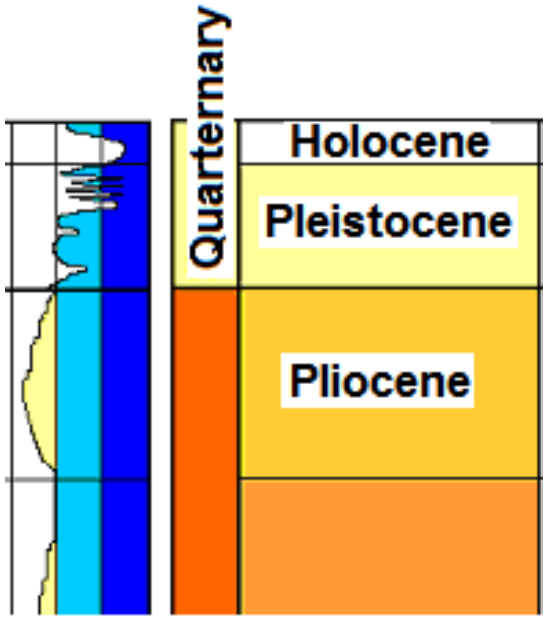
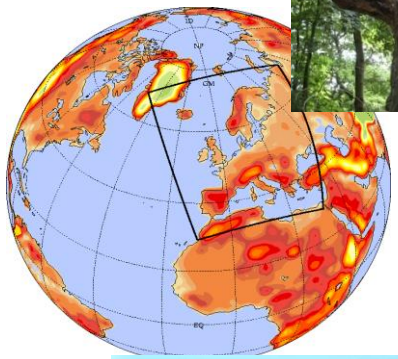
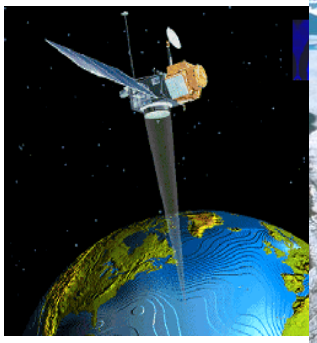
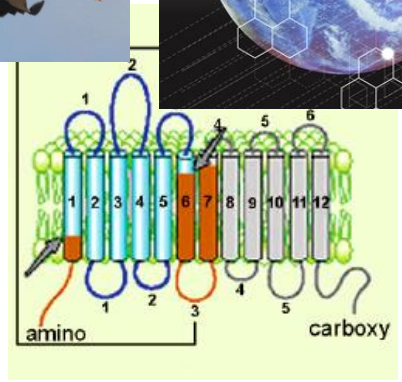
Climate Change: Chances and Challenges for Africa.





