



TRACCS

# TRAnsformer la modélisation du Climat pour les services Climatiques

*TRansformative Advances  
in Climate modelling  
for Climate Services*

Retraite IPSL CMC

November 17th 2022 – Masa Kageyama – Samuel Morin



**anr** <sup>©</sup>  
agence nationale  
de la recherche





## PEPR exploratoire

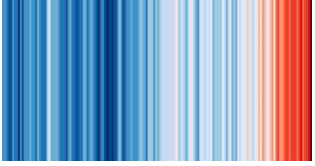
**PEPR: Programme et équipements prioritaires de recherches exploratoires,**

instrument du PIA pour

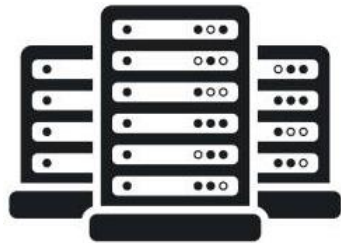
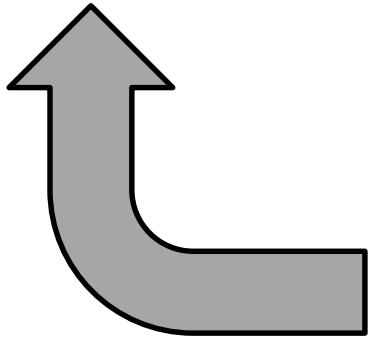
« construire ou consolider un leadership français dans des domaines scientifiques liés ou susceptibles d'être liés à une transformation technologique, économique, sociétale, sanitaire, environnementale, etc, et considérés comme prioritaires aux niveaux national ou européen ».

**PIA: Programme d'investissements d'avenir (PIA),** piloté par le Secrétariat général pour l'investissement (SGPI), mis en place par l'État pour financer des investissements innovants et prometteurs sur le territoire, afin de permettre à la France d'augmenter son potentiel de croissance et d'emplois. De l'émergence d'une idée jusqu'à la diffusion sur le marché d'un produit ou service nouveau, le PIA intervient sur tout le cycle de vie de l'innovation et fait le lien entre la recherche publique et le monde de l'entreprise.

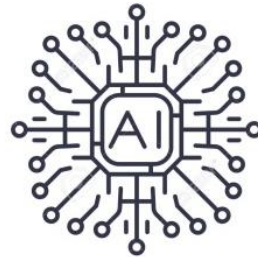
**Climate  
change**



**Climate  
modelling**



**Next-gen HPC**

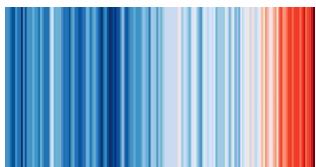


**More AI**



**Better physics & ESM**

Climate change

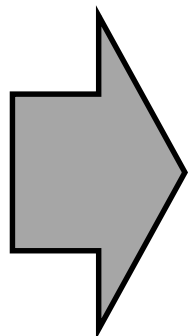


Need for local information (using AI)

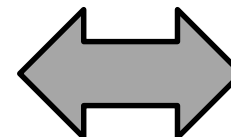
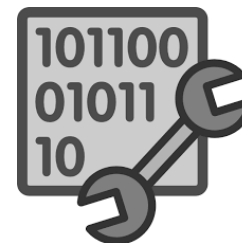


Training & Outreach

Climate modelling

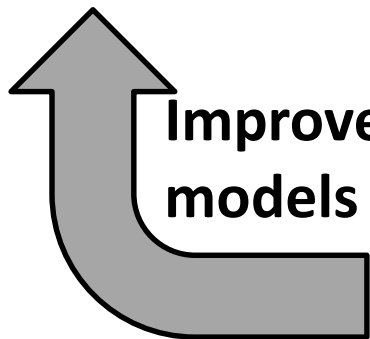


Need for sectoral information



Climate services co-constructed with institutional / industrial stakeholders

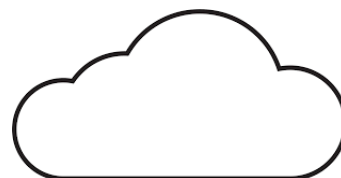
Improved models



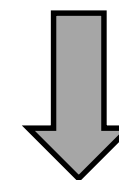
Next-gen HPC



More AI

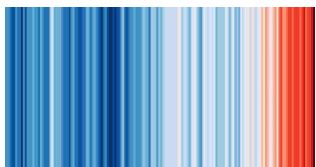


Better physics & ESM



Adaptation plans  
Support to 'GREC'  
Climate policies

Climate change

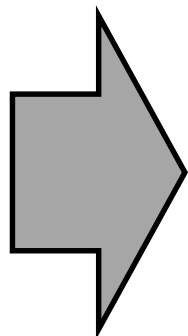


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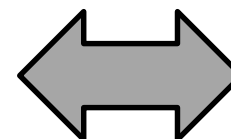
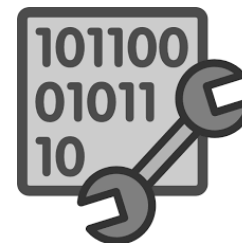


