Climate change impact on water resources: which future scenarios over France?

Guillaume Thirel

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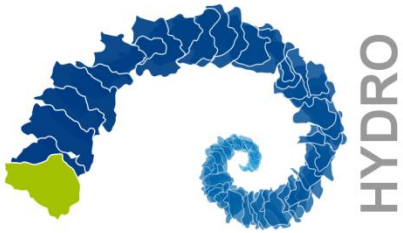
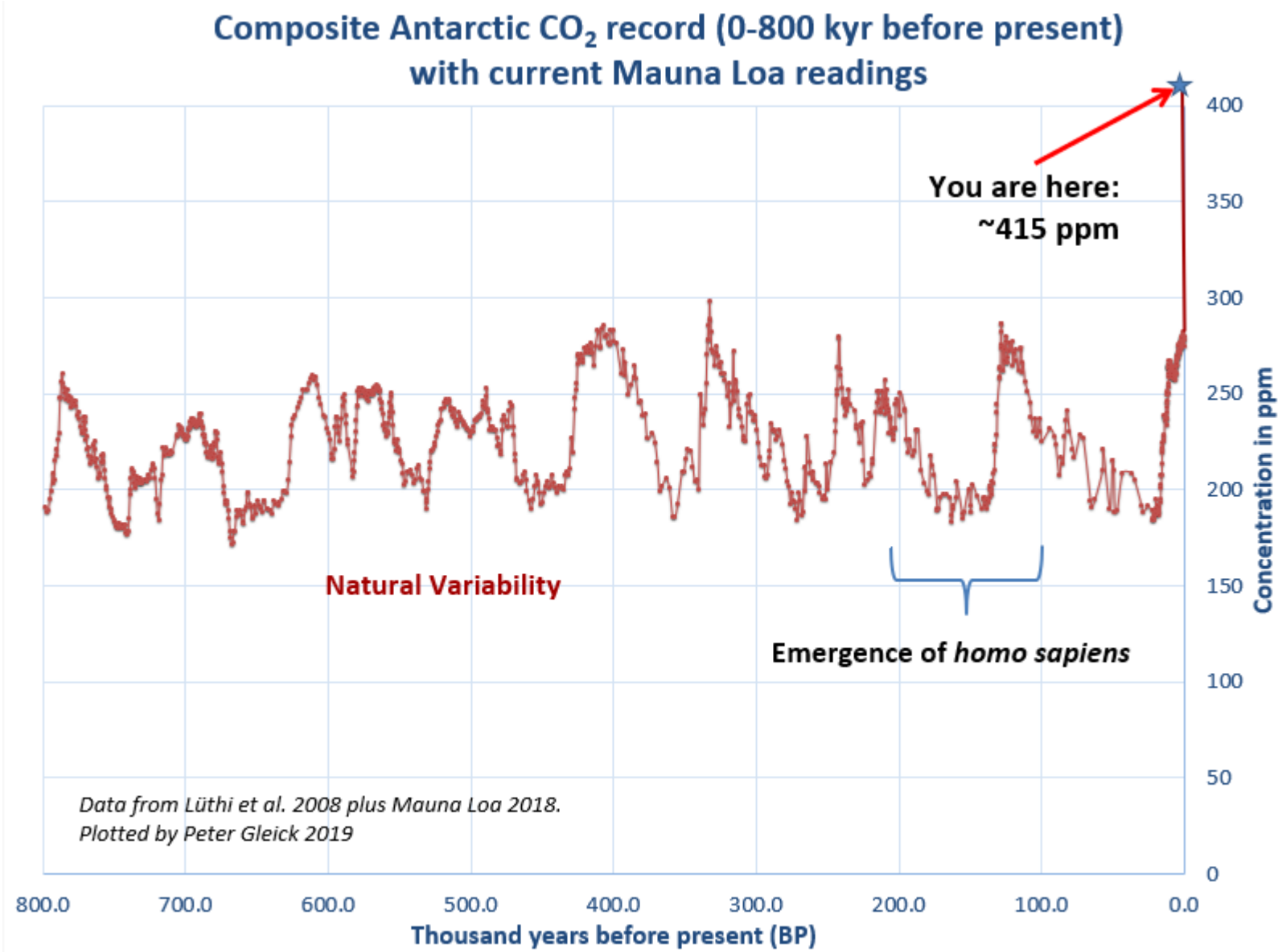
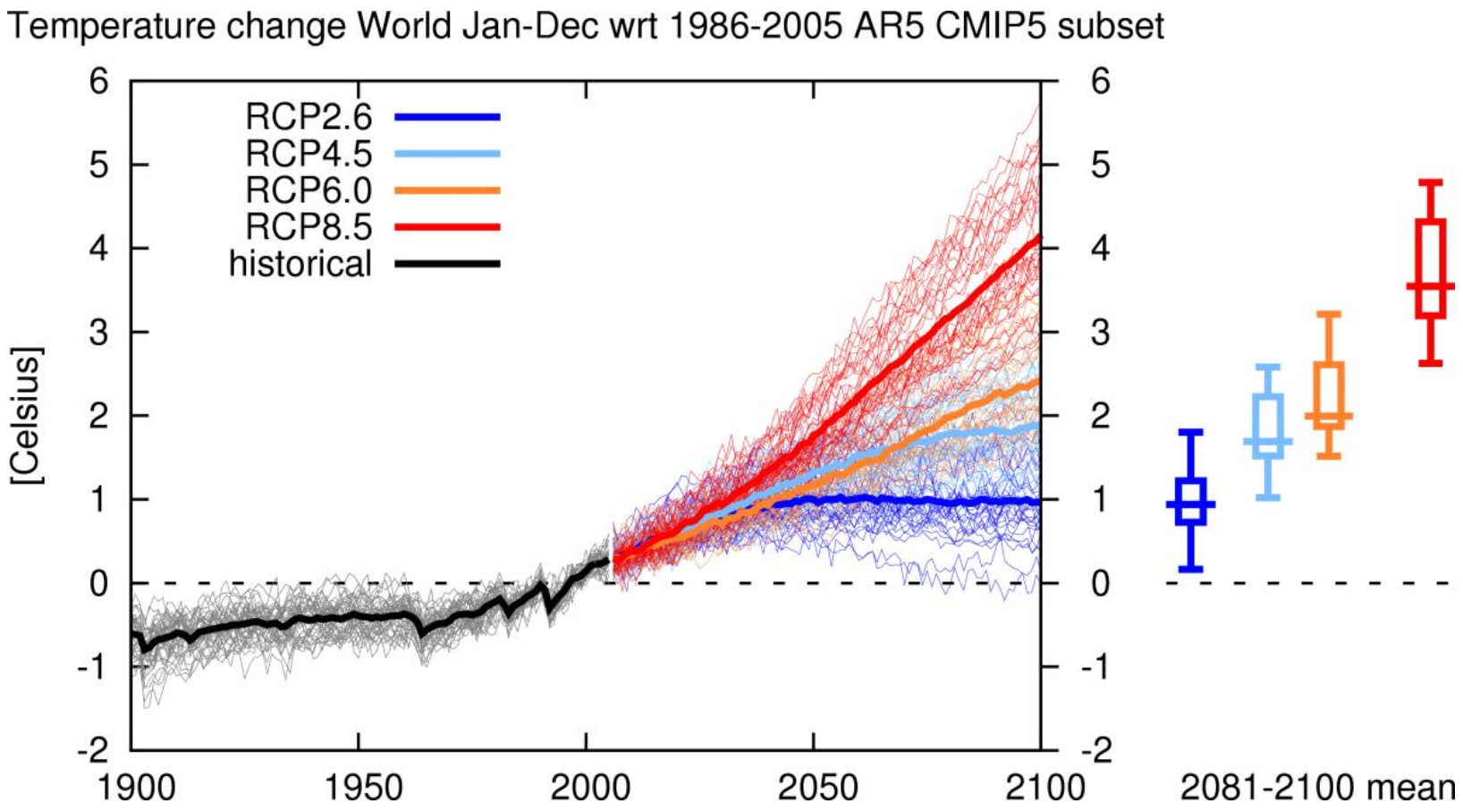
Irstea, Antony, guillaume.thirel@irstea.fr
https://webgr.irstea.fr
@G_Thirel



