FEDERAL SERVICE FOR HYDROMETEOROLOGY
AND ENVIRONMENTAL MONITORING

NATIONAL RESEARCH INSTITUTE OF
AGRICULTURAL METEOROLOGY

YU. A. IZRAEL INSTITUTE OF
GLOBAL CLIMATE AND ECOLOGY

EURASIAN CENTER FOR FOOD SECURITY

CLIMATE RISKS IN THE AGRICULTURAL CROPS CULTIVATION IN RUSSIA

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INTRODUCTION

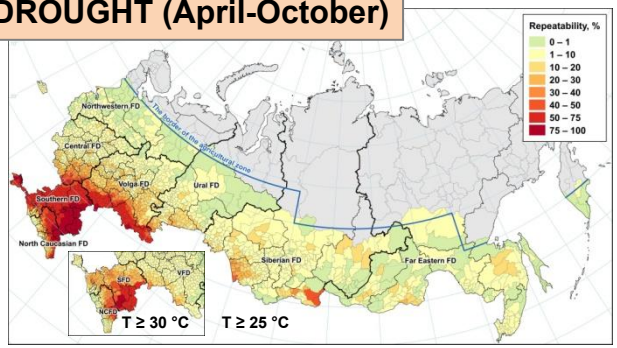
Extreme weather and climate events, including heat waves, droughts, hot winds, heavy rainfall and others, are a significant factor threatening food security in many countries of the world, as well as in Russia. The observed and projected global warming can increase the frequency and severity of such phenomena. To effectively adapt to these processes, first of all, regional information on the relevant climate threats is needed.

In this talk we present information on Russia
- about the occurrence (frequency, repeatability) of such phenomena as drought and hot dry wind crust at the end of the 20th century and the beginning of the 21st century;

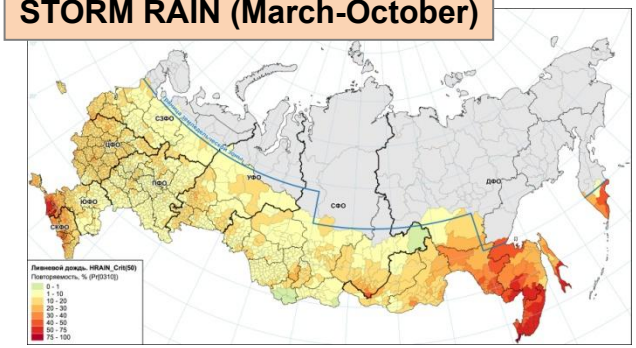
- **about changes in the conditions of climate aridity in the thirties and fifties of the 21st century in comparison with the last decade of the 20th of the century.**
- **about adaptation to climate change in agriculture in Russia**

THE REPEATABILITY (%) OF THE HAZARDOUS PHENOMENONS

DROUGHT (April-October)

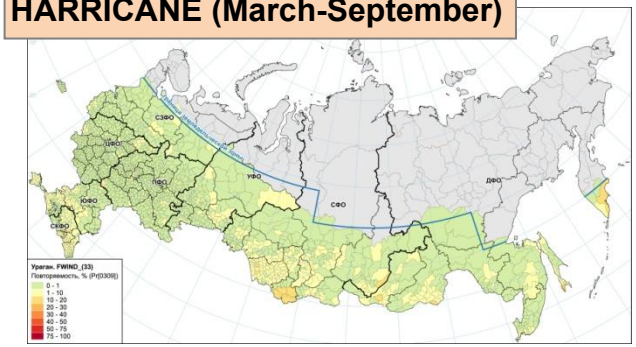


STORM RAIN (March-October)

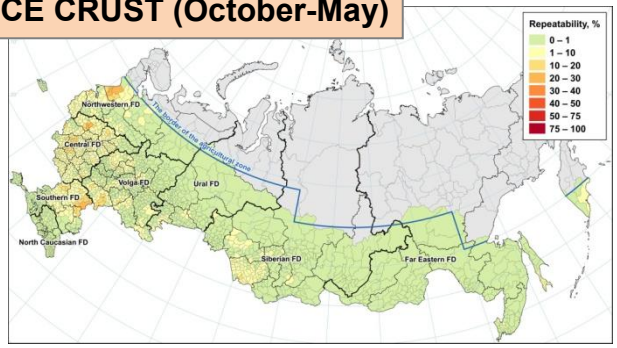


HOTWIND (April-October)

