

Climate Change



Causes, processes and possible effects

(compiled for BIOTA para-ecologist training by Moritz Engels, 2008)

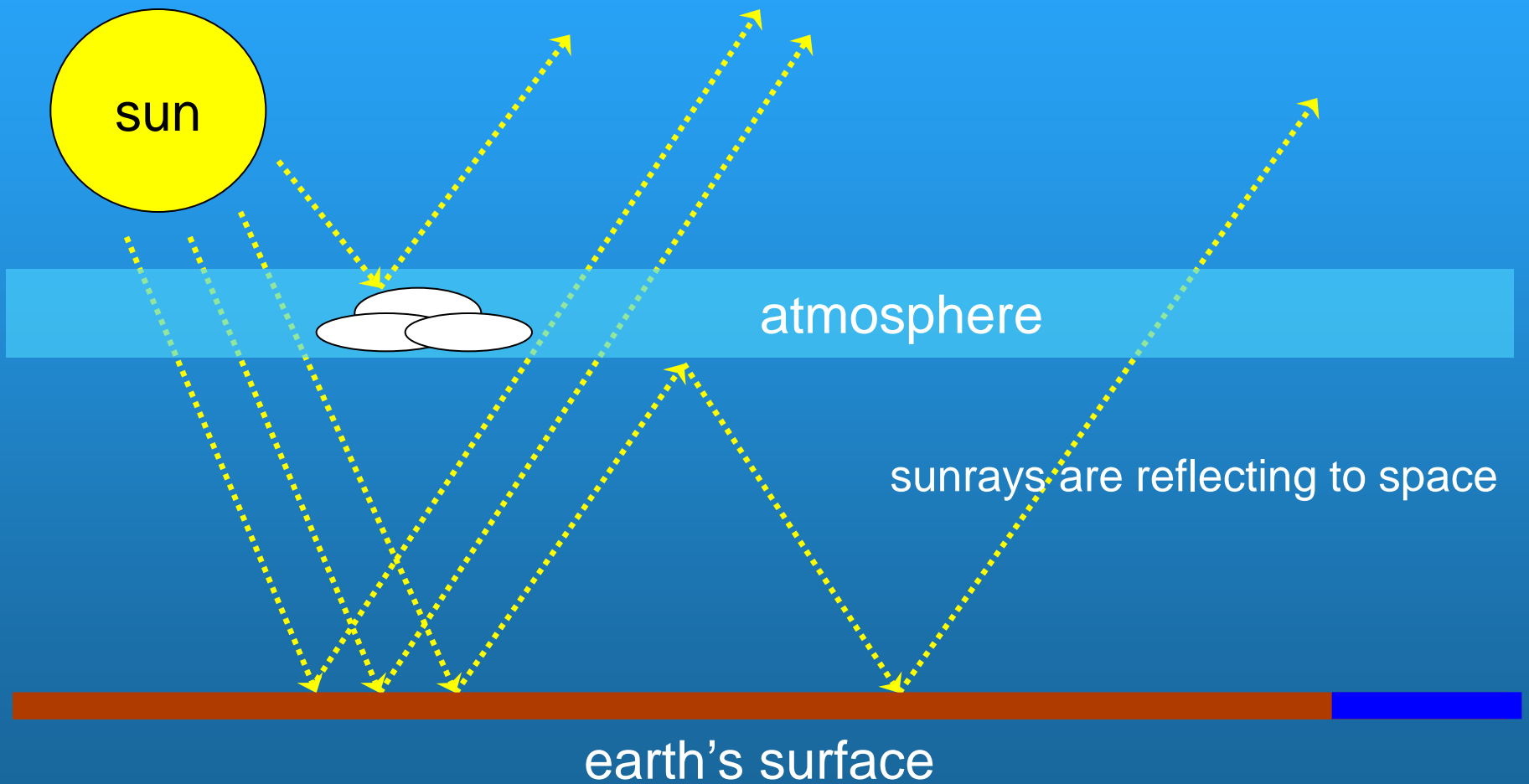
What is Climate Change?

"A change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods."