Rising greenhouse gases concentration…



… cause a global warming

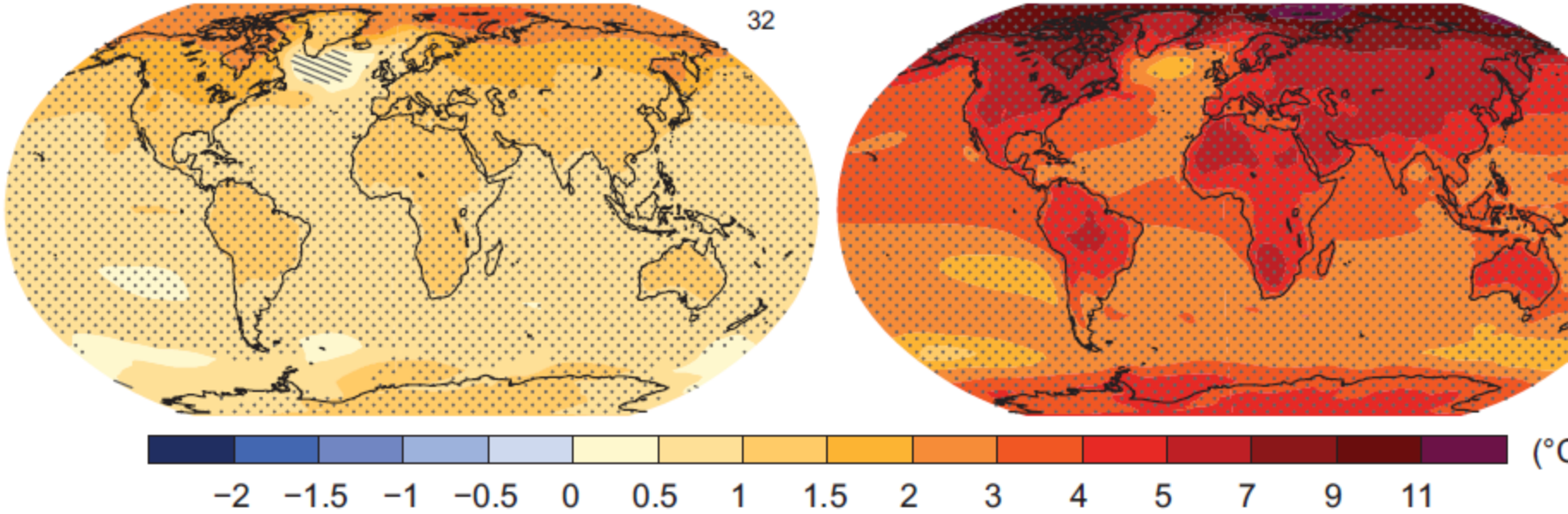


IPCC

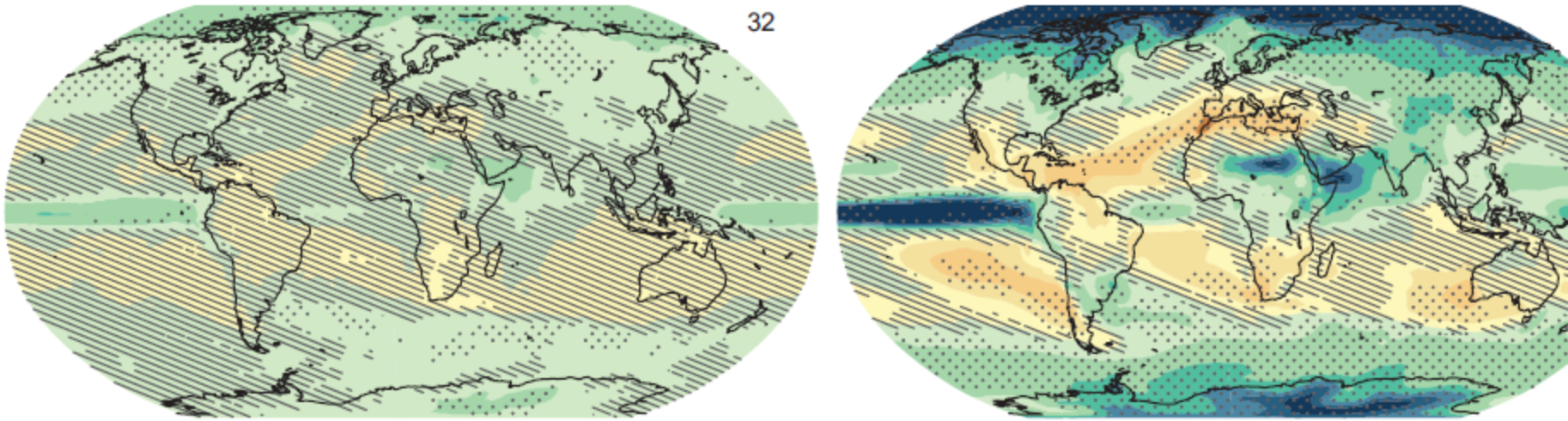