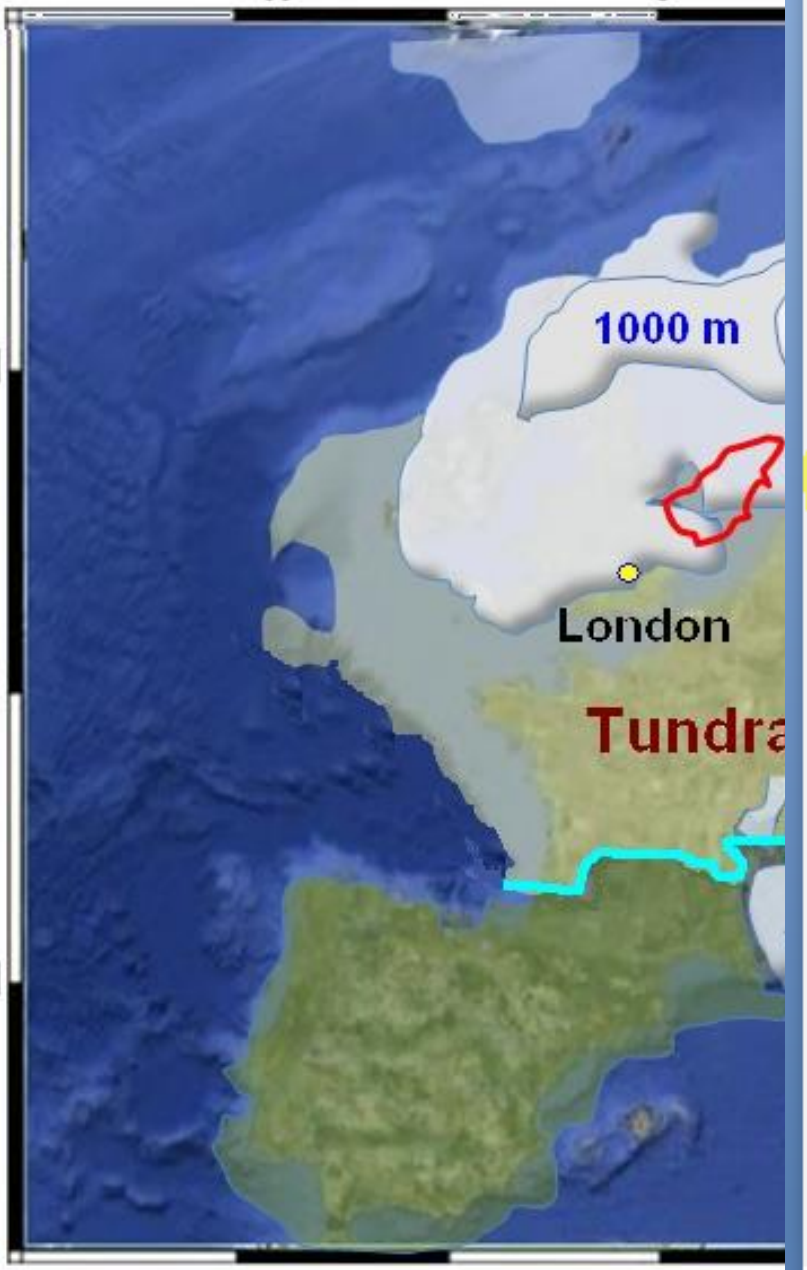




Prof. Dr. Bernhard Stribrny

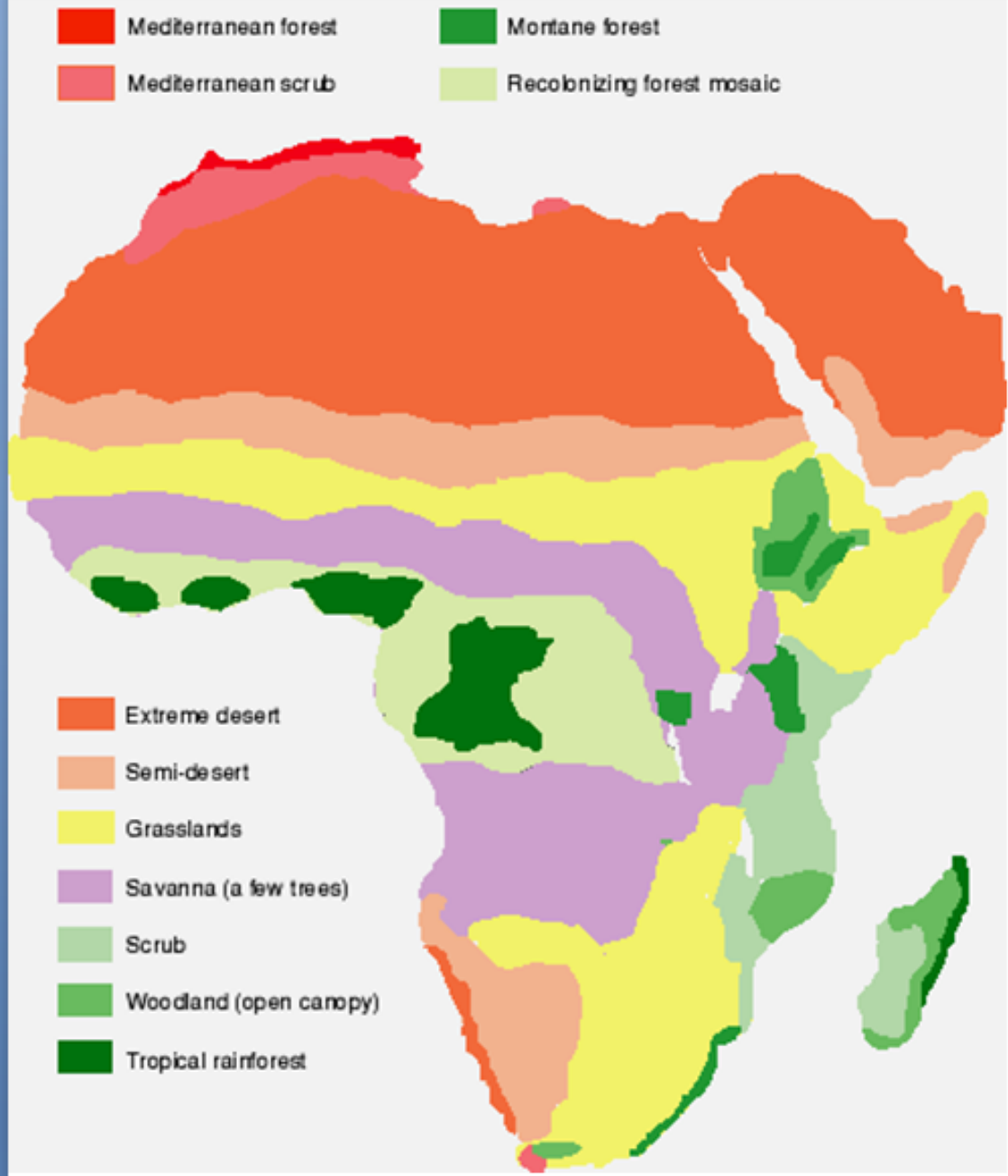
BGR Bundesanstalt für Geowissenschaften und Rohstoffe
GEOZENTRUM HANNOVER