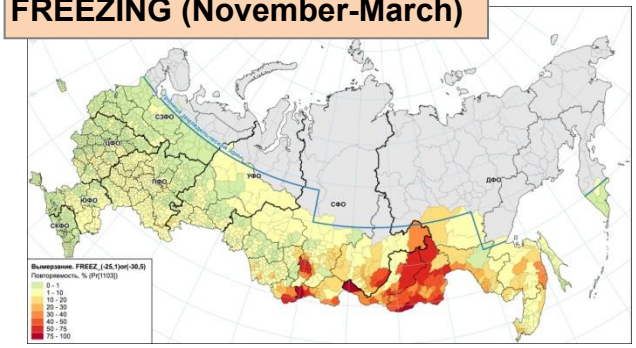
HARRICANE (March-September)



ICE CRUST (October-May)



FREEZING (November-March)

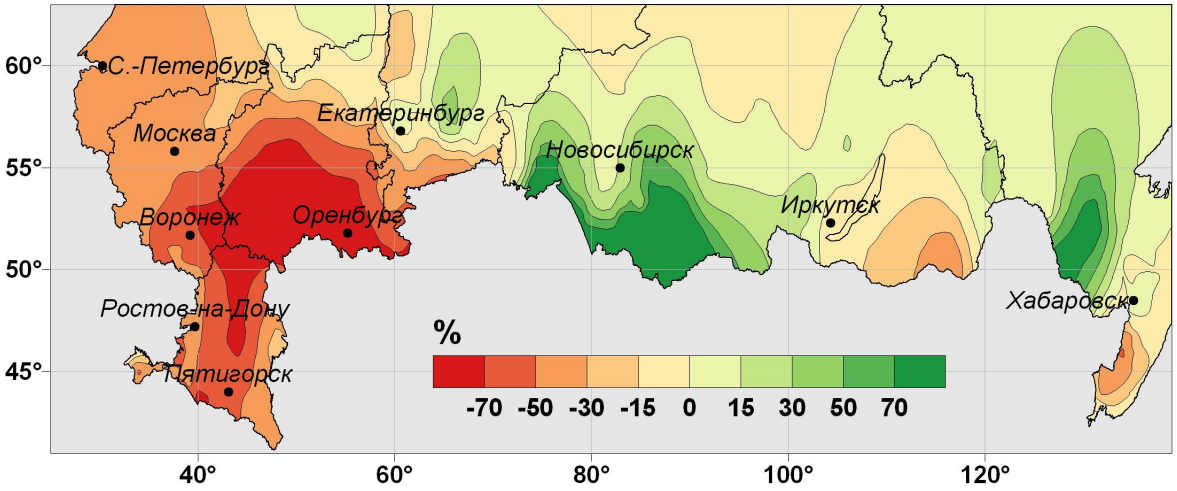


Repeatability, %

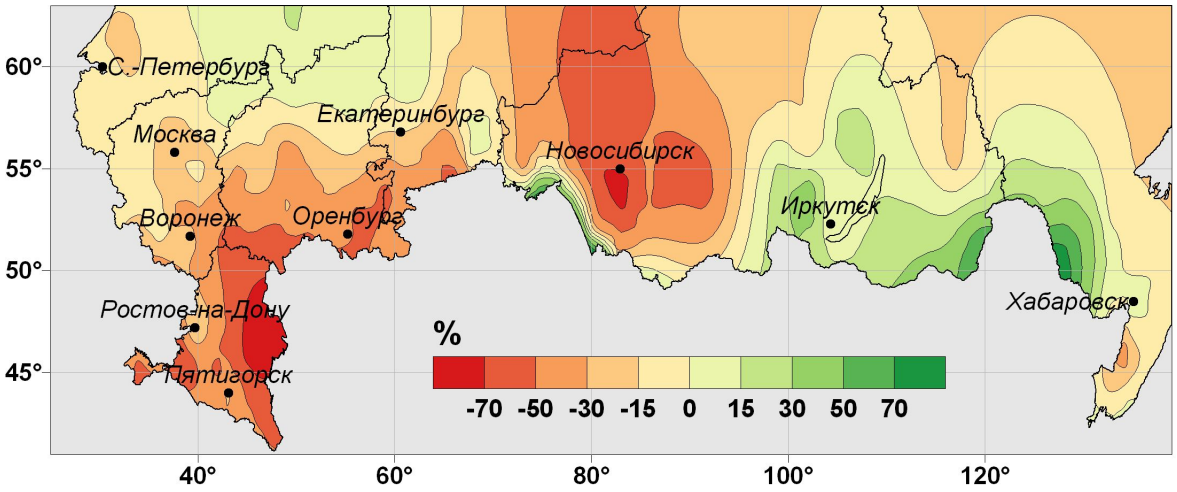
- 0 – 1
- 1 – 10
- 10 – 20
- 20 – 30
- 30 – 40
- 40 – 50
- 50 – 75
- 75 – 100

