

Baltic Earth Workshop on
**Natural hazards and extreme events
in the Baltic Sea region**
Finnish Meteorological Institute, Helsinki



Shift of extreme phenomena
in Belarus part of the Baltic Sea basin

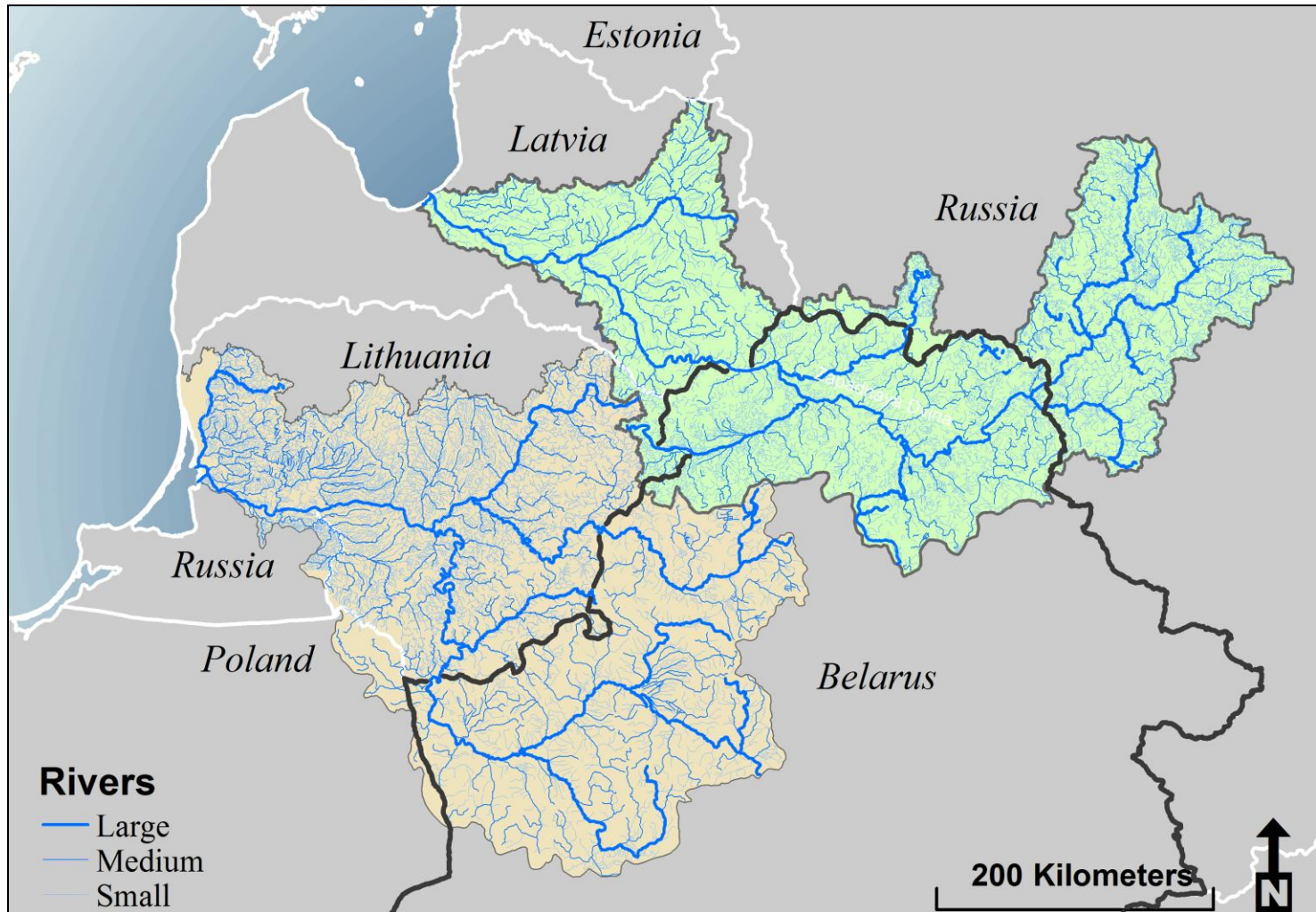
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Content



- General conditions of the region;
- Extreme meteorological events;
- Extreme hydrological events;
- Possible reasons of change in extreme events frequency;
- Conclusions.

