Climate science: The basics

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Outreach Event on the IPCC Role, Activities and Findings
Media Workshop
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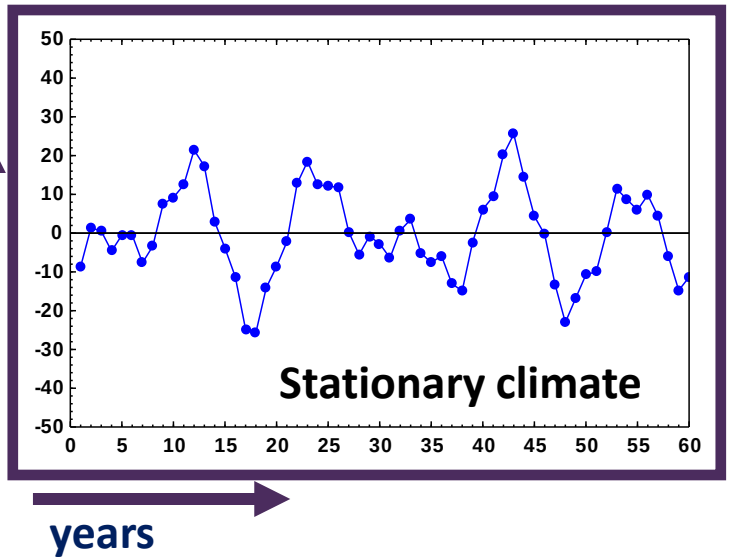
- What is climate change?
- Why does the climate change?
- What can we expect?
- What can we do?

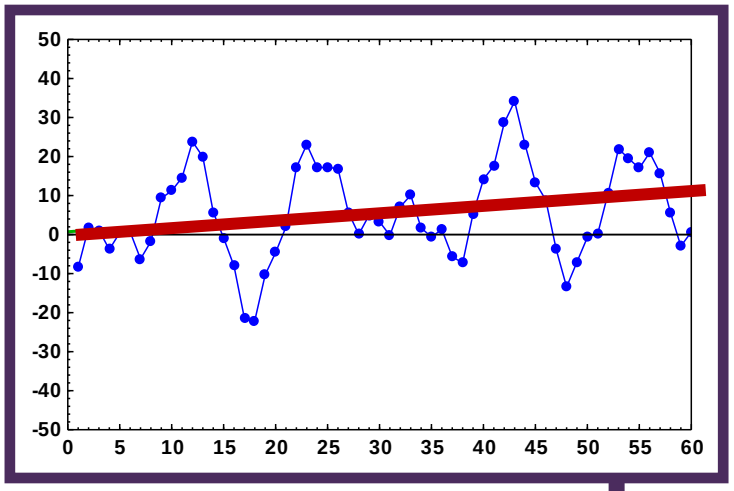
What is climate change?

Climate change refers to a variation in the state of the climate that persists for an extended period.

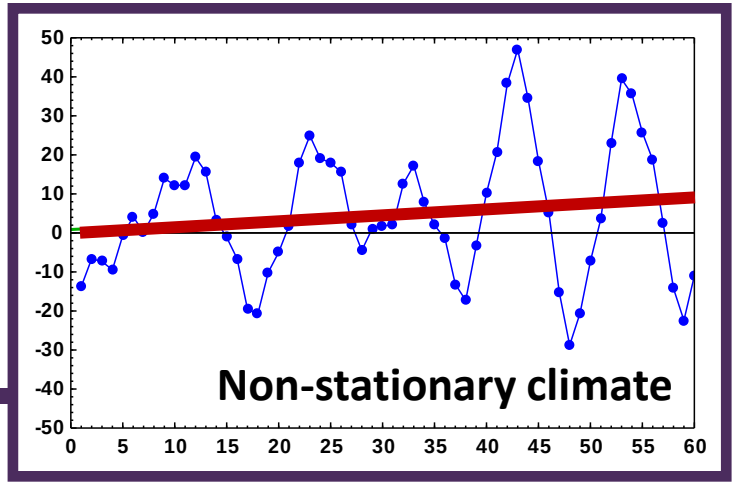
Change in the state of the climate → **Changes in the mean and/or the variability of its properties**

How can the climate change?





