Semi-Arid regions
Why? What do we know?
Can we move forward?

➔ GEWEX actions?

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Why me?

- Last year I committed to talk about warm semi-arid areas

GreenArid

What do we know about the potential impacts of Greening Scenarios in semi-arid regions ?

International Conference

15-17 April 2015 / Dakar, Sénégal

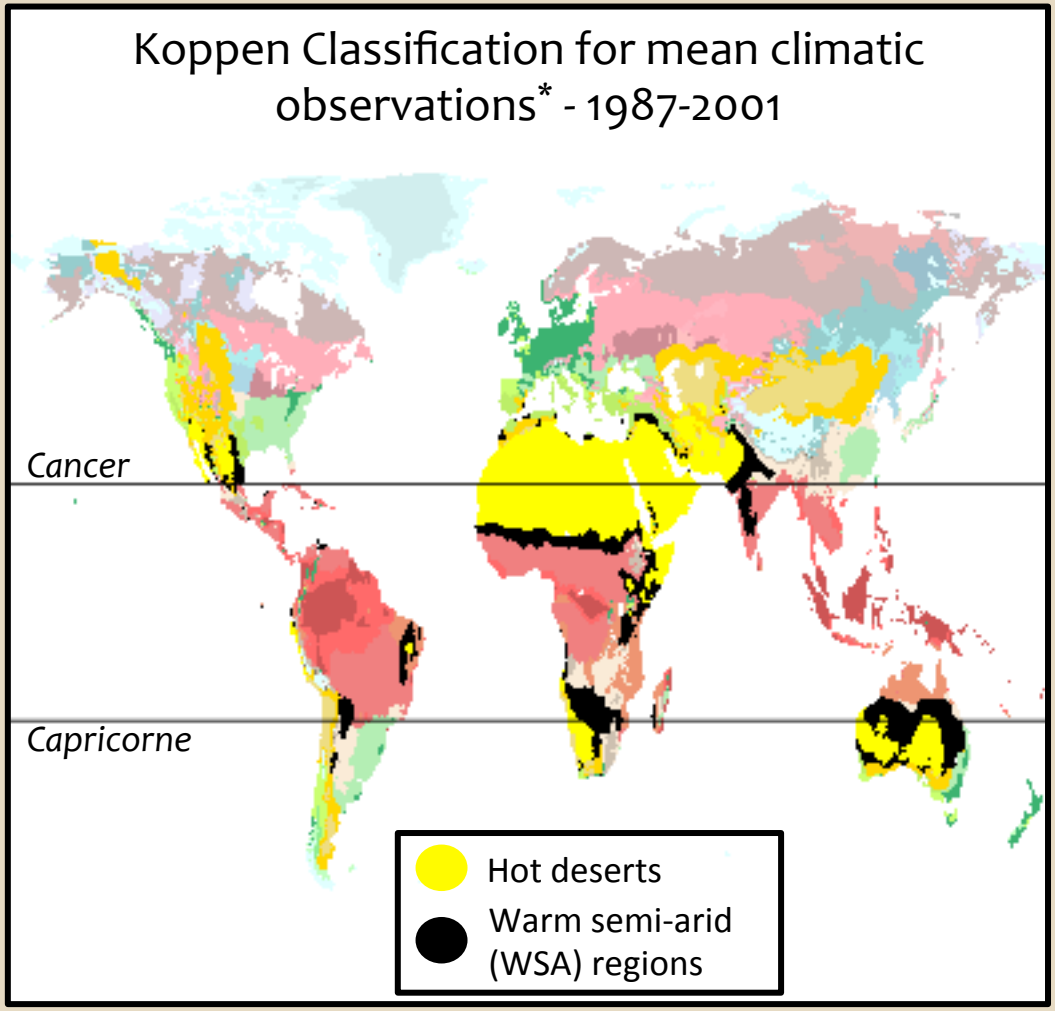
Organisors:

Nathalie de Noblet-Ducoudré
& Benjamin Sultan (France)
Jacques-André Ndione (Sénégal)
Paulo-Sérgio Lucio (Brésil)

Why?

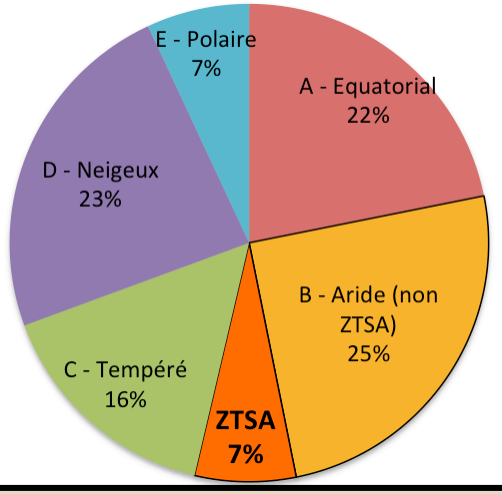
End of 20th century's distribution of WSA areas

