

The French reference trajectory for climate change adaptation (TRACC)

Agathe Drouin agathe.drouin@meteo.fr

Climate Services – Météo France

Lola Corre lola.corre@meteo.fr

DESR/CNRM – Météo France

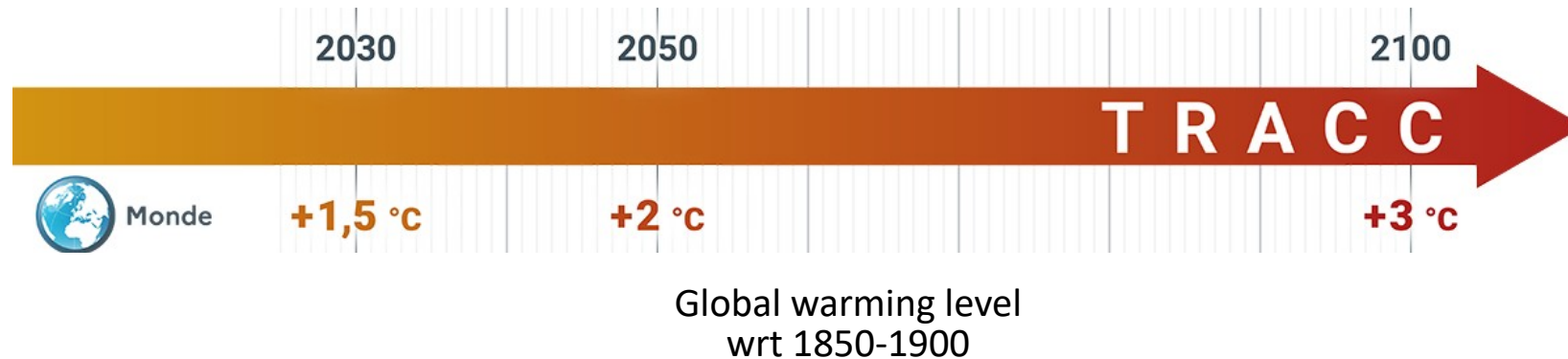
The French reference trajectory for climate change adaptation (TRACC)

To ensure consistency in adaptation policies, the government has adopted a reference trajectory for adaptation.

It is based on the current commitments of states to reduce their greenhouse gas emissions (AR6).

→ adopt a global warming level (GWL) approach

→ link the GWLs with time horizons



The TRACC defines 3 levels to which the country needs to prepare for

1. Context

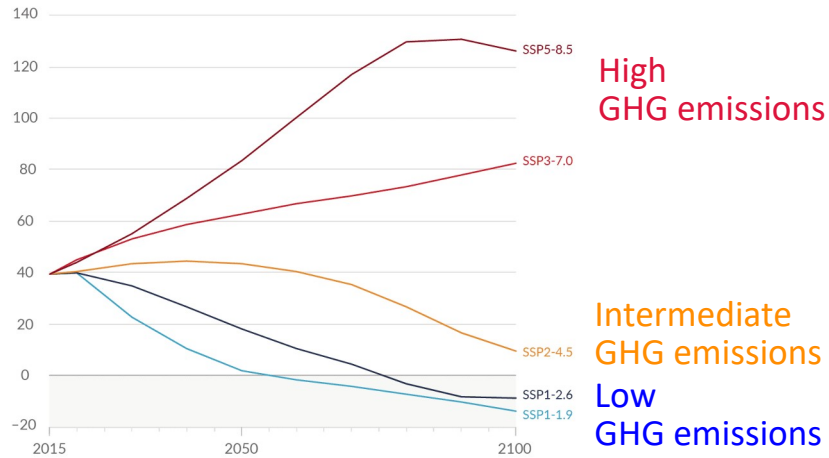
2. Reference Climate Projection for TRACC

Climate Projections :

Climate change scenarios across 21st century

Greenhouse Gas Concentration

Carbon Dioxide (Gt/Year)