General condition of the area

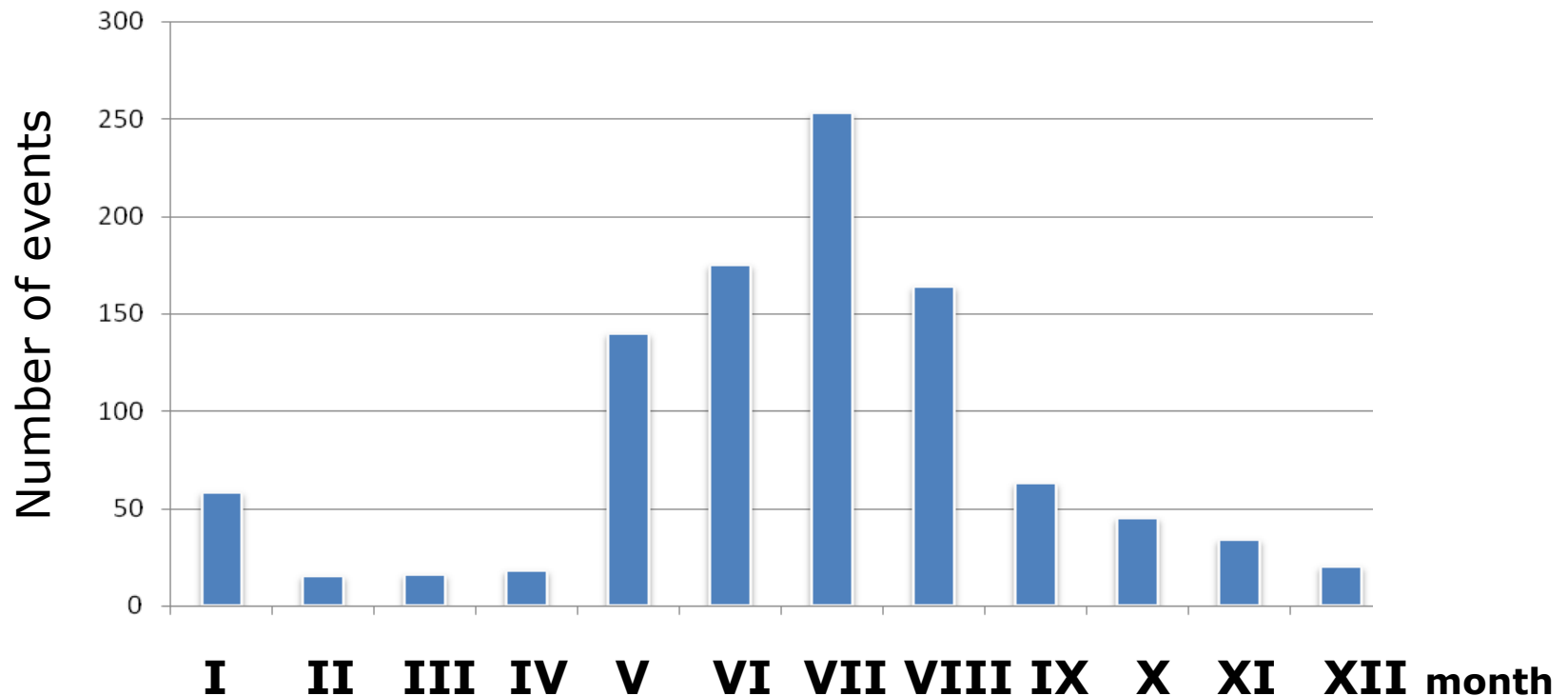


Extreme meteorological events



- ❑ **Extreme (hard) frost (-35 °C);**
- ❑ **Extreme heat (+35° C);**
- ❑ Heavy rainfall (50 mm per 12 hours);
- ❑ **Heavy snowfall (20 mm per 12 hours);**
- ❑ Strong wind (with blast 25 m/sec);
- ❑ Strong glaze-ice and rime deposition (with diameter 20 mm and more);
- ❑ Havy fog (with visibility of 50 sm during 6 hours);
- ❑ Heavy snowstorm (with blast of 15 m/s);
- ❑ Drought (absences of precipitation during 30 days under air temp. +25° C);
- ❑ **Hail (diameter 20 mm and more);**
- ❑ Light frost (0° C) during vegetation season;
- ❑ Hot wind (under air temp. 25° C, relative humidity 30% and wind 5 m/s during 3 days);
- ❑ **Thunderstorm.**

Tendencies of extreme meteo events

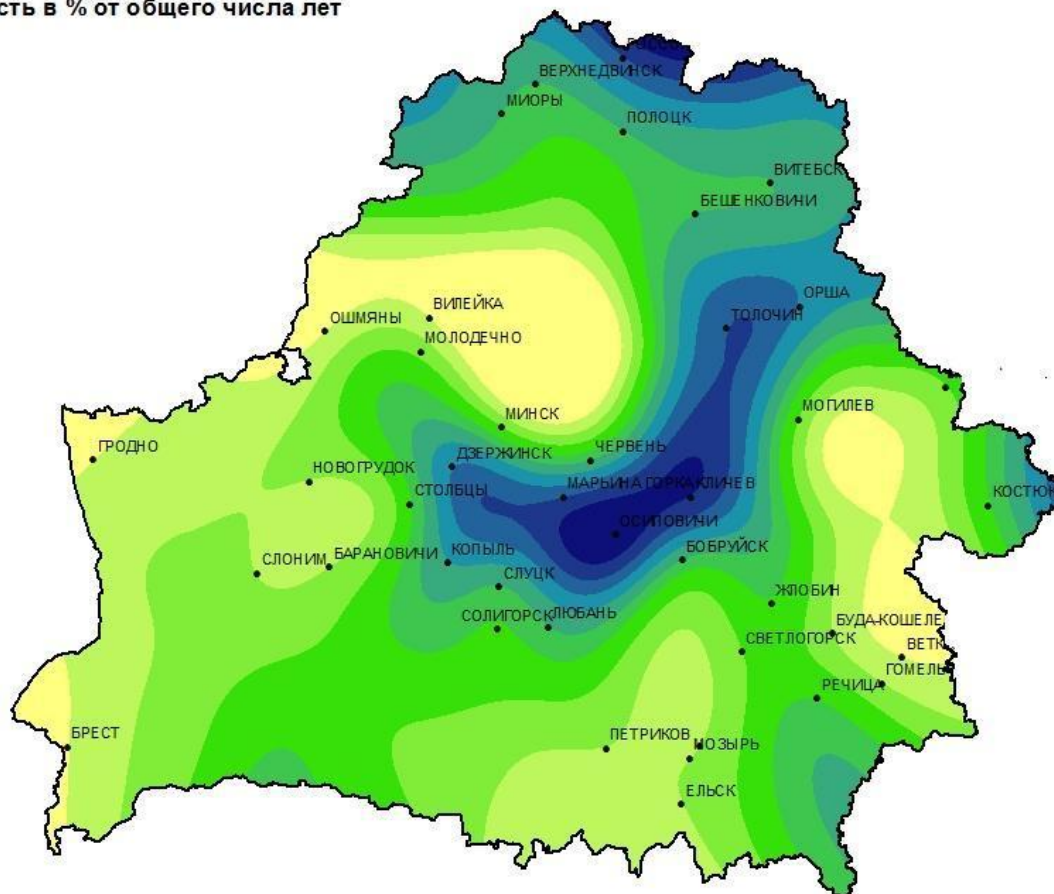
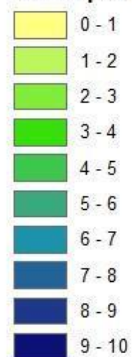


Distribution of extreme events sums
through month for period 1985-2010



Frequency of hard frost (% of events number)