Koppen Classification for mean climatic observations* - 1987-2001



* *Climatic Research Unit (CRU), University of East Anglia*

Total surface for each climate group
% of the Earth's land surface



<u>Arid Regions</u>
31% of global land surface
38% of global population

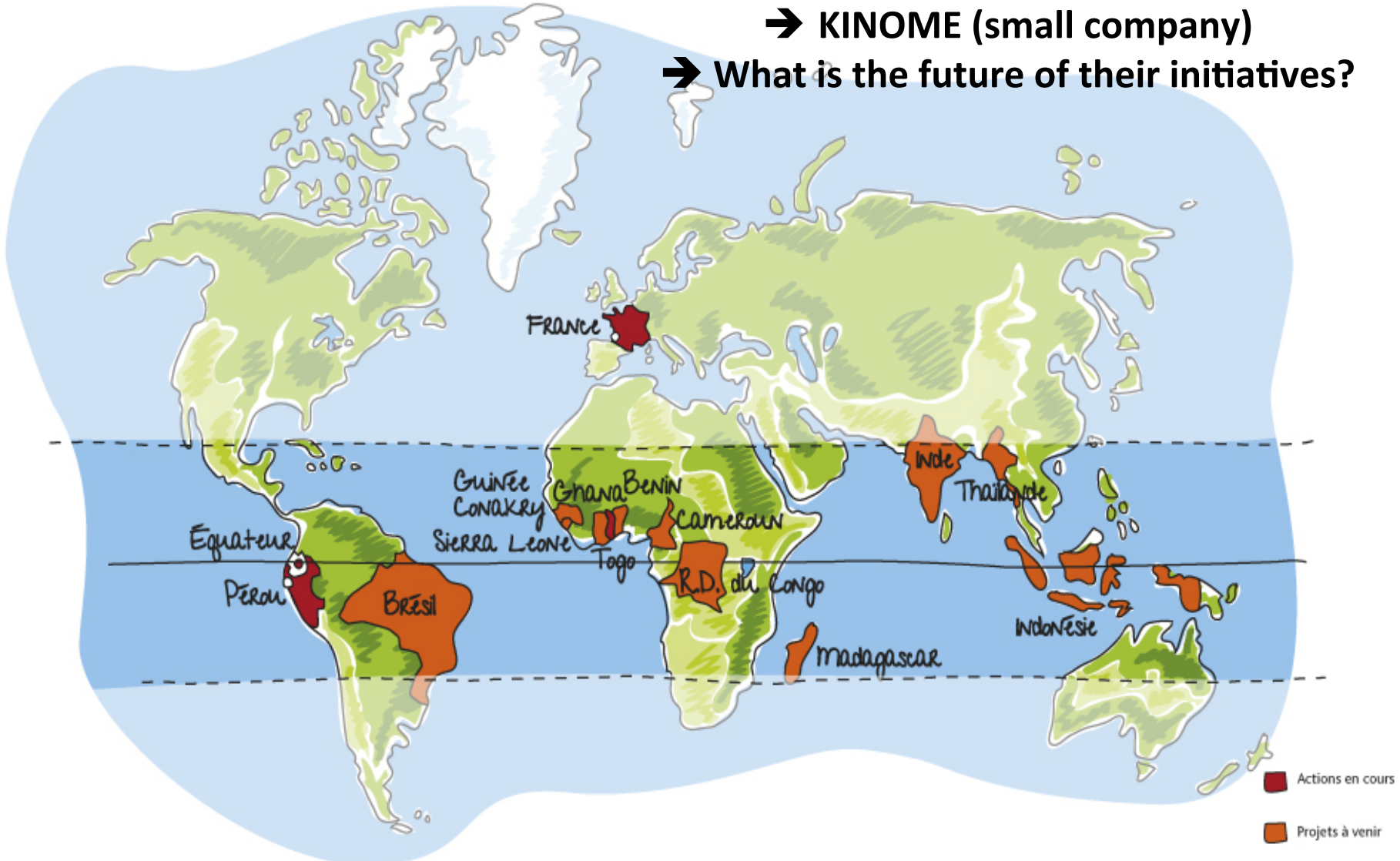
<u>Warm semi-arid regions</u>
7% of global land surface
75 % located between both tropics

Why?

Many reforestation projects in progress around the world in those regions

➔ KINOME (small company)

➔ What is the future of their initiatives?



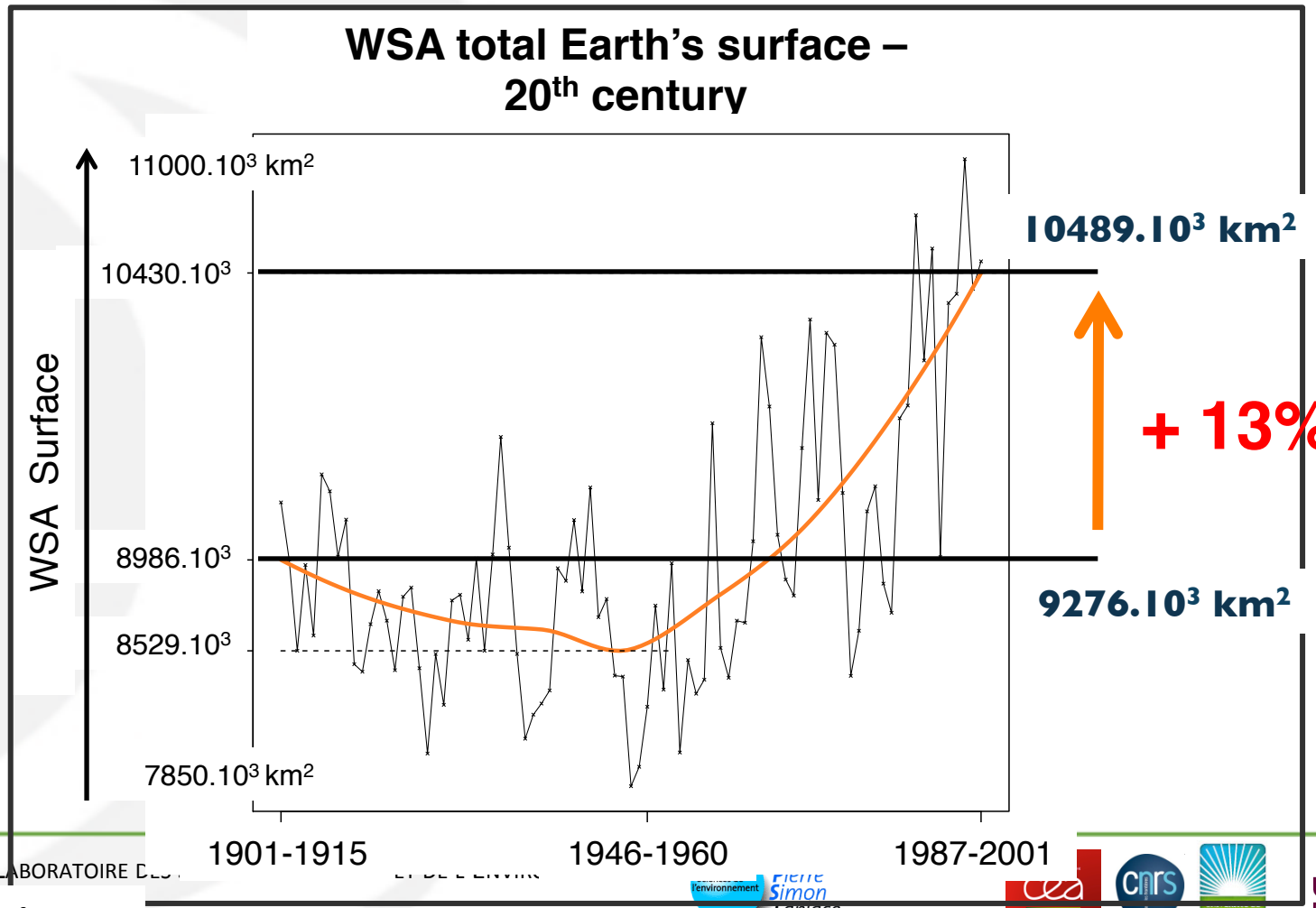
Why?

