



**Federal Service for Hydrometeorology
and Environmental Monitoring**



**VOEIKOV
MAIN GEOPHYSICAL
OBSERVATORY**

Since 1849

Assessment of macroeconomic impacts of climate change over the territory of Russian Federation until 2030 and beyond

Vladimir Kattsov

ОЦЕНОЧНЫЙ ДОКЛАД
ОБ ИЗМЕНЕНИЯХ КЛИМАТА И ИХ ПОСЛЕДСТВИЯХ
НА ТЕРРИТОРИИ РОССИЙСКОЙ ФЕДЕРАЦИИ

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Общее резюме

ФЕДЕРАЛЬНАЯ СЛУЖБА ПО ГИДРОМЕТЕОРОЛОГИИ И
МОНИТОРИНГУ ОКРУЖАЮЩЕЙ СРЕДЫ (РОСГИДРОМЕТ)

2008



WCC-3 (31 August - 4 September 2009) climate services plus seasonal through multi-year predictions

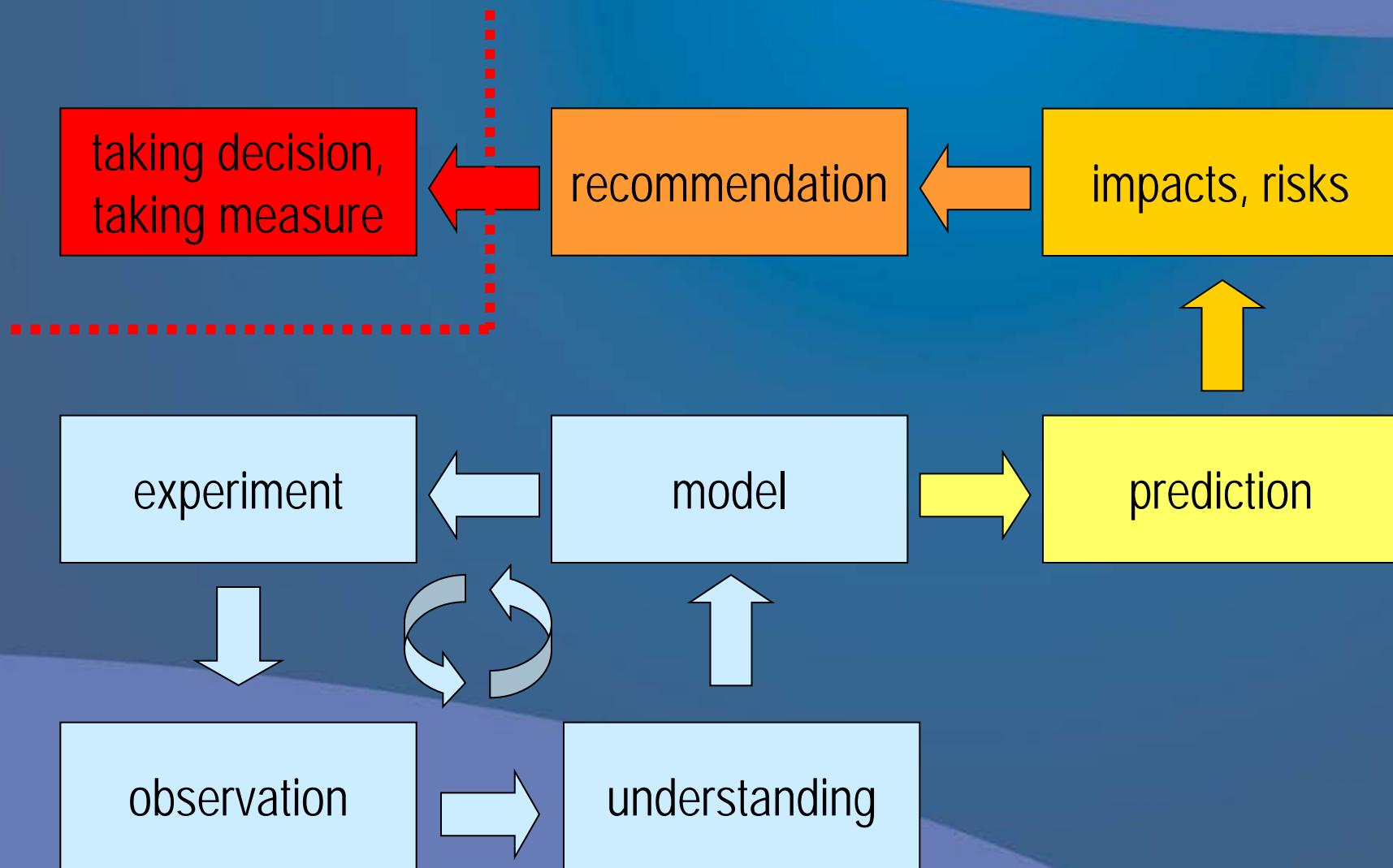
6th All-Russian Meteorological Congress (14-16 October 2009) addressed top research priorities for the Russian science

Russia's First Climate Assessment Report (2008) ends up with a summary of climate research priorities