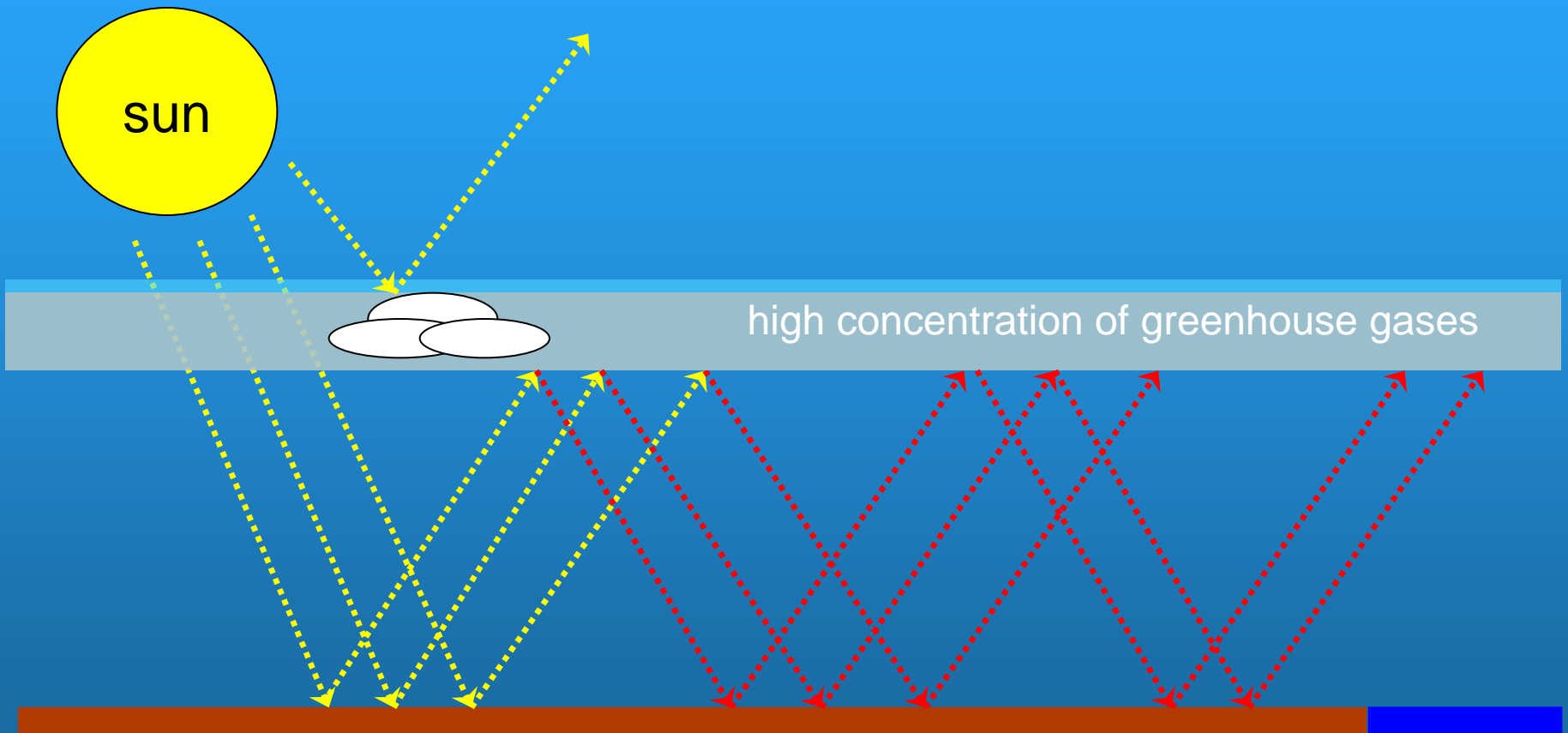
from Article 1 of the UNFCCC

(United Nations Framework Convention on Climate Change)

How does the greenhouse effect work?