Training & Outreach

Climate modelling

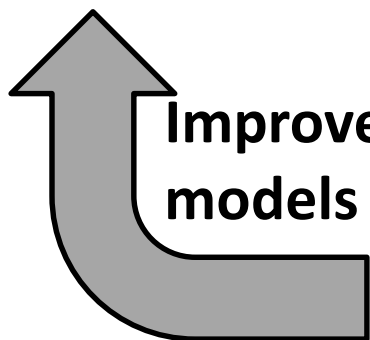


Need for sectoral information



Climate services co-constructed with institutional / industrial stakeholders

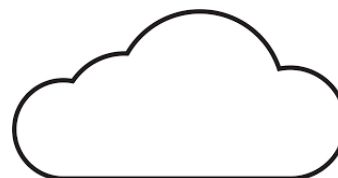
Improved models



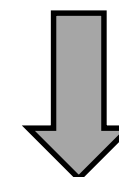
Next-gen HPC



More AI



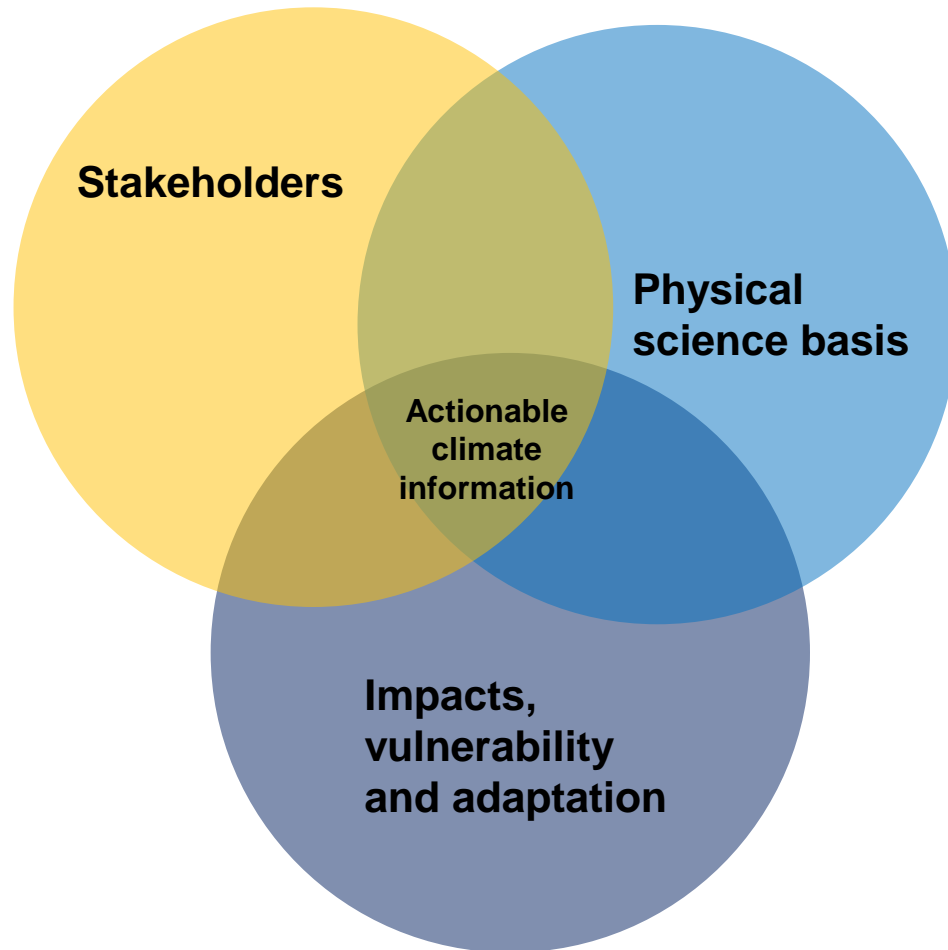
Better physics & ESM



Adaptation plans  
Support to 'GREC'  
Climate policies



# TRACCS : TRansformative Advances in Climate modelling for Climate Services



## TRACCS main objectives

1/ Foster actionable climate change information co-designed between 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