… whose future evolution will depend on present human action

RCP 2.6 RCP 8.5

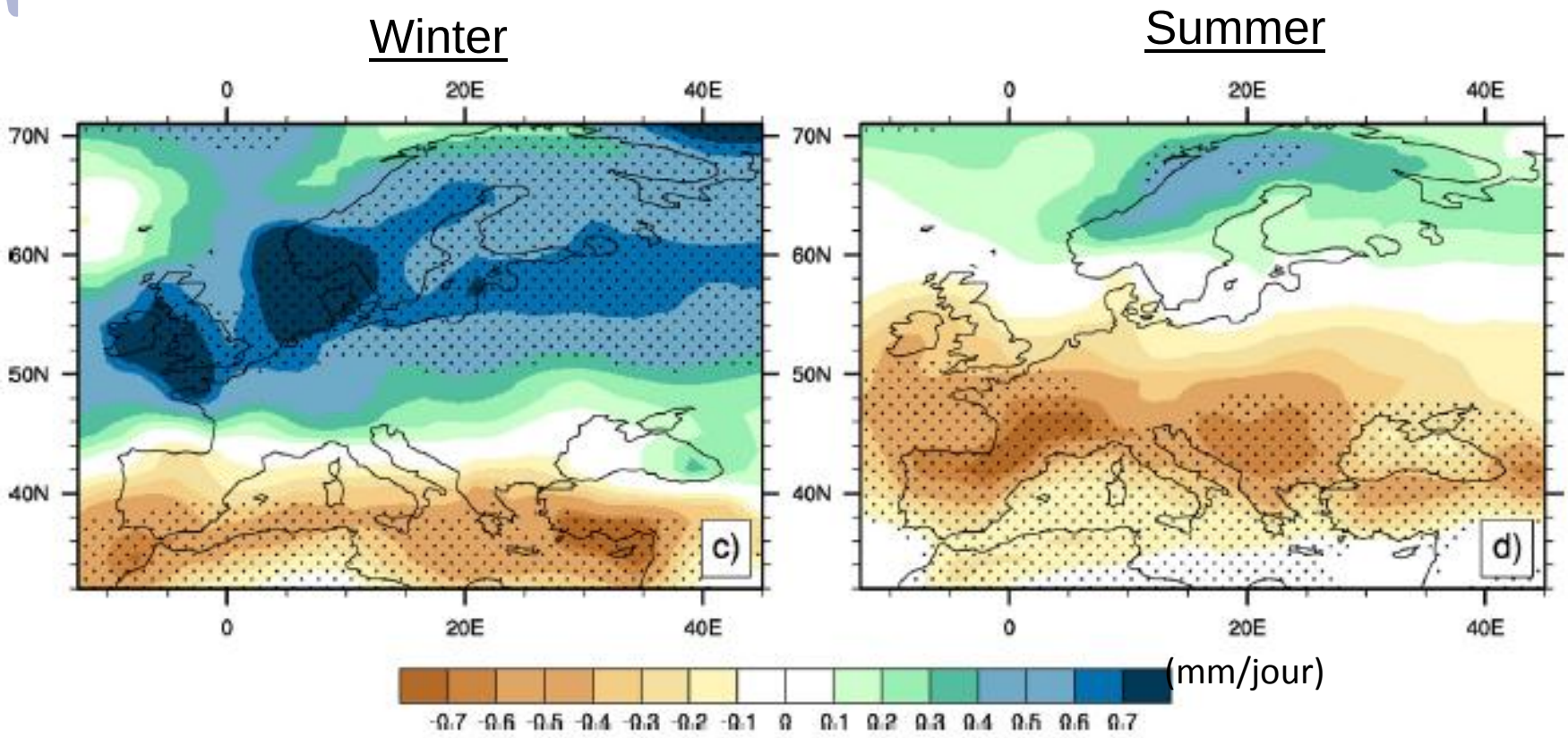
(a) Change in average surface temperature (1986–2005 to 2081–2100)