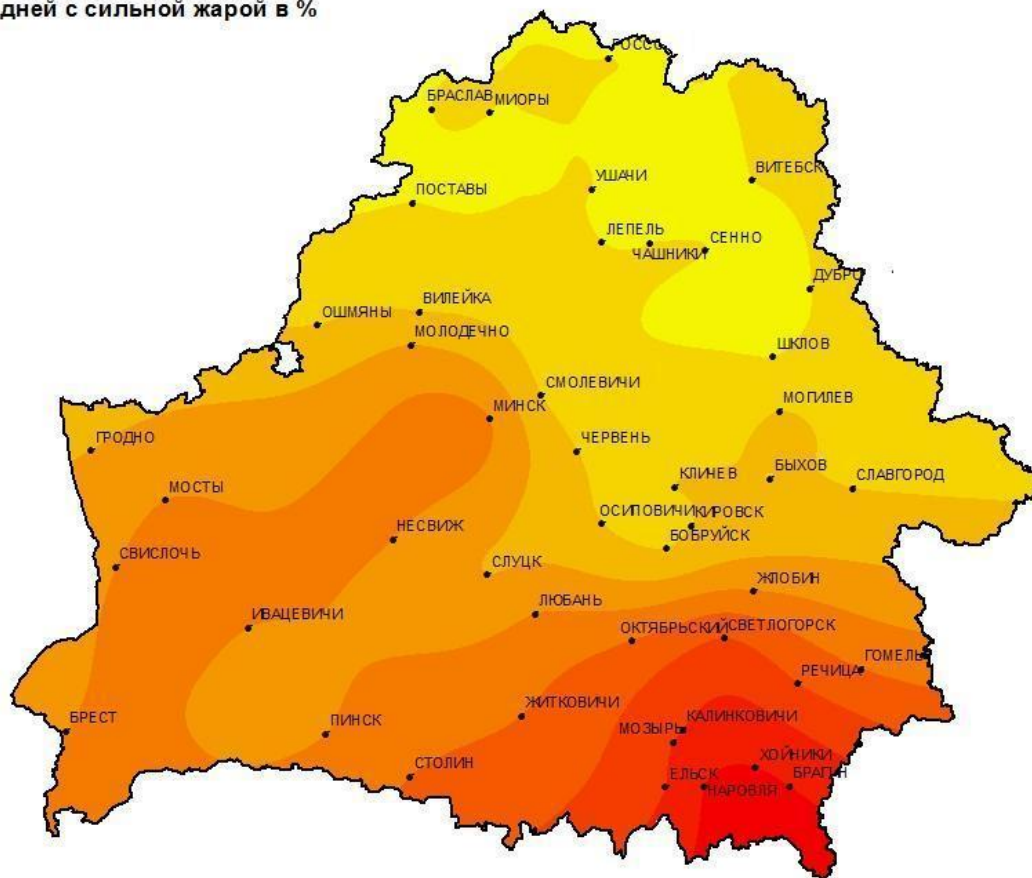
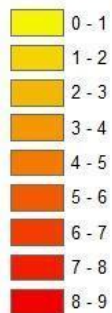
Повторяемость в % от общего числа лет





Frequency of extreme heat (% of events number)

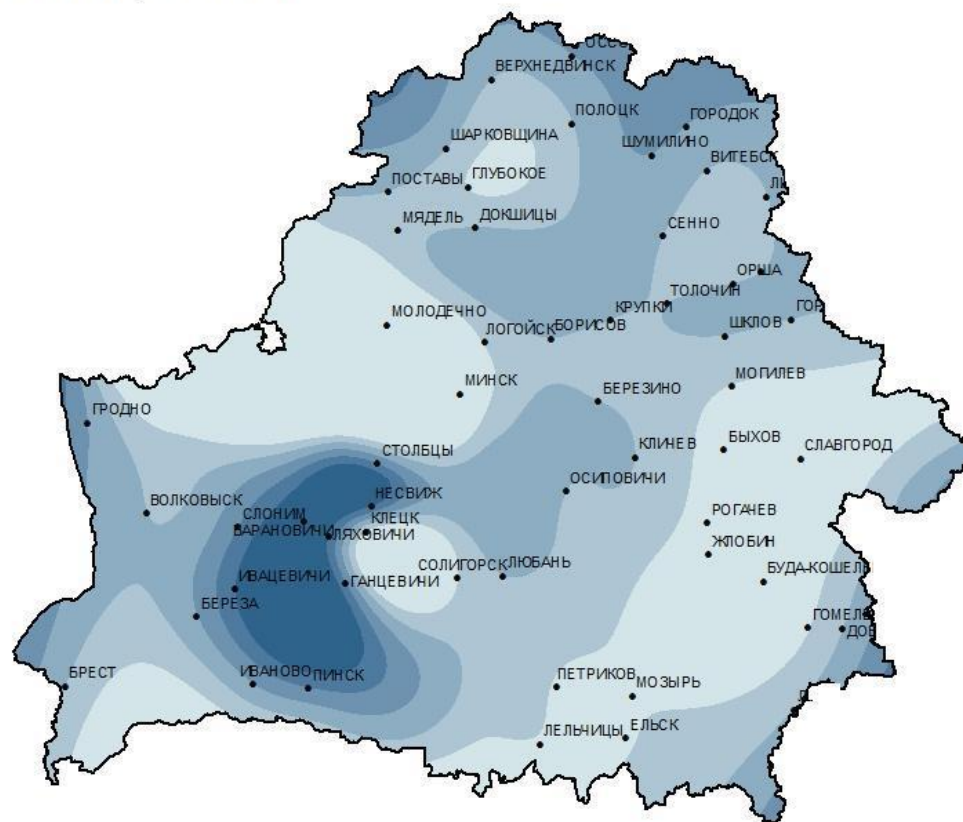
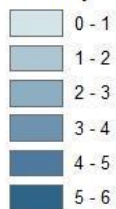
Количество дней с сильной жарой в %