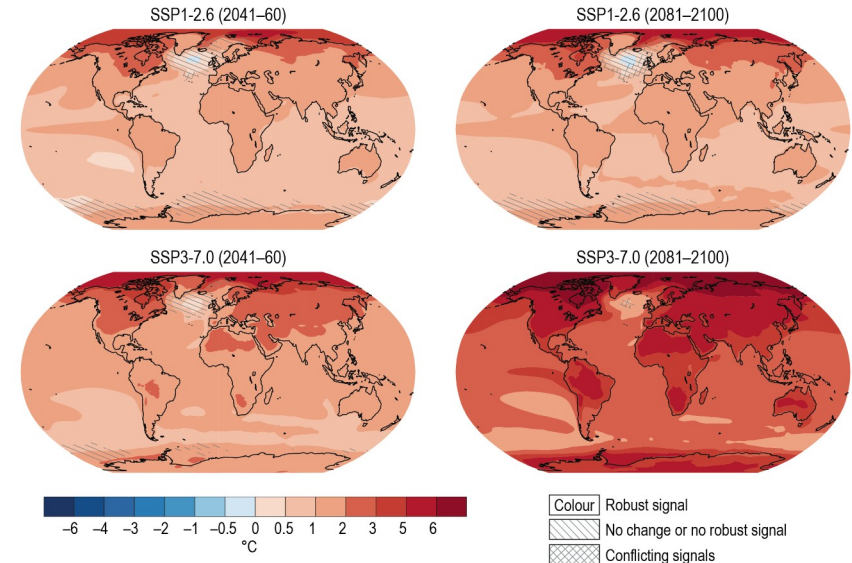


Source : AR6 IPCC

Temperature Change (°C)