Change in the mean



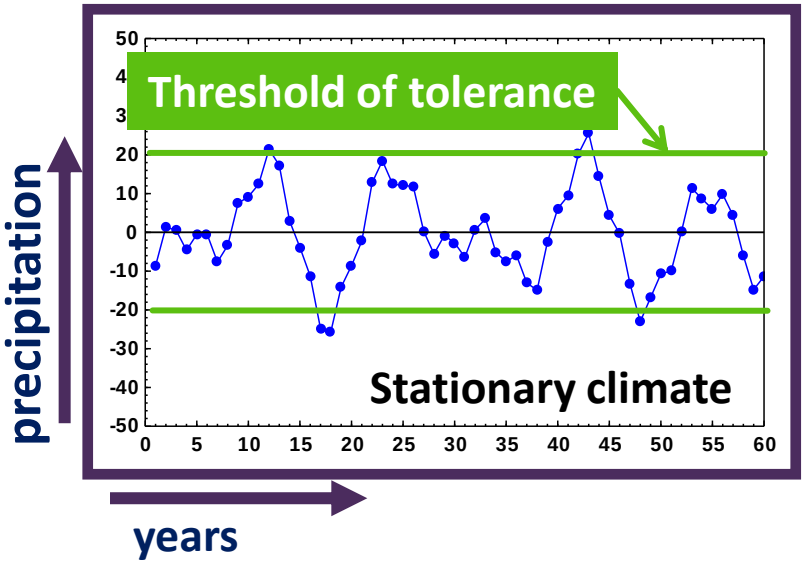
Change in the mean & variability

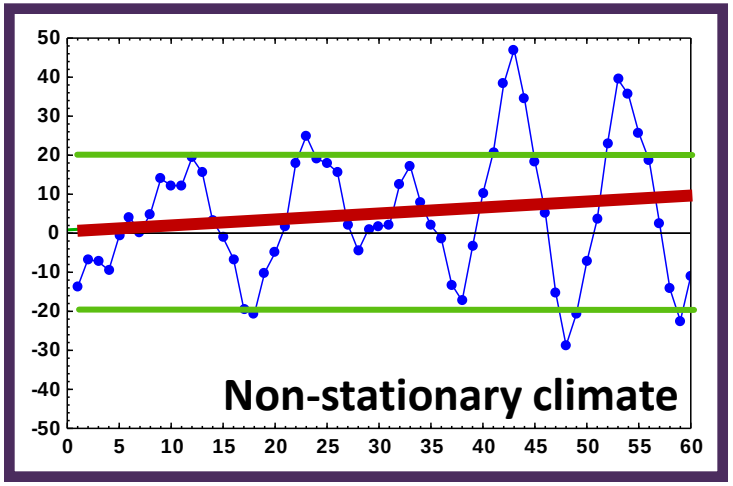
Climate change refers to a variation in the state of the climate that persists for an extended period.

Change in the state of the climate → **Changes in the mean and/or the variability of its properties**

Changes persistent for an extended period → **Decades or longer**

Why do we care about climate change?





IMPACTS

Take action!

Vulnerability

Level of propensity or predisposition to be adversely affected by climate change effects.

Mitigation

A human intervention on climate change causes to reduce its negative impacts.

Adaptation

Adjustment to actual or expected climate of human and natural systems to moderate or avoid harm or exploit beneficial opportunities.

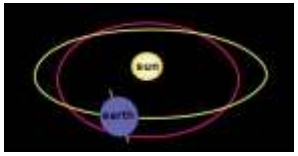
Why does climate change?