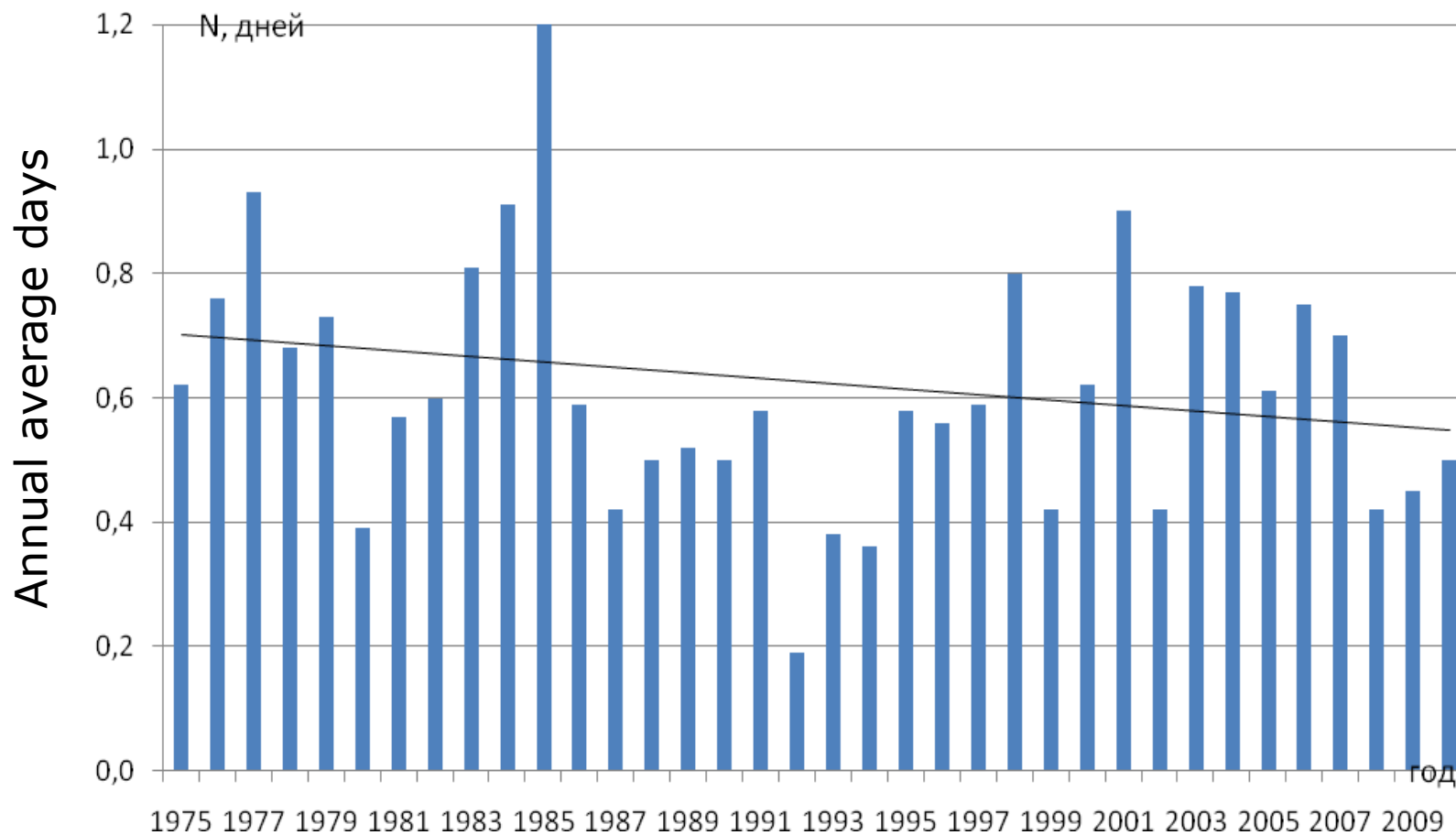


Frequency of heavy snowfall (% of events number)