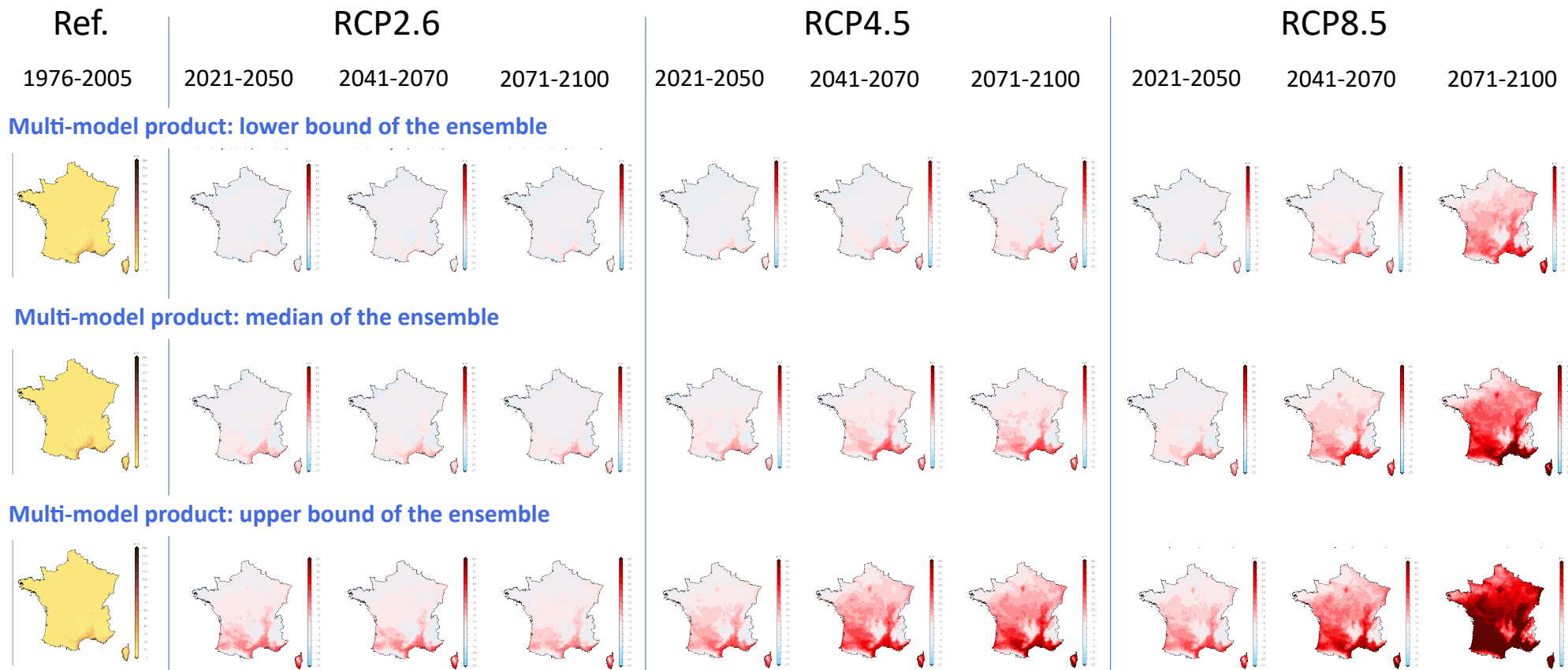
Mid term

Long term



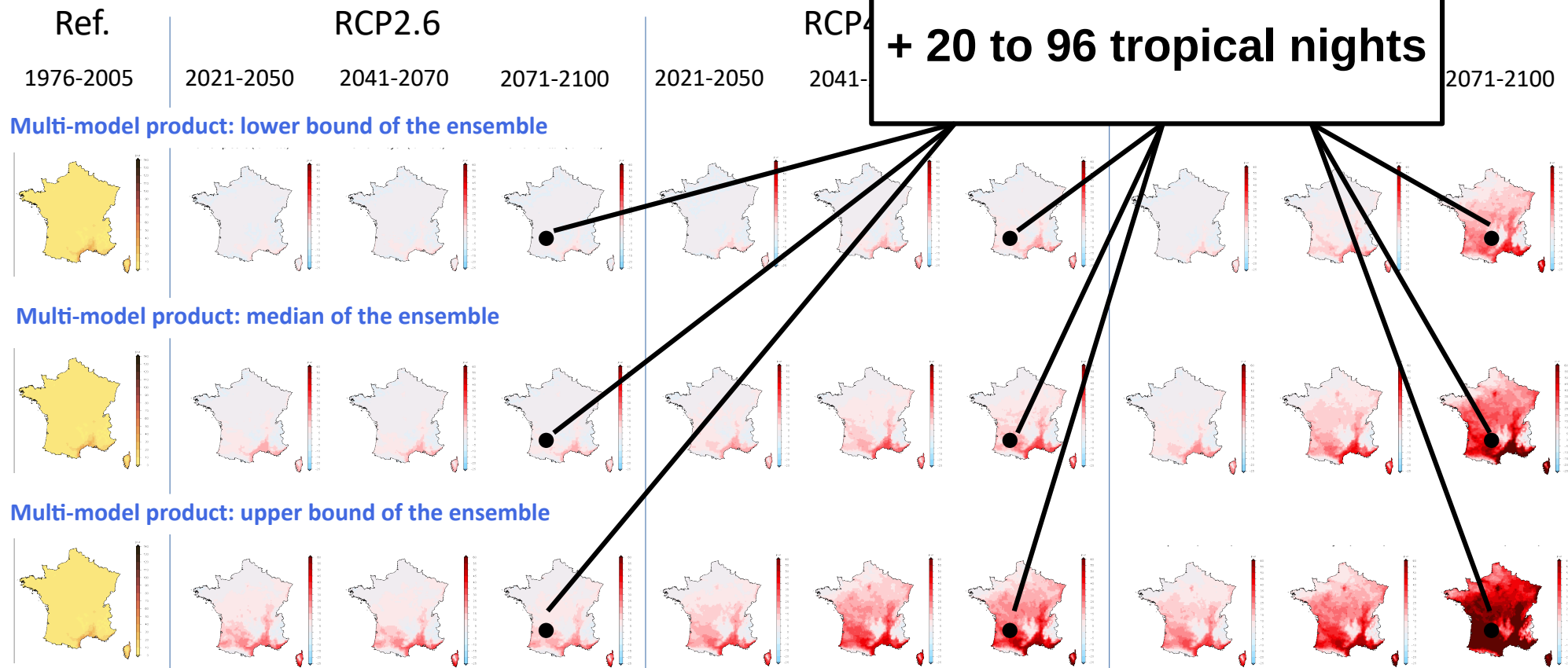
The higher values mean higher GHG emissions and therefore higher global surface temperatures and more pronounced effects of climate change
The lower values would require more stringent climate change mitigation efforts to achieve them.

Until 2023: 3 RCP scenarios, 3 time horizons

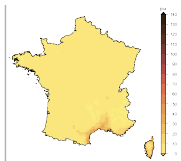


Reference climate projections in national climate services

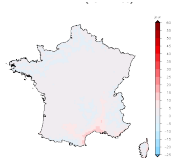
Until 2023: 3 RCP scenarios, 3 time horizons



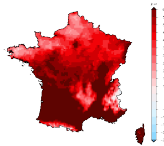
End of the century / City of Toulouse : + 20 to 96 tropical nights



Reference : 1976-2005



RCP2.6 : 2071-2100
multi-model lower-bound



RCP8.5 : 2071-2100
multi-model upper-bound

Wide range of possible futures

(e.g. range greater than x4 for Tropical nights in Toulouse)

Provide a transient path (useful for impact model)

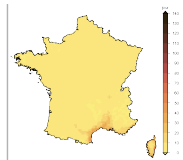
Complicated framework for decision-making processes

- What do I choose ?
 - which scenario
 - which horizon
- how to synthesize information ?

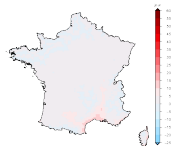
Different choices are made ...