12 300 years ago.....



Stribrny et al. 2012

Late Wechselian glaciation in Europe, aridity in Africa

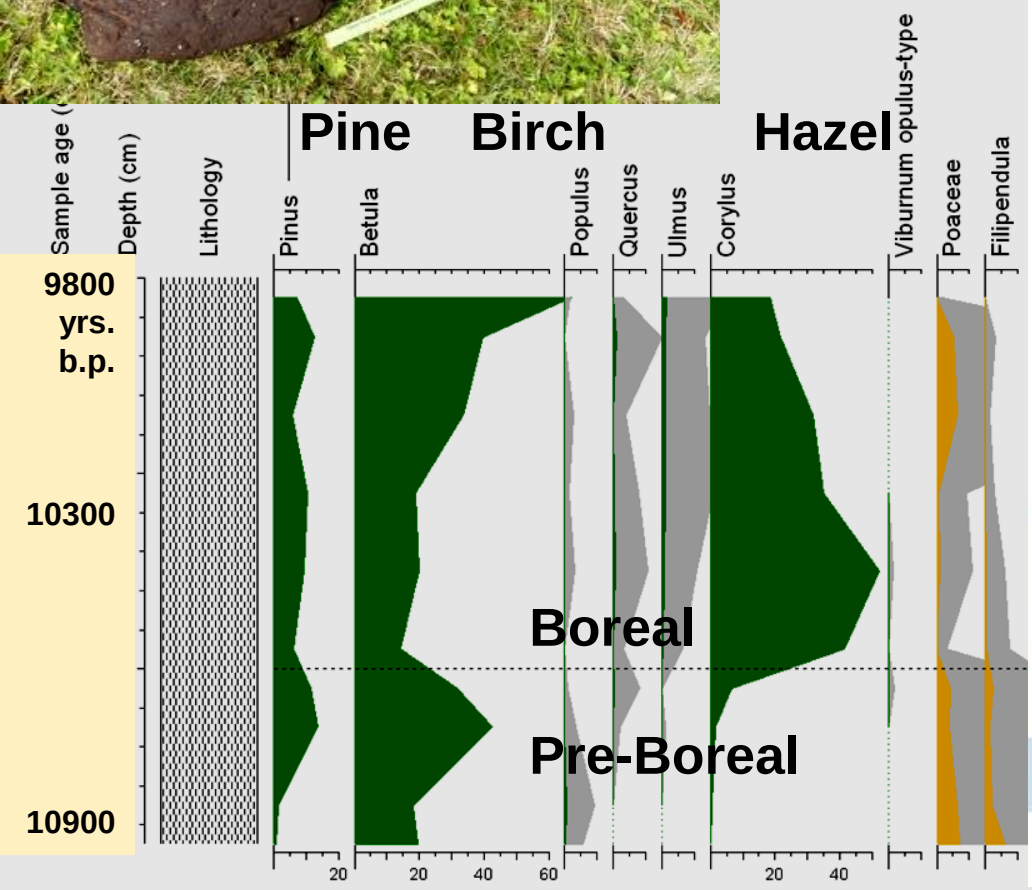


Jonathan Adams http://www.esd.ornl.gov/projects/qen/nercAFRICA.html

