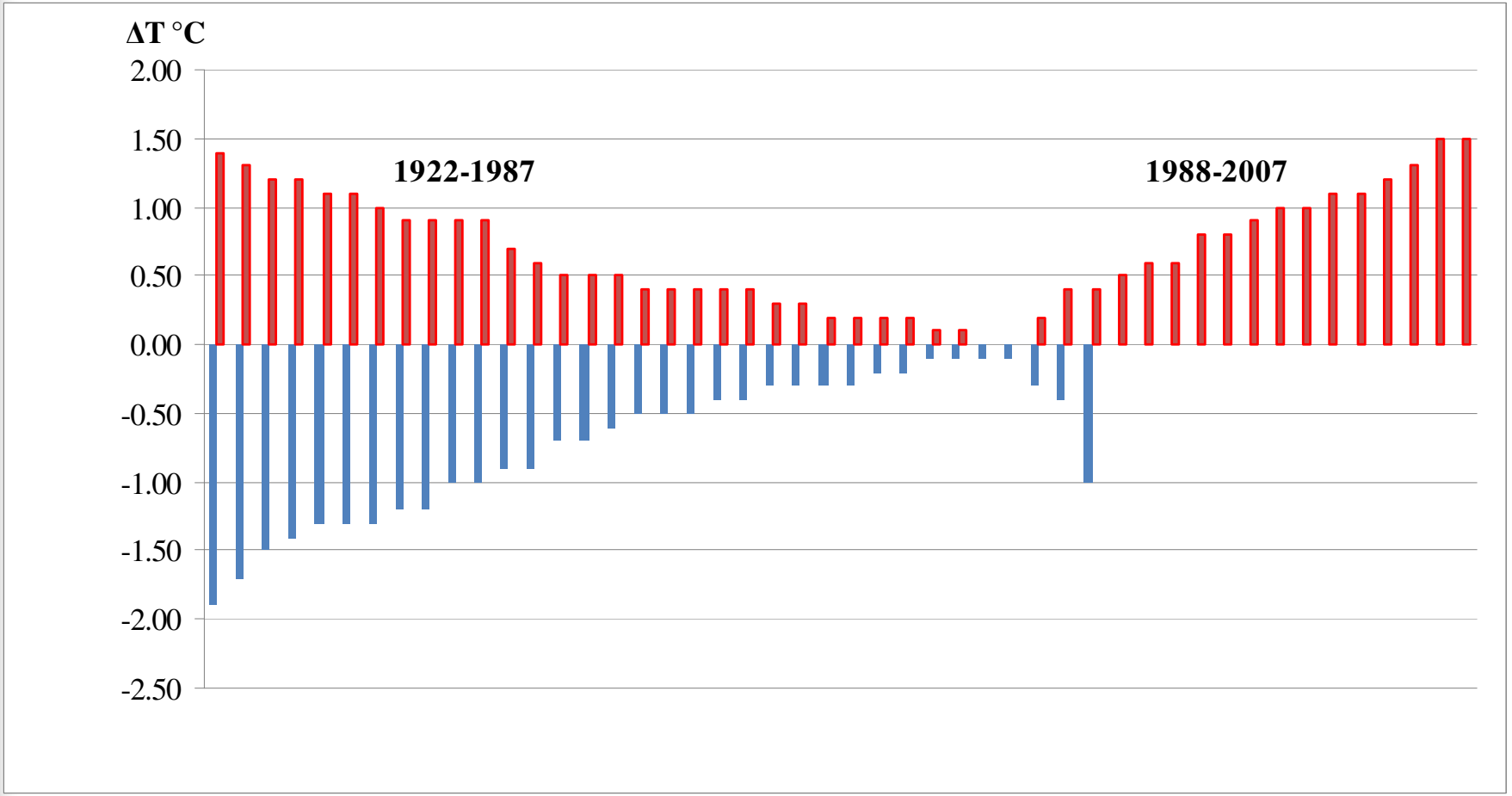
Ranking of average of regional time series of winter season temperature deviation in two periods (1922-1987 and 1988-2007)