(b) Change in average precipitation (1986–2005 to 2081–2100)



Expected precipitation evolution in 2100

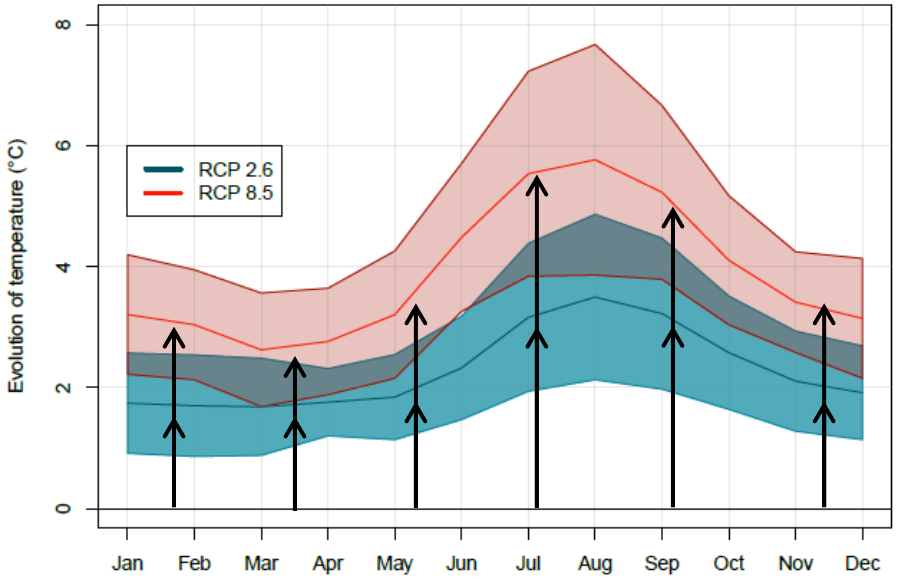


Scenario RCP8.5 (business as usual)

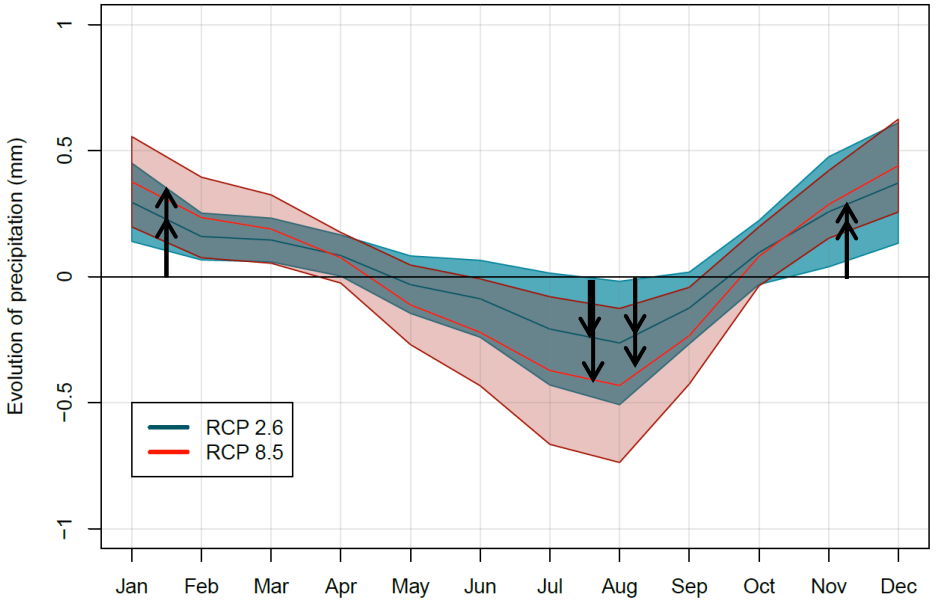
Terray & Boé, 2013, CRAS

Evolution of future climate over Paris

Temperature
RCP2.6: +2,3°C
RCP8.5: +3,9°C



Precipitation (2.5 mm/day currently)