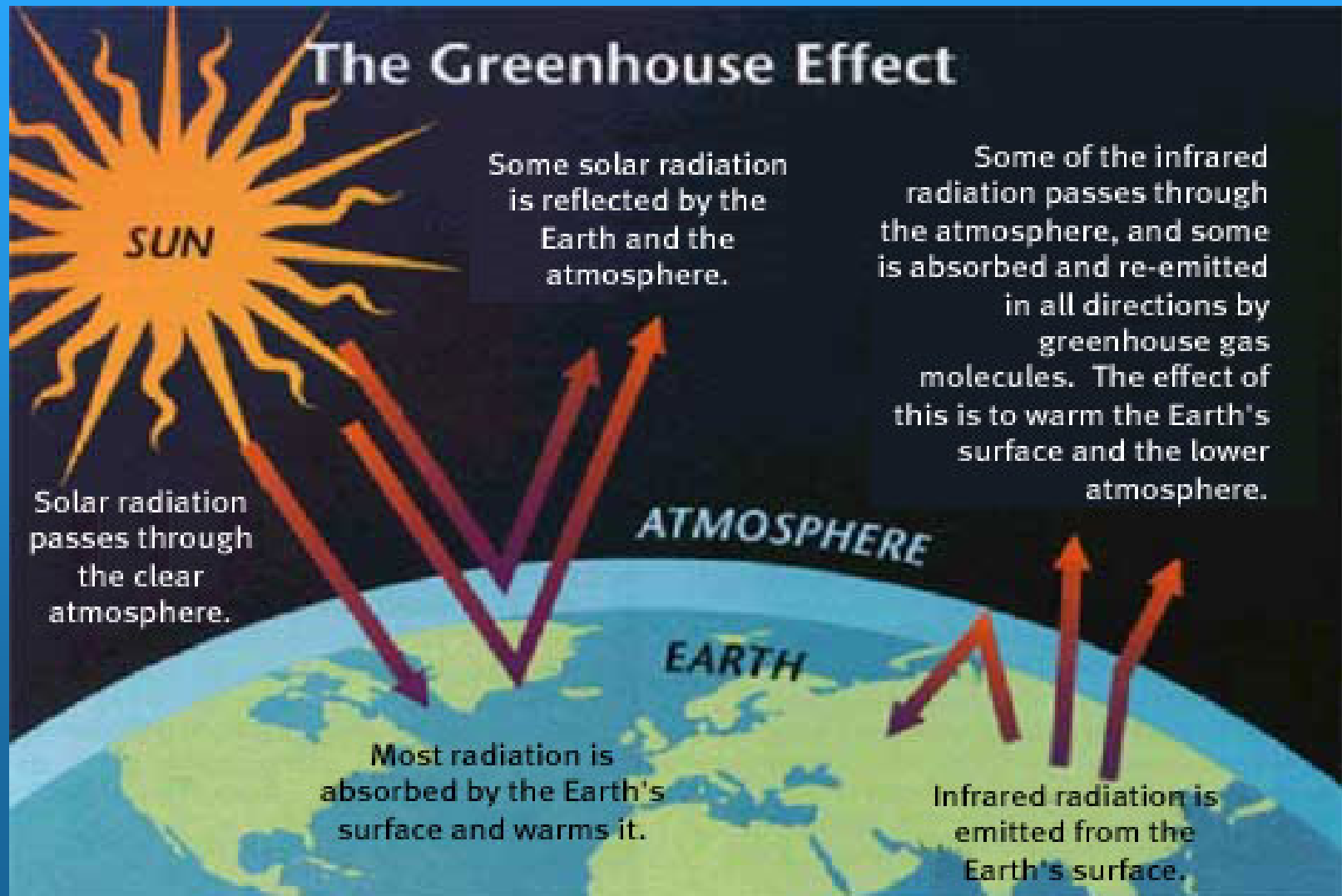


The greenhouse effect

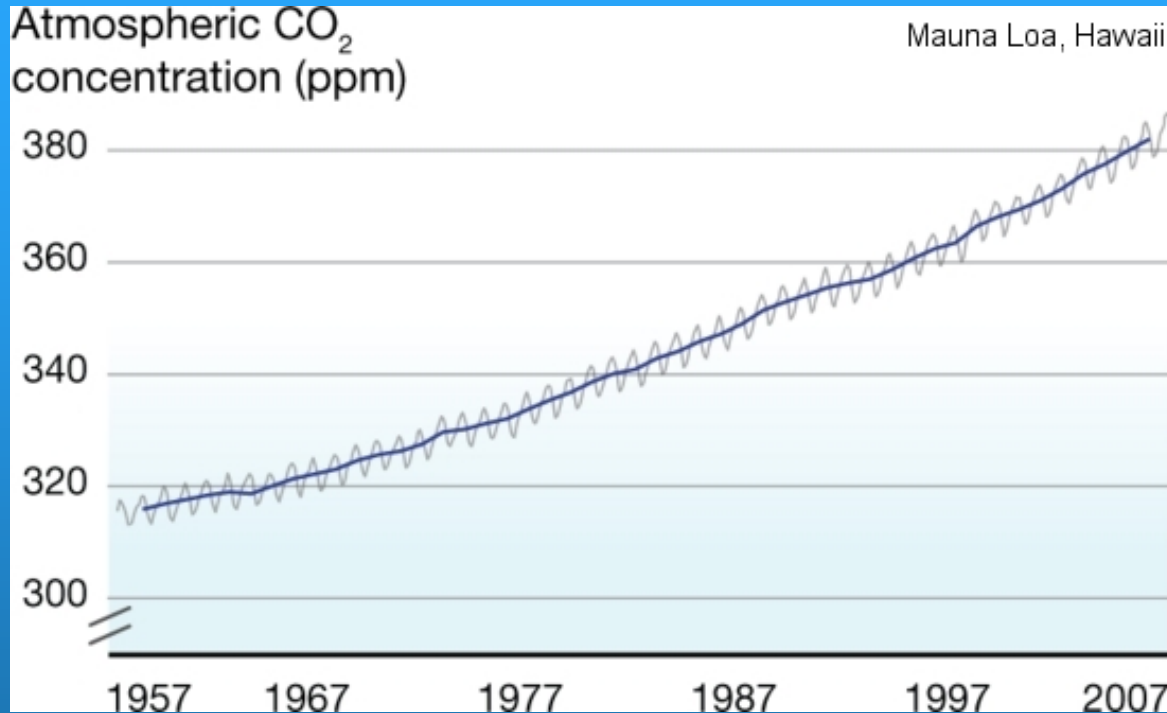


The energy is 'trapped' between land surface, oceans and atmosphere and the temperature is heating up...