The calculations were based on the data for 1984-2018

DEVIATIONS (%) OF THE CLIMATICALLY BASED YIELD OF SPRING WHEAT IN 2010 AND 2012 COMPARING TO 2008

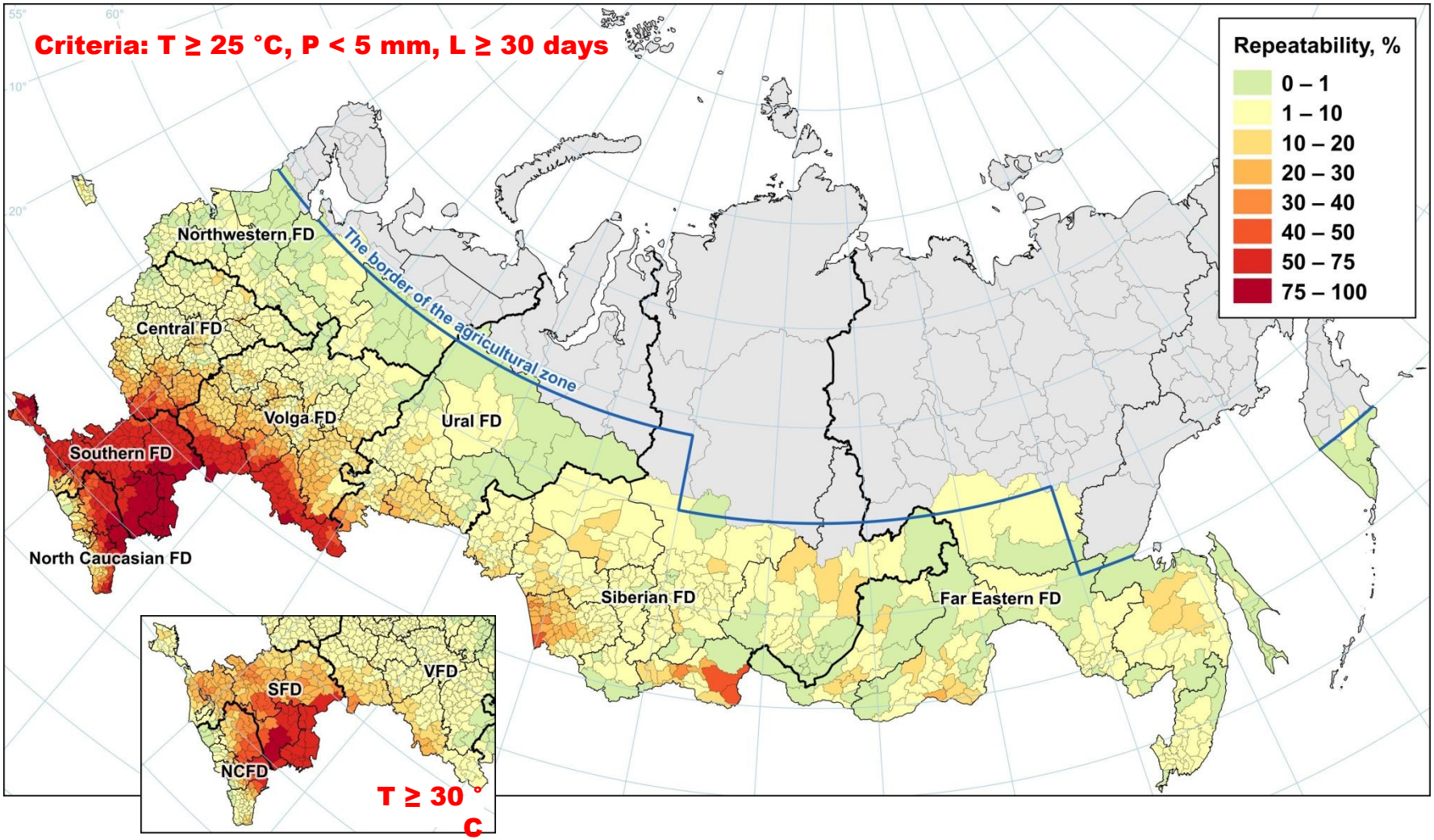


2010 г.