- Upcoming IPCC special report on climate change, **desertification, land degradation**, sustainable land management, food security, and greenhouse gas fluxes in terrestrial ecosystems

What do we know?

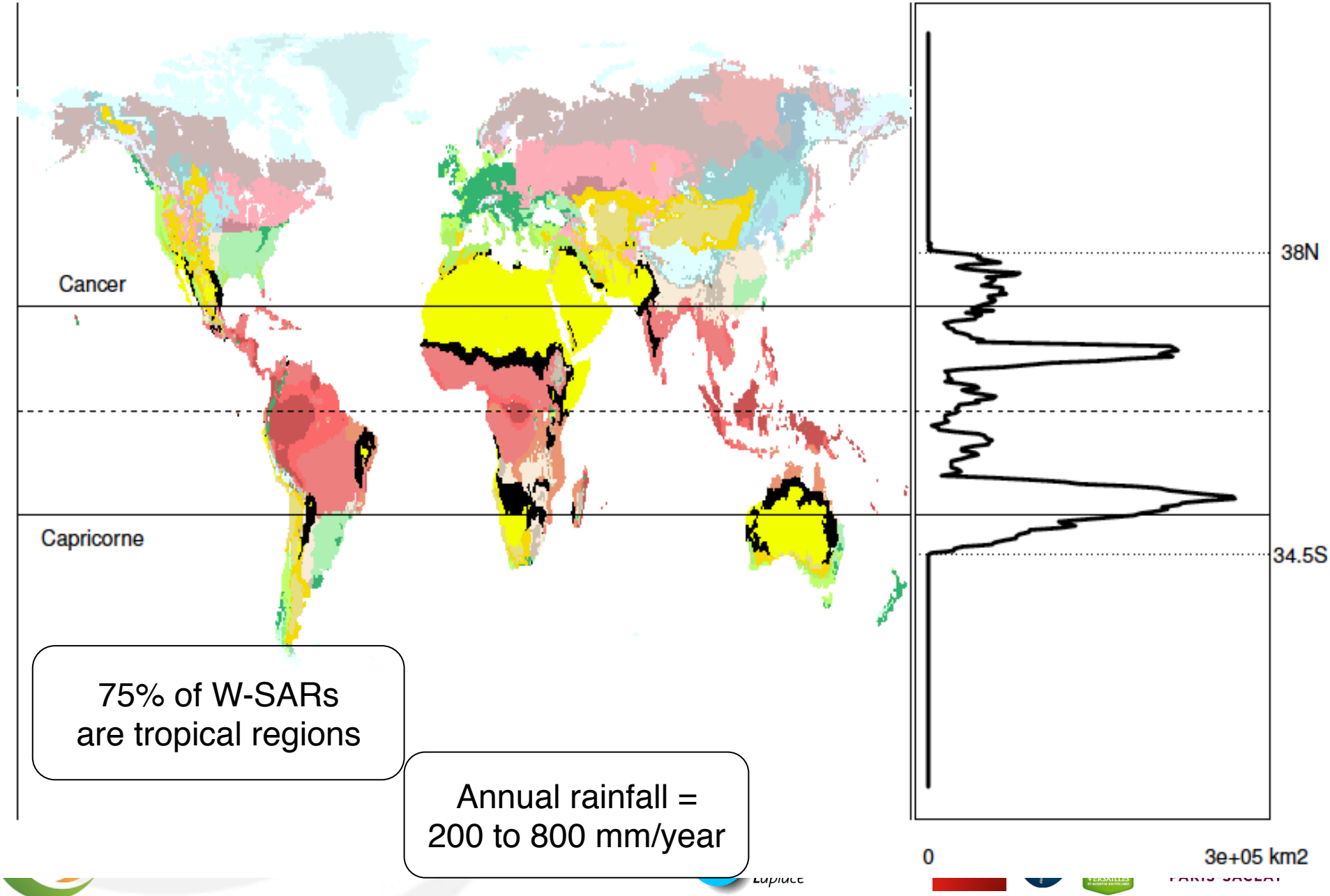
What do we know?

Warm semi-arid regions have started to increase before 2000



Rajaud et al. in rev.

What do we know?