Natural forcing

ASTRONOMICAL

- Fluctuations in the **solar output**

- Variability of the **Earth's orbit**

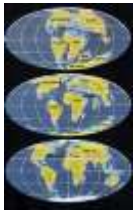


- Variability of the **Earth's axial tilt**

GEOLOGICAL

- **Volcanic aerosols** injected in the atmosphere

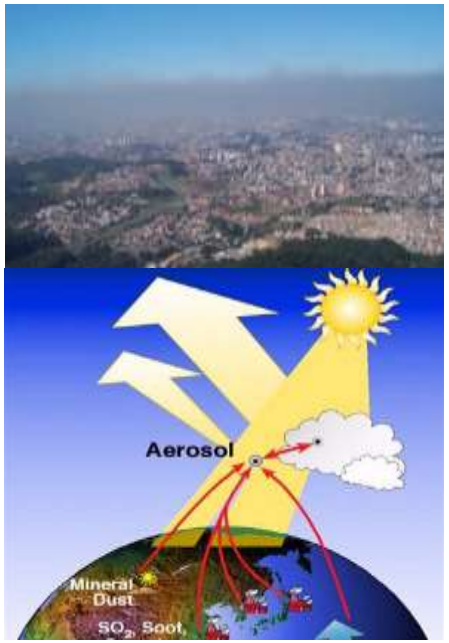
- **Continental drift**



- **Orogenic movements**

Anthropogenic forcing

Changes in the atmospheric composition: **aerosols**

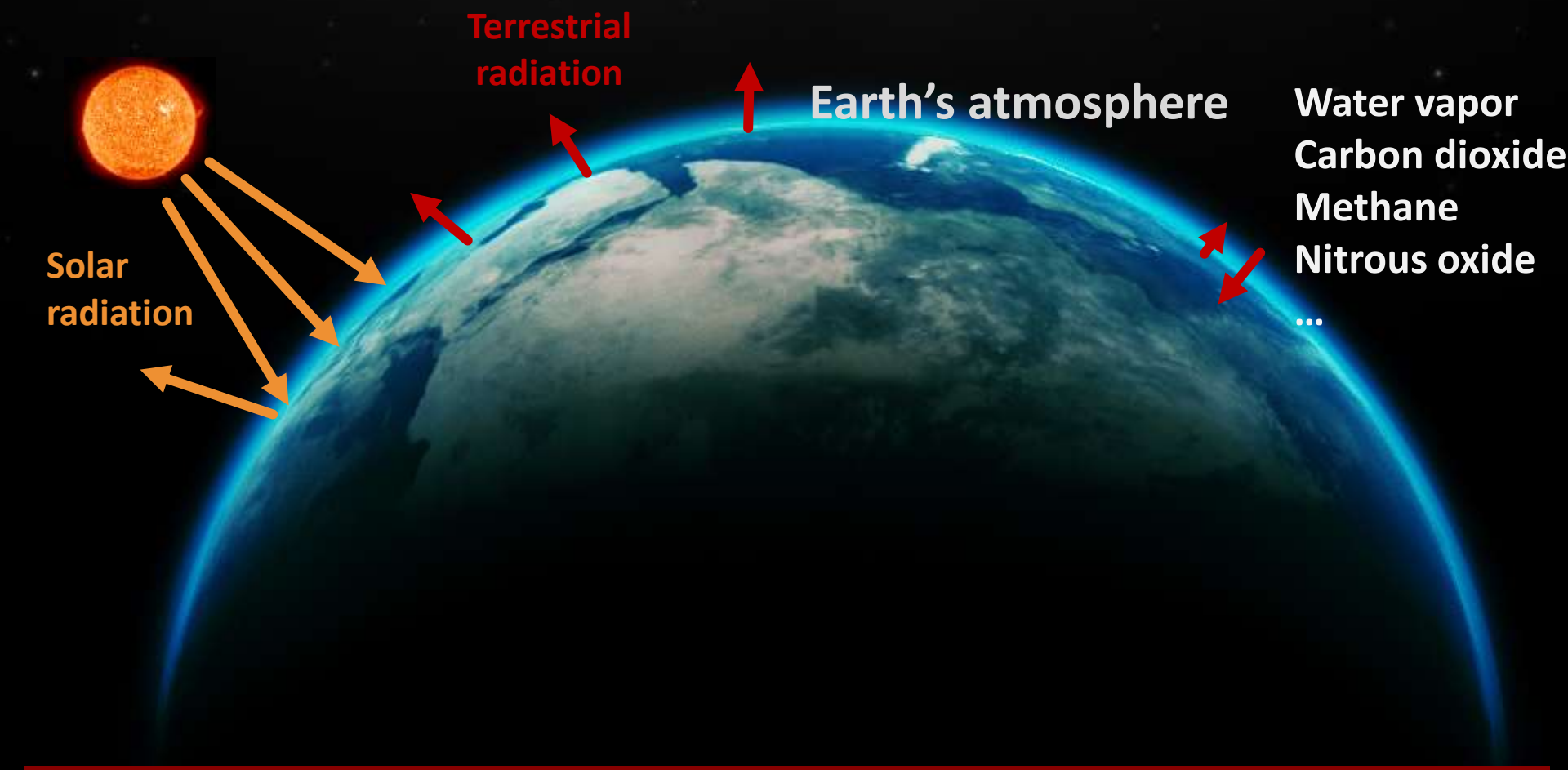


Changes in the atmospheric composition: **greenhouse gases (GHG)**

