

Official Launching Event



4th of October 2011 European Parliament

Atmospheric Chemistry and Climate in the Anthropocene

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ECRA Launching Event

European Parliament

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- **During the past 3 centuries human population has increased tenfold to 7000 million**
- **Cattle population increased to 1400 million (one cow/family); by a factor of 4 during the past century**
- **There are currently some 20 billion (20,000 million) of farm animals worldwide**
- **Urbanisation grew more than tenfold in the past century; almost half of the people live in cities and megacities**
- **Industrial output increased 40 times during the past century; energy use 16 times**
- **Almost 50 % of the land surface has been transformed by human action**

Water use increased 9 fold during the past century to 800 m³ per capita / year; 65 % for irrigation, 25 % industry, ~10 % households

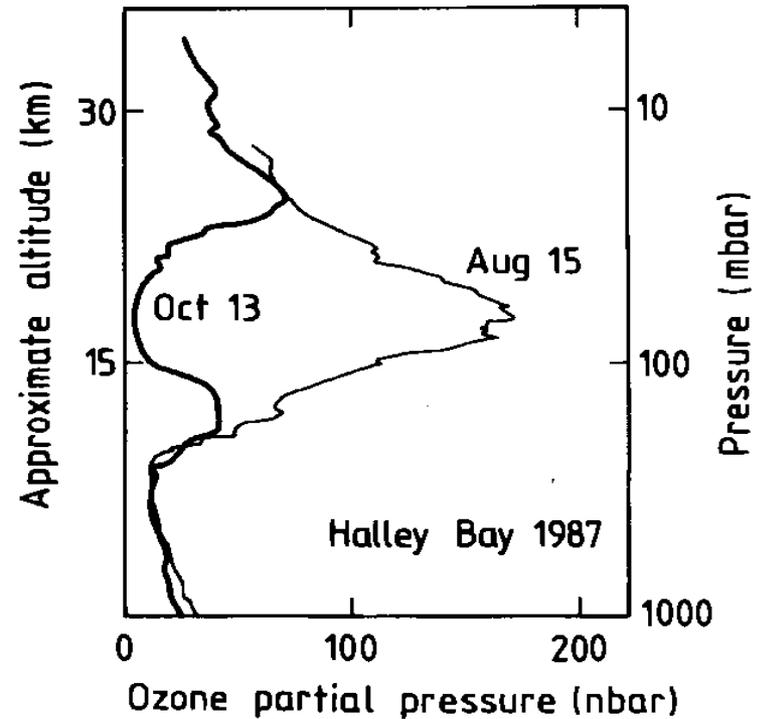
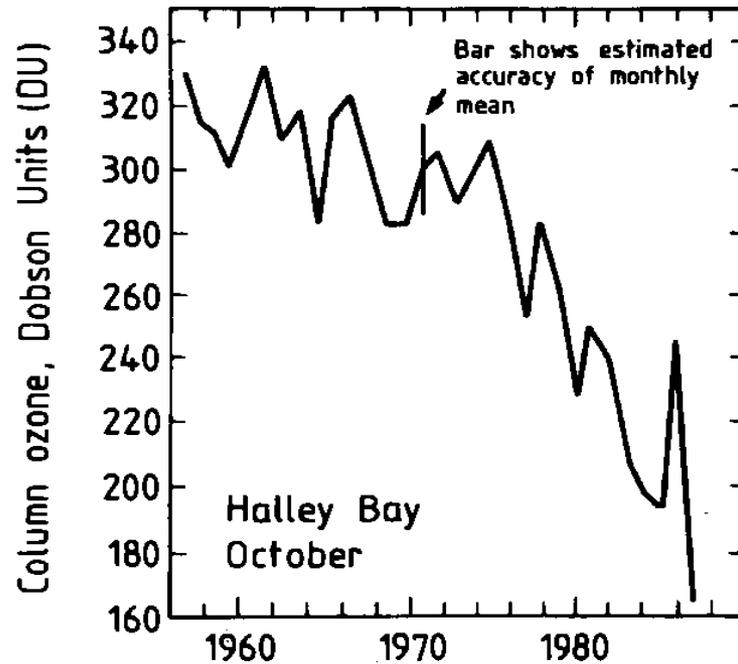
It takes **20,000 litres** of water to grow 1 kilo of coffee, **11,000 litres** of water to  make a quarter pounder,  and **5000 litres** of water to make 1 kilo of cheese 