75% of W-SARs
are tropical regions

Annual rainfall =
200 to 800 mm/year

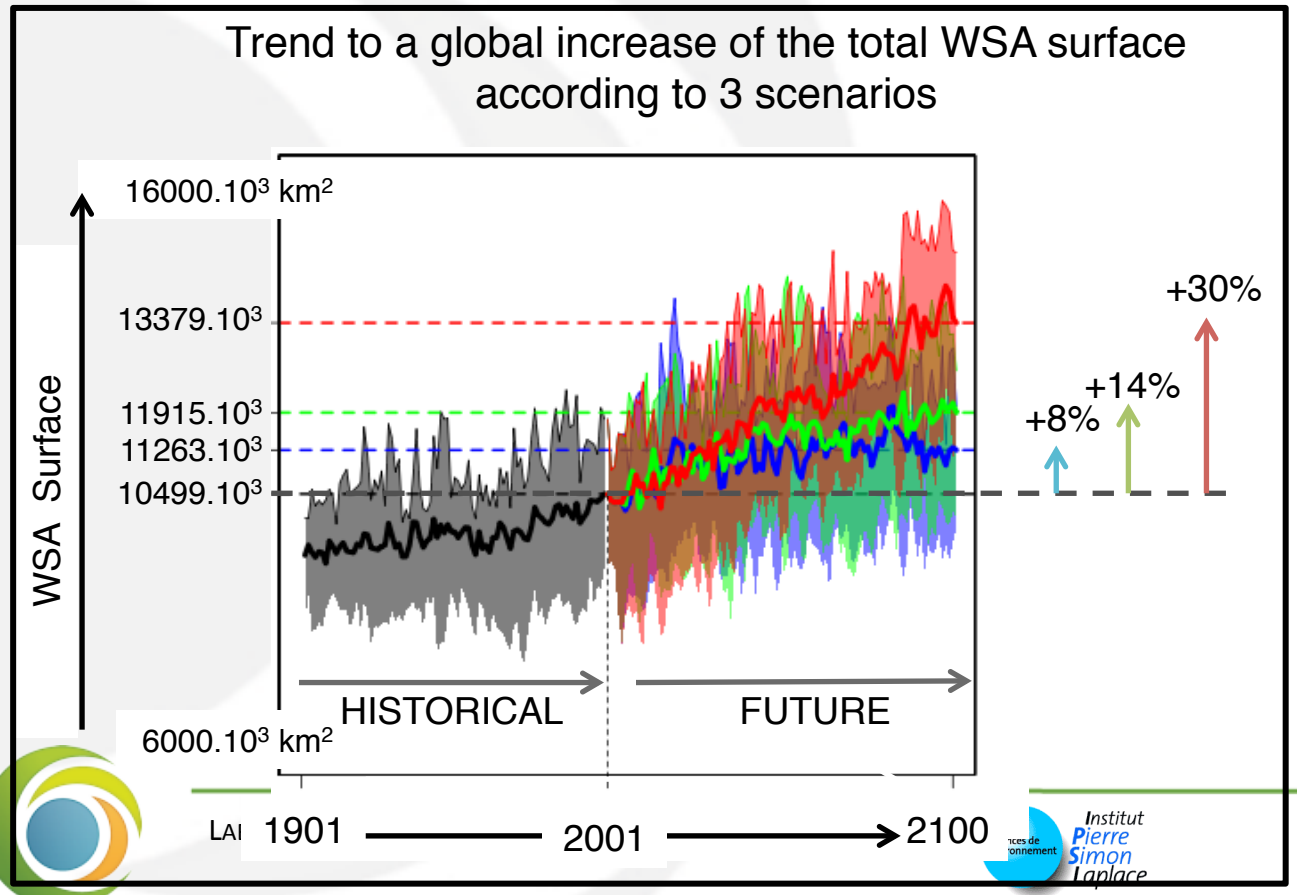
What do we know?

Increasing W-SARs' area over the 21st century

12 climate models (GCMs)

Historical simulations (1901-2006) +
3 scenarios' projections (2007-2100)

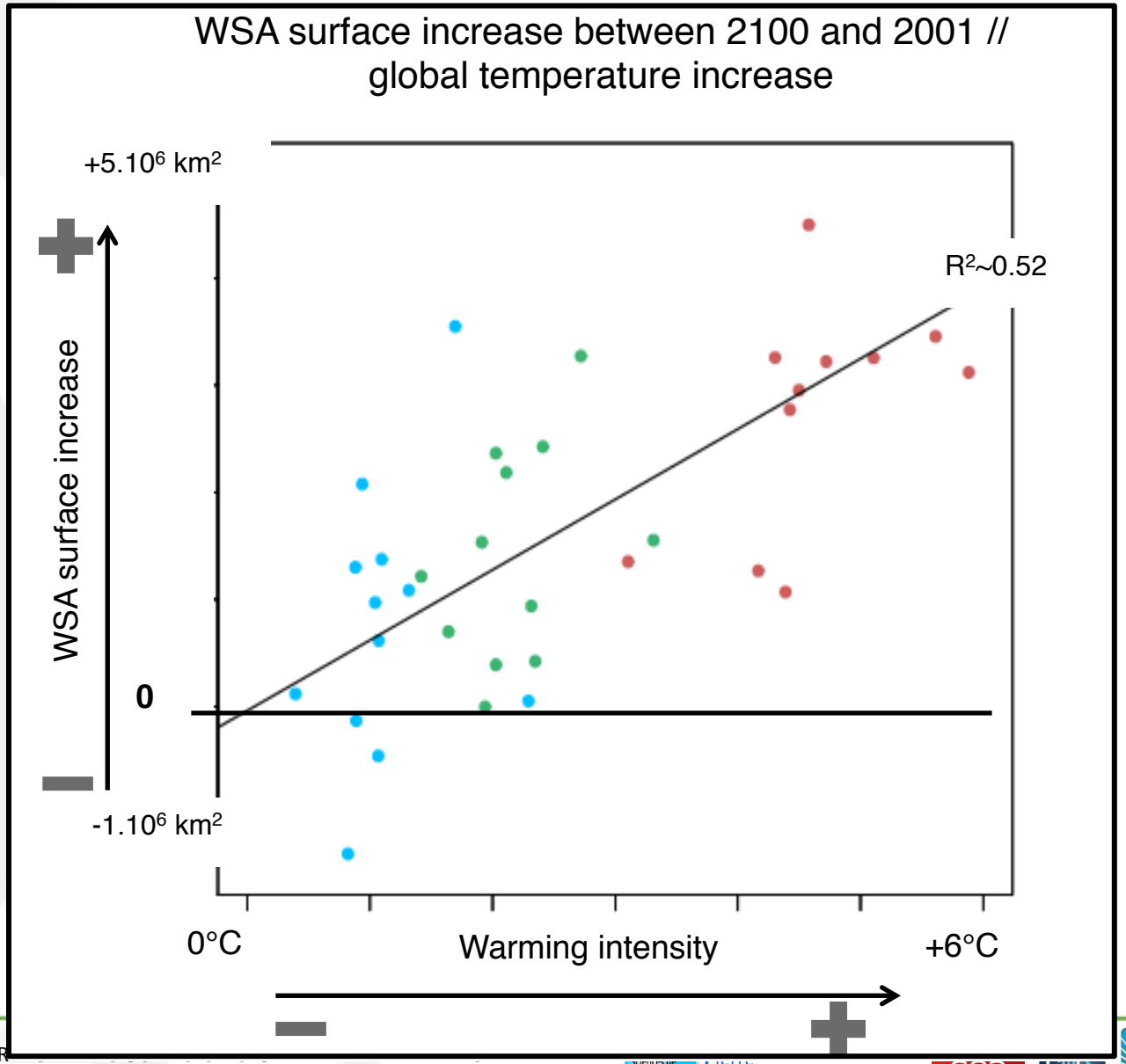
- RCP +2.6 W/m2 – '2°C target'
- RCP +4.5 W/m2 – median
- RCP +8.5 W/m2 – 'business as usual'