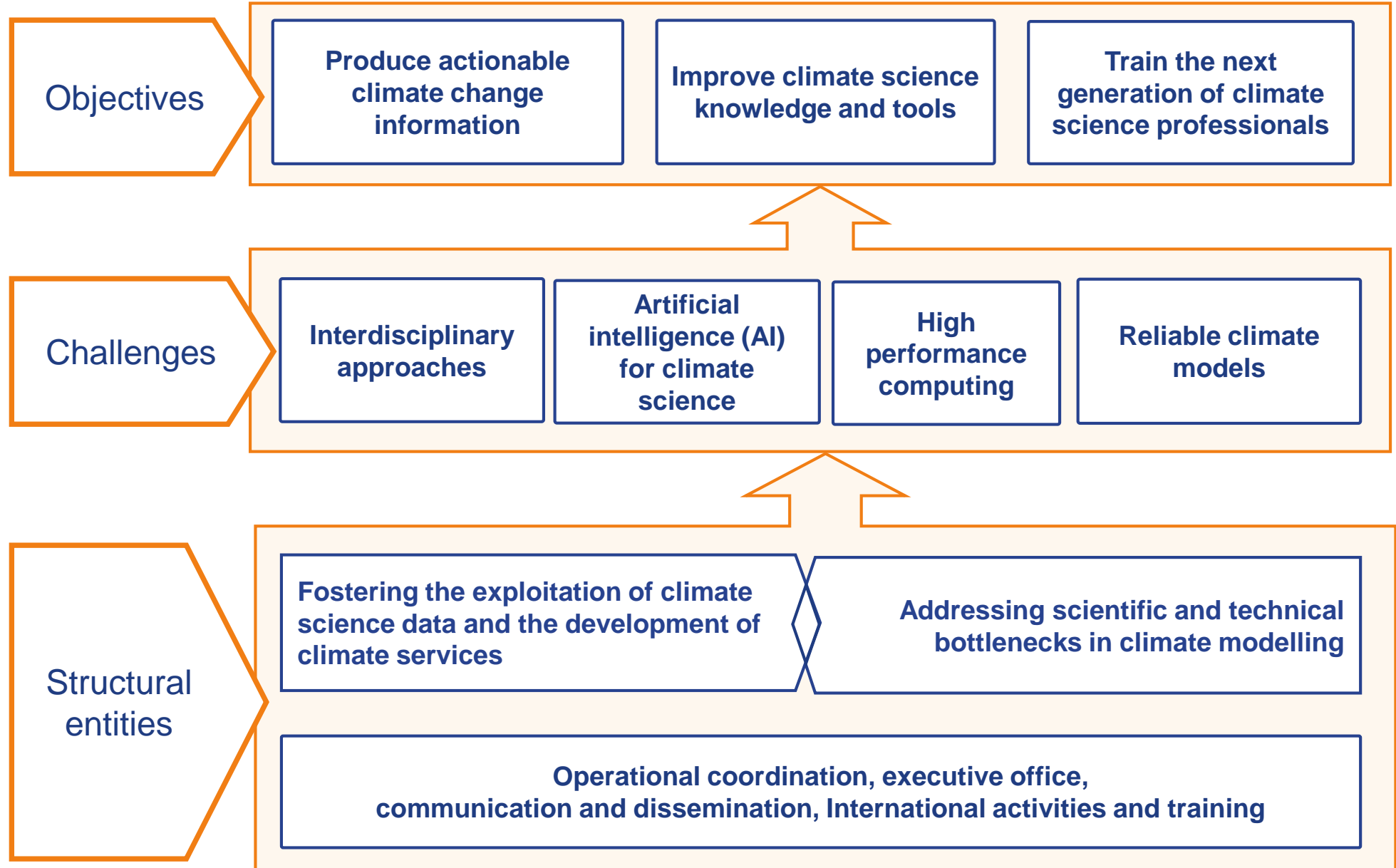
to deliver the best possible climate information for decision making;

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.



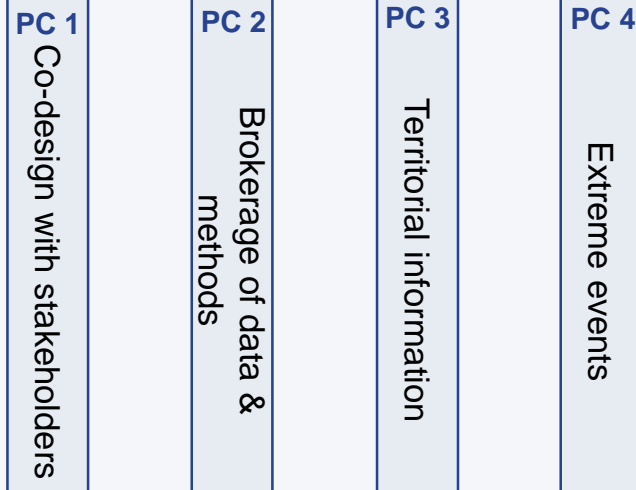
# TRACCS : Objectives, challenges, structural entities





