# Integration of modern statistical tools of analysis of extremes into the web-GIS system “Climate”

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# Introduction

The second part of **1970s** is characterized by **the beginning of modern global climate change.**

**Heavy precipitation** and **strong storms**, **droughts** and **heat wave** show **positive trends** in several regions of the world.

We need **to better understand their impact** on the environment and also **be able to predict them** and **minimize their consequences.**

# Web-GIS system “Climate”

- is based on a combined use of web and GIS technologies;
- is a part of a hardware and software complex for “cloud” data analysis using:
  - various climatic data sets;
  - dedicated algorithms for their searching, extraction, processing, and visualization.
- significantly facilitates and accelerates analysis of big volumes of geospatial data.

System “Climate” allows researchers to perform **complex climate data analysis** using desktop PCs with internet connection.

# Web-GIS system “Climate”: existing opportunities

The system already has a large number of computational modules calculating:

- standard statistical characteristics of meteorological values;
- extreme indices recommended by the WMO ETCCDI;
- hydrothermal coefficients.

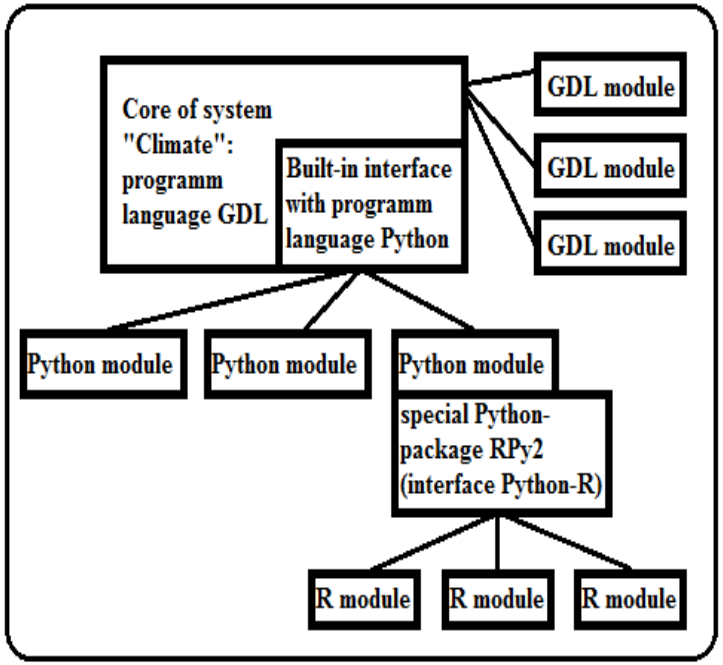
# Web-GIS system “Climate”: new opportunities

**We have integrated** into our system the **special additional statistical packages of program language R** that allow to use **new more powerful methods of analysis:**

- time-dependent statistics

of extremes;

- quantile regression;
- copula approach.

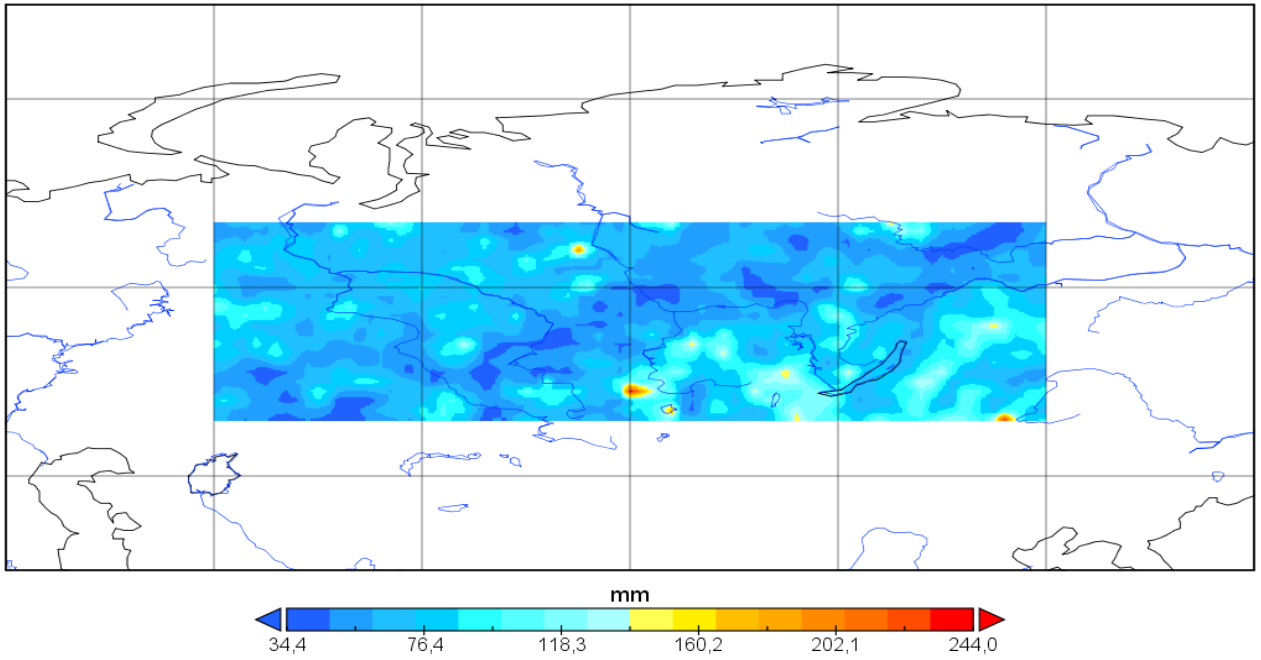


# Conclusion

Integration of new opportunities allows us:

- to do more detailed analysis of different extremes;
- to determine the degree of their impacts;
- to obtain structural links between these extremes and different characteristics of the environment.

# Illustration of successful integration




**Input data:** ERA Interim Reanalysis, 0.75×0.75°.
**Time:** 1979-2012 years.
**Territory:** South Siberia (50°-65° N, 60°-120° E).
**Results:** 100-year return levels of annual maximum precipitation.

Thank you for attention!