Land-use change: **deforestation, urbanization**

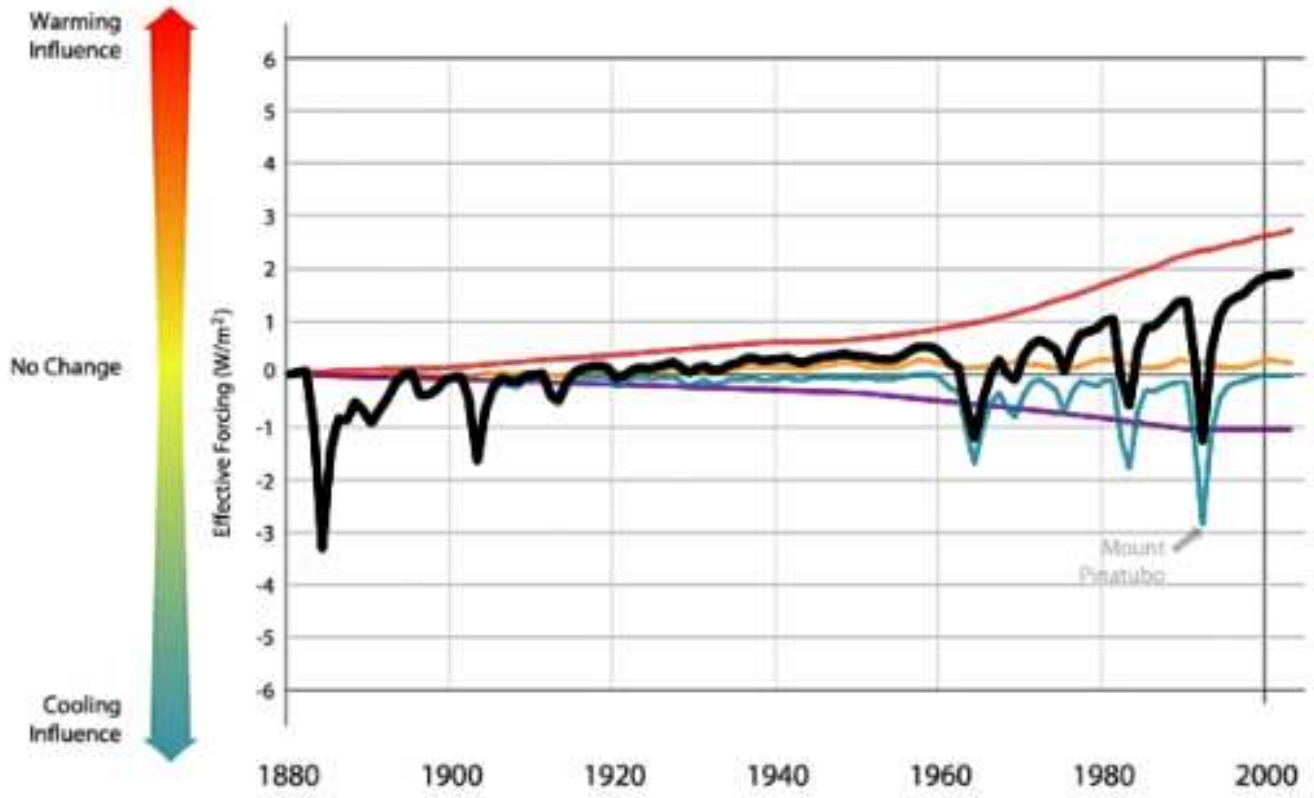
The greenhouse effect

Natural process that warms the Earth's surface and the lower atmosphere when some of the heat flowing back from the Earth's surface is absorbed by atmospheric gases (GHG).



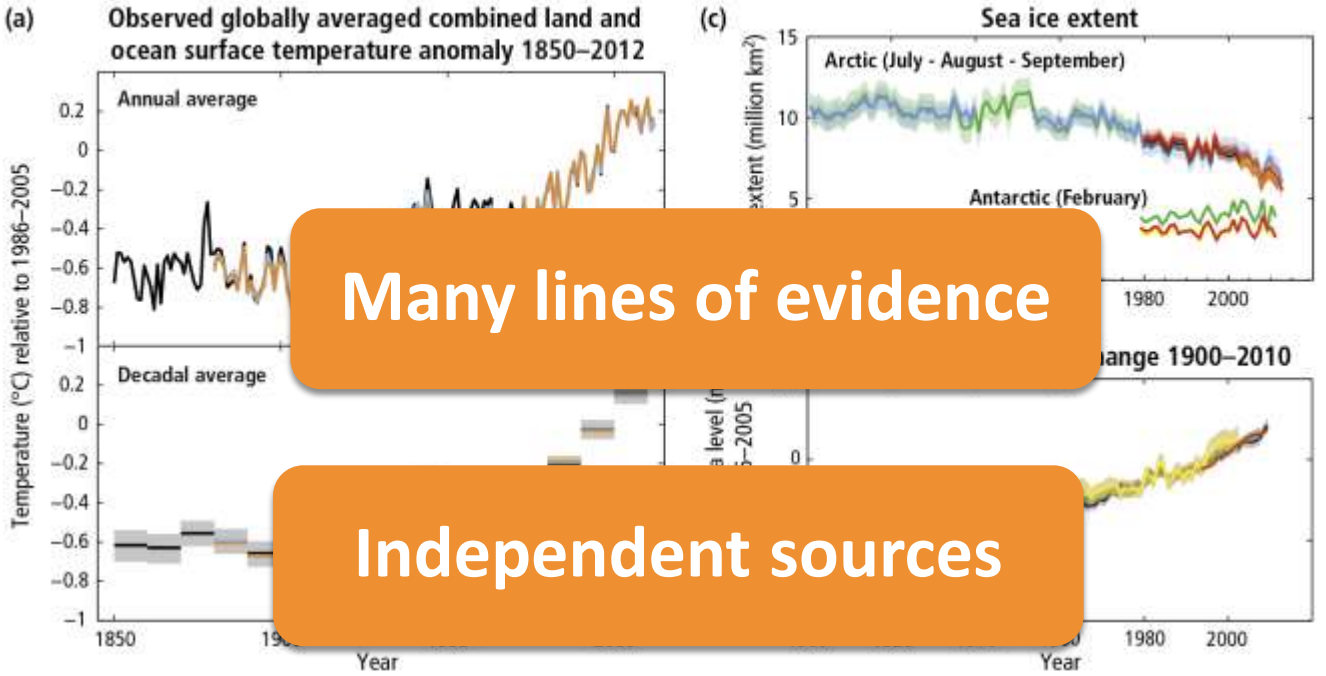
Anthropogenic GHG emissions enhanced the greenhouse effect

Attribution of climate change



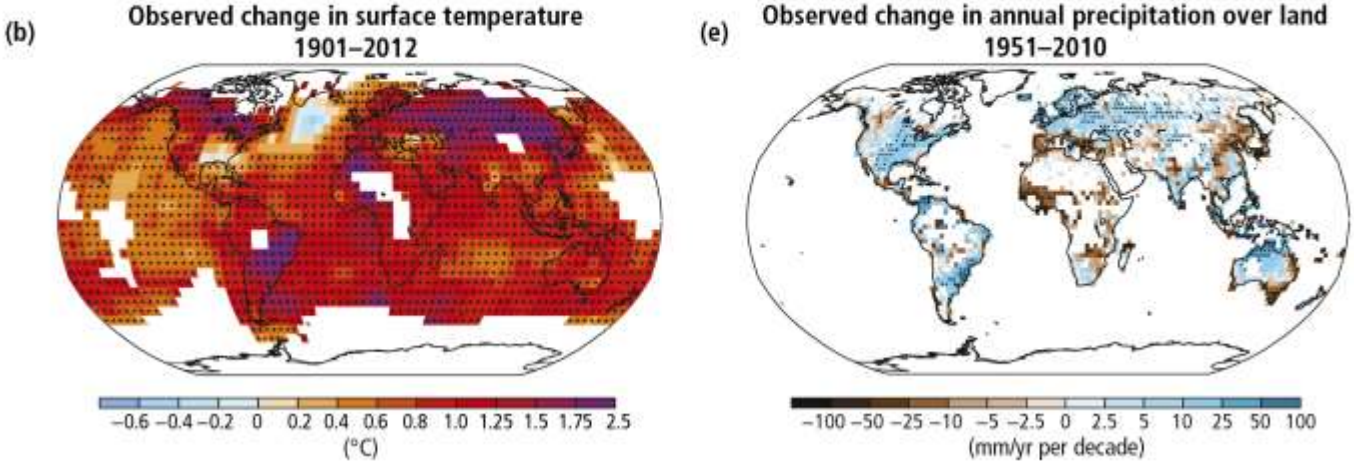
- Mean global temperature
- Solar radiation
- Sulfate partices
- Volcano activity
- Greenhouse gases