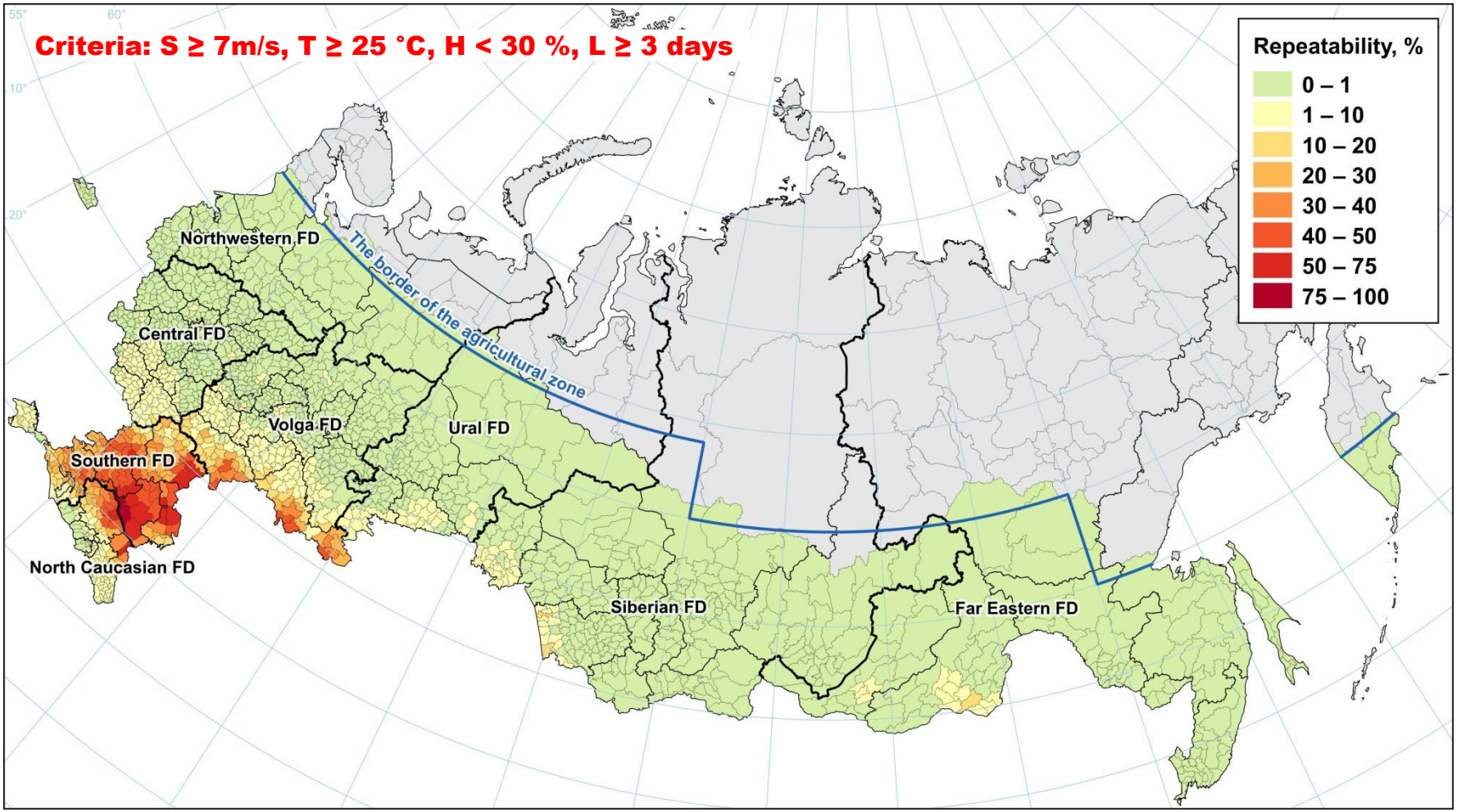


2012 г.

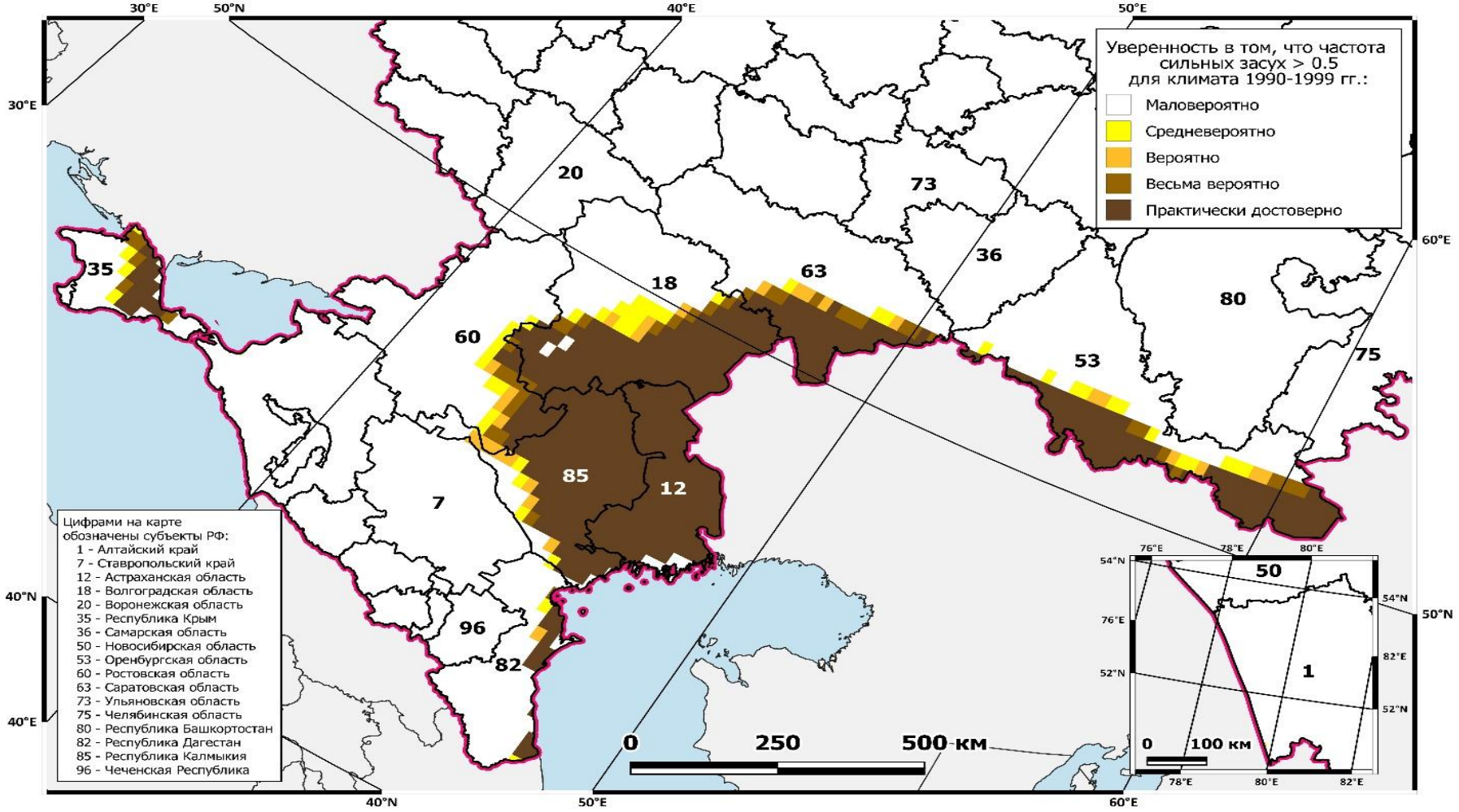
Occurrence of hazardous event DROUGHT in April-October assessed from data on 1984-2018



