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FRANCE 2030 PROGRAMME DE RECHERCHE CLIMAT

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À VOS CÔTÉS, DANS UN CLIMAT QUI CHANGE

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TRACCS: TRansformative Advances in Climate modelling for Climate Services

A research programme for the decade 2023-2032

FRANCE 2030 PROGRAMME DE RECHERCHE CLIMAT

Presentation of the research programme
for the WCRP JSC 46 « session with French scientists »

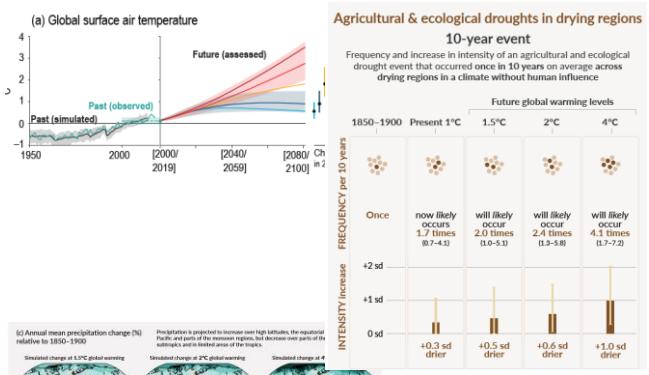
May 12th, 2025

Samuel Morin, Masa Kageyama, programme directors

pepr-traccs.fr

Climate science and society

Climate change and its impacts: understanding, knowledge



IPCC AR6 SPM & TS, 2021

Information, warning

Demands for action

Societal questions

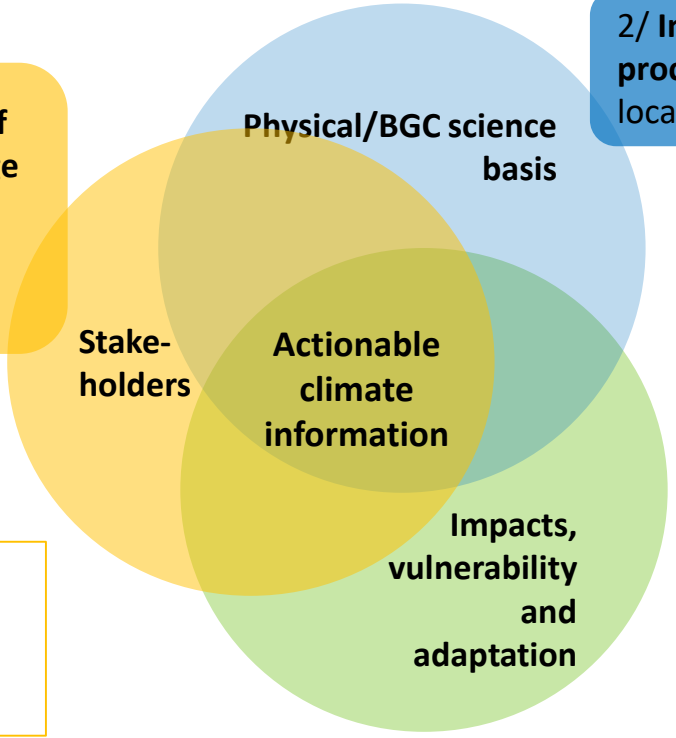
- Specific impacts on territories, economic sectors and the environment?
- Which actions to adapt and how effective would they be?
- Which actions to reduce the anthropogenic footprint on the climate and how effective would they be?

Opportunities opened for large research programmes in France in 2021,
we got funded in July 2022,
TRACCS started in 2023-2024

TRACCS : Objectives

1/ Foster the **co-design of actionable climate change information** by the scientific community and relevant stakeholders

to meet the users needs, from policy makers to industries, services and the general public



2/ **Improve knowledge and tools on climate change processes, impacts and risks**, from the global to the local scale

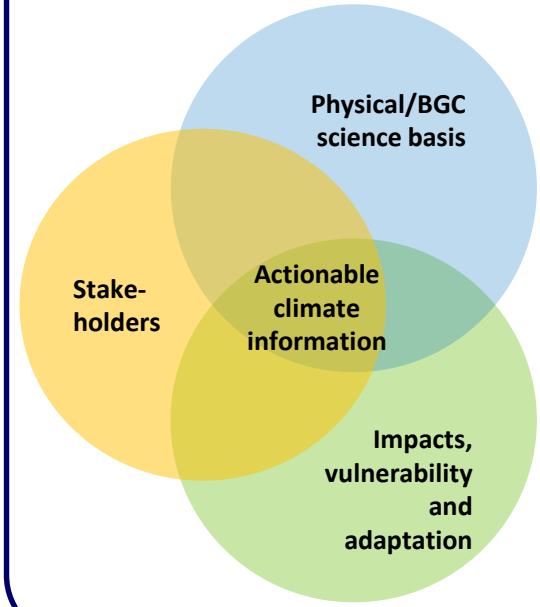
to deliver the best possible climate information for decision making