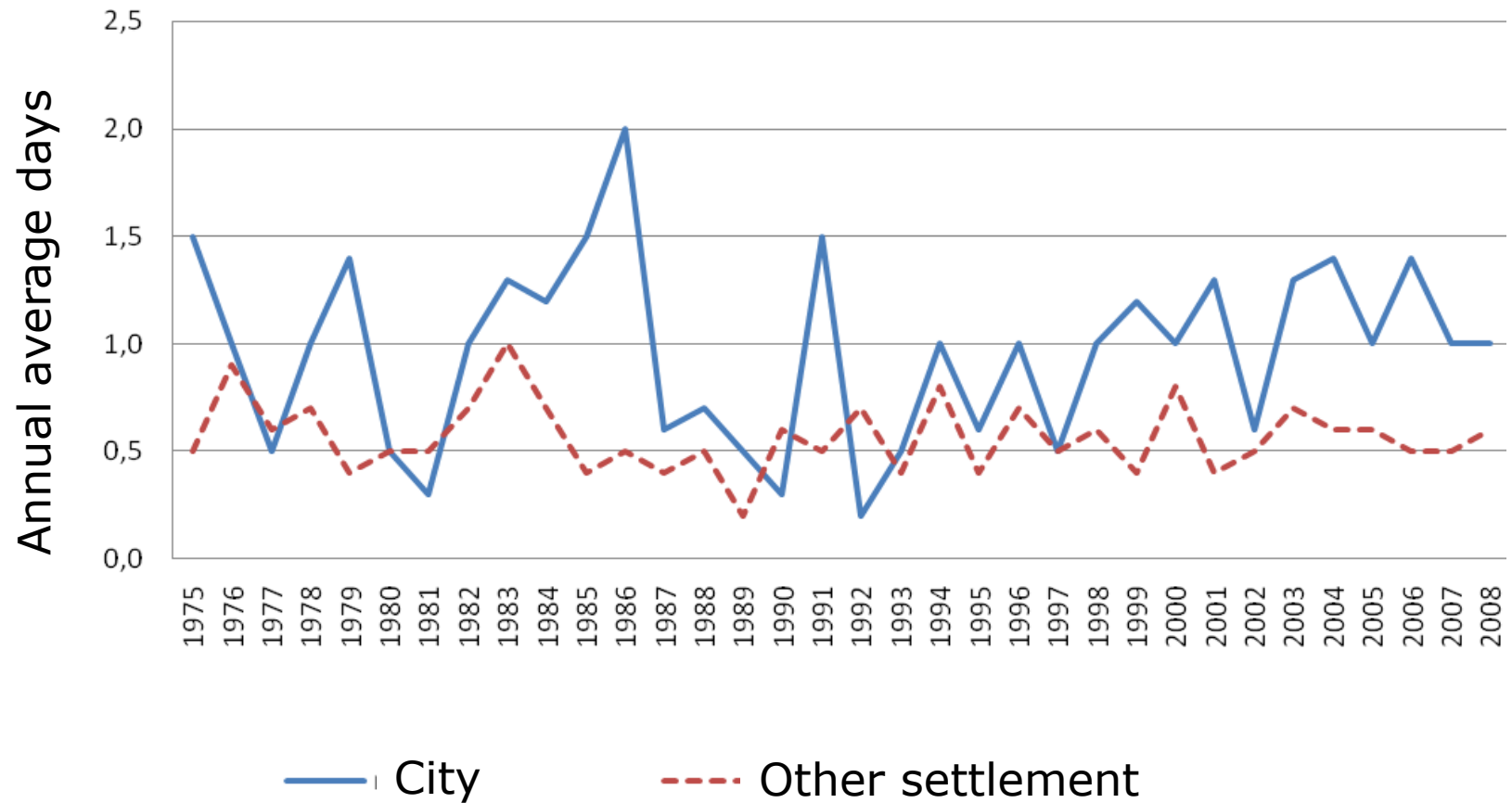
Повторяемость в % от общего числа лет



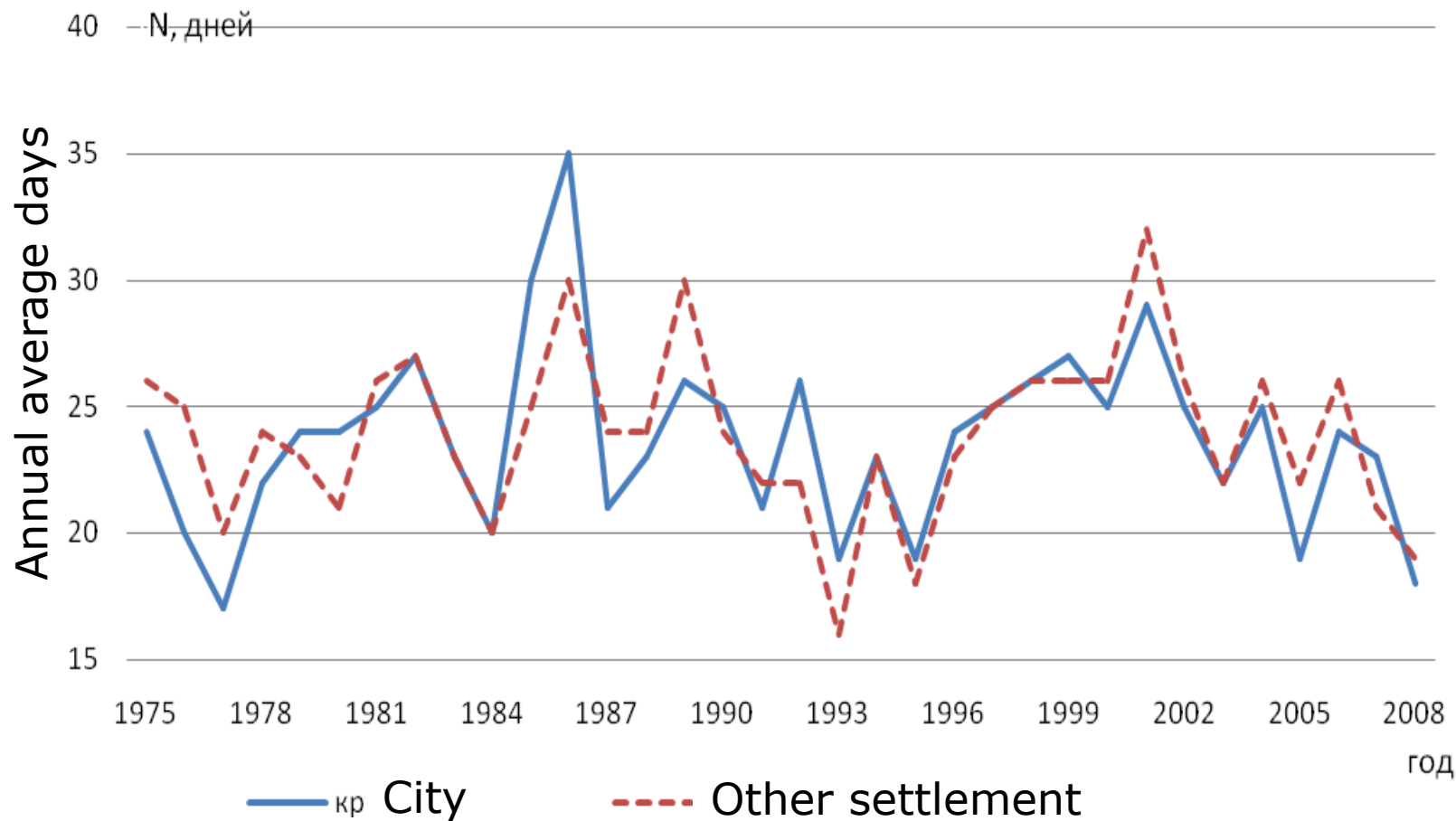
Hail dynamic



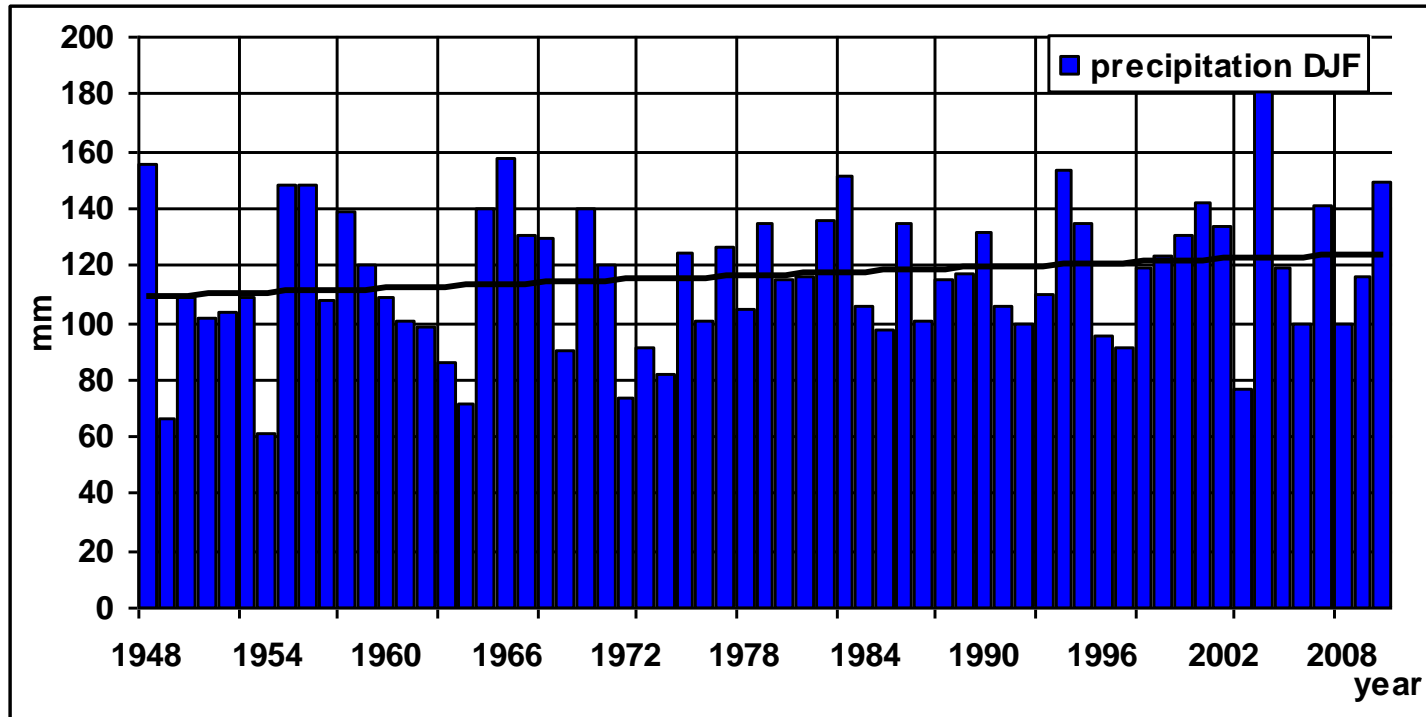
Hail dynamic in city/small town