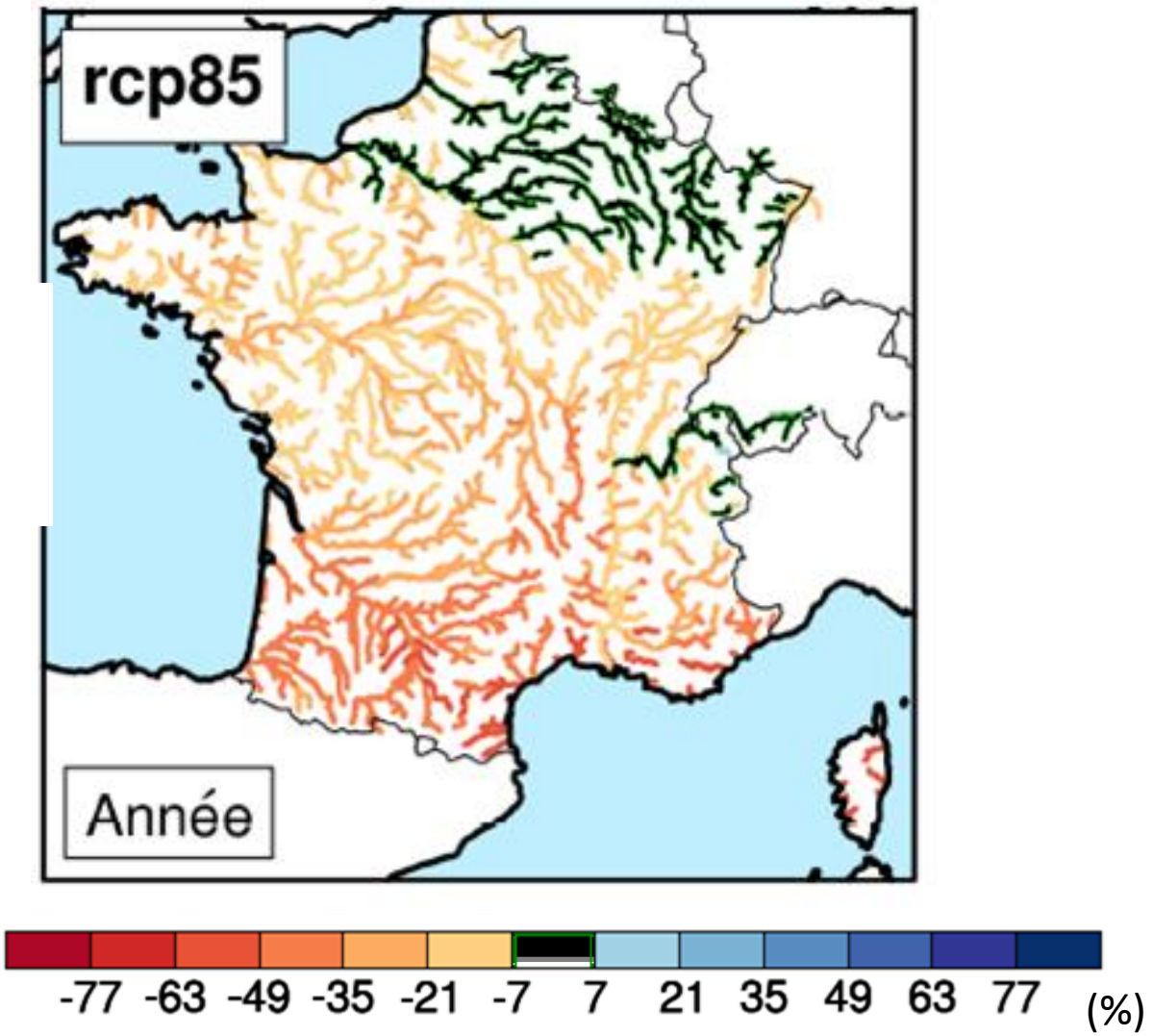


Strong seasonal climate evolution

Thirel, 2016

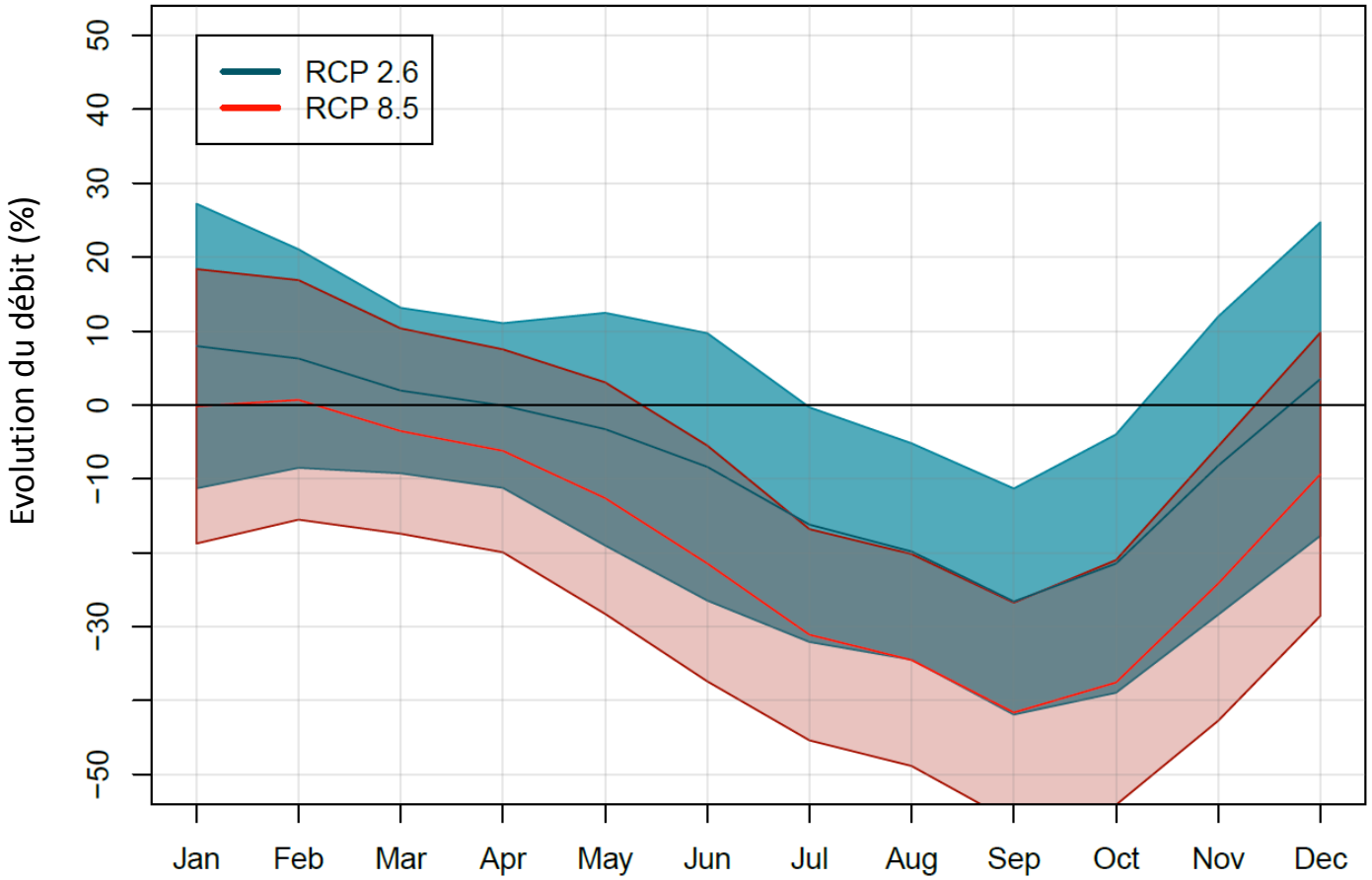
Evolution of future mean streamflow in 2100