3/ **Train the next generation of professionals** in model development, data distribution, climate service co-production, use and support of climate services

to ensure the sustainability of this enlarged climate science ecosystem.

TRACCS : Objectives and Challenges

Objectives



1/ Foster the **co-design of actionable climate change information** by the scientific community and relevant stakeholders

2/ **Improve knowledge and tools on climate change processes, impacts and risks**, from the global to the local scale

3/ Train the next generation of professionals in model development, data distribution, climate service co-production, use and support of climate services

Challenges

- Reliable climate models
- High performance computing - efficient use of new supercomputing facilities
- Artificial intelligence (AI) for climate science
- Interdisciplinary approaches

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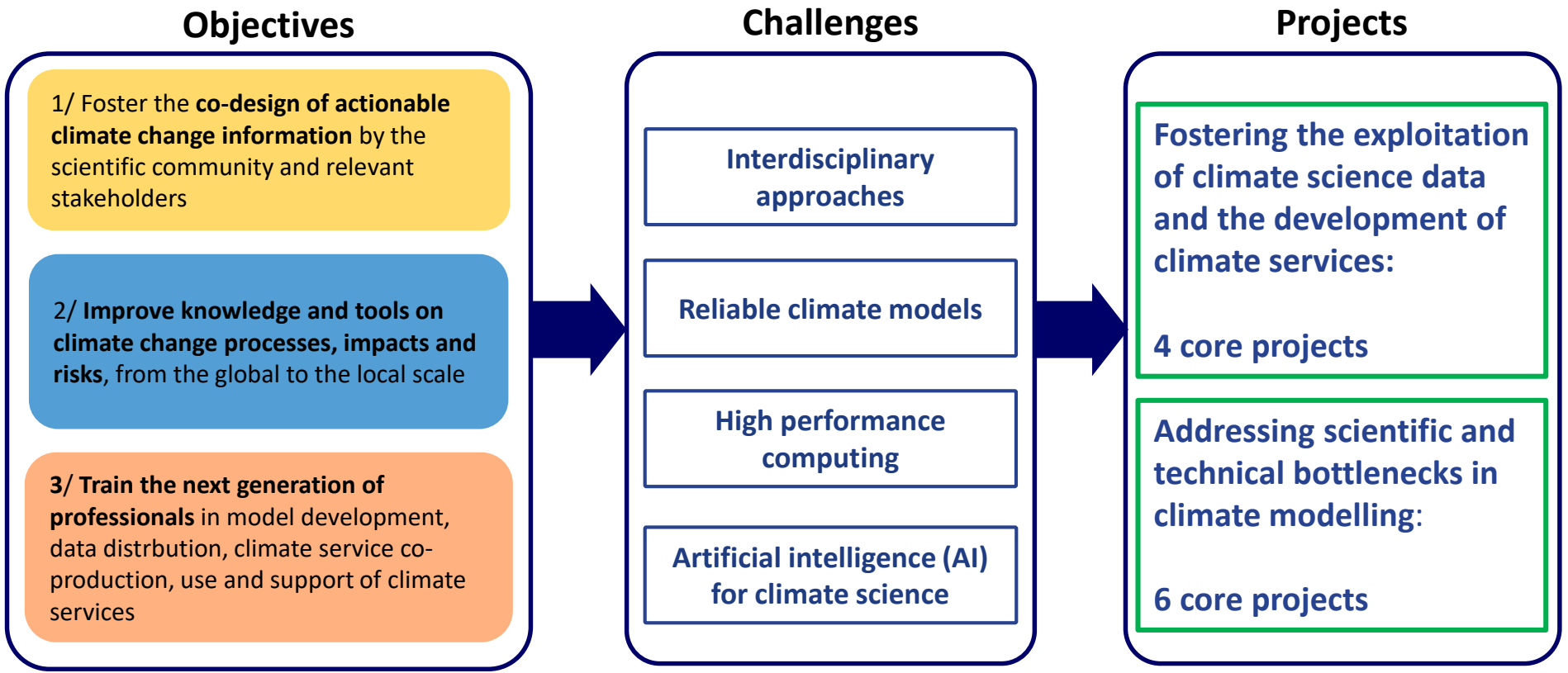
TRACCS : Objectives, Challenges and Projects