The greenhouse effect



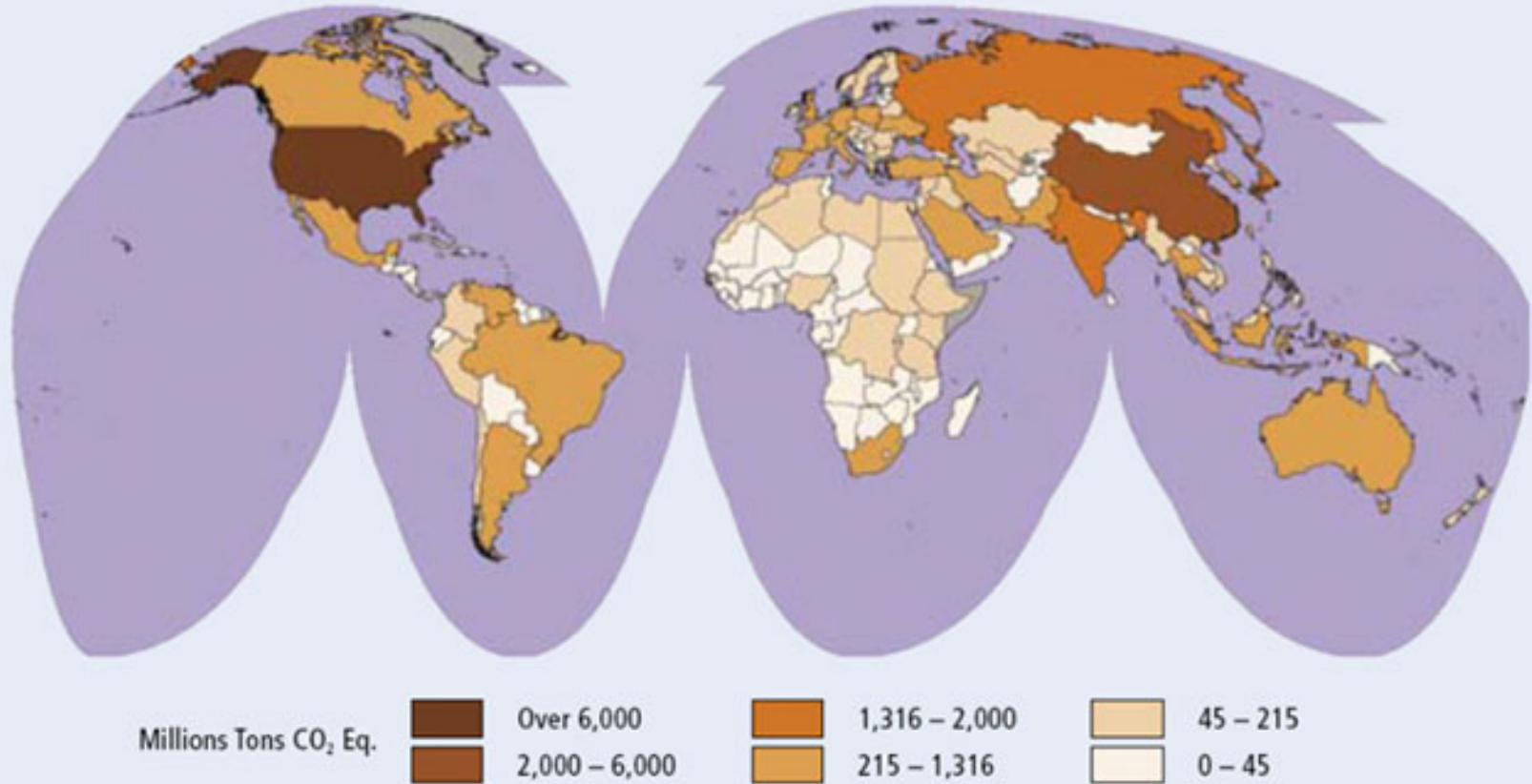
Heating up the earth?



There are different greenhouse gases, that induce global warming (vapor, methane, nitrous oxides). One of the most influential is CO₂.