Global increase of WSARs' surface over the 21st century for the 3 scenarios

Rajaud et al. in rev.

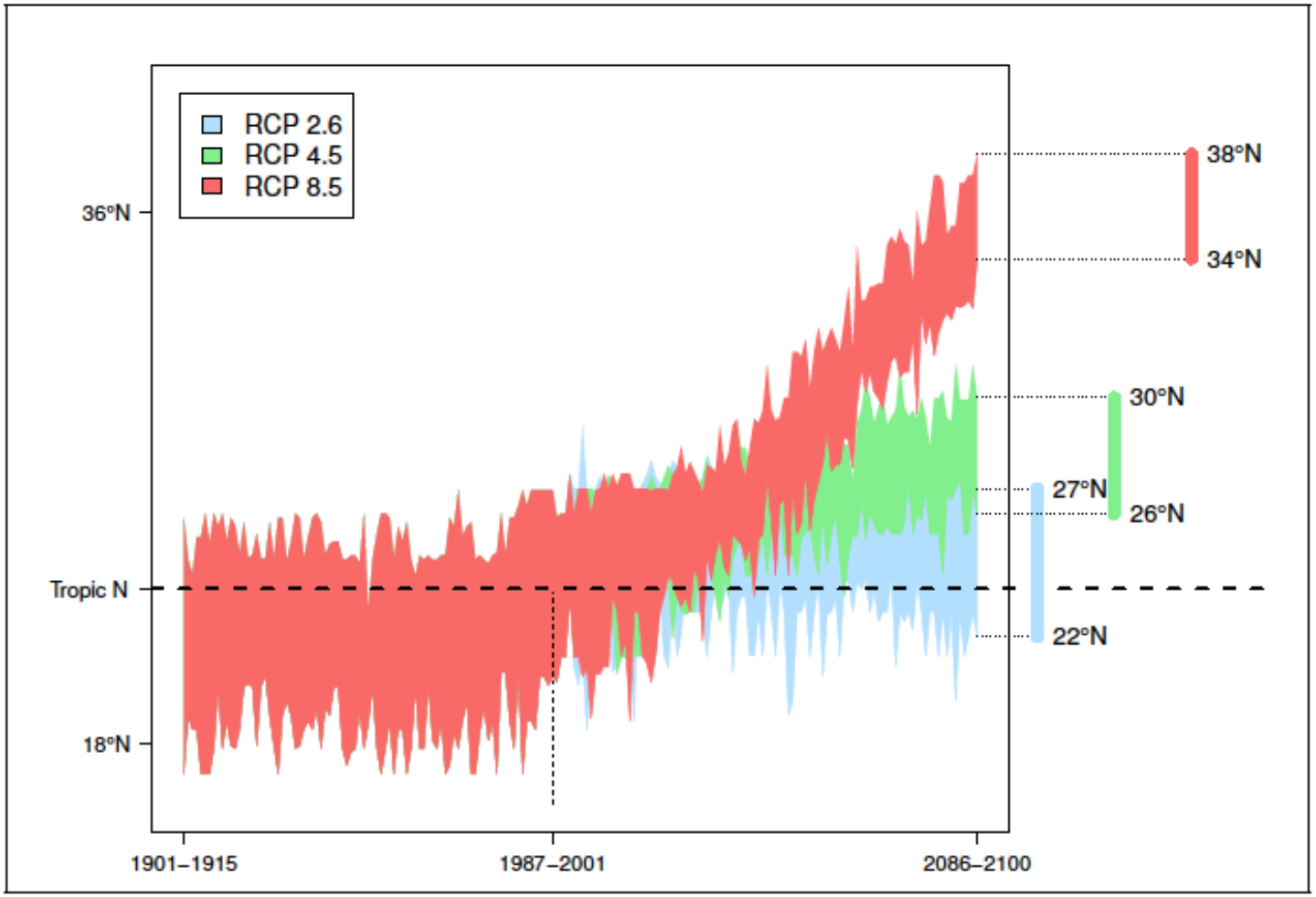
What do we know?



Rajaud et al. in rev.

What do we know?