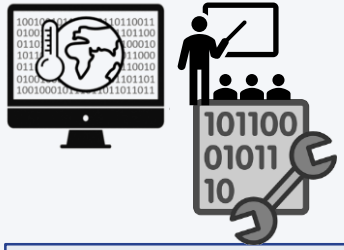


Fostering the exploitation of climate science data and the development of climate services

- **Actionable climate change information** for key sectors and territories (France mainland & overseas, foreign countries)
- **Special focus on extreme events**: quantification, attribution, compounds, future evolution
- Transformative, **interdisciplinary and transdisciplinary** advances towards climate services

PC1. DIALOG
Co-design with stakeholders

PC2. INVEST
Brokerage of data & methods



PC3. DEMOCLIMA
Territorial information

GRECs network

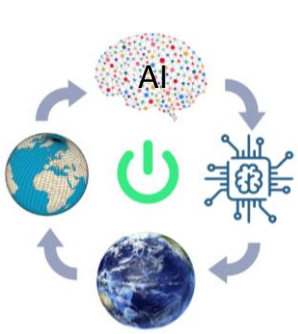
PC4. EXTENDING
Extreme events

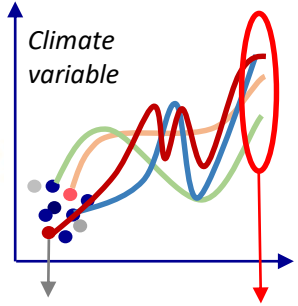
Future climate risks in France and elsewhere

Addressing scientific and technical bottlenecks in climate modelling

PC5. COMPACT New computing paradigms	PC6. QUINTET Calibration & uncertainties	PC7. IMPRESSION-ESM Physical processes	PC8. CYCL-ESM Biogeo-chemistry	PC9. IsClim Polar ice sheets	PC10. LOCALISING km-scale climate information

Transformative advances
in model design
- increased use of AI,
- addressing new HPC frameworks,
- quantifying confidence levels





Calibration, parameter selection

Distribution of values, including extremes

Addressing scientific and technical bottlenecks in climate modelling

PC5. COMPACT New computing paradigms	PC6. QUINTET Calibration & uncertainties	PC7. IMPRESSION-ESM Physical processes	PC8. CYCL-ESM Biogeo-chemistry	PC9. IsClim Polar ice sheets	PC10. LOCALISING km-scale climate information

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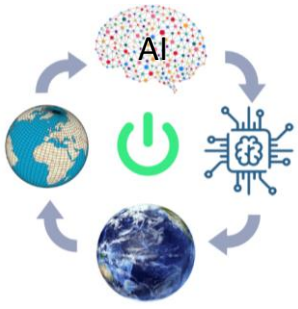
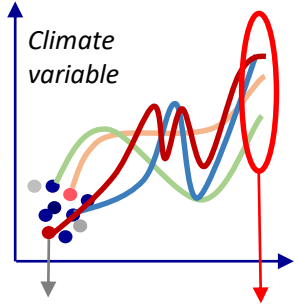
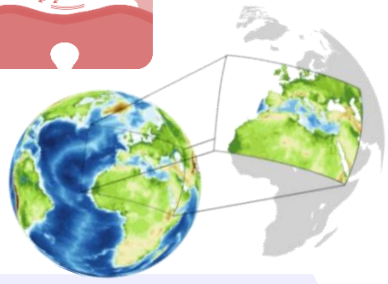




Calibration, parameter selection

Distribution of values, including extremes



TRACCS will develop and contribute
- a consistent set of improved climate models
- operating across all spatial (100-1 km scale) and temporal scales of the climate system,
- enabling long simulations & large ensembles.