1 kg meat → 16000 l water

1 kg grain → 1000 l water

•Humanity is also responsible for the presence of many toxic substances in the environment and even some which are not toxic at all, but which have, nevertheless, led to the ozone hole.

•Among the „greenhouse gases“ are also the almost inert CFCs (chlorofluorocarbons) gases. However, their photochemical breakdown in the stratosphere gives rise to highly reactive chlorine and bromine gases (radicals), which destroy ozone by catalytic reactions. As a consequence UV-B radiation from the sun increases, leading for instance to enhanced risk of skin cancer.



Fortunately, the CFC gases are no longer produced, but it will take 50 years or more to heal the ozone hole.

Species extinction

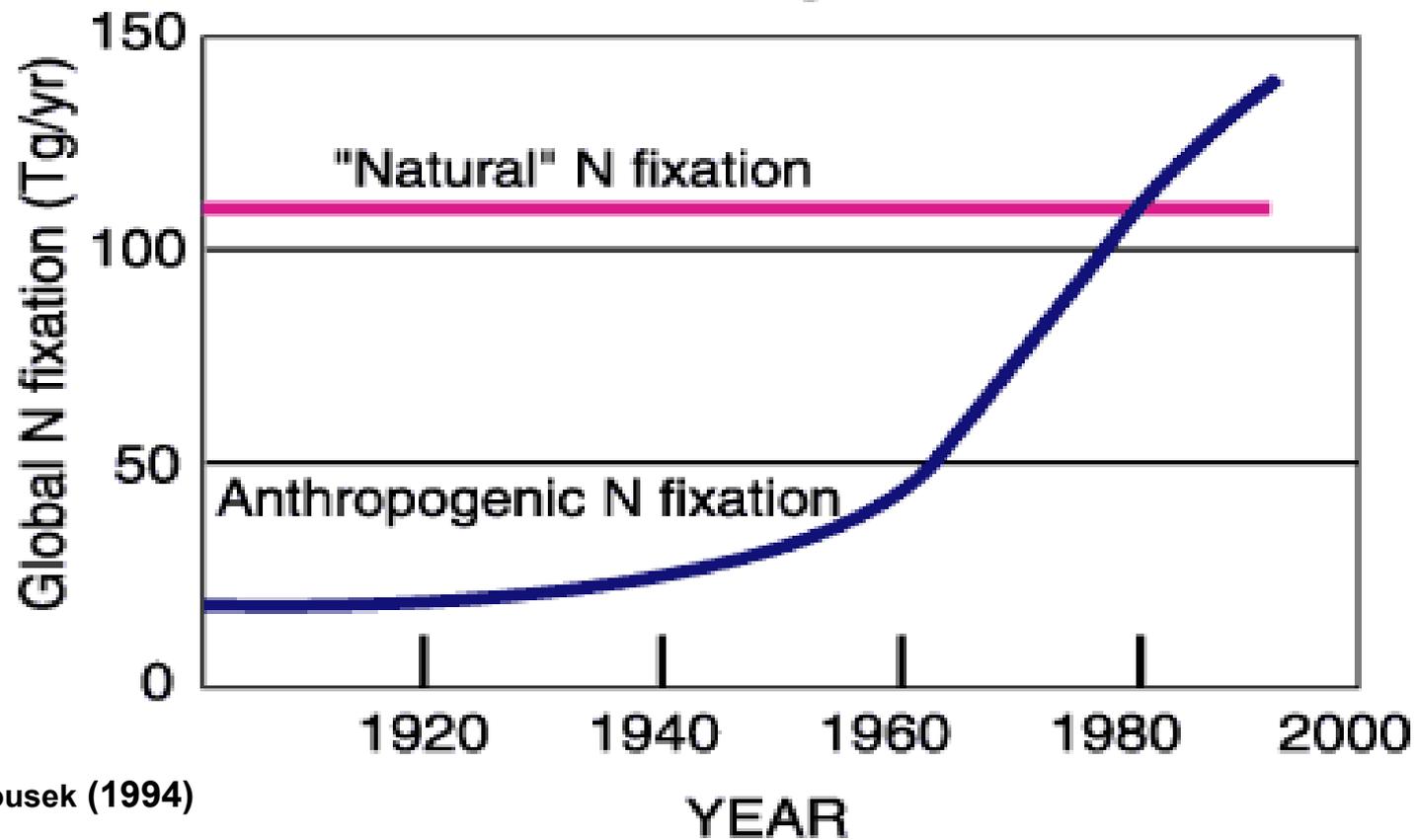
•E.O. Wilson “Before humans existed, the species extinction rate was (very roughly) one species per million species per year. Estimates for current species extinction rates range from 100 to 10,000 times that, but most hover close to 1,000 times prehuman levels (\approx 10% per century)