Main CO₂ emitters

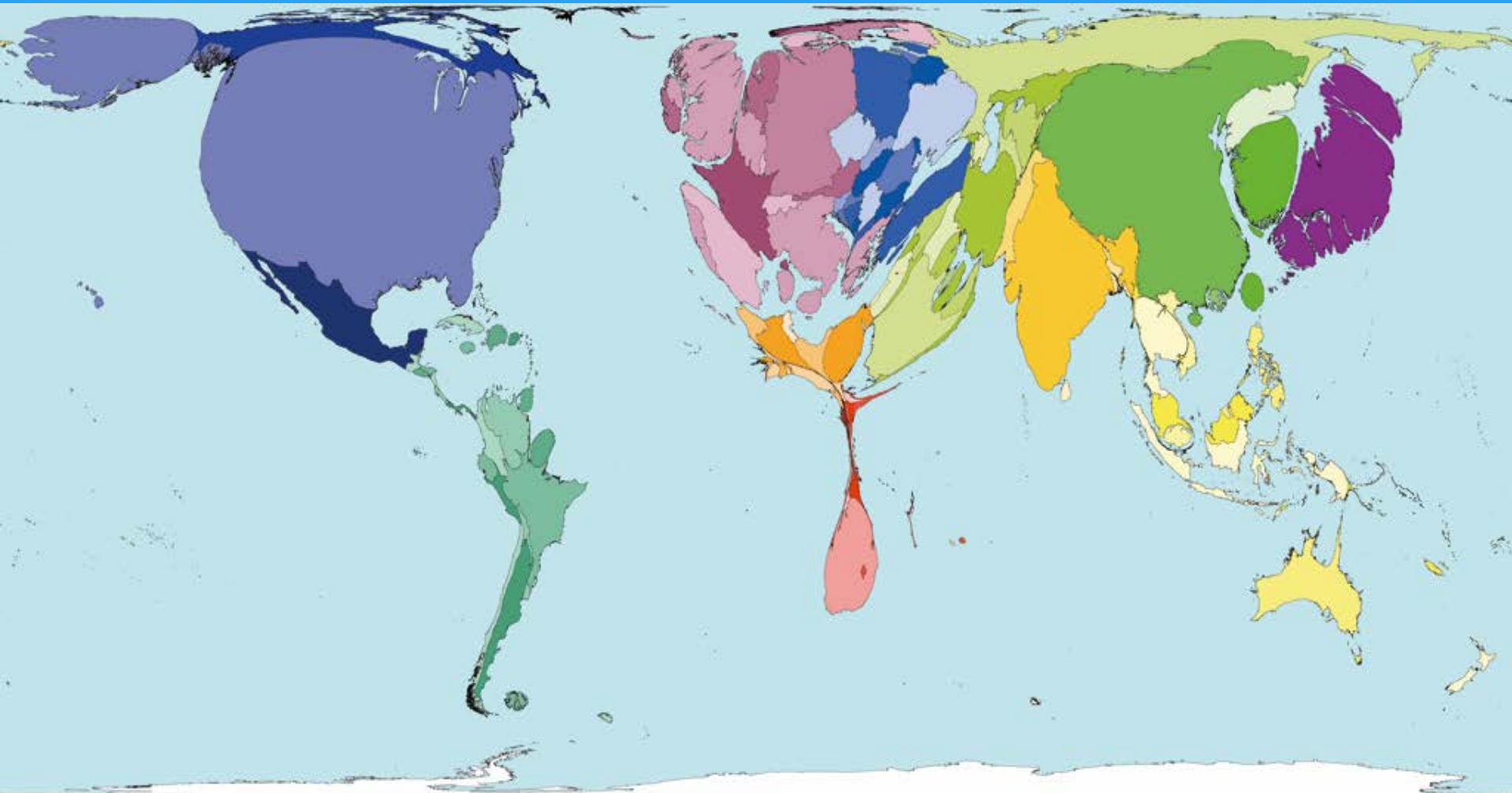
World map with greenhouse gas emission levels presented by country



Sources & Notes: WRI, CAIT. Data is in absolute totals of six GHGs for 2000. EU-25 is not shown collectively.