Thunderstorm in city/small town



Dynamic winter precipitation

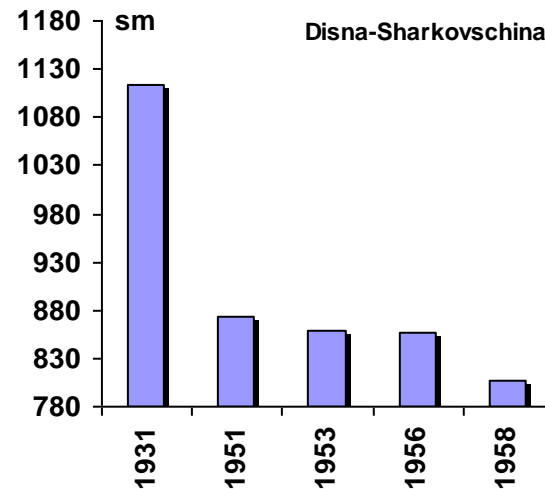
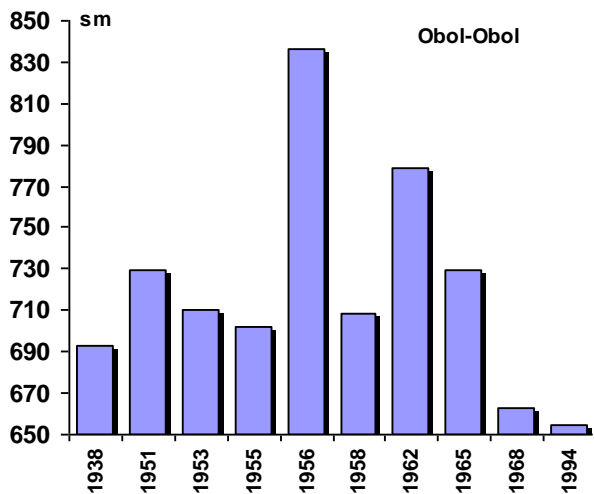
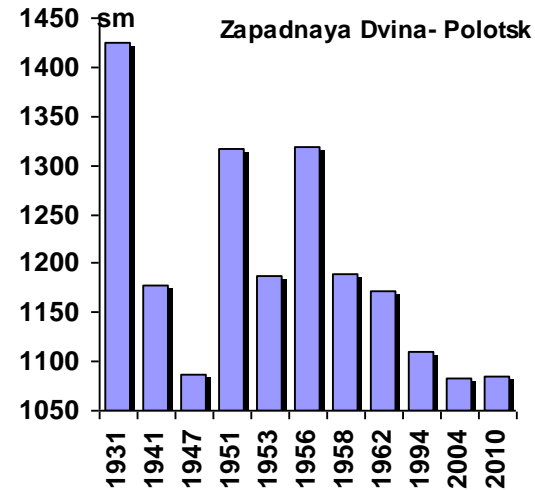
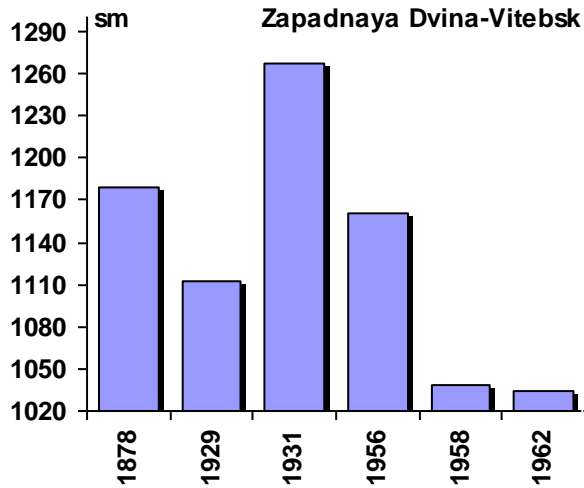