Robust basis for science and climate services

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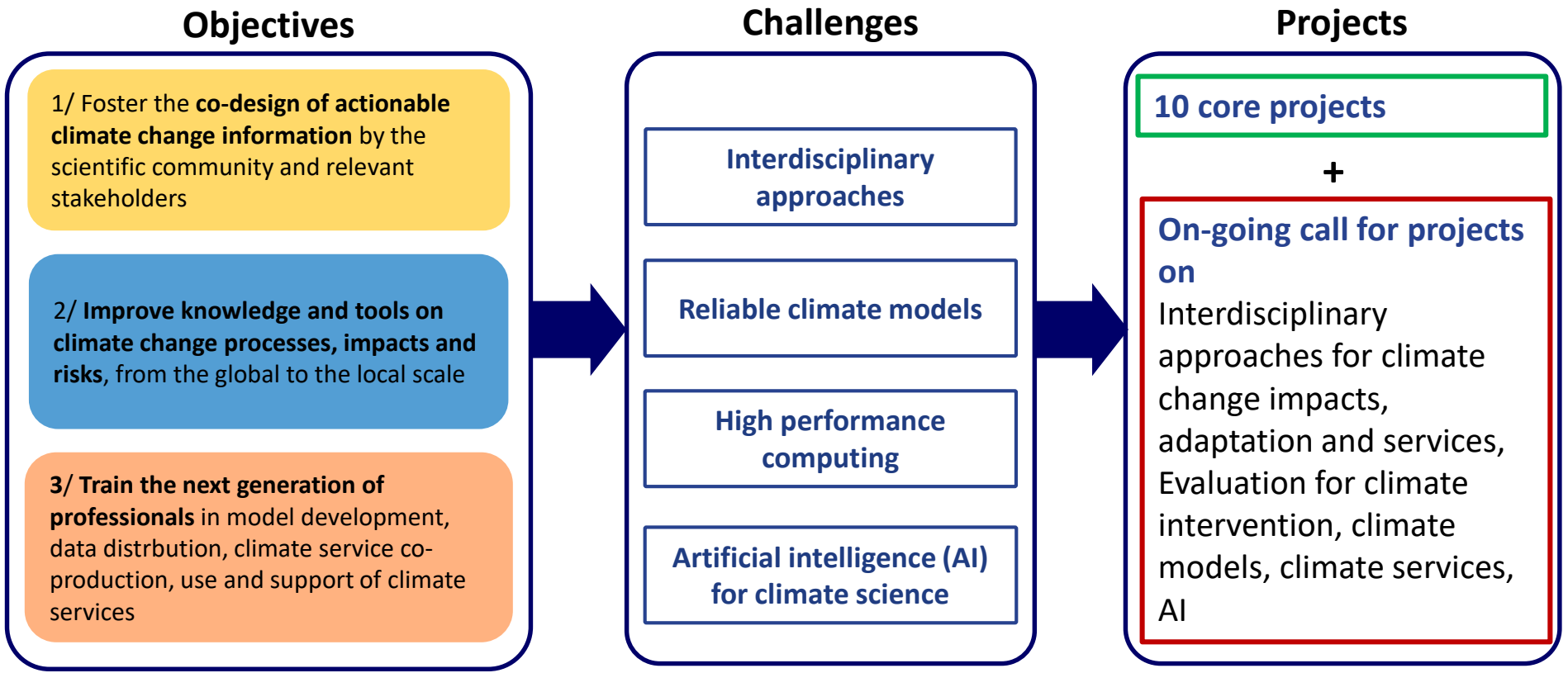
TRACCS : Objectives, Challenges and Projects



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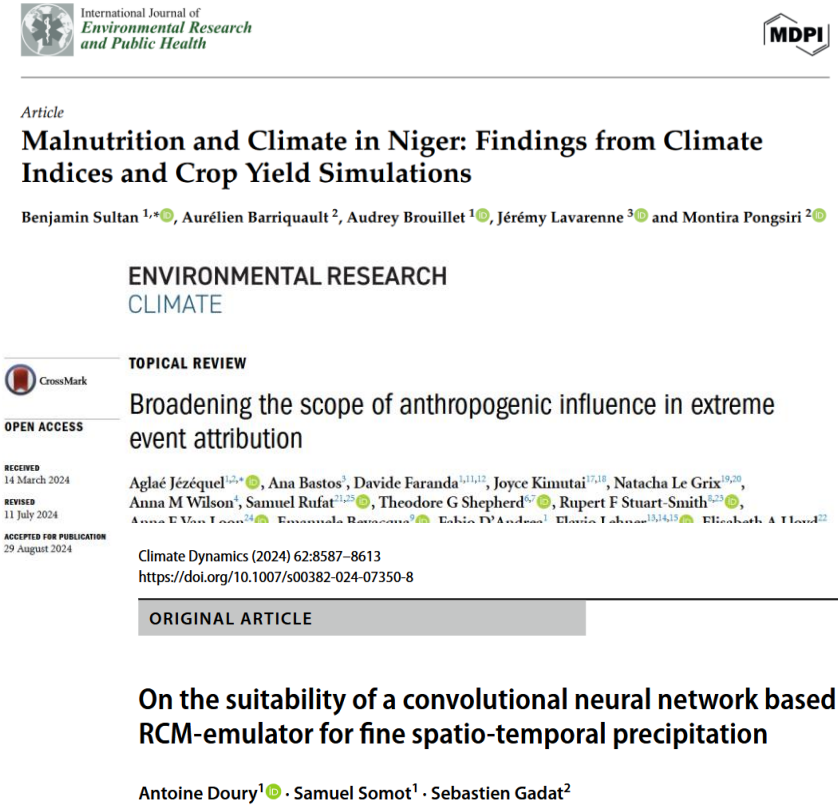
Some 2024-2025 achievements