Figure from Baumert et al. (2005) – World Resources Institute

Main CO₂ emitters



CO₂ emissions 2000

Examples of CO₂ sources



forest fires



coal and oil burning



volcanic eruptions

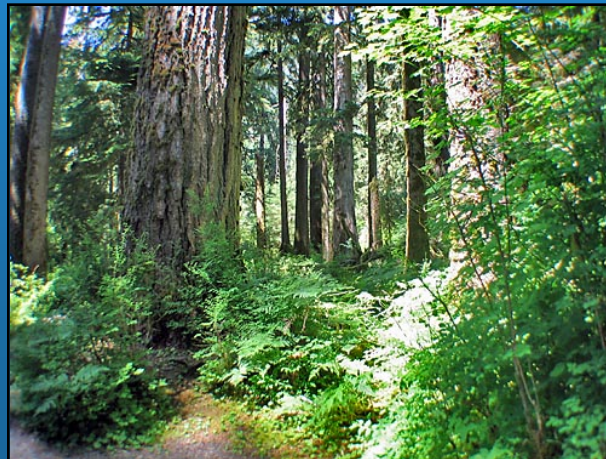
Examples of CO₂ sinks



oceans



soils



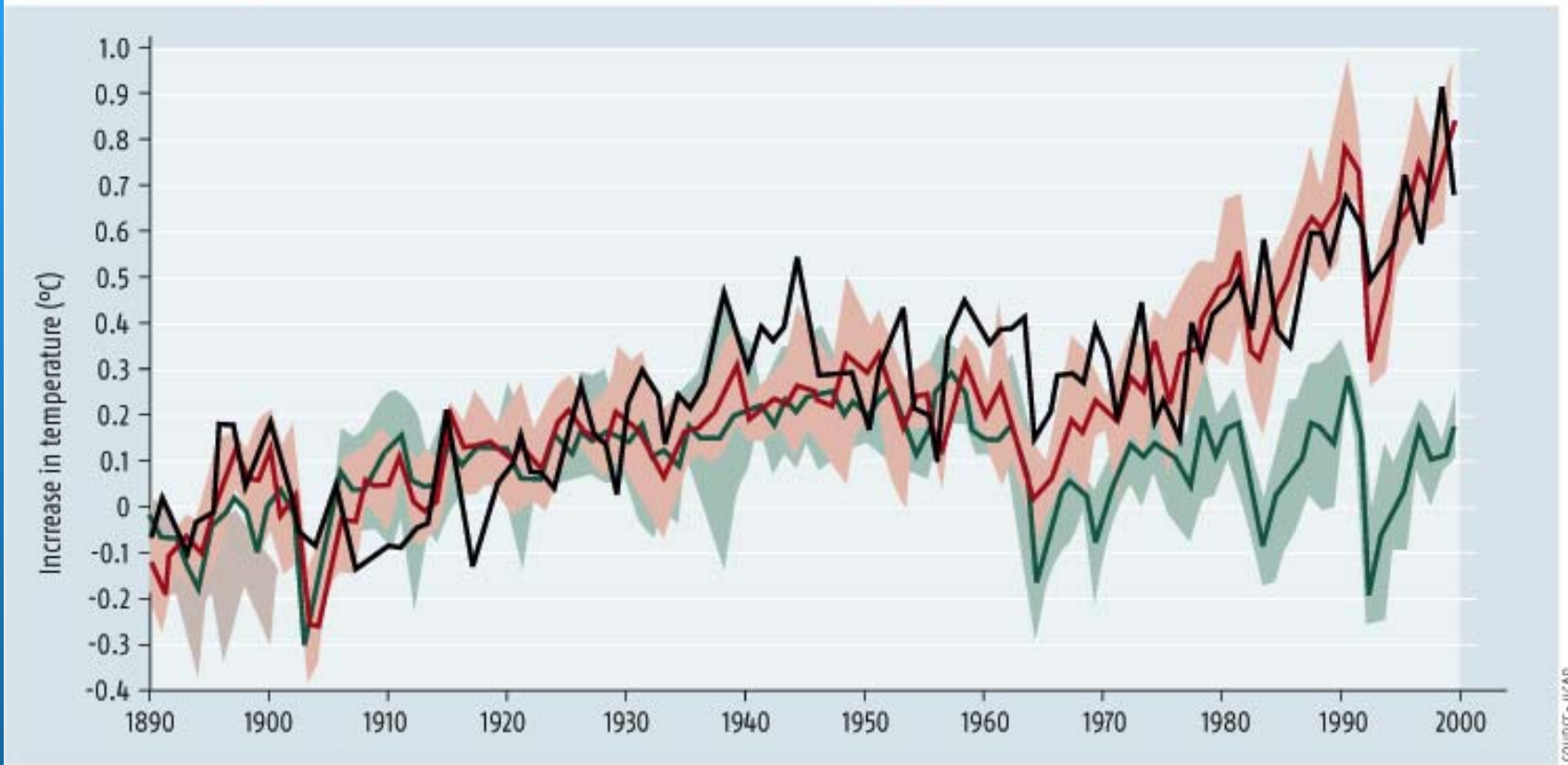
forests

Induced by human or nature?

THE HUMAN IMPACT ON CLIMATE

Without human activities global temperatures might now be falling

● Observations ● Predicted sum of natural and anthropogenic changes ● Predicted natural changes

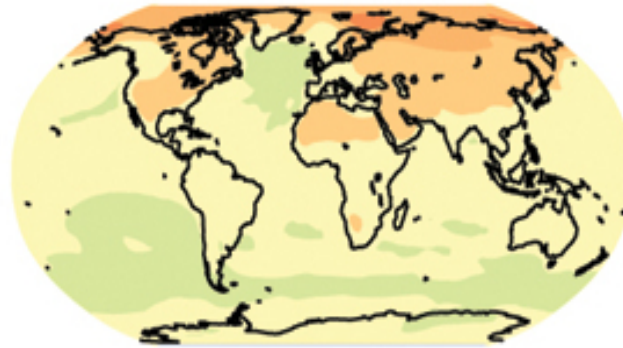


Computer models are helpful to understand the causes of climate change.