Evidences: Observed changes



Many lines of evidence

Independent sources



Warming of the climate system is unequivocal

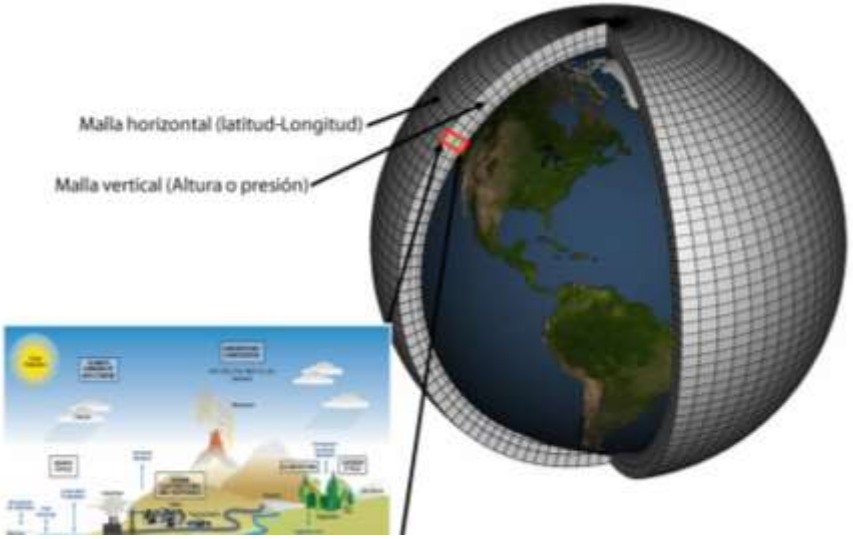
What can we expect?

What is a climate scenario?

Description of the possible future state of the climate system due to changes in the atmospheric composition due to human activities.

¿How climate scenarios are build?