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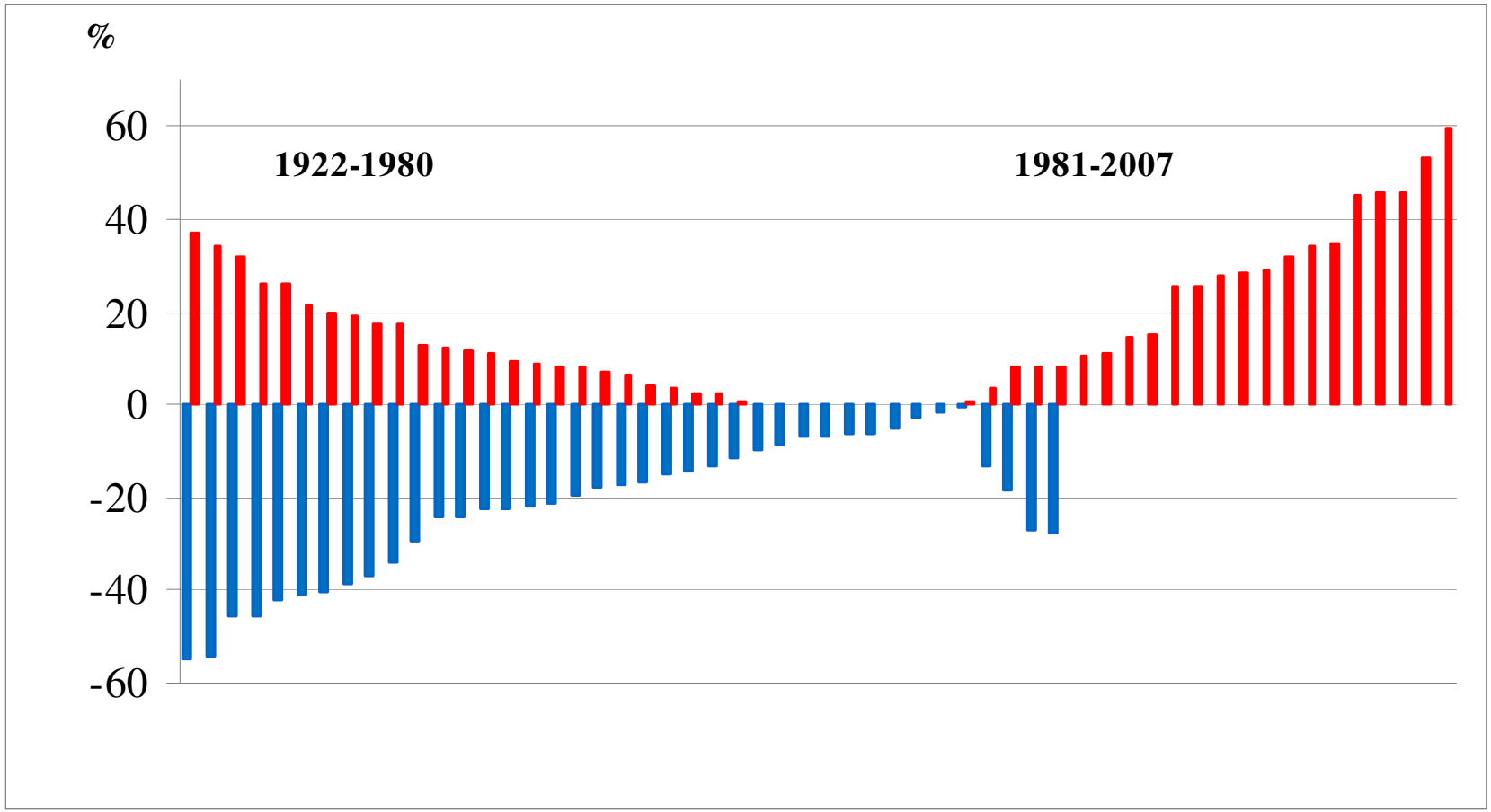
Ranking of average of regional time series of winter season precipitation deviation in two periods (1922-1980 and 1981-2007)