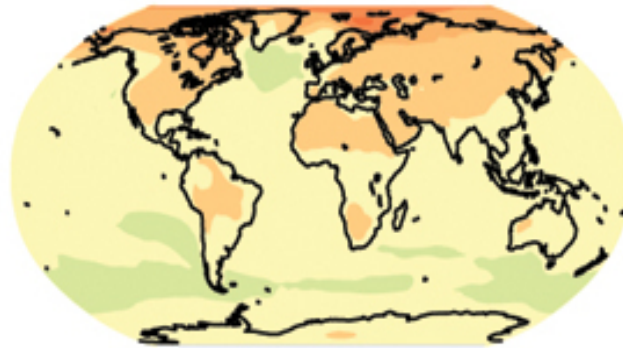
Climate Change Scenarios

2020 - 2029

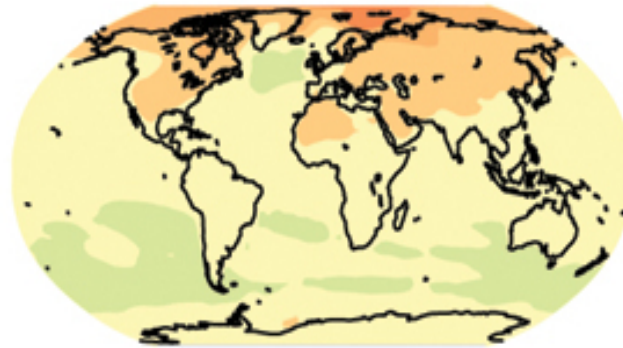
A2



A1B



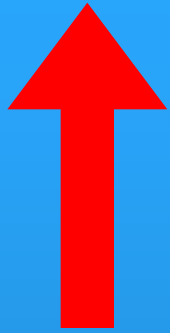
B1



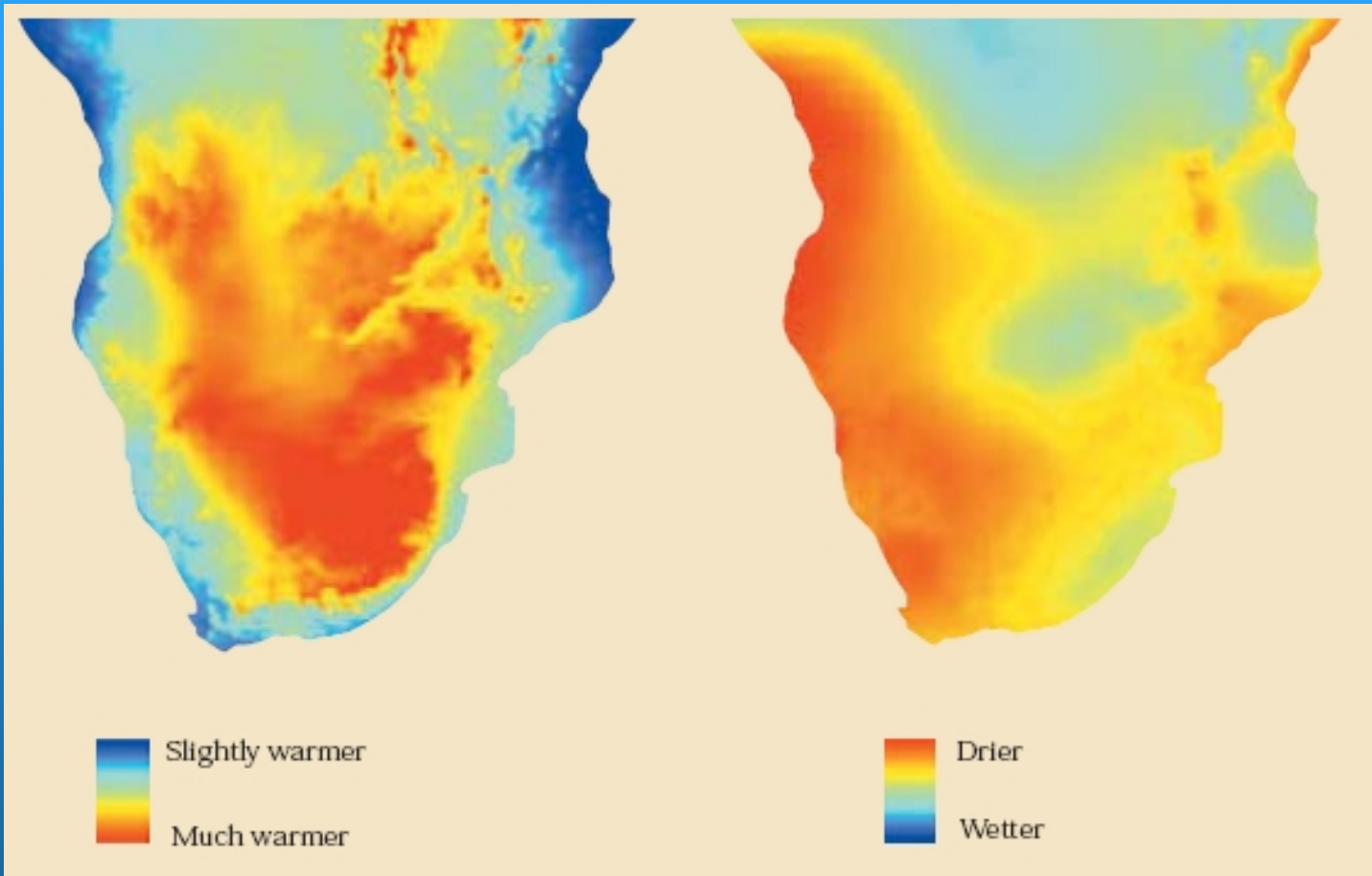
0 0.5 1 1.5 2 2.5 3 3.5 4 4.5 5 5.5 6 6.5 7 7.5