CLIMATE
DOCTRINE
OF THE RUSSIAN
FEDERATION


VI ВСЕРОССИЙСКИЙ
МЕТЕОРОЛОГИЧЕСКИЙ
СЪЕЗД

National climate science goals, challenges, priorities



WCRP Open Science Conference

24-28 October 2011

Denver, Colorado, USA

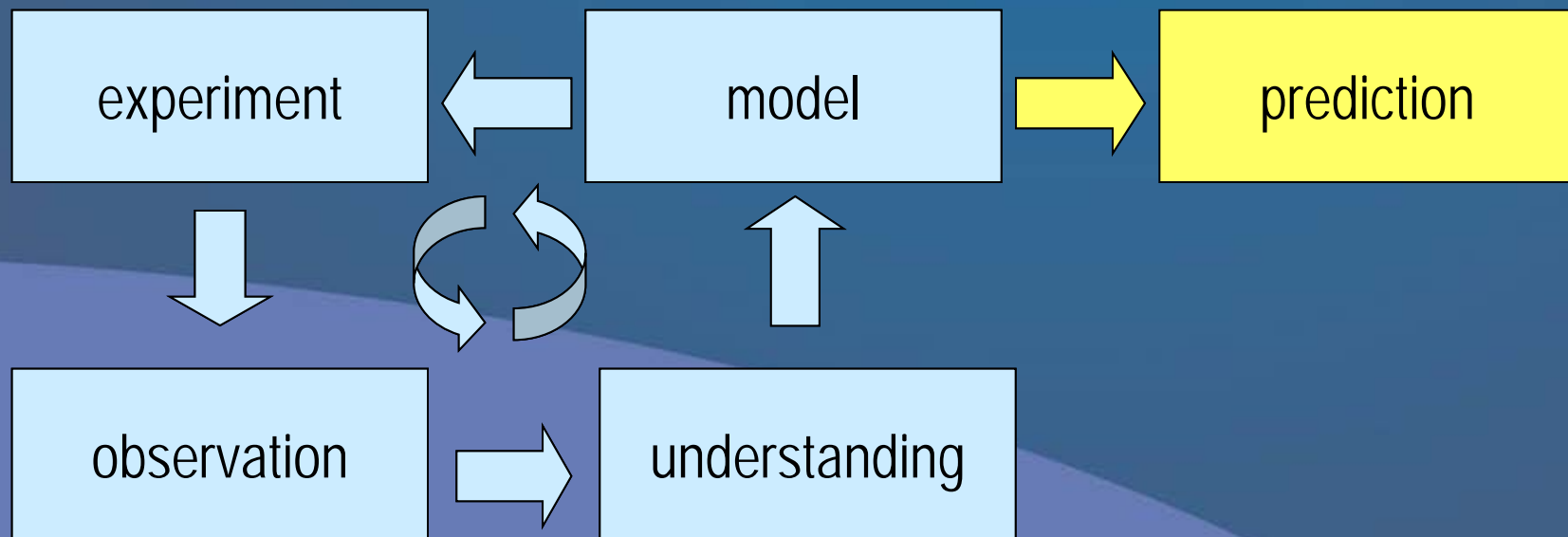
<http://conference2011.wcrp-climate.org>

Promoting, Facilitating and Coordinating
Climate Research in Service to Society



Challenges of Russian
international science
possibilities of sea ice
carbon and associated
of the Arctic sea ice

with those of the
projection;
the permafrost
observed rapid loss



National climate science goals, challenges, priorities

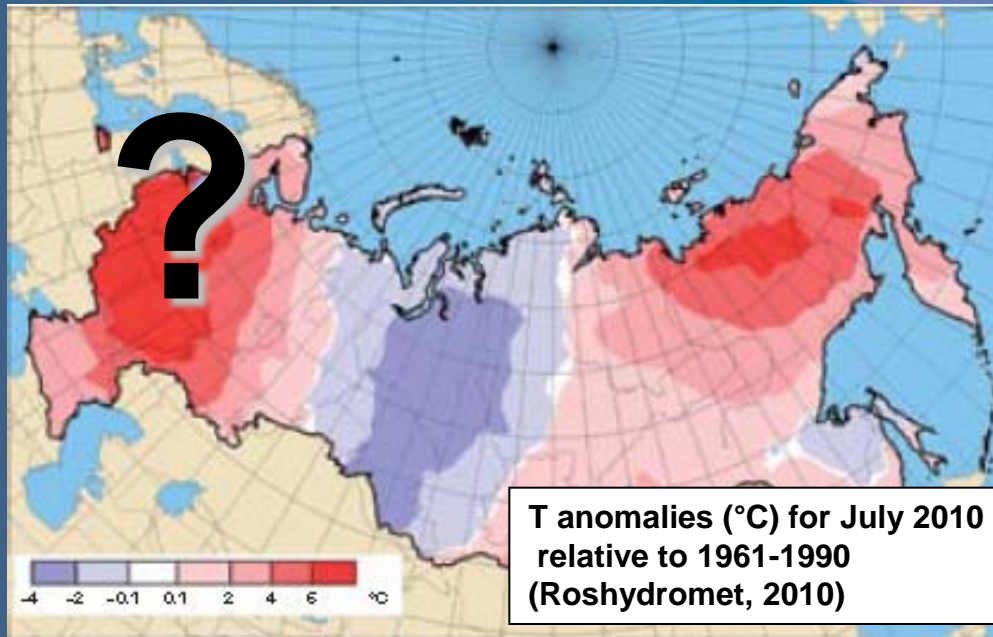


A number of geographic, economic, social, and other specific features of Russian Federation predetermine ***national research priorities*** particularly those of applied climate research, particularly related to climate change adaptation and risk management options, climate resources and the economy of climate; climate services and scientific guidance to be provided to climate information users, etc.



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Hot Russian summer 2010: Climate change? Adaptation deficit!



The variety of CC impacts



We need to know when and what we should do,
and how much it costs!

We need better quantification of climate impacts!