- not consistent between activity sectors
- not consistent between locations / cities

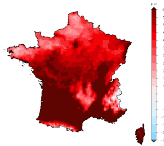
End of the century / City of Toulouse : + 20 to 96 tropical nights



Reference : 1976-2005



RCP2.6 : 2071-2100
multi-model lower-bound



RCP8.5 : 2071-2100
multi-model upper-bound

Wide range of possible futures

(e.g. range greater than x4 for Tropical nights in Toulouse)

Provide a transient path (useful for impact model)

Complicated framework for decision-making processes

- What do I choose ?
 - which scenario
 - which horizon
- how to synthesize information ?

Different choices are made ...

- not consistent between activity sectors
- not consistent between locations, cities

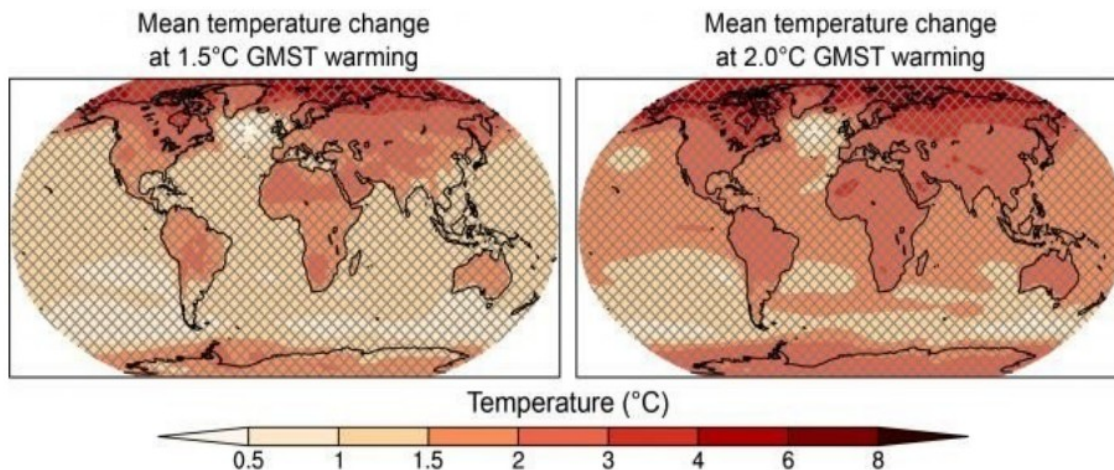
Barrier to climate change adaptation

COP21, Paris, 2015

Holding the increase in the global average temperature to well below 2 °C above pre-industrial levels
Pursue efforts to limit the temperature increase to 1.5 °C above pre-industrial levels

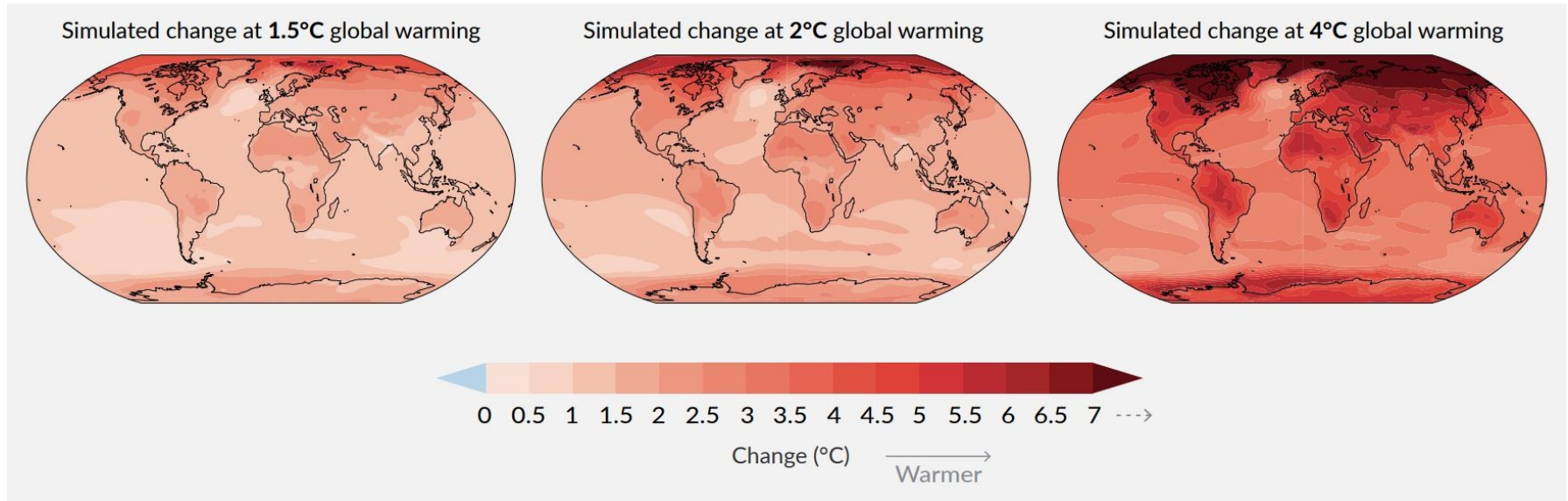
IPCC Special Report on Global Warming of 1.5°C, 2018