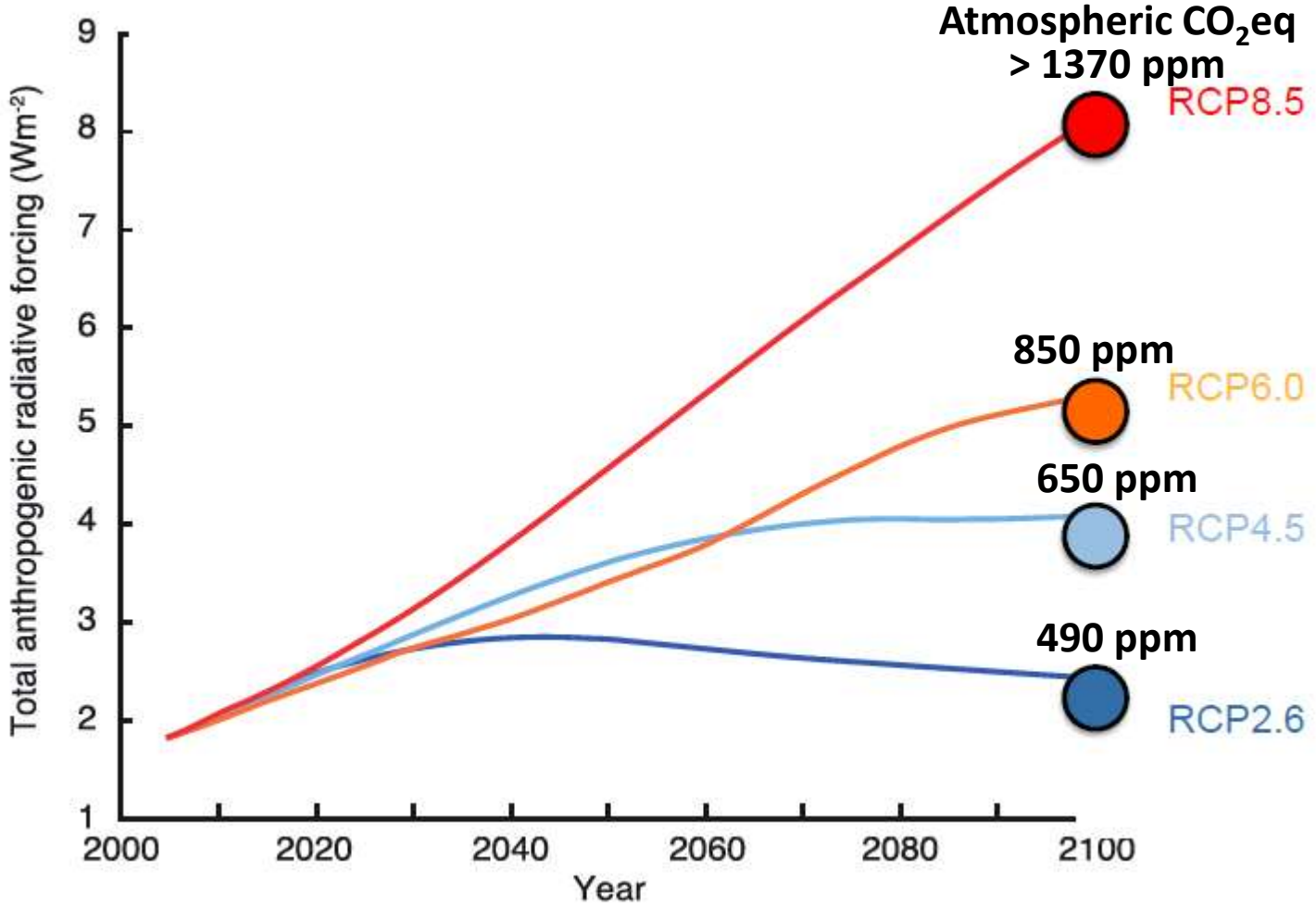
Global climate models



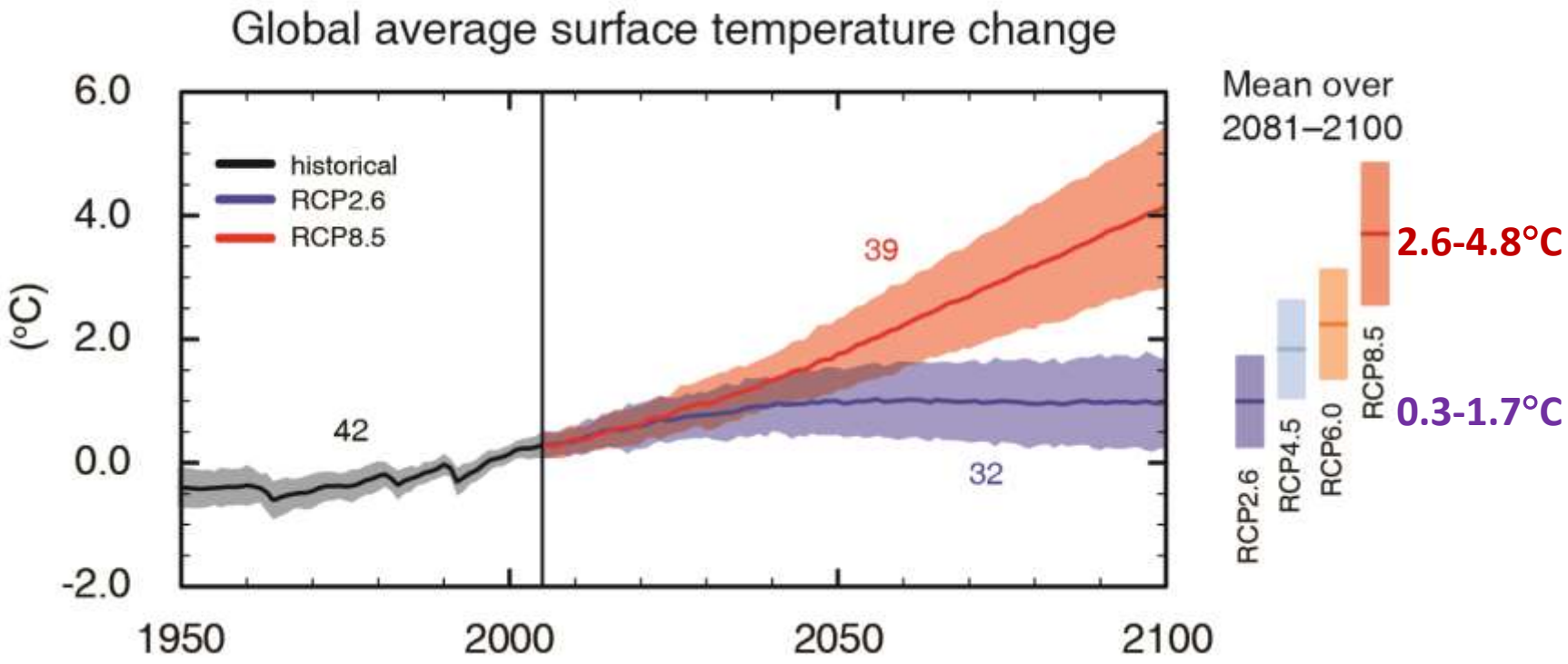
Anthropogenic forcing scenarios

RCPs: Representative Concentration Pathways

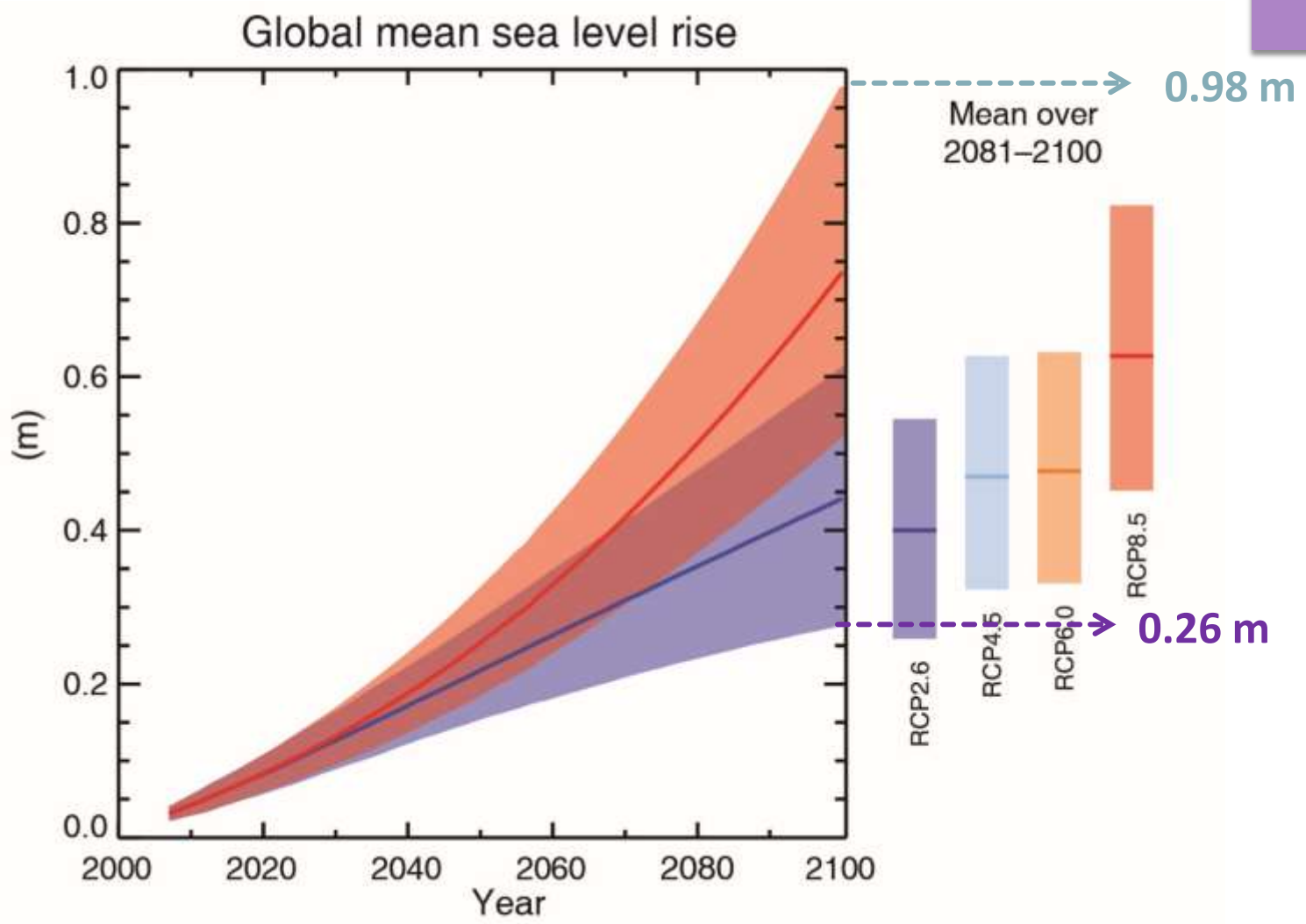
Anthropogenic forcing scenarios



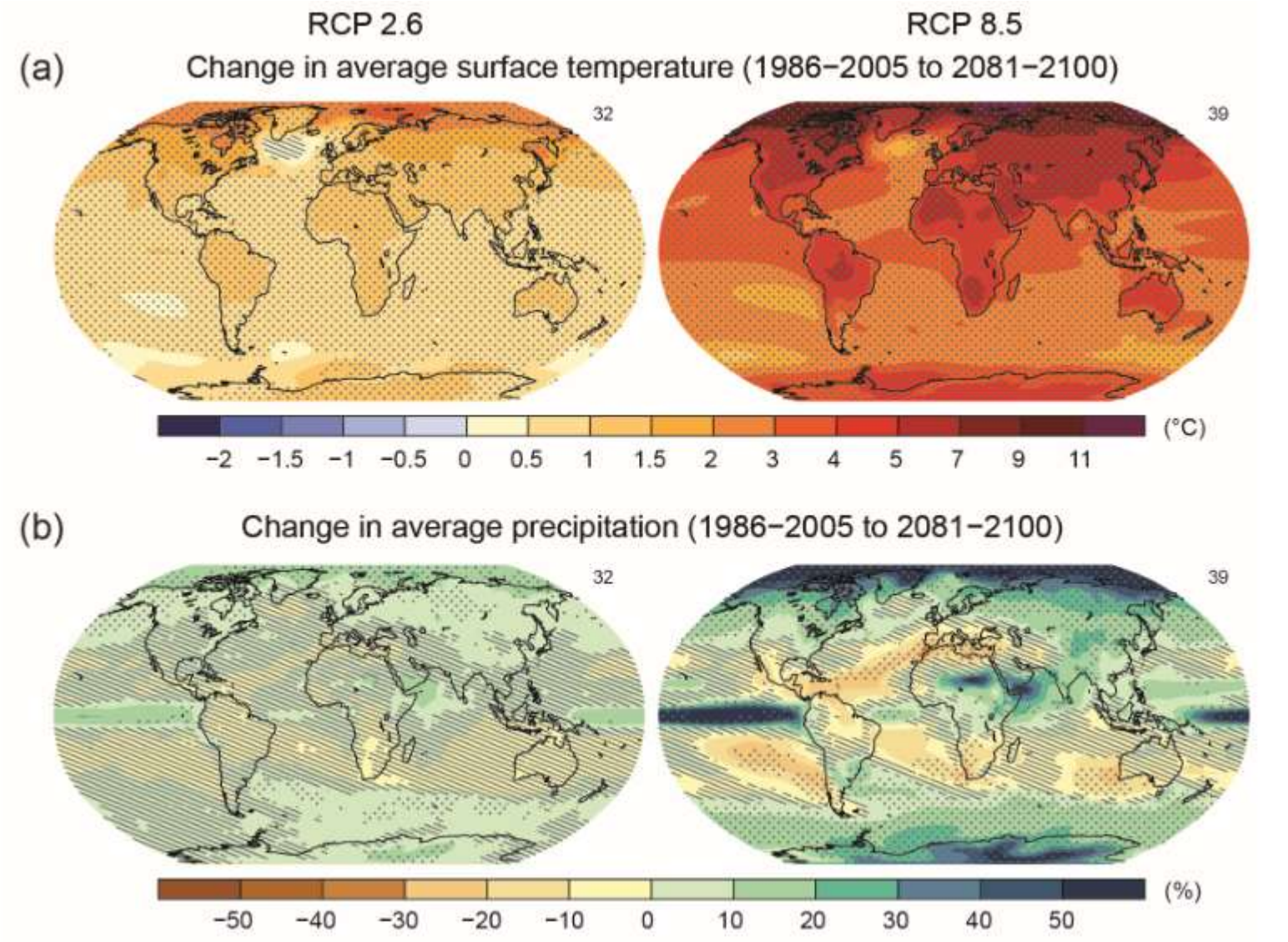
(IPCC 2013. Box TS.6)



Global temperature change for the end of the 21st century is likely to exceed 1.5°C relative to 1850 for all scenarios



Global mean sea level will continue to rise during the 21st century


RCP 2.6
RCP 8.5
(a)
Change in average surface temperature (1986–2005 to 2081–2100)