Roshydromet's Assessment of macroeconomic impacts of CC over the territory of RF until 2030 and beyond (published in 2011)

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Федеральная служба
по гидрометеорологии
и мониторингу
окружающей среды

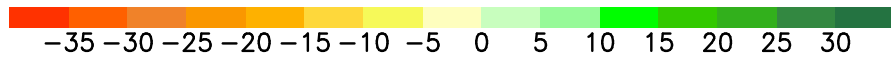
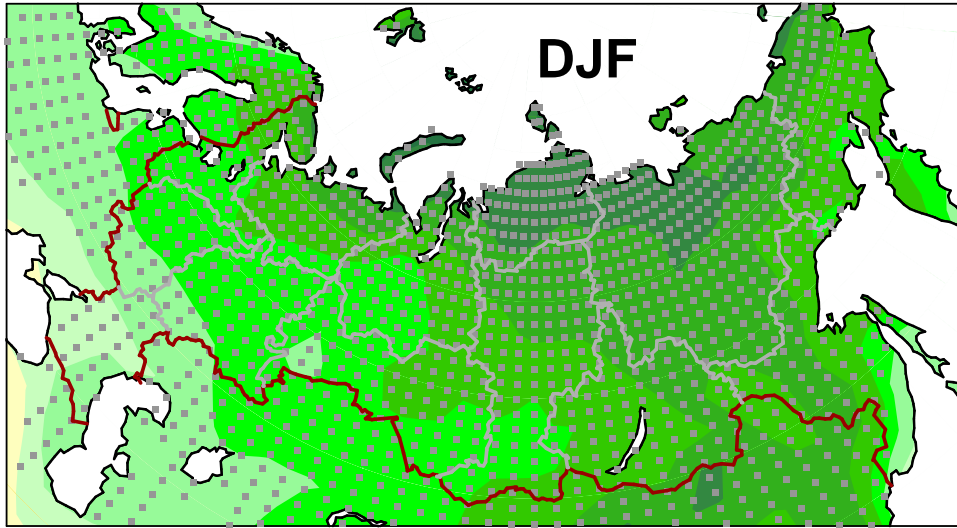
ОЦЕНКА

макроэкономических
последствий
изменений климата
на территории
Российской Федерации
на период до 2030 года
и дальнейшую
перспективу

1. Observed and projected CC over the territory of Russia in the global context
2. Socio-demographic impacts of CC
3. CC impact on the economic development of Russia
4. Specific features of CC impacts on the economy of Russian regions
5. Adaptation of people and economy to CC
6. Conclusions and recommendations



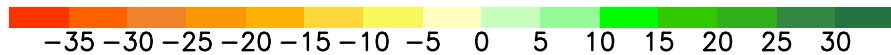
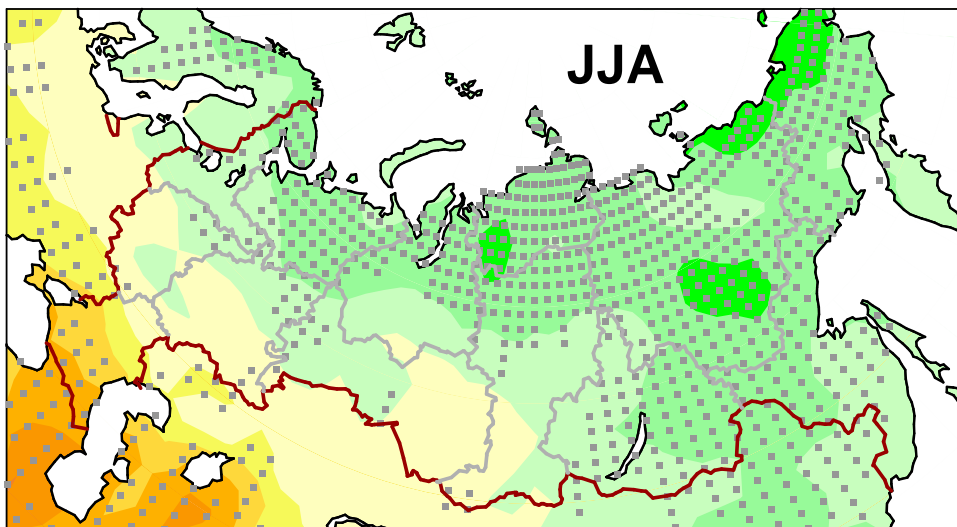
DJF