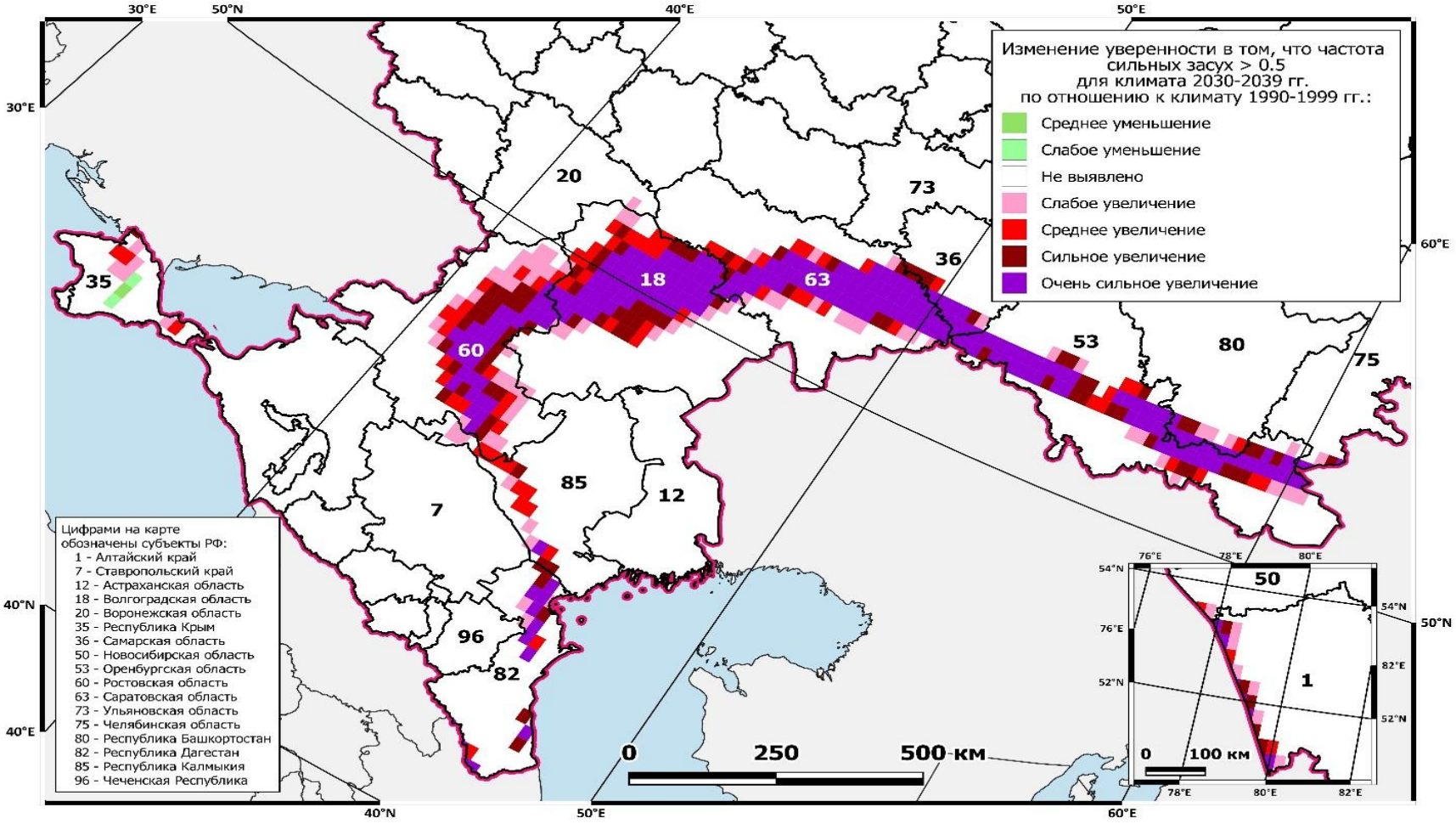
Occurrence of hazardous event HOTWIND in April-October assessed from data on 1984-2018