32
39
(°C)
−2 −1.5 −1 −0.5 0 0.5 1 1.5 2 3 4 5 7 9 11
(b)
Change in average precipitation (1986–2005 to 2081–2100)
32
39
(%)
−50 −40 −30 −20 −10 0 10 20 30 40 50

What can we do?

Mitigation options

Adaptation options

Production

Consumption

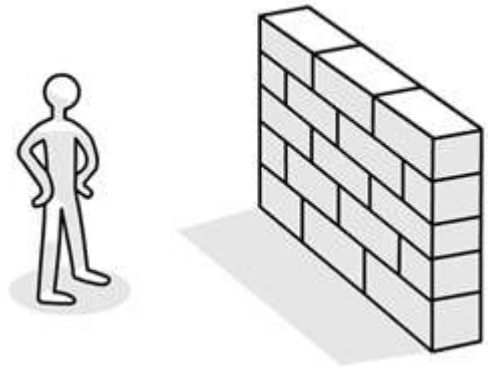
Integration of infrastructures, technologies, institutions and regulations

CULTURAL TRANSFORMATION

Some obstacles for local/regional adaptation & mitigation …

Scientific uncertainties

Professional practices



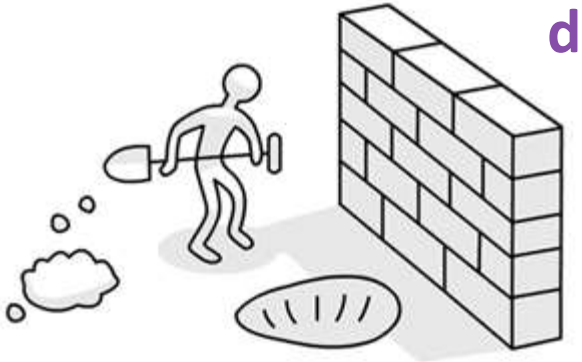
Short-term economic planning

Policies

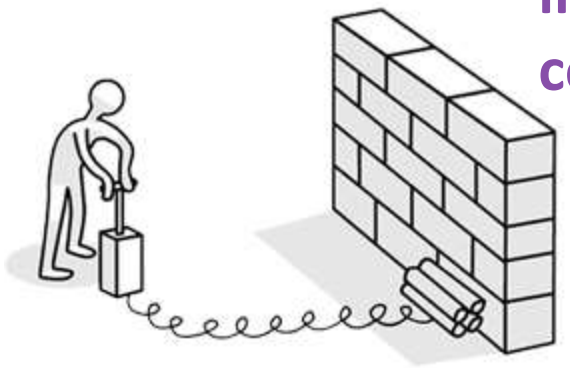
And how to overcome them…

Updated scientific knowledge

Sustainable development



National and international context




Climate Change 2013: The Physical Science Basis
Working Group I contribution to the IPCC Fifth Assessment Report
Further Information
www.climatechange2013.org
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IPCC AR5 Working Group I
Climate Change 2013: The Physical Science Basis
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INTERGOVERNMENTAL PANEL ON climate change