


 Global Climate Change Alliance
 Support Facility
 

Module 3

Understanding the basics of climate change science

Training workshops on
mainstreaming climate change


Is climate change real?

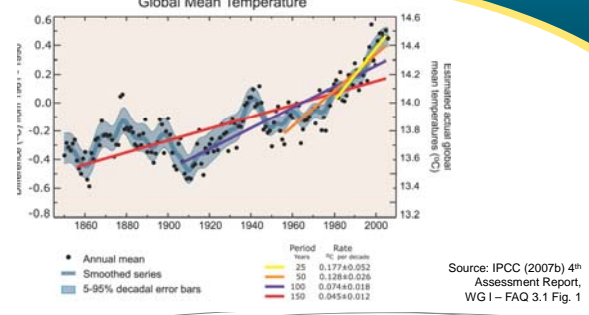


- IPCC 4th Assessment Report:
 - “Warming of the climate system is unequivocal, as is now evident from observations of increases in global average air and ocean temperatures, widespread melting of snow and ice and rising global average sea level”.
- Observed trends:
 - Recent years warmest on record
 - Accelerating increase in global surface temperature and ocean temperature
 - Accelerating rise in sea level

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Some observations: trends in global mean temperature

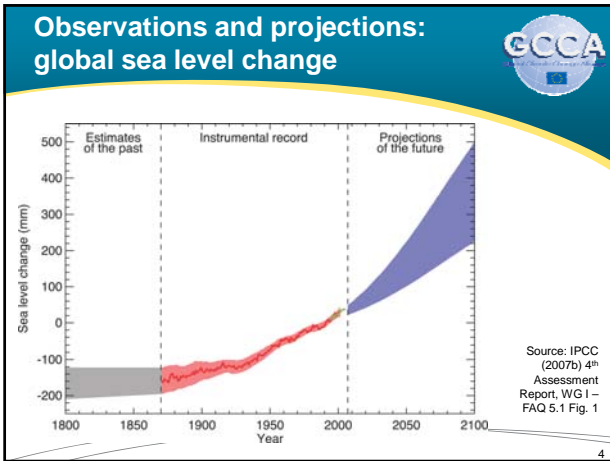


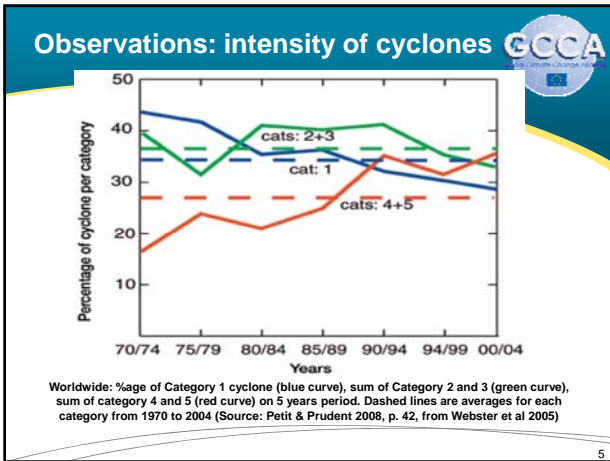


Period (years)	Rate (°C per decade)
25	0.177 ± 0.052
50	0.128 ± 0.036
100	0.074 ± 0.018
150	0.045 ± 0.012

Source: IPCC (2007b) 4th Assessment Report, WG I – FAQ 3.1 Fig. 1

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What are the causes of climate change?

- *Natural variation* is an inherent feature of the climate (e.g. driven by solar cycles, earth orbit, volcanoes)
- But *anthropogenic emissions of long-lived greenhouse gases* in the atmosphere are a major cause of the changes now being observed

The greenhouse effect

The Greenhouse Effect

Solar radiation powers the climate system.

Some solar radiation is reflected by the Earth and the atmosphere.

Some of the infrared radiation passes through the atmosphere but most is absorbed and re-emitted in all directions by greenhouse gas molecules and clouds. The effect of this is to warm the Earth's surface and the lower atmosphere.

ATMOSPHERE

EARTH

About half the solar radiation is absorbed by the Earth's surface and warms it.

Infrared radiation is emitted from the Earth's surface.

Source: WWF/IPCC, http://wwf.panda.org/about_our_earth/aboutcc/how_cc_works/

What are the main greenhouse gases?

- By decreasing order of abundance:
 - water vapour (H₂O)
 - carbon dioxide (CO₂)
 - methane (CH₄)
 - nitrous oxide (N₂O)
 - ozone (O₃)
 - chlorofluorocarbons (CFC)
 - other halogenated compounds (i.e. gases containing fluorine, chlorine, bromine or iodine) (e.g. hydrofluorocarbons – HFC, sulphur hexafluoride – SF₆)