International Journal of Environmental Research and Public Health

MDPI

Article

Malnutrition and Climate in Niger: Findings from Climate Indices and Crop Yield Simulations

Benjamin Sultan [1,*], Aurélien Barriquault [2], Audrey Brouillet [1], Jérémy Lavarenne [3] and Montira Pongsiri [2]

ENVIRONMENTAL RESEARCH
CLIMATE

CrossMark

TOPICAL REVIEW

OPEN ACCESS

RECEIVED
14 March 2024

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11 July 2024

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29 August 2024

Broadening the scope of anthropogenic influence in extreme event attribution

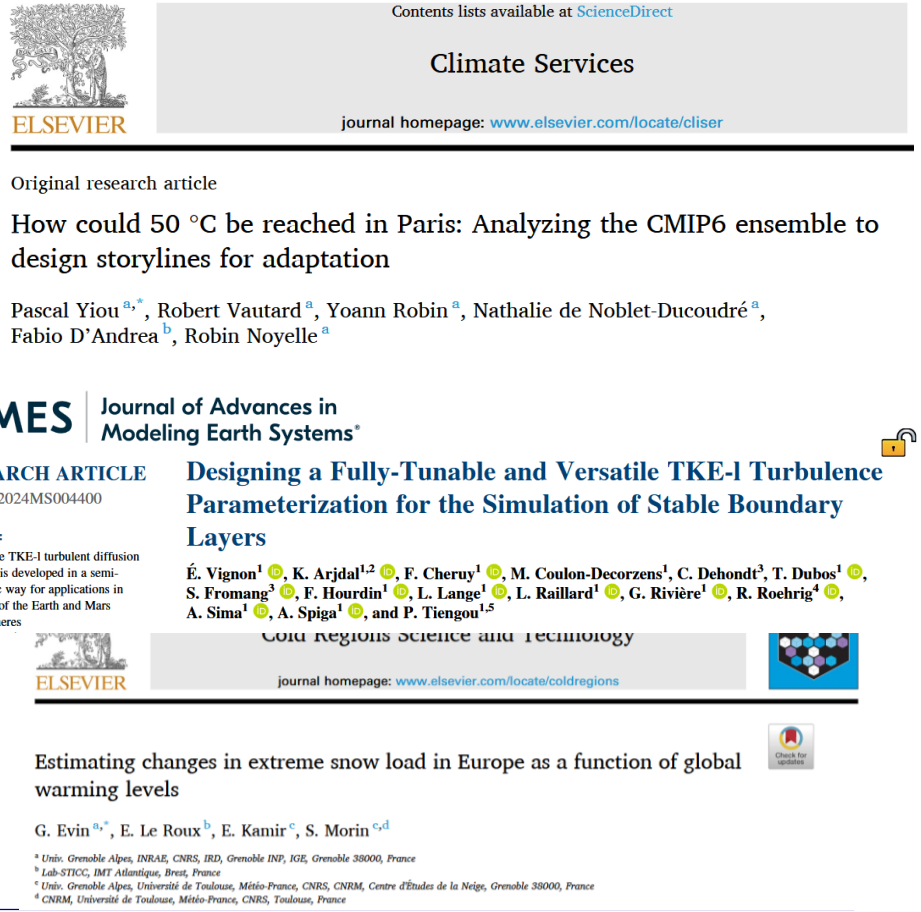
Aglaé Jézéquel[1,5,*], Ana Bastos[3], Davide Faranda[1,11,12], Joyce Kimutai[17,18], Natacha Le Grix[19,20], Anna M Wilson[4], Samuel Rufat[21,25], Theodore G Shepherd[6,7], Rupert F Stuart-Smith[5,23],