Towards a decrease of country-wide water resources



Thèse G. Dayon, Cerfacs, 2015

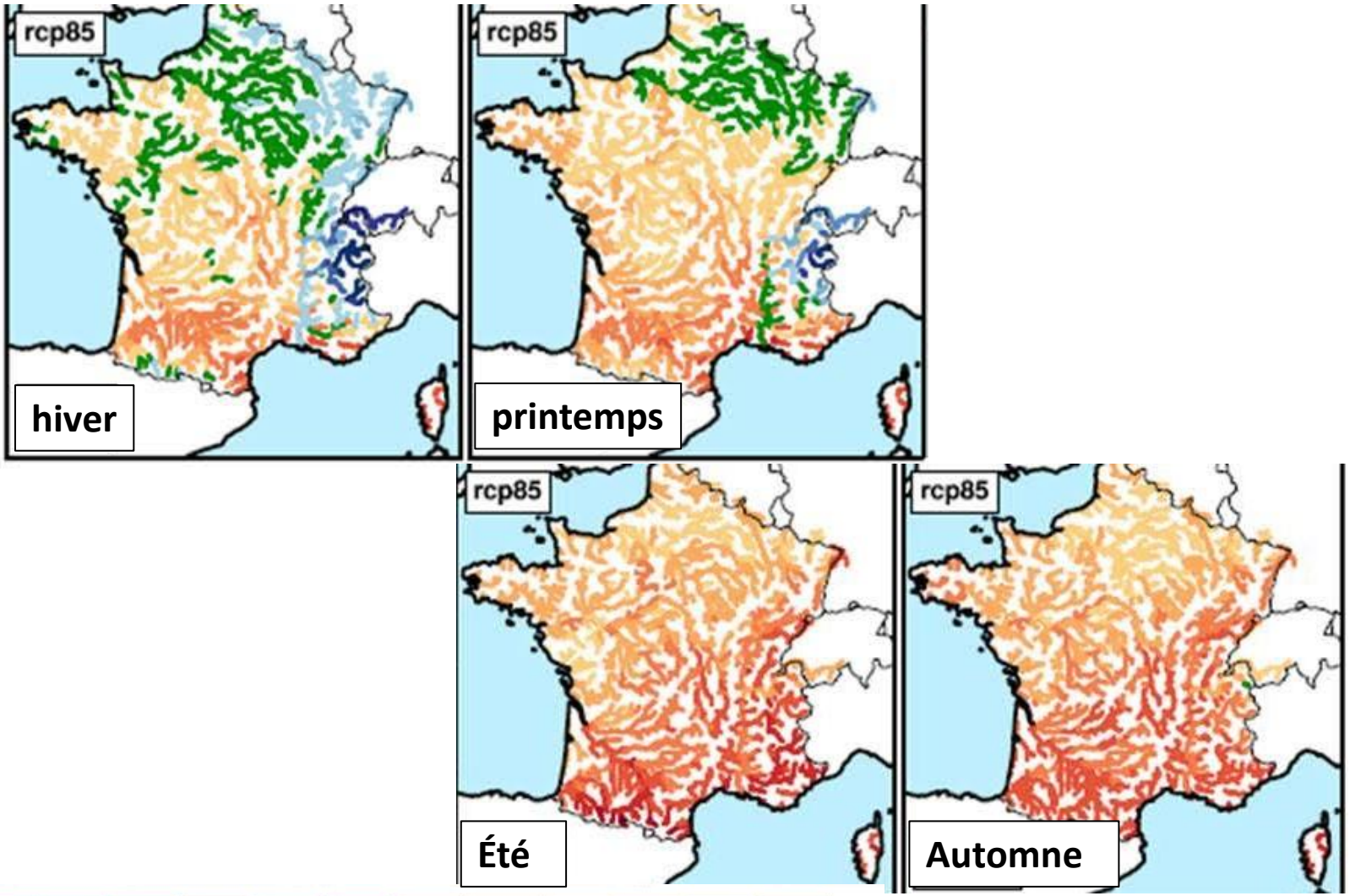
Evolution of future streamflow for the River Seine at Paris (2100, in %)