Man the Eroder

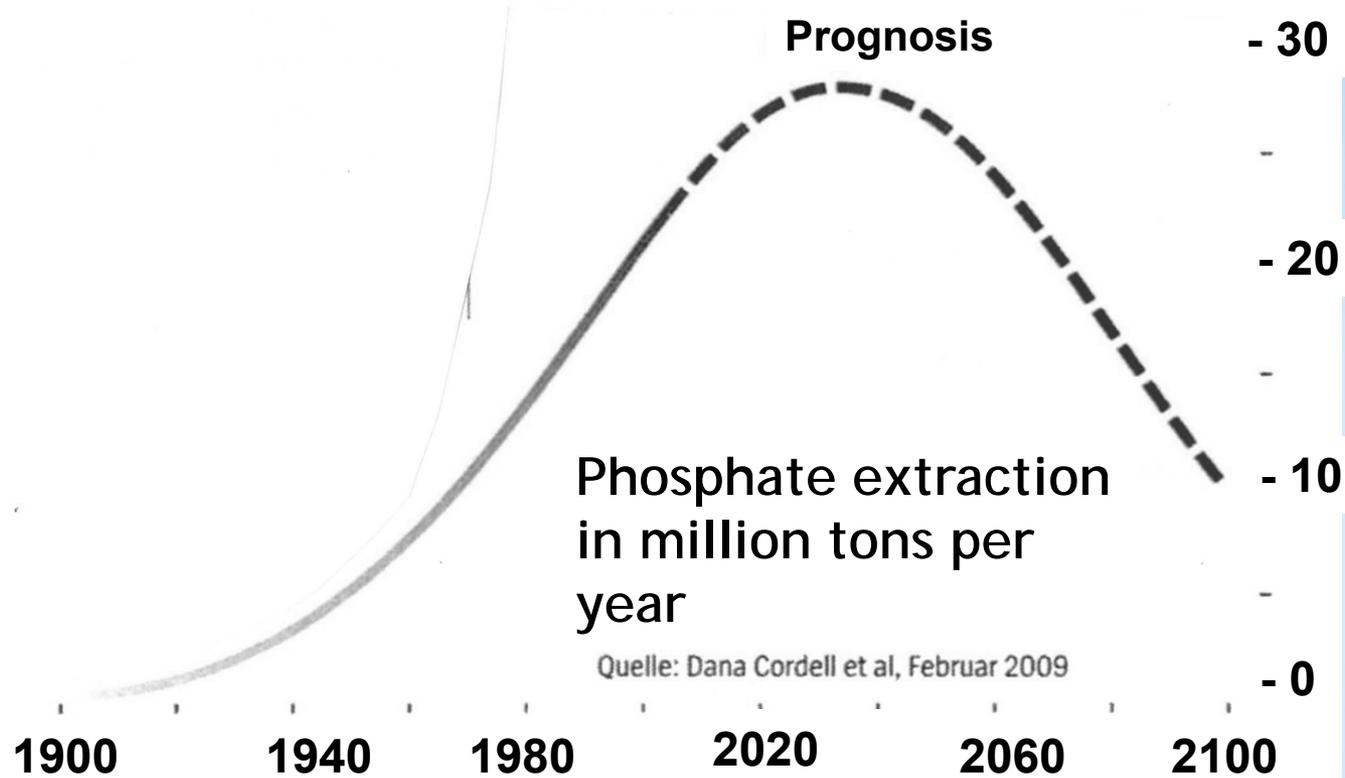
- **Man-caused erosion (crop tillage, land conversion for grazing and construction): 15 times natural erosion**
- **At current rate anthropogenic soil erosion would fill the Grand Canyon in 50 years.**