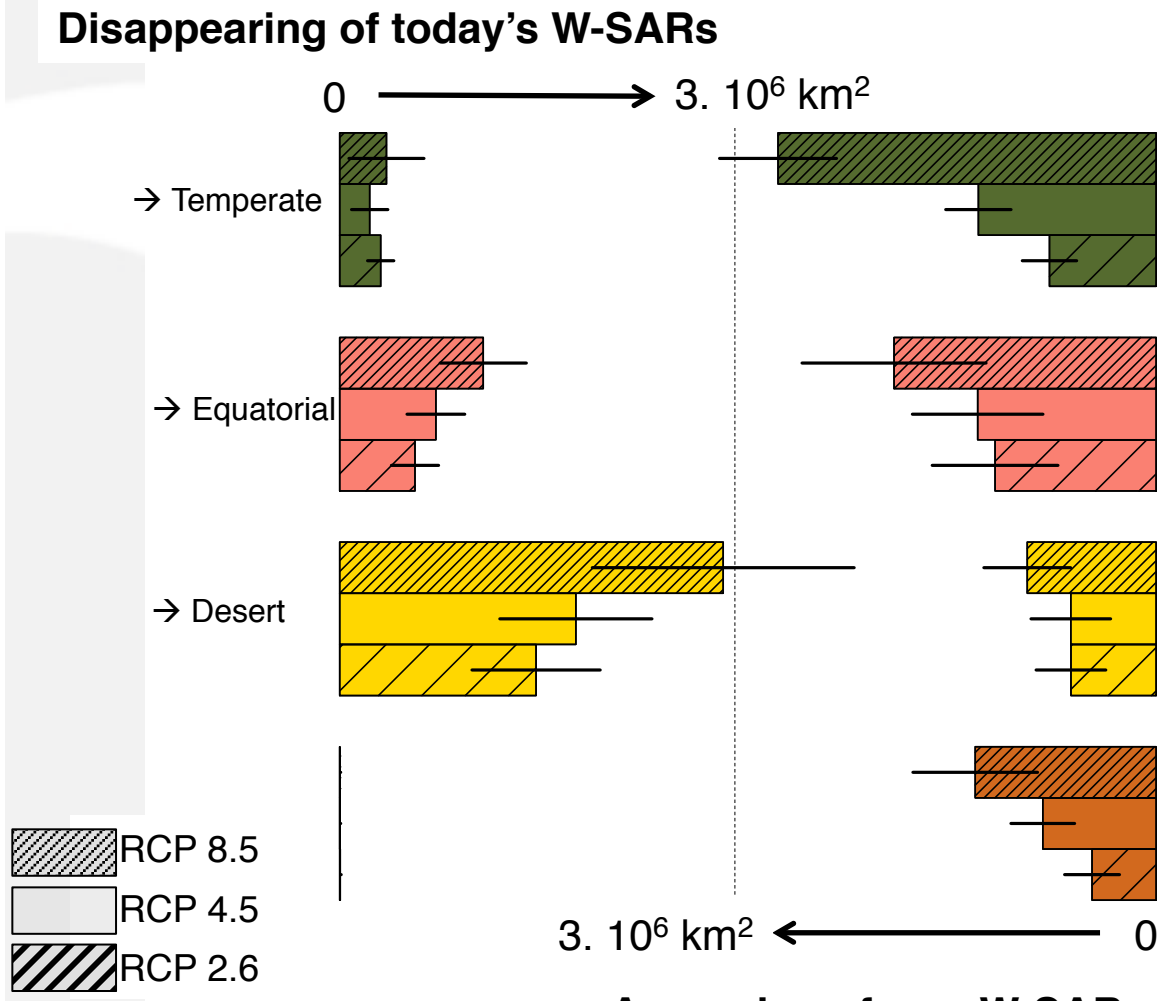
Warm Semi Arid regions will largely expand outside the tropics ➔ 'tropical' climatic conditions in temperate regions ➔ what consequences on the ecology?



Rajaud et al. in rev.

What do we know?

Types of W-SARs' conversions – 2100//2001



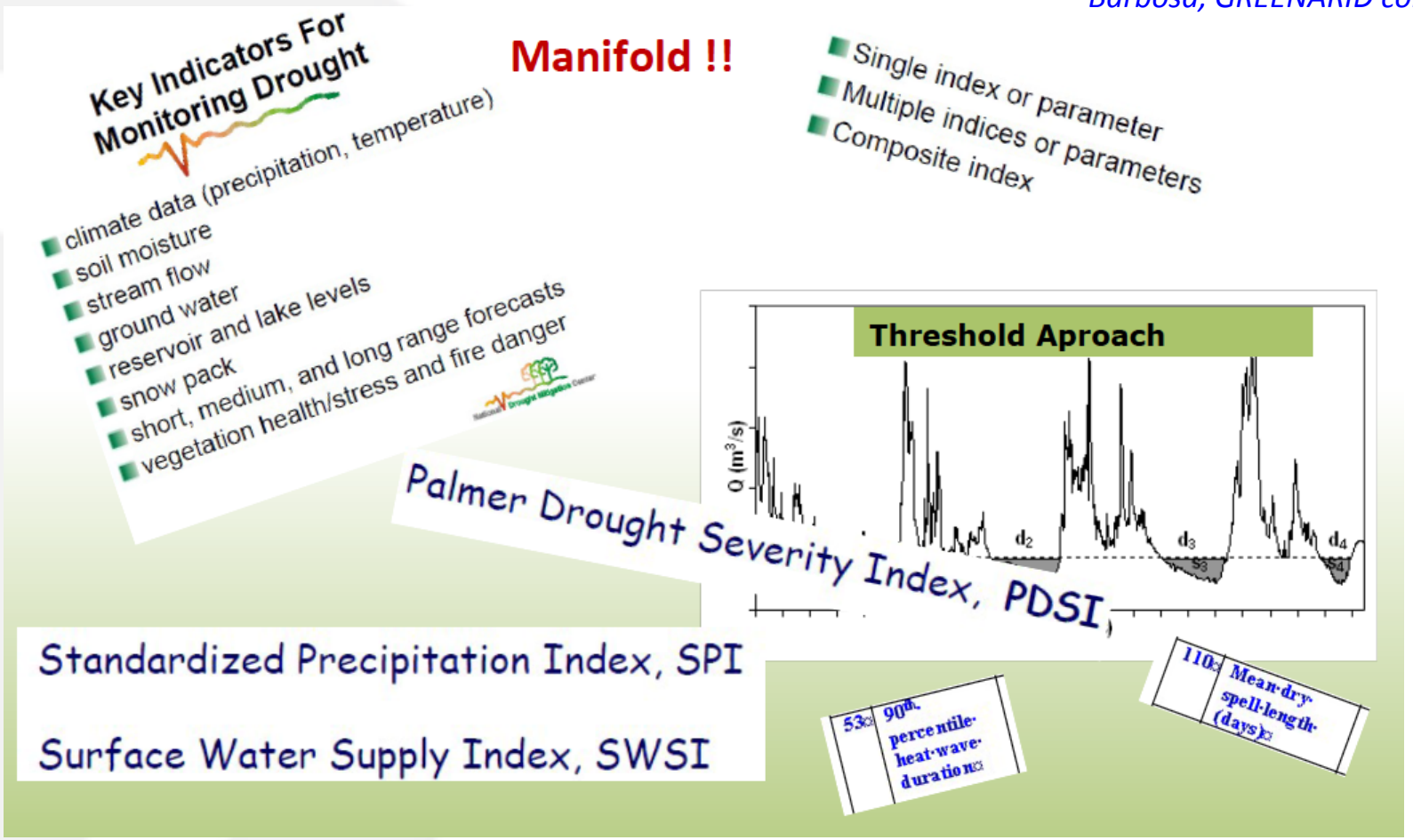
Type of conversion	Principal mechanism
Temperate → WSA	Drying Warming
Equatorial → WSA	Drying
Hot Desert → WSA	Wettening
Cold Semi-arid → WSA	Warming