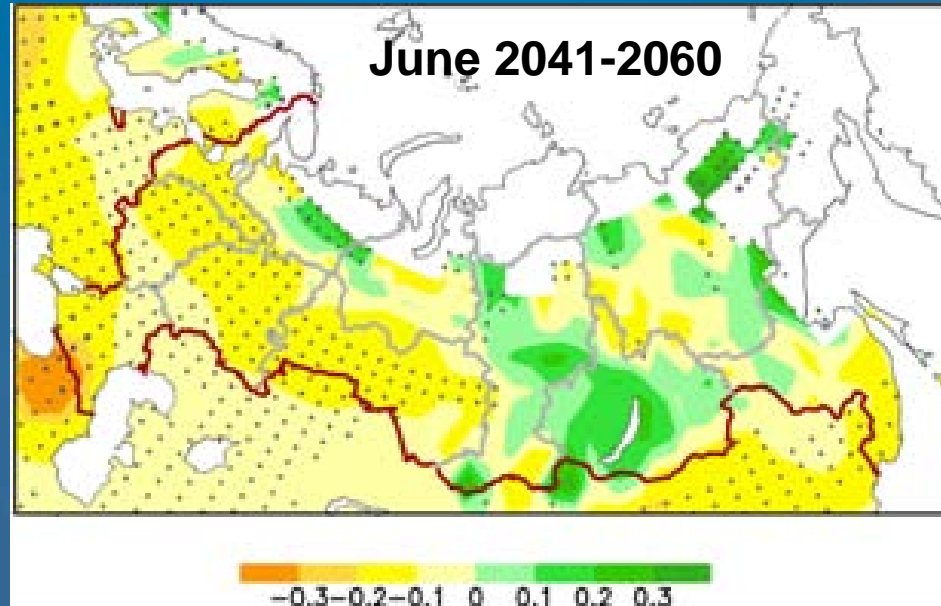
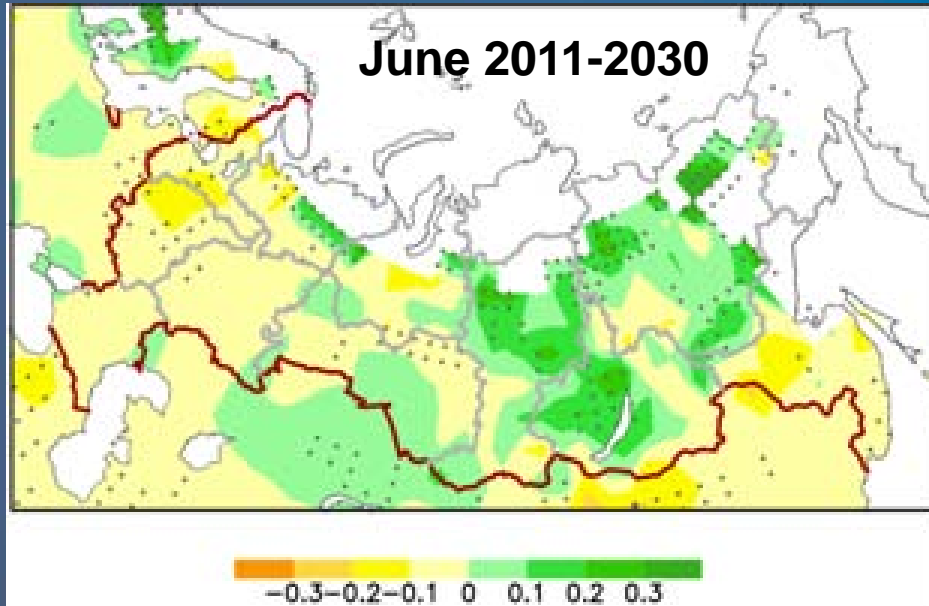
P change (% relative to 1980-1999)

2041-2060 гг.

JJA



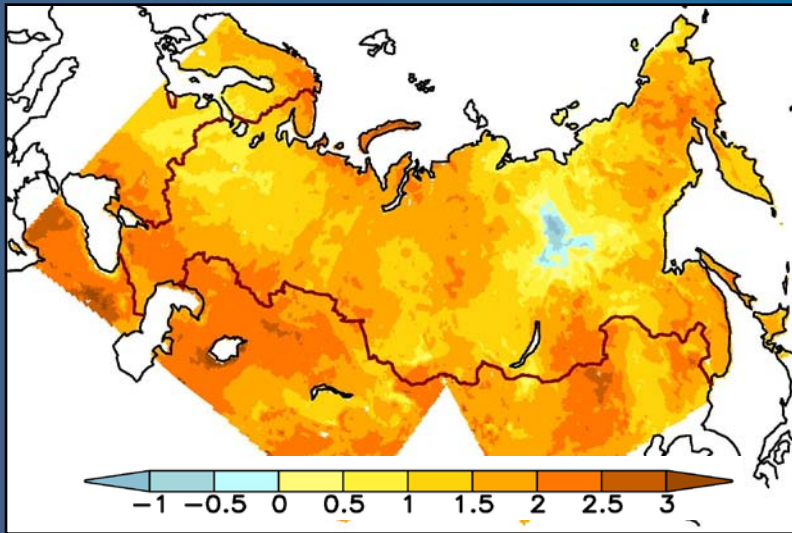
Changes in availability of soil moisture for agriculture (A2)



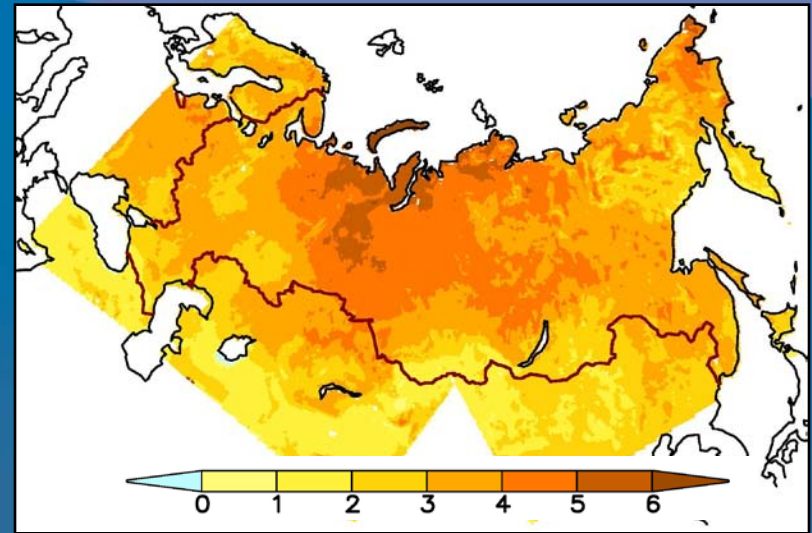
Selyaninov's hydrothermal coefficient (10mm/degree).