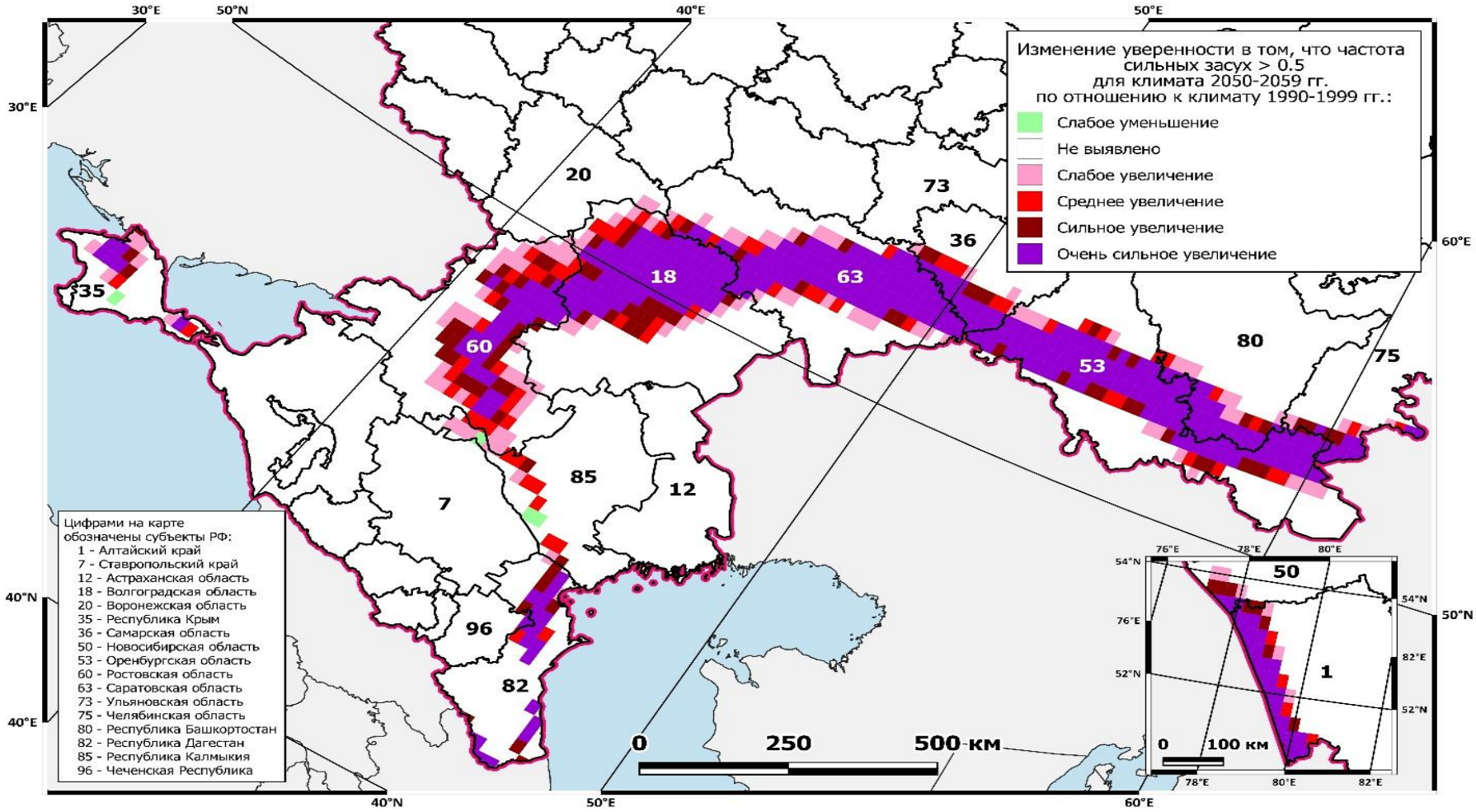
Confidence in hazardous climate aridity for grain crops in Russia in 1990-1999, scores (from low-0 to virtually certain-4) (assessed from data of the Climate Centre of Roshydromet and CRU)