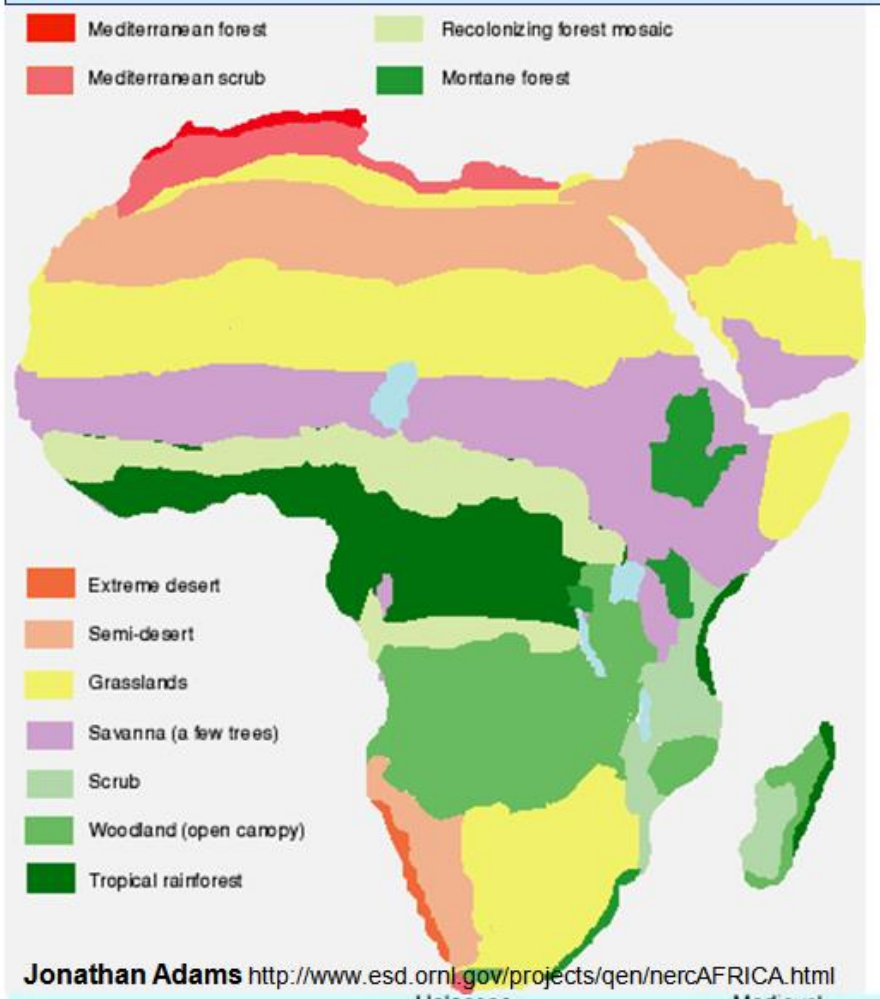
Post-glacial peat of the Dogger B

Big peat boulder 75x40x15 cm

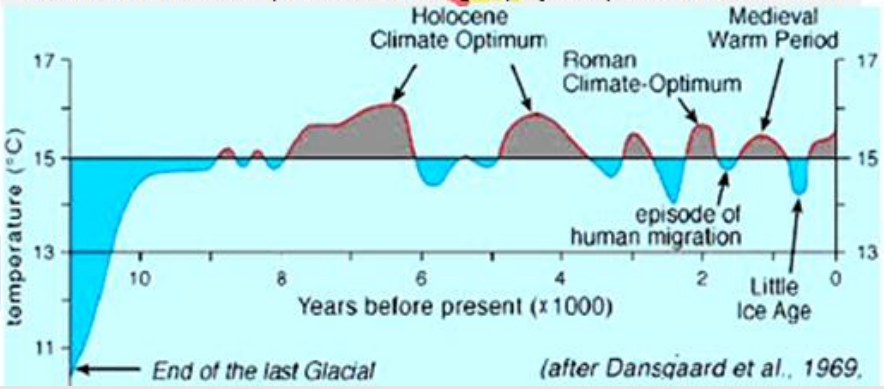
54°59,4' N / 1 °37,9 E in 29,9 m depth