According to Wilkinson (Geology) March 2005.

Nitrogen

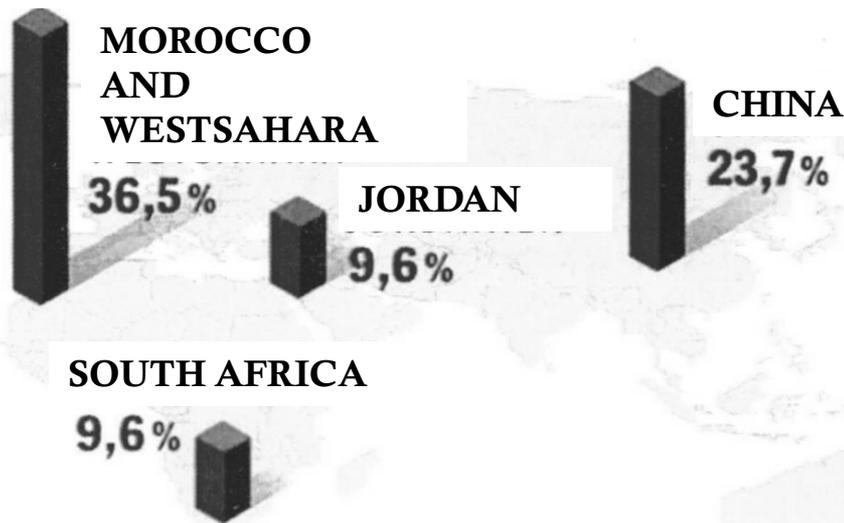


Vitousek (1994)



Share of global reserves of phosphate rock

Four countries control around 80 % of the world's phosphate rock reserves.