→ impacts of global warming of 1.5°C above pre-industrial levels



Climate projections in IPCC – Assessment Report 6

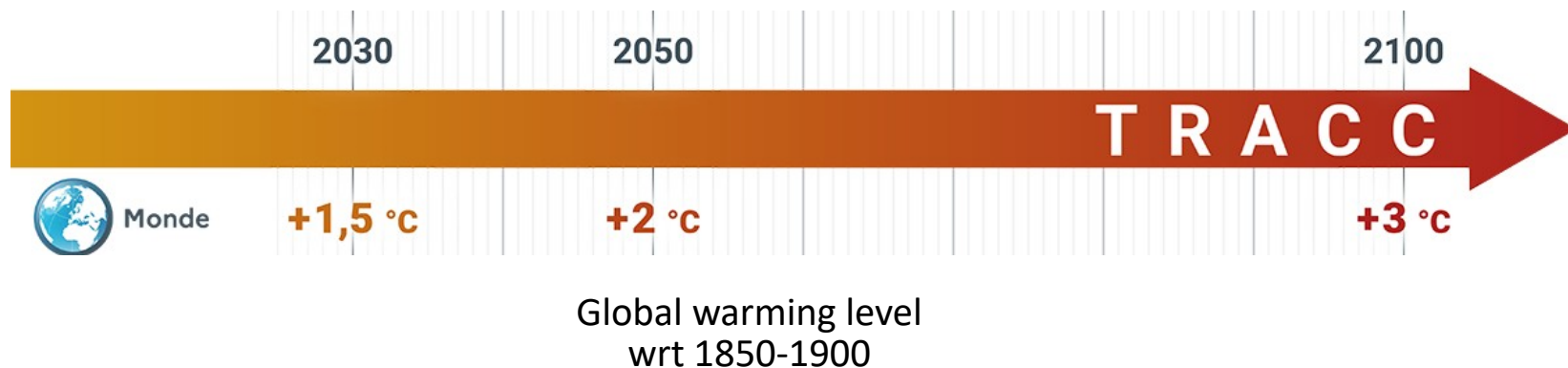
IPCC – AR6 (2021) describes the simulated changes at several global warming levels



1. Context

2. Reference Climate Projection for TRACC

The French reference trajectory for climate change adaptation (TRACC)



TRACC forms the basis for the third National Climate Change Adaptation Plan.

It is included in French regulation documents.

By 2030, all public policies (technical standards, sectoral policies and public aid, etc.) should be brought into line with this trajectory.

It is intended to be revised in light of new scientific findings.

Météo France has been mandated to clarify what these GWLs mean for the French territories.

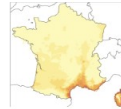
Hypothesis behind a warming level approach

Hypothesis

Amplitude of future changes depends :

- on the level of global warming
- not the trajectory followed to reach that level
- not on when that level is reached

Number of tropical nights

GWL + 1.5°C	Scénario émissions faibles	Scénario émissions modérées	Scénario émissions fortes	Tous scénarios
Borne sup des modèles				
Médiane				
Borne inf des modèles				

Limitations

Not applicables to all climate variables

(e.g. slow responding variables or time dependent changes such as sea level rise / hydrological cycle)

French trajectory warming levels

Which climate do I need to prepare for ? And When ?