Strong seasonal impacts

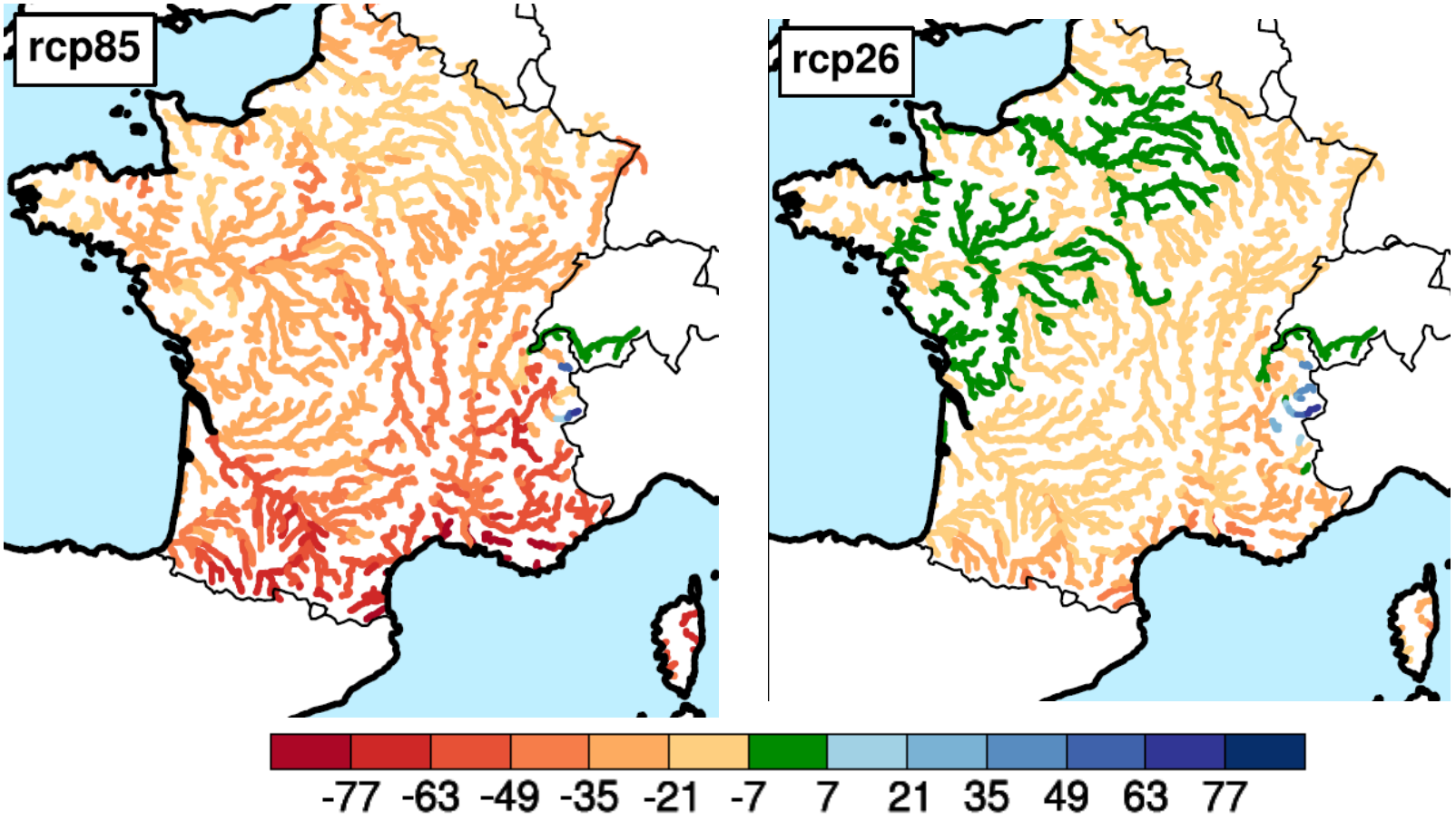
Thirel, 2016

Seasonal evolution



Thèse G. Dayon, Cerfacs, 2015

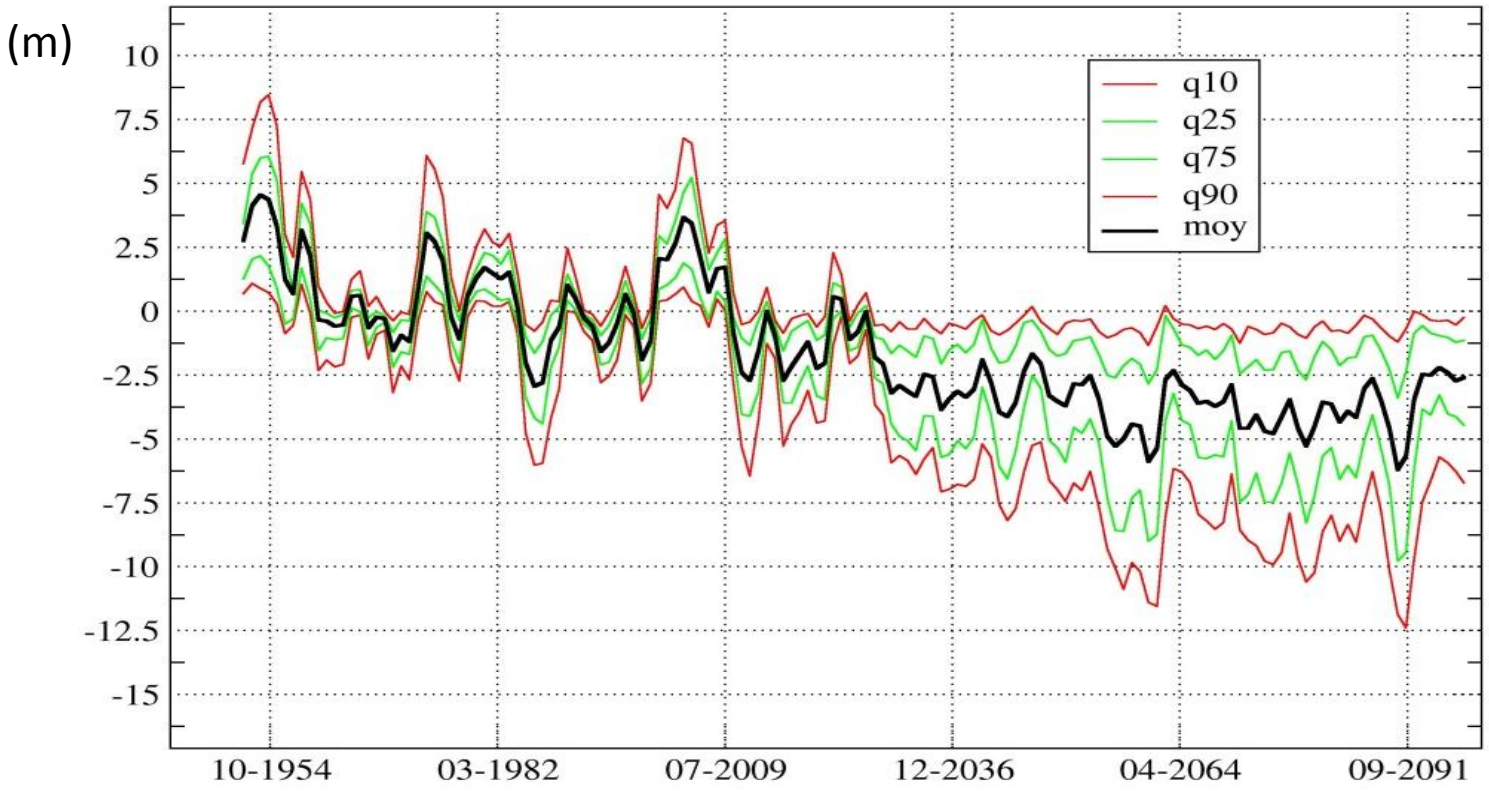
Evolution of low flows



The reduction of greenhouse gases emission would have a strong impact

Thèse G. Dayon, Cerfacs, 2015

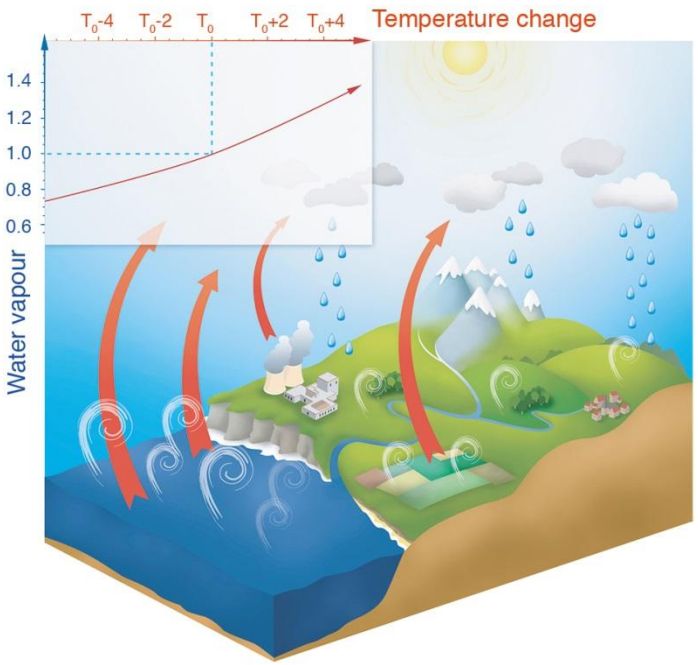
Evolution of aquifer layer levels



Rexhyss, Habets et al., 2013

Evolution of floods and inundations

Evolution of air temperature



- Uncertain evolution of average floods
- Likely increase of local inundations due to intense precipitation

Source GIEC AR5

Take-home messages

Climate change will impact the water cycle

- ❑ Strong diminution of water resources in France, mostly during summer
- ❑ Low flows will become even lower
- ❑ Impact on floods is uncertain
- ❑ **Mitigation** would allow a significant reduction of climate change impact on water resources

Strong potential impacts on the agriculture sector can be foreseen