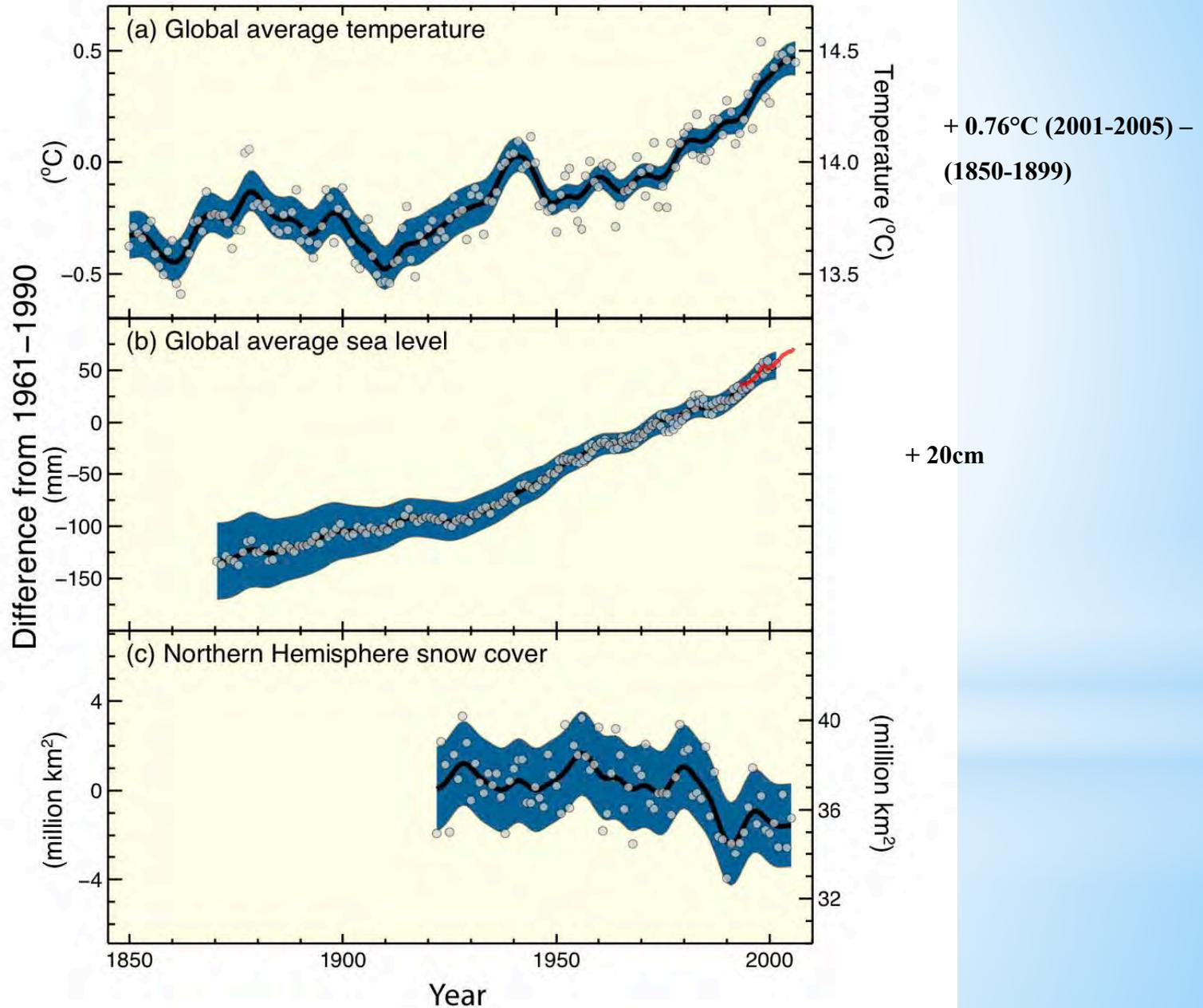


Since the beginning of the 19th Century, by its own growing activities, Mankind opened a new geological epoch: the Anthropocene.

We are clearly affecting climate and can deliberately do so.



Changes in Temperature, Sea Level and Northern Hemisphere Snow Cover



IPCC (2007):

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.

Average global surface temperature rise 2.0 - 4.5 °C (1.1 - 6.4 °C) by 2100.

Sea level rise 19 – 58 cm by 2100; S.Rahmstorff: 0.5 – 1.4 m by 2100

* Acidity of ocean water increased by 0.1 pH units, hindering carbonate-secreting organisms building their skeletons

(Caldeira and Wicket, 2003)

**Wastes: Only 20-30 % of N fertilizer is taken up by plants.
 Only about 50 % of food produced is consumed.**

**Loss of agricultural soil through erosions is a serious problem.
Even worse may be the loss of phosphorous.**

**From generation to generation the effect of human activities is
accumulating and even accelerating.**

**Mankind will remain a major environmental force for many
millennia. A daunting task lies ahead for scientists and engineers
to guide society towards environmentally sustainable
management during the era of the Anthropocene. This will require
appropriate human behaviour at all scales.**

Living up to the Anthropocene means building a culture that grows with Earth's biological wealth instead of depleting it. In this new era, nature is us.