Rajaud et al. in rev.

What do we know ?

Diagnostics used to evaluate the extent of semi-arid or drying zones

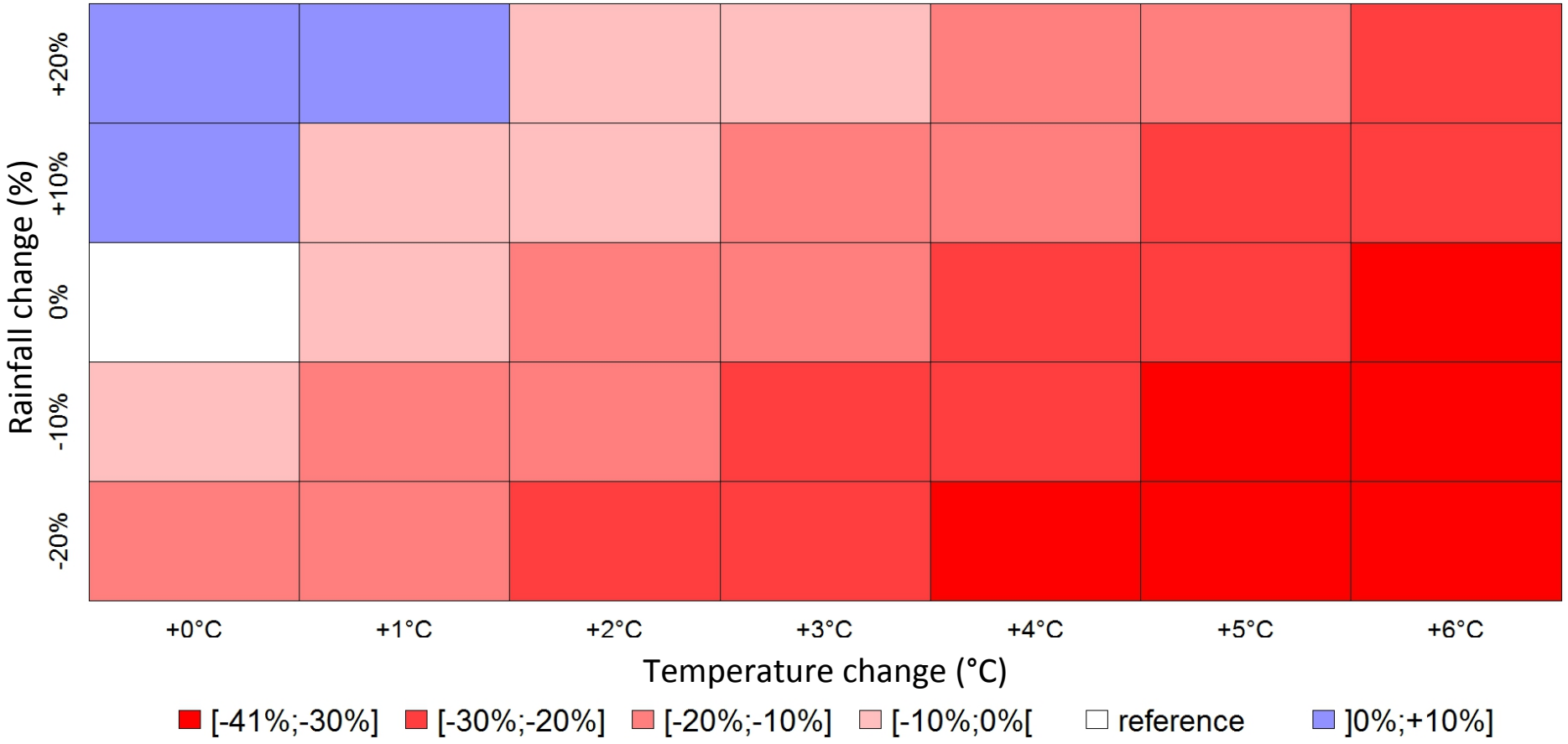
Barbosa, GREENARID conference



Urgent: what is the uncertainty in the future of warm semi-arid regions resulting from the choice of indicator?

What do we know ?