Adaptation Trajectory

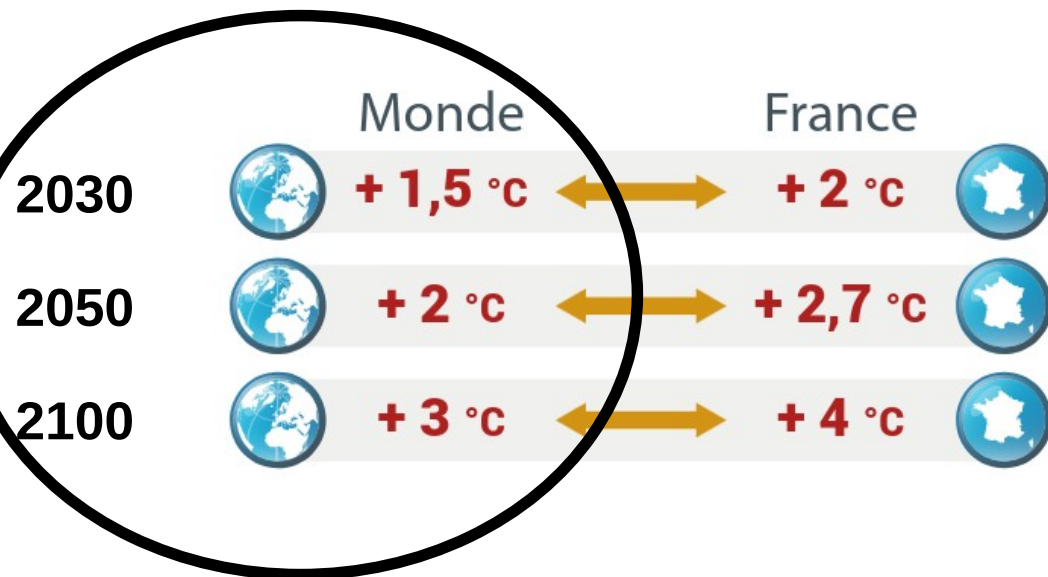
≠

Attenuation Objective
(Paris Agreement)



French trajectory warming levels

Which climate do I need to prepare for ? And When ?



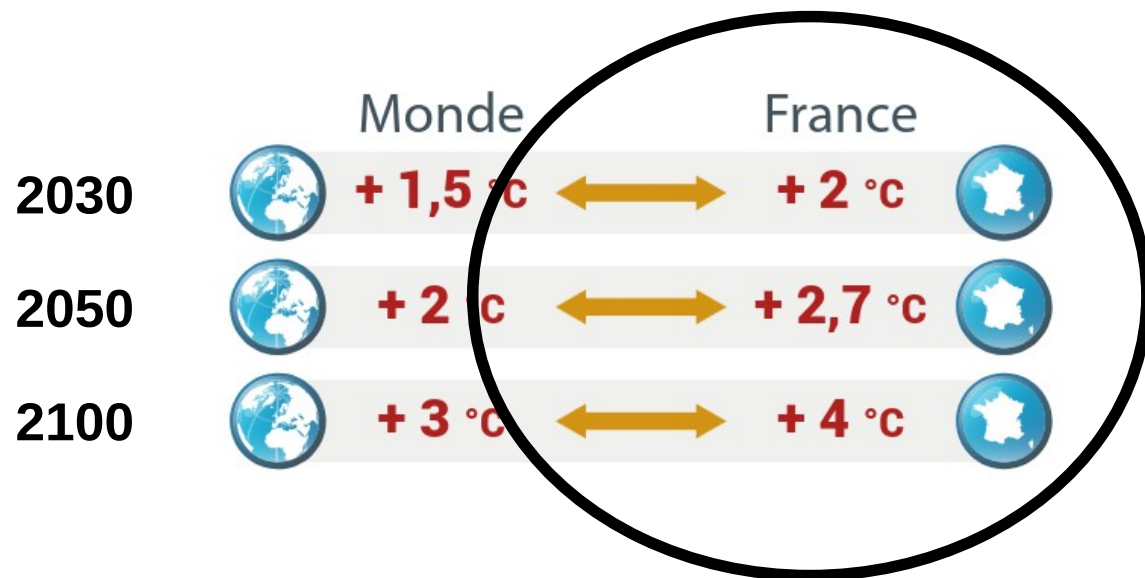
Political choice

→ inter ministerial working group
+ public consultation



French trajectory warming levels

Which climate do I need to prepare for ? And When ?