Changes in confidence in hazardous climatic dryness for grain crops over Russia: 2030-2039 vs. 1990-1999: scenario RCP8.5



Changes in confidence in hazardous climate aridity for grain crops over Russia: 2050-2059 vs. 1990-1999: scenario RCP8.5



ADAPTATION TO CLIMATE CHANGES

The main directions of adaptation of Russia agriculture to the observed and expected climate changes are the follows:

– ***Adaptation to the increasing thermal resources of the growing season***

Adaptation measures: increase in acreage of heat-loving high-intensity crops, such as corn, soybeans, etc., increase in acreage energy crops

– ***Adaptation to the conditions of the cold season***

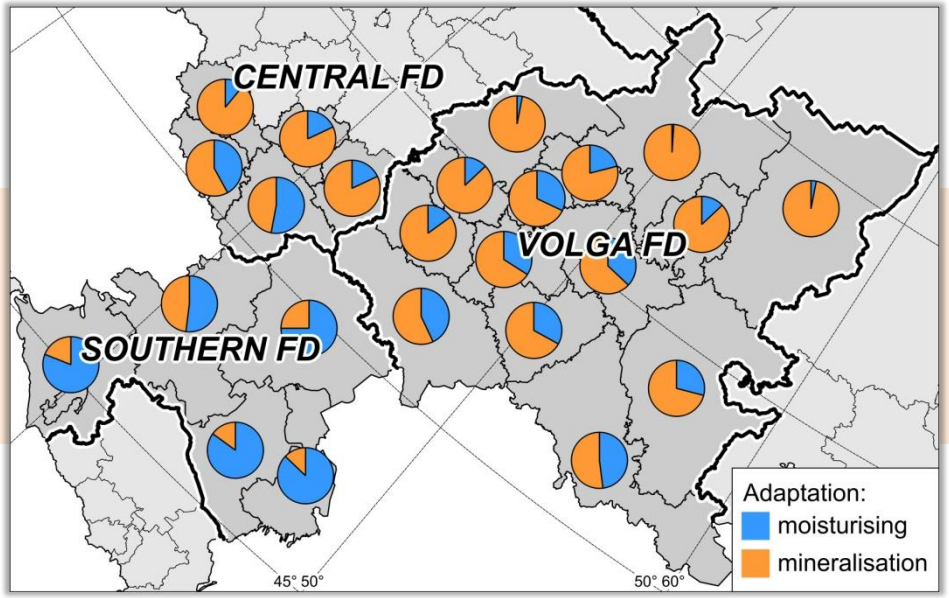
Adaptation measures : increasing in acreage the winter grain crops (wheat, barley) as more productive with climate change.

– ***Adaptation to changes in moisture conditions***

Adaptation measures: wider implementation of water-saving technologies; expansion of drought-tolerant crops; expansion of winter crops

– **Ratio of water and "fertilizer" melioration efficiency , providing sufficient moisture level and sufficient level of mineral nutrition.**

GFDL CM3, RCP4.5, 2080-2099



CONCLUSION

Dangerous hydrometeorological phenomena - drought, hot wind, ice crust and etc. were observed on the territory of Russia in the late 20th - early 21st centuries in southern Russia.

These events, including in a strong form, took place in some grain-producing regions of the country. In the last decade the climate-based yield in Russia reduced by 2.5 % per decade.

As the scenario assessments show, in the context of the continuing strong anthropogenic impact on the Earth's climate system (scenario RCP8.5), climate-based risks for grain production in Russia associated with climate aridity will increase.

THANK YOU!

If you have any questions, please send them to my e-mail address

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