Climate extremes change by 2050

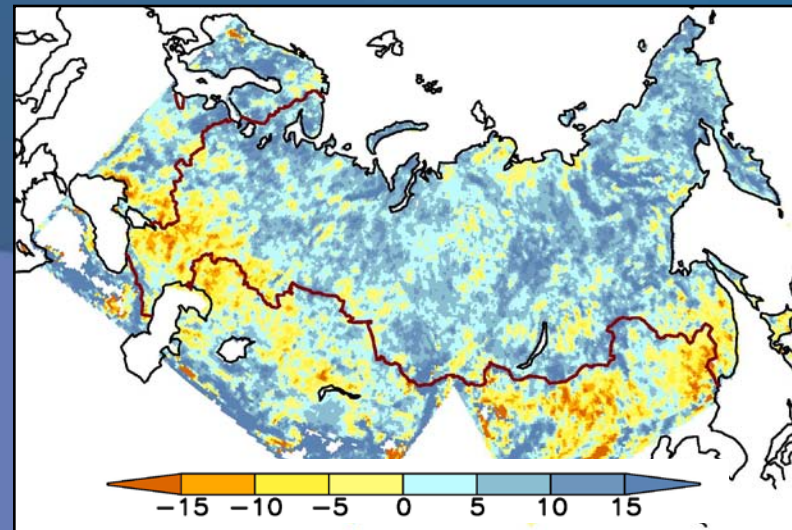
TASMAX₉₅, °C winter



TASMIN₅, °C summer

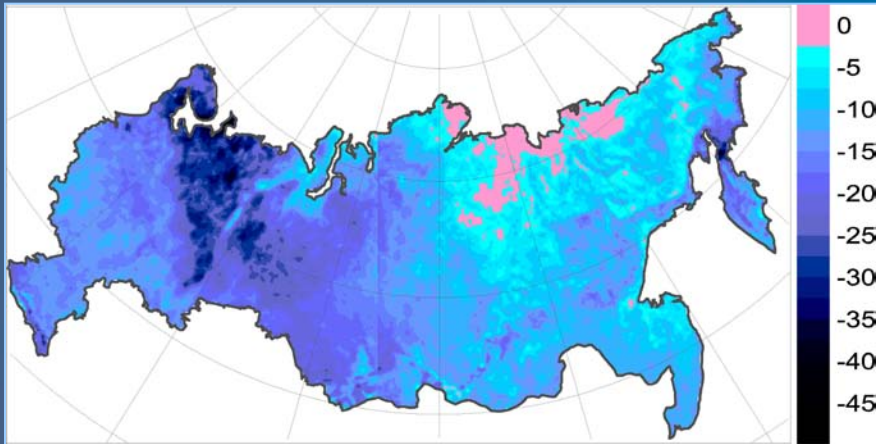


95th percentile precip, % (summer)

