

# Robustness of Climate Change Information for Decisions

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## Reference trajectory for adaptation in France:

Using regional warming levels to reduce inconsistencies in climate data



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# The framework

## Update of the French National Plan for Climate Change Adaptation

- set a reference warming trajectory for adaptation (TRACC) common to all sectors and territories.

## Choice of French policymakers: define 3 adaptation targets

- 3 global warming levels (GWL) associated with 3 time horizons



Request to the national climate service : clarify what these GWLs mean for France through a localized impact assessment.



**MINISTÈRE  
DE LA TRANSITION  
ÉCOLOGIQUE**

*Liberté  
Égalité  
Fraternité*



## IPCC AR6 GWL approach *(Gutiérrez et al. 2021)*

### 1. Timing of GWL

→ determine when a given GWL is likely reached

data = AR6 assessed range of projected global temperature  
(observational constraints on CMIP6, emulators, ...)

### 2. Regional response at GWL *(Vautard et al. 2014)*

data = regional projections (GCM\*/RCM\*\* pairs)

2.1. determine the period when a given GWL is reached

data = individual global projection (GCM)

2.2. map the climate changes over this period

data = individual regional projection (GCM/RCM)

\* GCM = Global Climate Model

\*\* RCM = Regional Climate Model

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Application to the metropolitan France

data = biais-corrected EURO-CORDEX projections

Results:

France / global warming ratio  $\approx 1$

→ unrealistically small

*Ribes et al. 2022* (observational constraints on CMIP6)

France / global warming ratio  $\approx 1.3$

Known issue:

Inconsistencies between RCM and GCM projections over Europe

→ RCMs project a smaller temperature increase than GCMs

*(Schwingshackl et al. 2019, Boé et al. 2020, Taranu et al. 2022, ...)*

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## RWL approach *(Corre and Ribes, in prep.)*

### 1.1 Timing of GWL



→ determine when a given GWL is likely reached

data = obs. constrained CMIP6 global temperature  
*(Ribes et al. 2021)*

### 1.2 Corresponding RWL



data = obs. constrained CMIP6 France temperature  
*(Ribes et al. 2022)*

### 2. Regional response at RWL



data = regional projections (GCM/RCM)

2.1. determine the period when a given RWL is reached

data = individual regional projection (GCM/RCM)

2.2. map the climate changes over this period

data = individual regional projection (GCM/RCM)

Results:

- upward revision of the warming in France
- impacts associated with a given level of warming are arriving earlier than predicted by RCM projections

→ simple and relevant methodology for reassessing projected future climate without having to rerun regional simulations.

**RWL approach** *(Corre and Ribes, in prep.)*

## 1.1 Timing of GWL



→ determine when a given GWL is likely reached

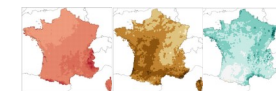
data = **obs. constrained CMIP6 global temperature**  
*(Ribes et al. 2021)*

## 1.2 Corresponding RWL



data = **obs. constrained CMIP6 France temperature**  
*(Ribes et al. 2022)*

## 2. Regional response at RWL



data = **regional projections (GCM/RCM)**

2.1. determine the period when a given **RWL** is reached

data = **individual regional projection (GCM/RCM)**

2.2. map the climate changes over this period

data = **individual regional projection (GCM/RCM)**

## Strong reduction in the range of future climates to prepare for

Defining a unique trajectory	→	ignoring uncertainty in emissions scenarios
Targeting specific levels of warming	→	reducing uncertainty related to the models sensitivity
Focusing on a given RWL	→	ignoring the uncertainty in the RWL /GWL ratio

Political choices  
and  
expert judgment

## How stakeholders perceive it?

- general public: giving up the fight against global warming
  - difficulty in separating adaptation and mitigation targets
- adaptation actors : **a major progress for many sectors**
  - facilitating adaptation action planning
  - ensuring standardization across sectors and territories
  - linking with IPCC and international negotiations

**But it does not cover the needs of all sectors** (safety-related activities: need for worst-case scenarios)