Role of temperature and rainfall changes on crop yields

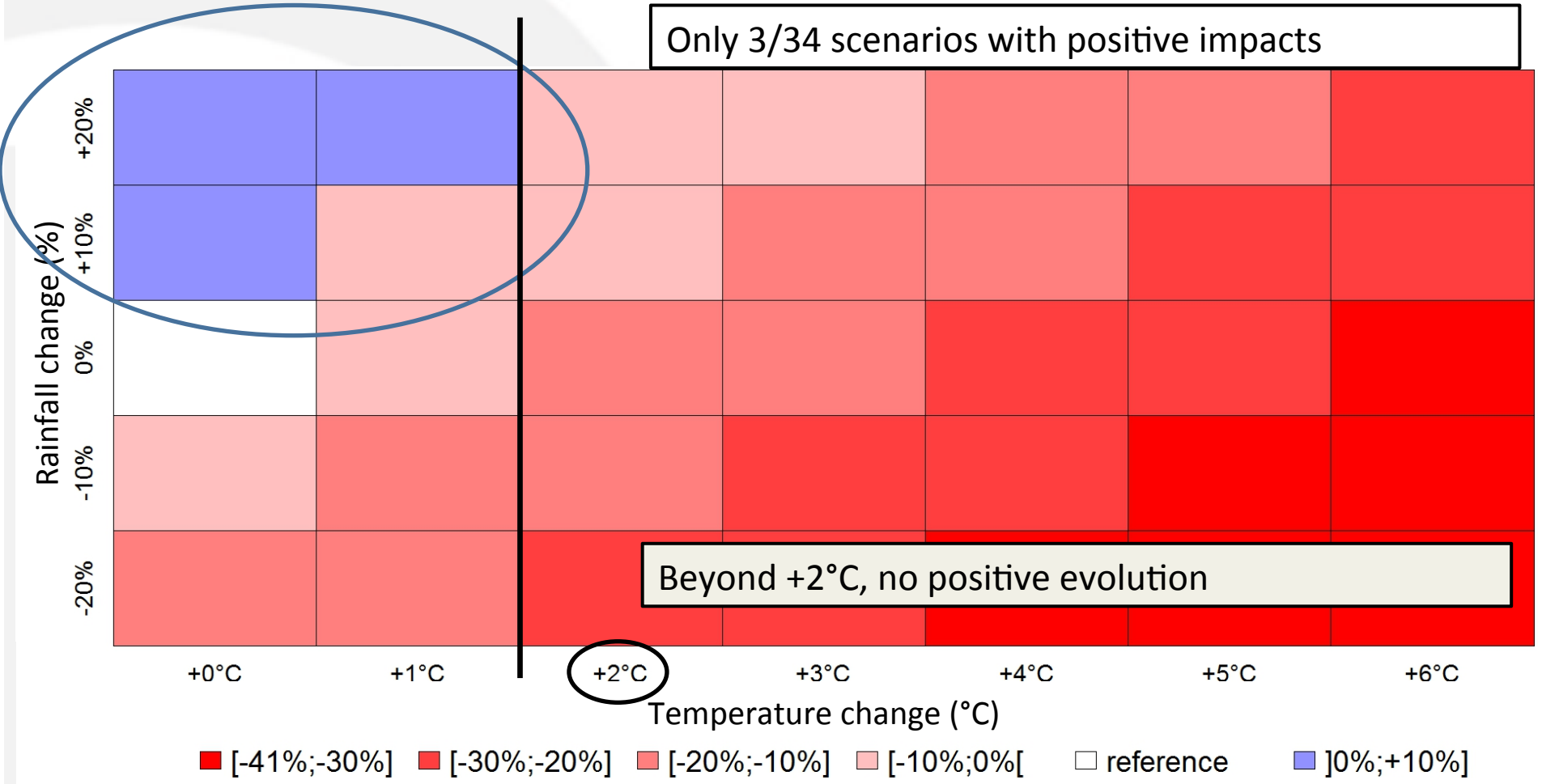


➢ Average over 6 varieties, 35 stations and 30 years

Sultan et al. (2013)

What do we know ?

Role of temperature and rainfall changes on crop yields



- Average over 6 varieties, 35 stations and 30 years

Sultan et al. (2013)

GREENARID: evolution of warm semi-arid regions, and of living conditions of local populations under combined pressures: a) climate (its evolution and variability) et b) anthropogenic actions (greening, pollution, harvesting of resources, …).

3 main categories of subjects were discussed :

① Impacts of climate, its evolution and variability on the distribution of ecosystems ;
② Evolution of ressources and ecosystem services ;
③ Adaptation, economic impacts and adaptation strategies.

72 participants:

- **Africa (Niger, Sénégal, Kenya, Tunisie, Nigéria, Ghana, Niger, Burkina Faso)**
- **Europe (France, Belgique)**
- **South America (Brésil, Vénézuéla).**

categories:

- **Scientists from various disciplines (climatology, agronomy, ecology, économy, hydrology)**
- **NGOs**
- **National representatives (e.g. ministeries)**

What do we know? ➔ Can we move forward?
(conclusions from GREENARID conference)

- ✓ **Climate change is not always the biggest risk for those warm semi-arid regions**
  - ➔ Need to determine ahead what the targetted resource is sensitive to!

- ✓ **Climatic information is not always used efficiently nor similarly:**
  - ➔ Improve bias corrections
  - ➔ Use targetted thresholds rather than targetted years (2°C, 3°C, …), …

- ✓ **Early Warning bulletins are very useful / requested / needed** (meteorology, crops, …) - many exist in various regions ➔ what do we learn from them? Harmonisation would be usefule ? Utility for people, decision makers?

- ✓ How **to translate those bulletins into useful propositions** to adapat?

- ✓ **There is a lot of 'ancestral' knowledge** (non academic) ➔ not published but probably useful …. How can we make use of this knowledge ?

- ✓ Important to **provide local people with tools to measure changes, impacts** ➔ improve their understanding of utility and value of actions.

Can we move forward? ➔ GEWEX actions?

- Is a 'book' or special issue useful? (➔ problem of many african countries that would like to have a french version)
- Can semi arid regions be considered by WCRP as a 'scoping regional activity'?
- Should GEWEX think about it? (with ilEAPS?)
- ….