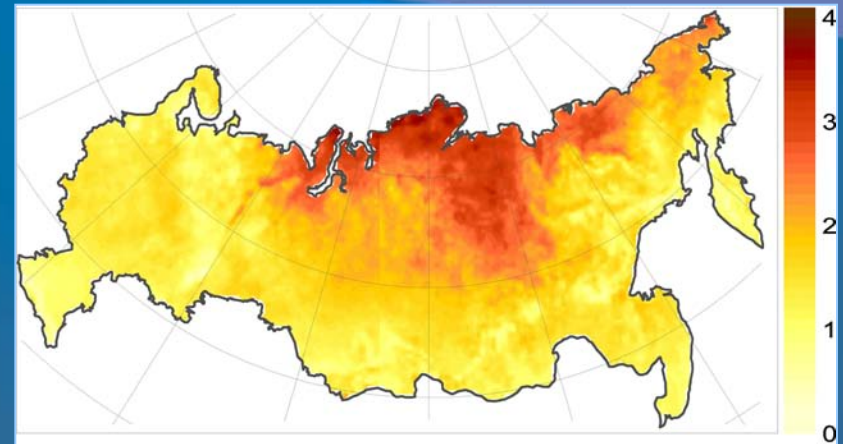


Heating period characteristics change by 2050

Heating period duration

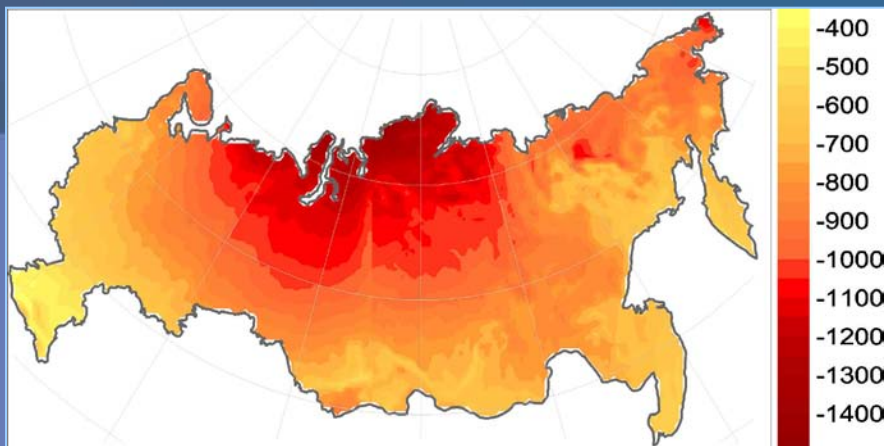


Mean temperature

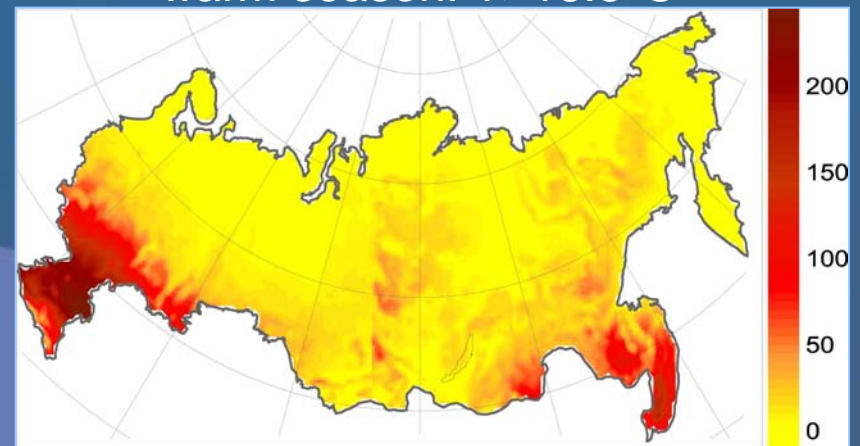


Fuel consumption index change (degree-days) by 2050

cold season: $T < 18.3^{\circ}\text{C}$

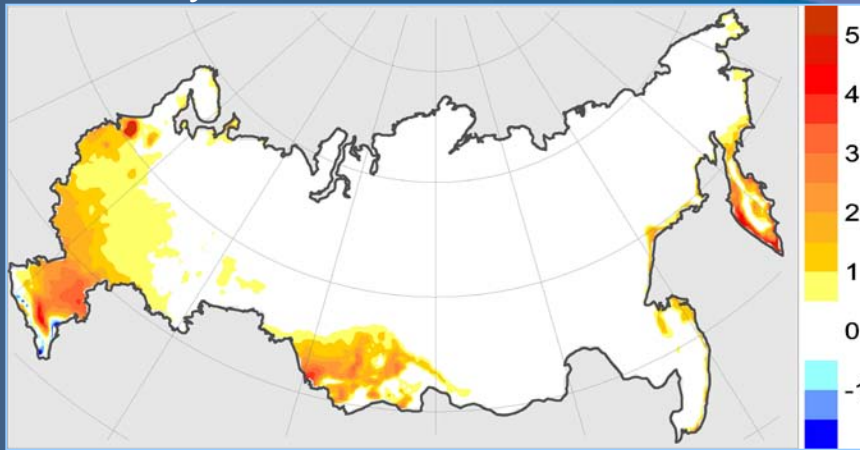


warm season: $T > 18.3^{\circ}\text{C}$

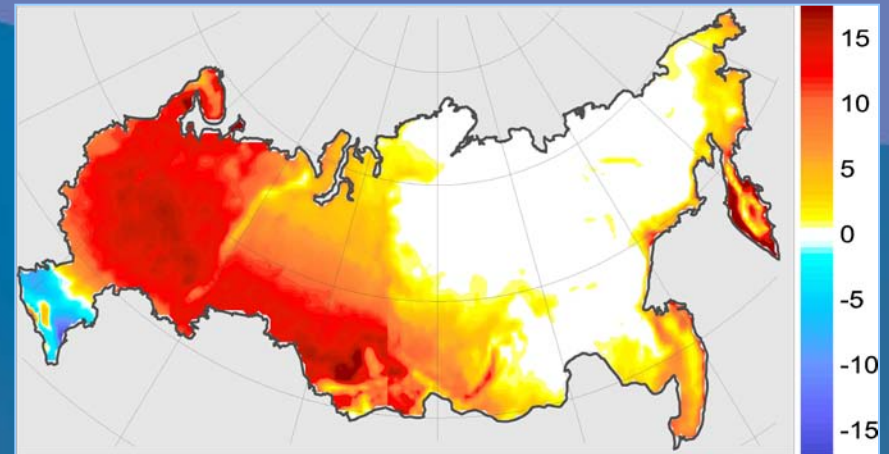


Change of number of days with a risk of road icing by 2050

January

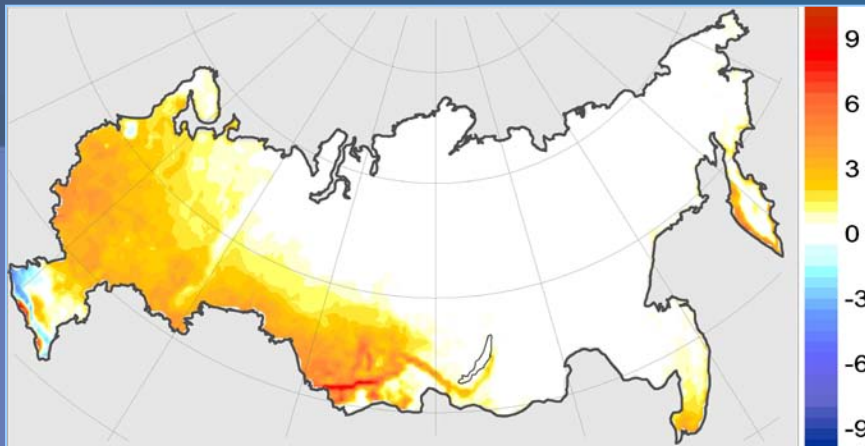


November-March

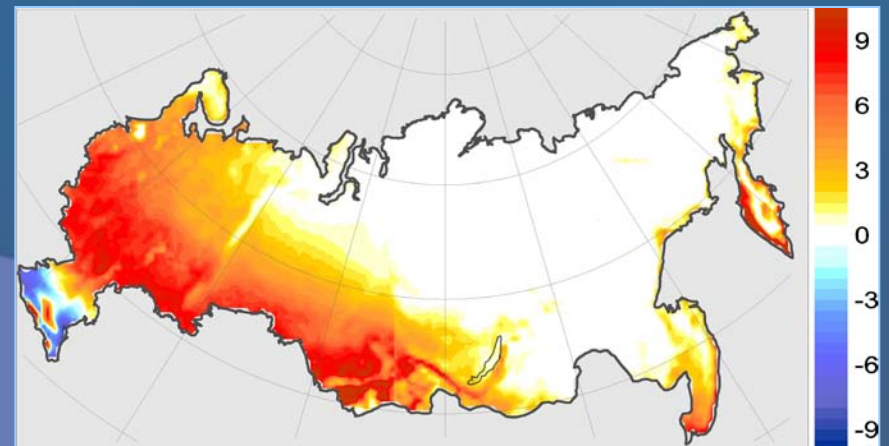


Change of climatic factors critical for infrastructure by 2050

Number of cases with daily mean T crossing 0°C (November-March)