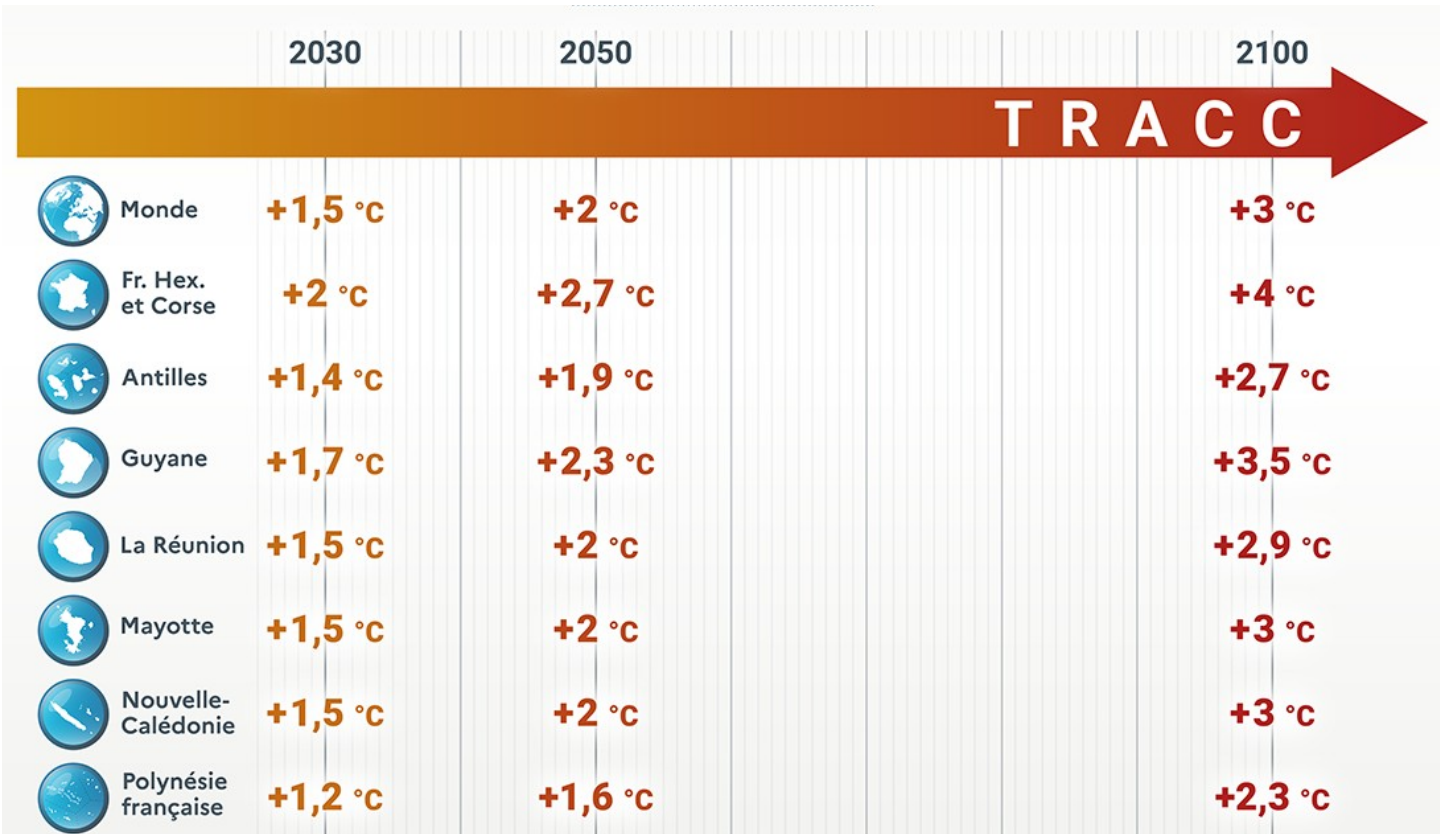


From latest warming estimates
based on climate projections and **Observations**
(Ribes et al. 2021, 2022)

More details in : *Climate Services* paper (Corre et al. 2025)



TRACC Regional Warming Levels for overseas France

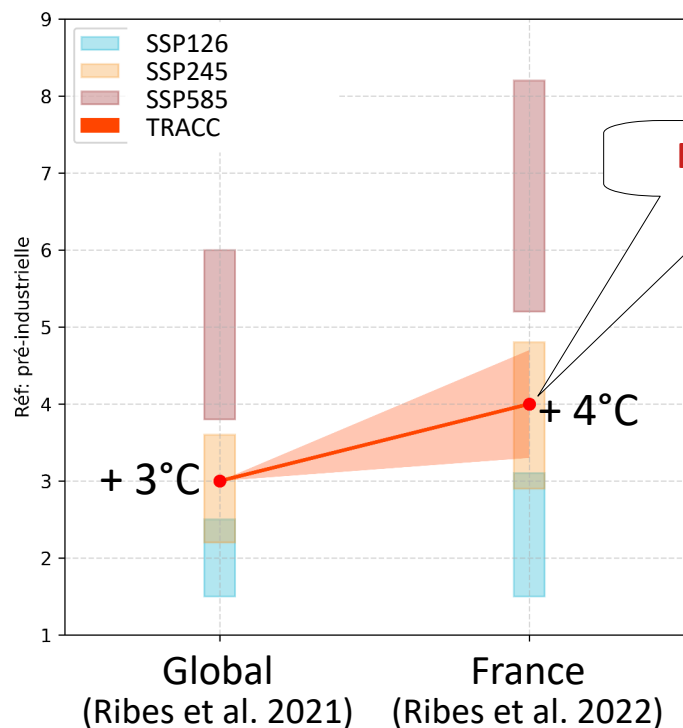


Bias corrected projections are used to described climate changes at these RWL.