(°C)

strength of impact

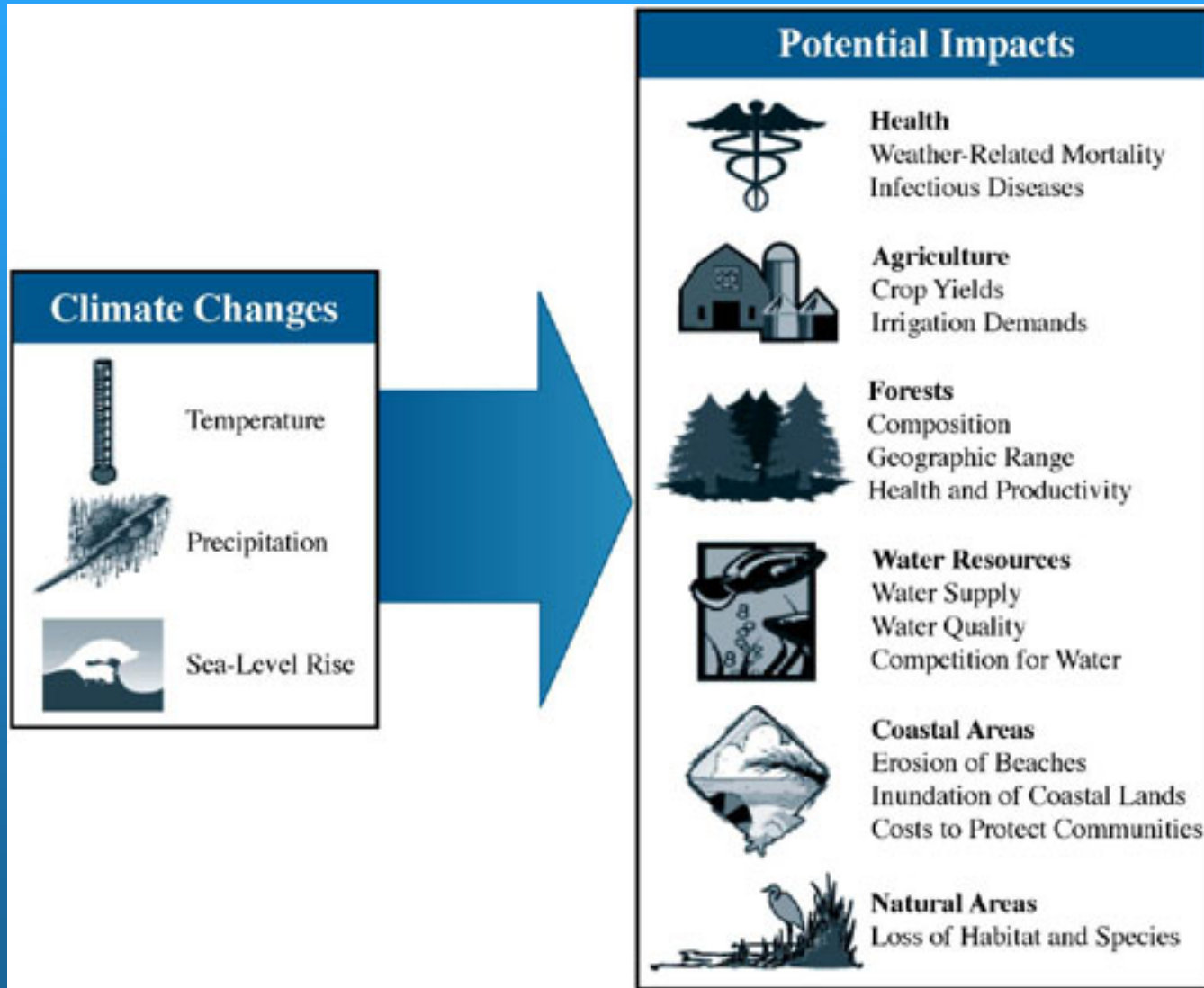


What could happen in South Africa?



The HADCM3 climate model of changes in temperature (left) and precipitation (right) for 2050 (relative to conditions between 1961 and 1990)

Consequences of Climate Change



How to deal with Climate Change?

There are two overall strategies:

mitigation



e.g.
Kyoto-protocol
reduction of emission
renewable energy

adaption



e.g.
coastal protection
adapted agriculture

A brief summary

- Human influence on climate is regarded as to be sure
- Greenhouse gases play an important role in Climate Change
- Climate forecasts are difficult to model and have a high uncertainty
- Local impacts are very hard to predict