Climate Dynamics (2024) 62:8587–8613
https://doi.org/10.1007/s00382-024-07350-8

ORIGINAL ARTICLE

On the suitability of a convolutional neural network based RCM-emulator for fine spatio-temporal precipitation

Antoine Doury[1] · Samuel Somot[1] · Sebastien Gadat[2]



ELSEVIER

Contents lists available at ScienceDirect

Climate Services

journal homepage: www.elsevier.com/locate/cliser

Original research article

How could 50 °C be reached in Paris: Analyzing the CMIP6 ensemble to design storylines for adaptation

Pascal Yiou [a,*], Robert Vautard [a], Yoann Robin [a], Nathalie de Noblet-Ducoudré [a], Fabio D'Andrea [b], Robin Noyelle [a]

JAMES | Journal of Advances in Modeling Earth Systems

RESEARCH ARTICLE
10.1029/2024MS004400

Key Points:

- A simple TKE-l turbulent diffusion scheme is developed in a semi-heuristic way for applications in models of the Earth and Mars atmospheres

Designing a Fully-Tunable and Versatile TKE-l Turbulence Parameterization for the Simulation of Stable Boundary Layers

É. Vignon[1], K. Arjdal[1,2], F. Cheruy[1], M. Coulon-Decorzens[1], C. Dehondt[3], T. Dubos[1], S. Fromang[3], F. Hourdin[1], L. Lange[1], L. Raillard[1], G. Rivière[1], R. Roehrig[4], A. Sima[1], A. Spiga[1], and P. Tiengou[1,5]

ELSEVIER

Cold Regions Science and Technology

journal homepage: www.elsevier.com/locate/coldregions

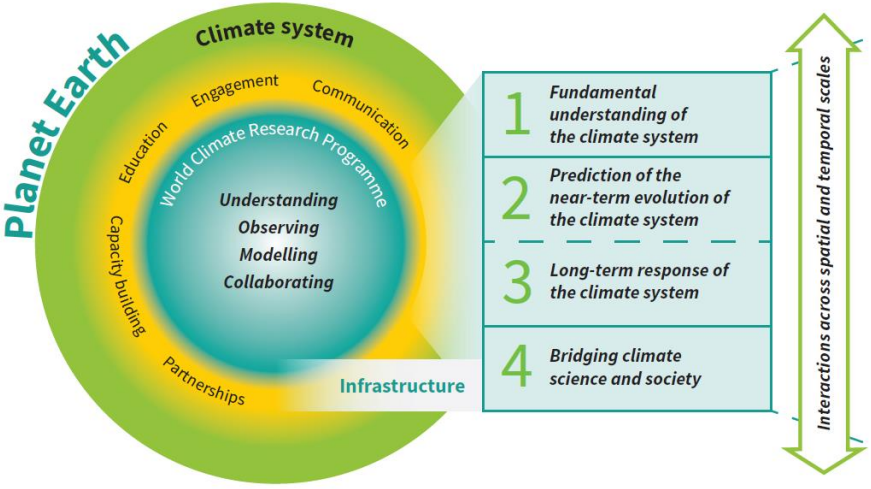
Check for updates

Estimating changes in extreme snow load in Europe as a function of global warming levels

G. Evin [a,*], E. Le Roux [b], E. Kamir [c], S. Morin [c,d]

[a] Univ. Grenoble Alpes, INRAE, CNRS, IRD, Grenoble INP, IGE, Grenoble 38000, France
[b] Lab-STICC, IMT Atlantique, Brest, France
[c] Univ. Grenoble Alpes, Université de Toulouse, Météo-France, CNRS, CNRM, Centre d'Études de la Neige, Grenoble 38000, France
[d] CNRM, Université de Toulouse, Météo-France, CNRS, Toulouse, France

Possible contributions to WCRP



Core Projects:

- ESMO
- CLIVAR/APARC
- CliC
- GEWEX
- RifS

Lighthouse activities

- MyClimateRisk
- Explaining and Predicting Earth System Change
- Research on Climate Intervention
- Safe Landing Climate

WCRP academy

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Thank you !

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