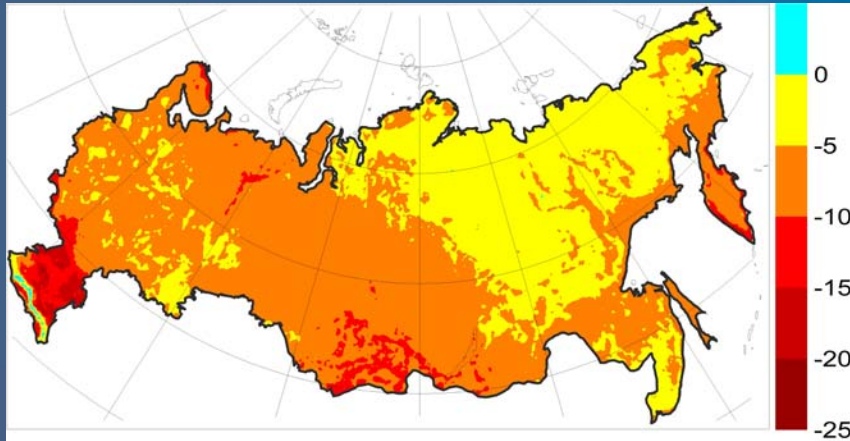


Number of cases with subdaily T crossing 0°C (November-March)



Change of agroclimatic characteristics of the warm period by 2050

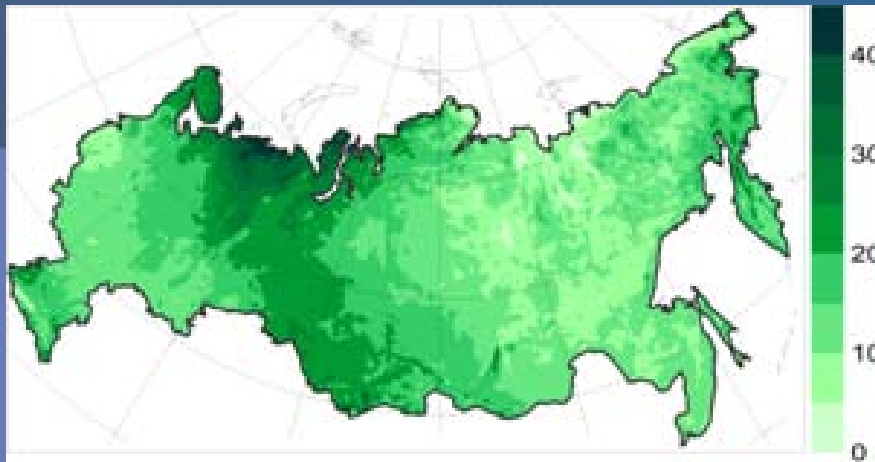
The date of the spring T stably crossing 0°C (days)



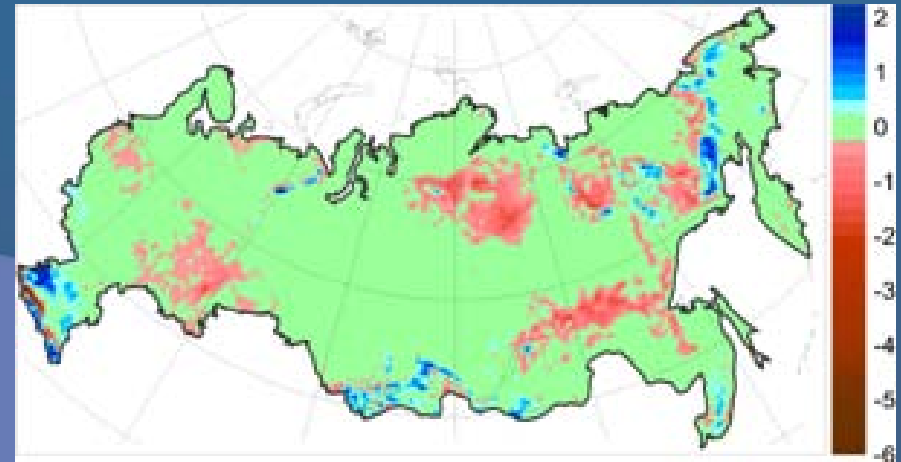
The sum of temperatures above 10°C



Duration of vegetation season (days)



The number of frost days within the vegetation season



Conference Declaration

We, Heads of State and Government, Ministers and Heads of Delegation present at the High-level segment of the World Climate Conference-3 (WCC-3) in Geneva, noting the findings of the Expert Segment of the Conference:

Decide to establish a Global Framework for Climate Services (hereafter referred to as "the Framework") to strengthen the production, availability, delivery and application of science-based climate prediction and services:


**Working together towards
a Global Framework for Climate Services**



Request the Secretary-General of the World Meteorological Organization (WMO) to convene, within four months of the adoption of the Declaration, an intergovernmental meeting of Member States of the WMO to approve the terms of reference and to endorse the composition of a task force of high-level, independent advisors to be appointed by the Secretary-General of the WMO with due consideration to expertise, geographical and gender balance:

Decide that the task force will, after wide consultation with governments, partner organizations and relevant stakeholders, prepare a report, including recommendations on proposed elements of the Framework, to the Secretary-General of WMO within 12 months of the task force being set up. The report should contain findings and proposed next steps for developing and implementing the Framework. In the development of their report, the task force will take into account the concepts outlined in the annexed Brief Note:

Decide that the report will be made available to all Member States of the WMO and to all States Parties to the United Nations Framework Convention on Climate Change (UNFCCC) and to all States Parties to the Paris Agreement.