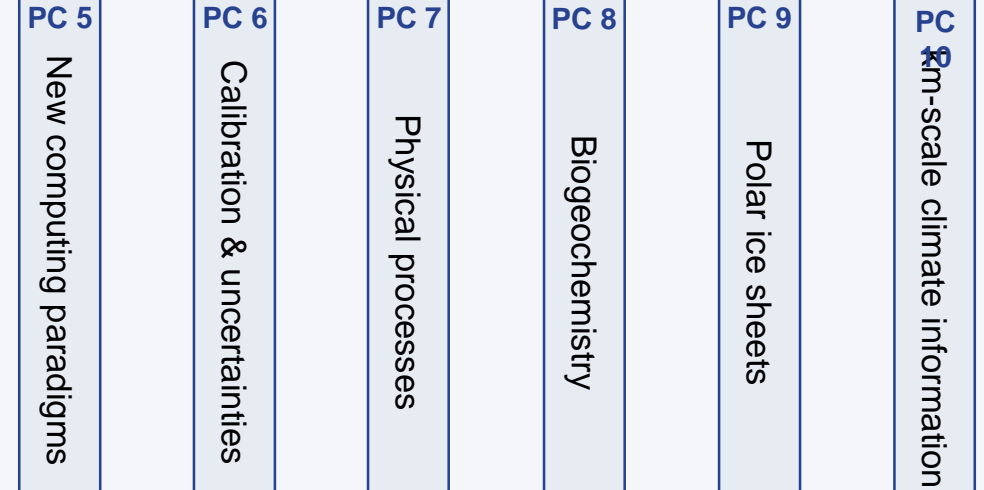
**Fostering the exploitation of climate science data and the development of climate services**

S. Anquetin, L. Terray, R. Vautard  
« *Impacts, adaptation and vulnerabilities* »



**Addressing scientific and technical bottlenecks in climate modelling**

O. Boucher, J. Deshayes, G. Durand, D. Salas y Melia  
« *The physical science basis* »



**AO1** – Interdisciplinary approaches for climate change impacts, adaptation and services

**AO2** – Evaluation of climate interventions

**AO3** – AI for climate sciences

**AO4** – Model evaluation





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

## PC1. Co-design with stakeholders



## PC2. Brokerage of data & methods



## PC3. Territorial information



## PC4. Extreme events



Future climate  
risks in France  
and elsewhere

- **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



# Addressing scientific and technical bottlenecks in climate modelling

**PC5.**  
New computing paradigms

**PC6.**  
Calibration & uncertainties

**PC7.**  
Physical processes

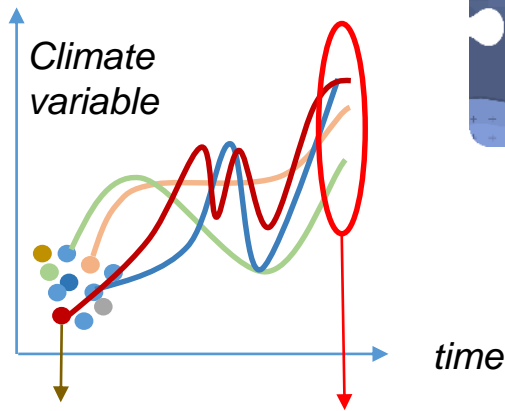
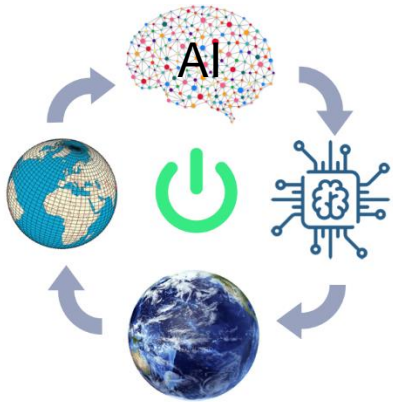
**PC8.**  
Biogeo-chemistry

**PC9.**  
Polar ice sheets

**PC10.**  
km-scale climate information

Transformative advances in model design

- increased use of AI,
- addressing new HPC frameworks,
- quantifying confidence levels



Calibration, parameter section

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



# TRACCS Organization ; 8 years ; 51 M€

Operational coordination, executive office, communication and dissemination  
International activities, training – 6.2 M€

Fostering the exploitation of  
climate science data and the  
development of climate services  
*« Impacts, adaptation and  
vulnerabilities »*

PC 1 to 4 – 10,1 M€

Addressing scientific and technical bottlenecks  
in climate modelling  
*« The physical science basis »*

PC 5 to 10 – 24,7 M€

Calls for  
projects

10 M€

- AO1** – Interdisciplinary approaches for climate change impacts, adaptation and services
- AO2** – Evaluation of climate interventions
- AO3** – AI for climate sciences
- AO4** – Model evaluation



4C



→ Des projets  
au service du modèle de l'IPSL