Extreme hydrological events

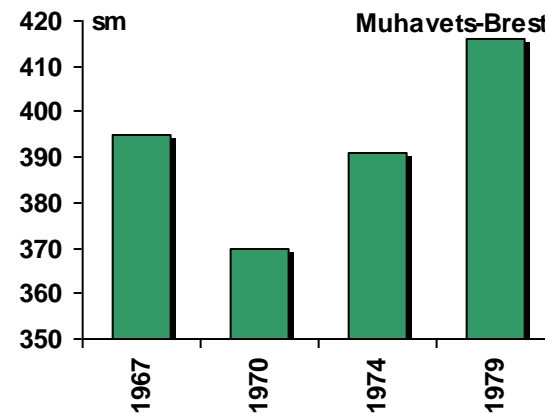
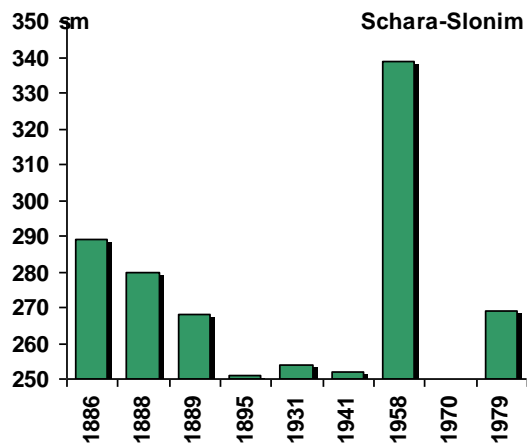
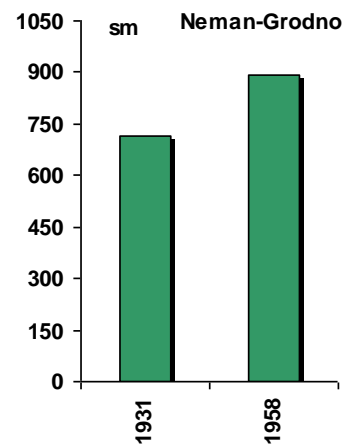
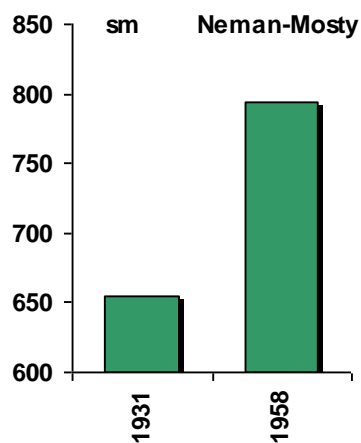


- **High stage during floods, caused by snow-melting or/and rainfall and reduce to inundation of close regions;**
- Low stage less designed navigation marks on navigable rivers;
- Early formation of freeze-up and ice appearance on navigable rivers with frequency 1 per 10 years.

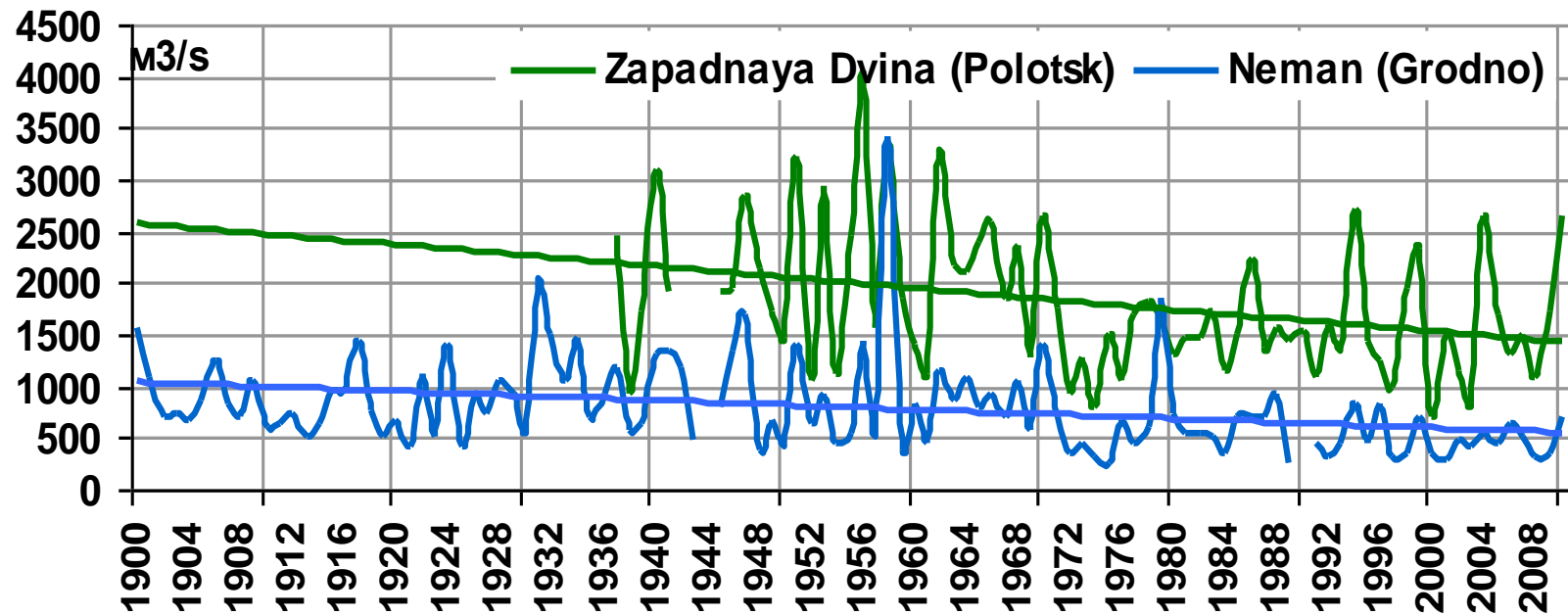
Floods frequency (stage exceeding the dangerous marks) in the Zapadnaya Dvina basin



Floods frequency (stage exceeding the dangerous marks and deviations from these marks) in the Neman and Zapadny Bug basin



Maximum discharge during spring floods on two major rivers in the Belarus part of the Baltic Sea Basin





Possible reasons of change in extreme events



We used databases of cyclones of NCEP/NCAR and ERA-Interim reanalysis

Current domain:
50-56° N
23-33° E

Cyclones from the North Atlantic:

West

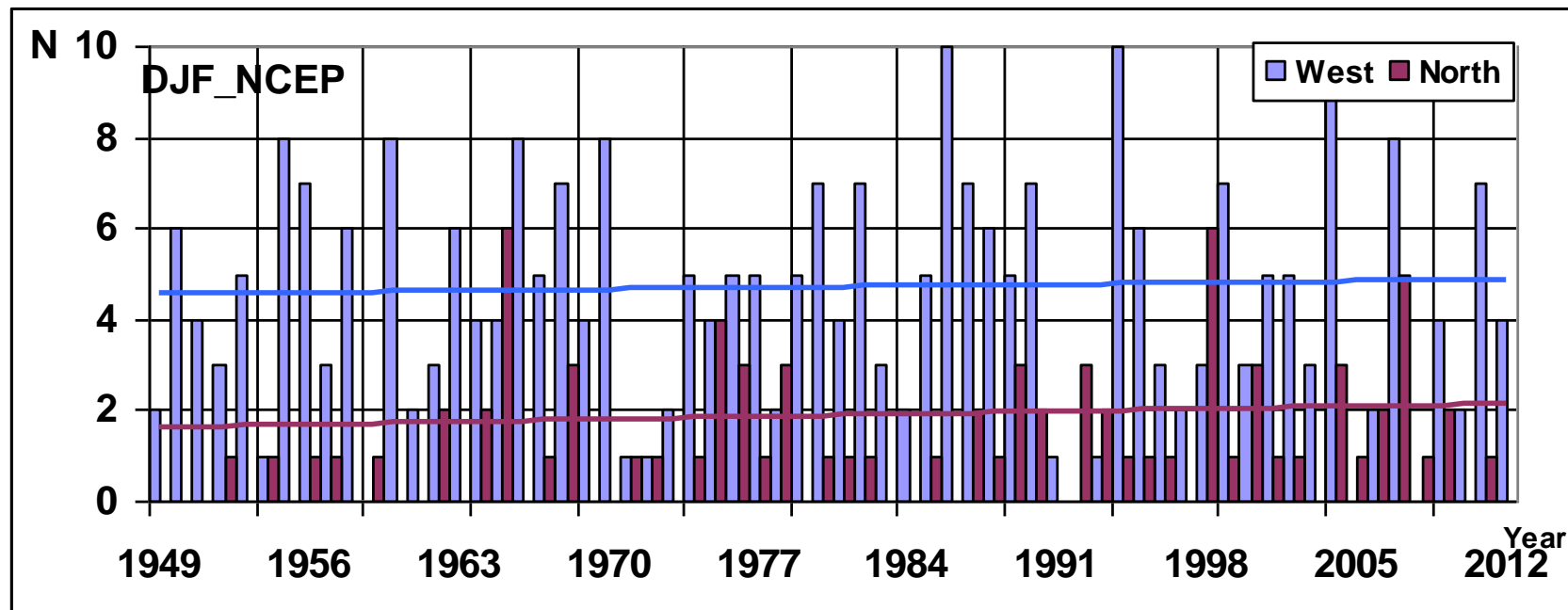
North

Diving

Cyclones with south origin

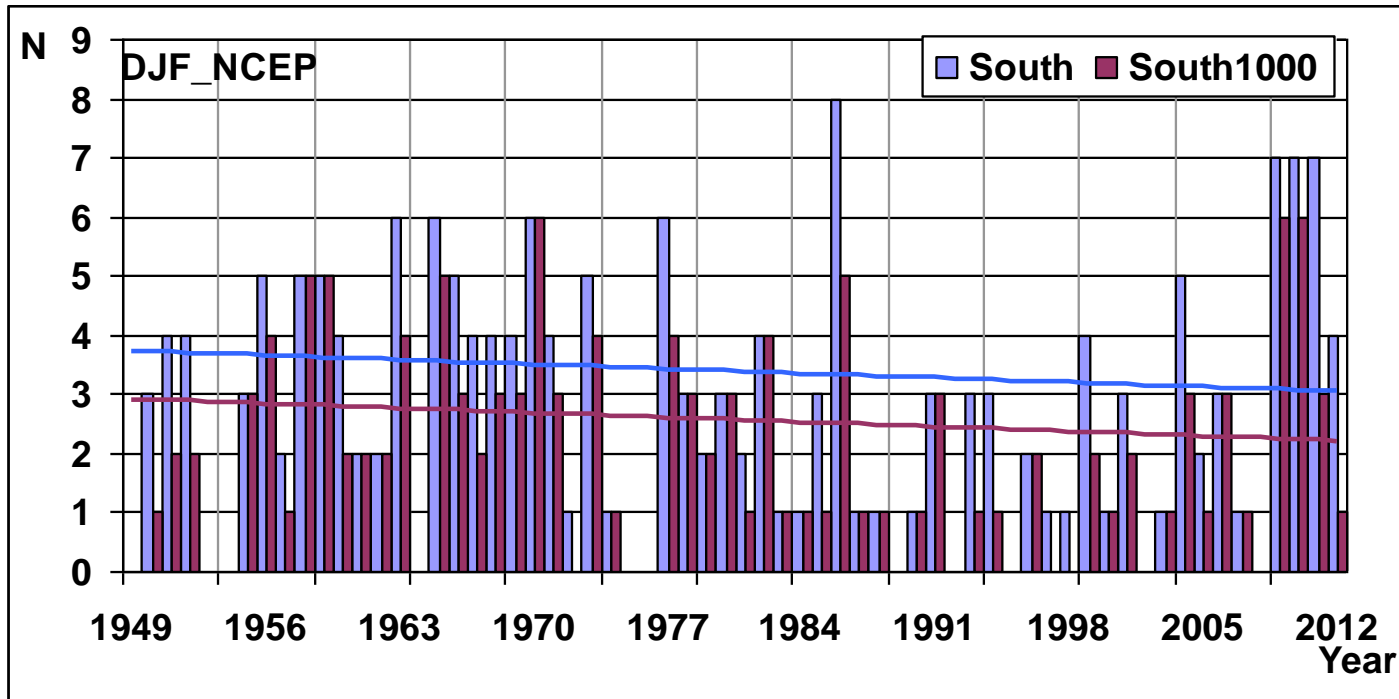


Dynamic of Atlantic cyclones





Dynamic of cyclones with south origin





Conclusions

- ❑ Slight increase of winter precipitation in the north of Belarus (Baltic sea basin).
- ❑ Decrease of days with hail, fog snow storm, hard frost and snowfall.
- ❑ Decrease of significant floods on rivers and max value of spring streamflow.



Thank you for attention!