Different ensembles of climate models are used for each territory

!!!
Extent of the Climate Change consequences does not depend solely on the level of warming

Warming in 2100



TRACC is close to the median of CMIP6 projections under SSP245.
Consistent with current policies (+3,1°C in 2100 (UNEP Gap Report 2024)).

Significant reduction in the range of possible futures.

Does not cover :

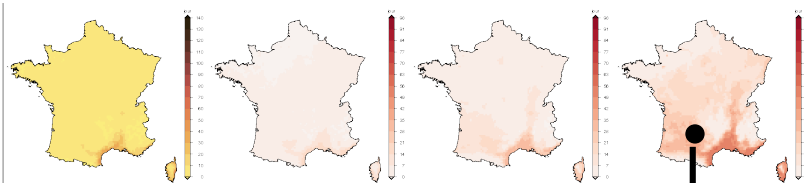
- possible changes in mitigation policies nor worst-case scenarios
- all the uncertainty for a given GWL

(see Corre et al. 2025 for an alternative implementation of the RWL method ensuring full coverage of uncertainties at a fixed GWL)

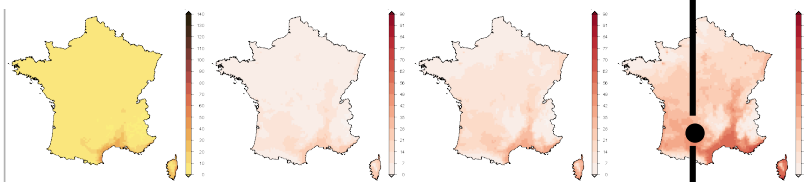
The Pros and Cons of a unique trajectory for adaptation

Reference 1976-2005	TRACC 2030 France +2°C	TRACC 2050 France +2.7°C	TRACC 2100 France +4°C
------------------------	---------------------------	-----------------------------	---------------------------

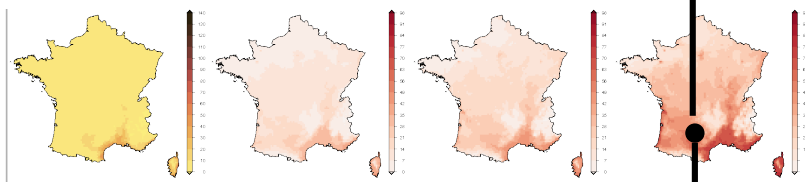
Multi-model product: lower bound of the ensemble



Multi-model product: median of the ensemble



Multi-model product: upper bound of the ensemble



Toulouse: + 40 to 64

Significant reduction in the range of possible futures

(e.g. Tropical nights in Toulouse ~ - 70%)

Simplified framework valuable for decision-making processes

- to ease the integration of climate projections into decision-making processes
- to provide a common reference that facilitates uniformity and consistency
- direct link to international climate negotiations

Does not...

- cover possible changes in mitigation policies
- cover worst-case scenarios
- cover all the uncertainty for a given GWL
- provide transient path
- enable comparison with neighboring countries

A pan-EU reference scenario?

Requests from users already emerging (e.g., energy sector,)

What form ?

Which data ?

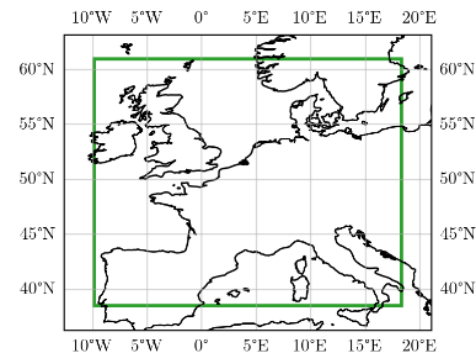
Discussion on-going to define a reference trajectory for EU :

DG CLIMA (Directorate General for Climate Action EU)

Copernicus program

Trajectory defined in GWL with corresponding time horizon

Consistant with the french TRACC



- Web portals

DRIAS - futures of climate

<http://www.drias-climat.fr/>

View and download reference climate projections (mainland France and Overseas).

Climadiag Commune

<https://www.meteofrance.com/climadiag-commune>

Simple access to the main climate changes expected for a municipality according to TRACC.

DRIAS futures of water

<https://www.drias-eau.fr/>

Climadiag Agriculture

<https://climadiag-agriculture.fr/>

- Article describing the methodology (RWL)

Corre et al. 2025 <https://doi.org/10.1016/j.cliser.2025.100553>

- National reports



<https://hal.science/hal-04797481v3>



[hal-04991790v1](https://hal.science/hal-04991790v1)

**Thanks for your
attention !**