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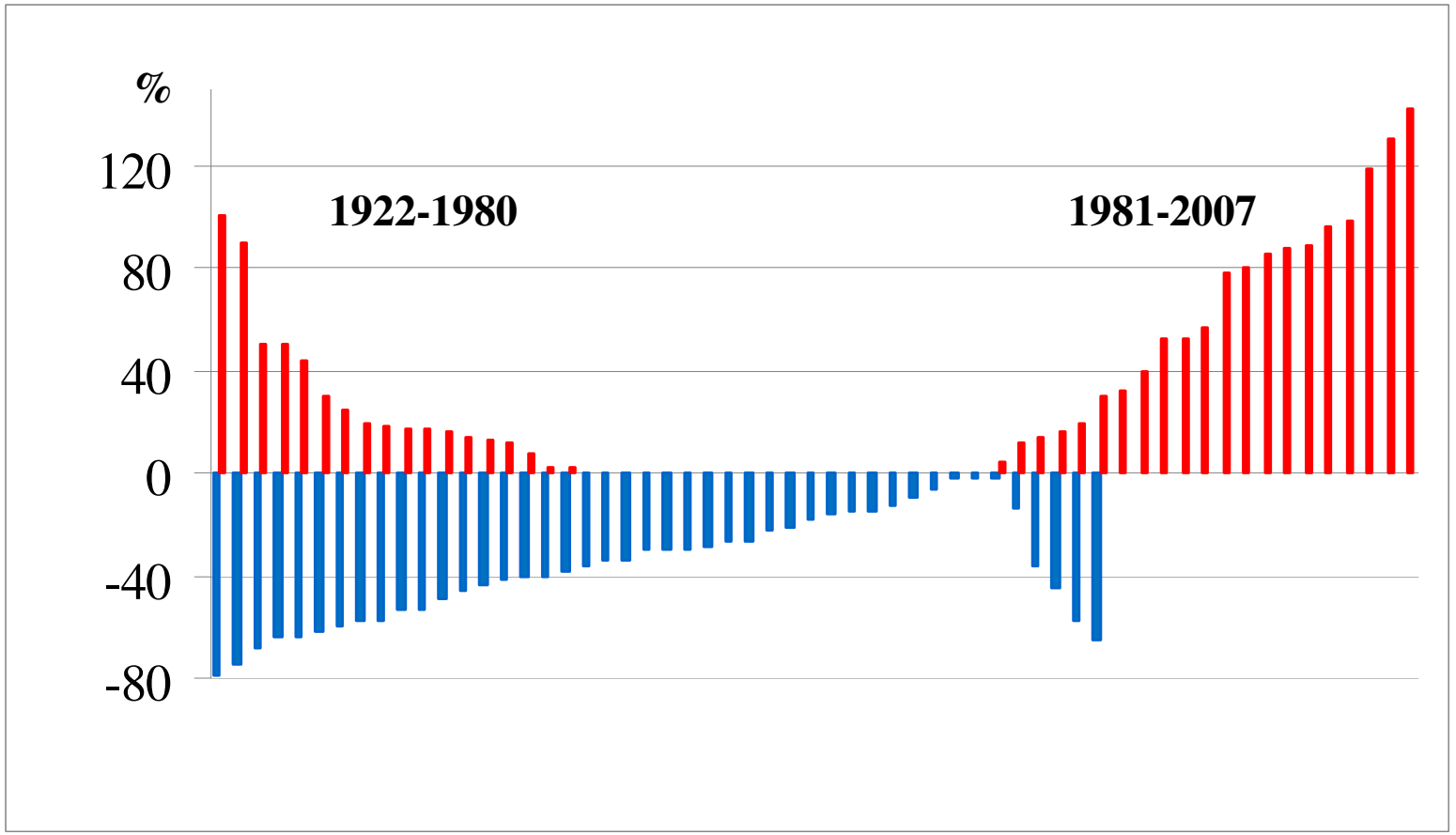
Ranking of averages of regional time series of winter season runoff deviation in two periods (1922-1980 and 1981-2007)



Average temperature anomaly (ºC) of 1931-1960 and 1991-2007 compared with reference period

	LT-W	LT-C	LT-SE	LV-SE	LV-NE	LV-C	LV-W	ES-N	ES-E	ES-W
1931-1960	-0.2	-0.1	0.0	-0.1	-0.2	-0.1	-0.1	0.0	0.1	0.1
1991-2007	0.9	0.9	0.9	0.8	0.9	0.9	0.9	0.8	0.8	0.9

Average runoff anomaly (%) of 1931-1960 and 1991-2007 compared with reference period

	LT-W	LT-C	LT-SE	LV-SE	LV-NE	LV-C	LV-W	ES-N	ES-E	ES-W
1931-1960	-7.7	-2.4	10.4	7.4	5.4	15.0	-12.3	-7.9	-3.2	-11.3
1991-2007	0.6	1.2	6.3	5.5	4.8	5.0	-1.4	-3.7	6.7	-1.7

Conclusions

- Annual and seasonal temperature anomalies of last years (1991-2007) above the reference level were positive in all regions of the Baltic States.
- The runoff anomalies in 1991-2007 were slightly positive in Lithuania and Latvia and slightly negative in Estonia comparing with reference period.

Conclusions

- Geographical position (from south to west, from the Baltic Sea to continent) and hydrometeo-rological factors (snow cover, temperature, precipitation ...) have significant influence on patterns of river runoff in different regions of the Baltic States.

Acknowledgements

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