Invite the Secretary-General of WMO to provide the report to relevant organizations and to the United Nations Secretary-General.





 **Report of the World Climate Conference-3** 

WMO-No. 1048

CLIMATE KNOWLEDGE FOR ACTION:

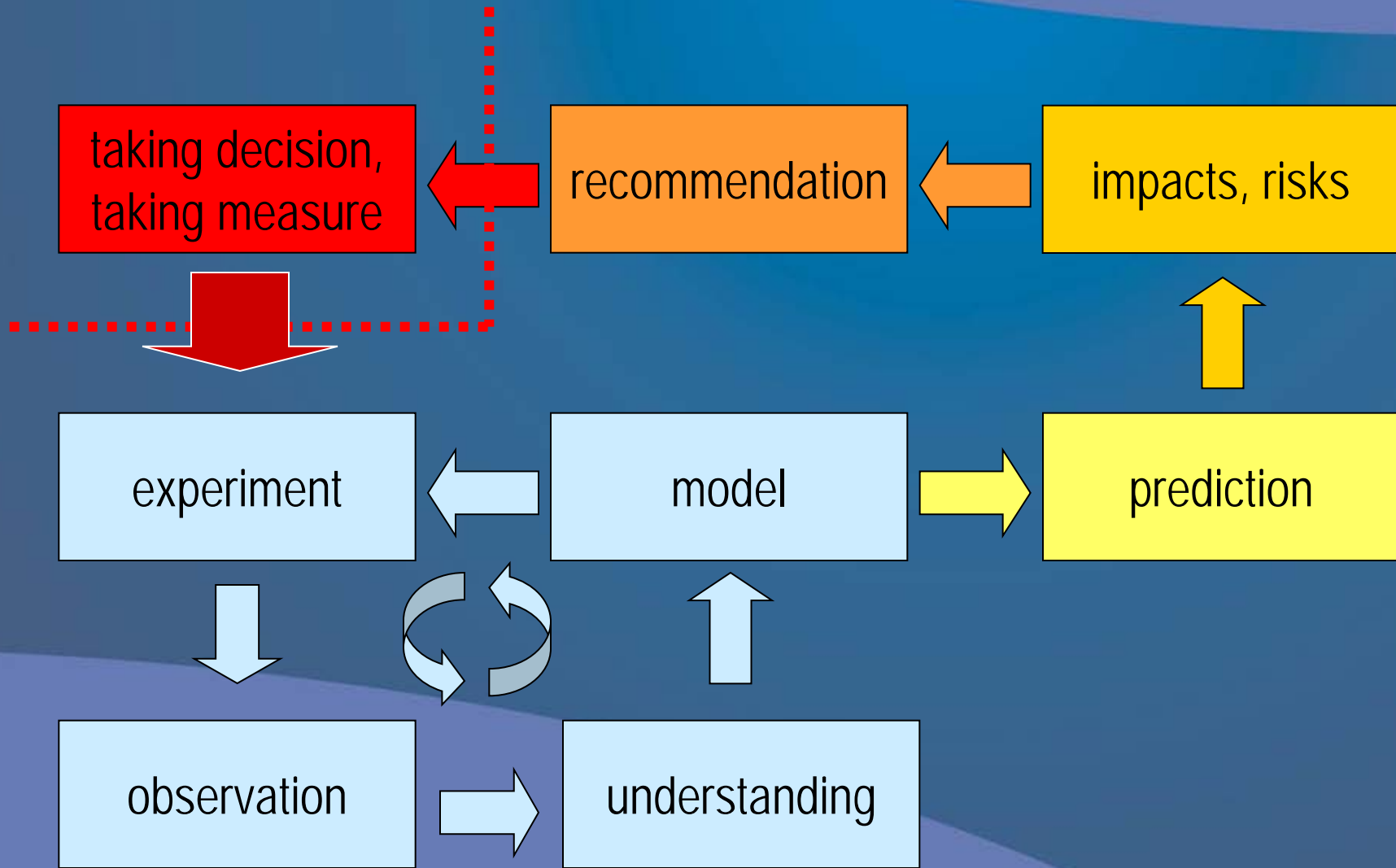
A GLOBAL FRAMEWORK FOR CLIMATE SERVICES— EMPOWERING THE MOST VULNERABLE

•

 **THE REPORT OF THE HIGH-LEVEL TASKFORCE
FOR THE GLOBAL FRAMEWORK
FOR CLIMATE SERVICES** 

WMO-No. 1066

GFCS as a possibility of a range of science-based disaster risk response strategies everywhere.





Thank you!

Acknowledgements:

Some of the results presented above were obtained under the Roshydromet Target Research programme (TsNTP-3) and projects supported by the Russian Foundation for Basic Research. Modeling groups, the Program for Climate Model Diagnosis and Intercomparison (PCMDI) and the WCRP's Working Group on Coupled Modelling (WGCM) are acknowledged for their roles in making available the WCRP CMIP3 multi-model dataset. Support of this dataset is provided by the Office of Science, U.S. Department of Energy. I thank Igor Shkolnik, Elena Khlebnikova, Vamentin Meleshko, Veronika Govorkova, Irina Sall, Sergey Efimov, Elena Stafeeva, who contributed to this study.