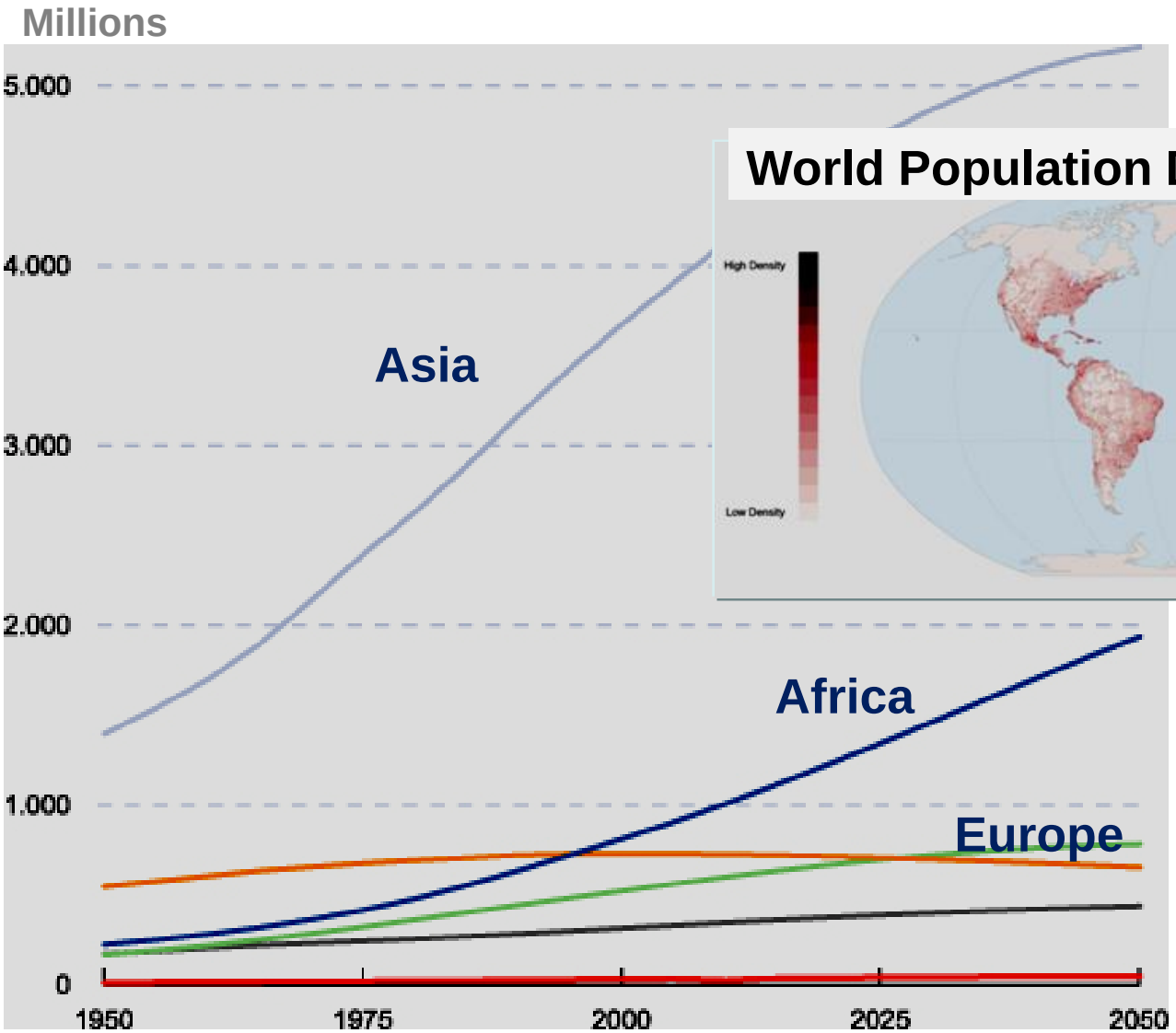
Holocene temperature optimum: "Green Sahara"



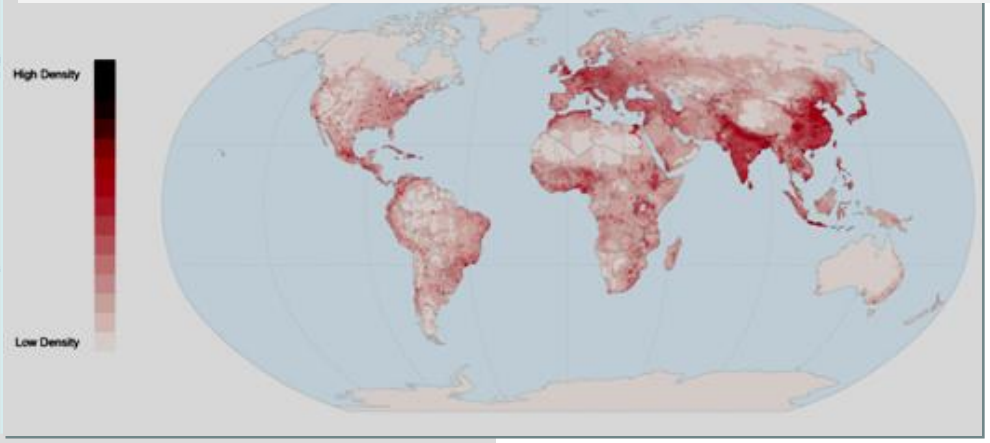
Jonathan Adams http://www.esd.ornl.gov/projects/qen/nercAFRICA.html



World Population

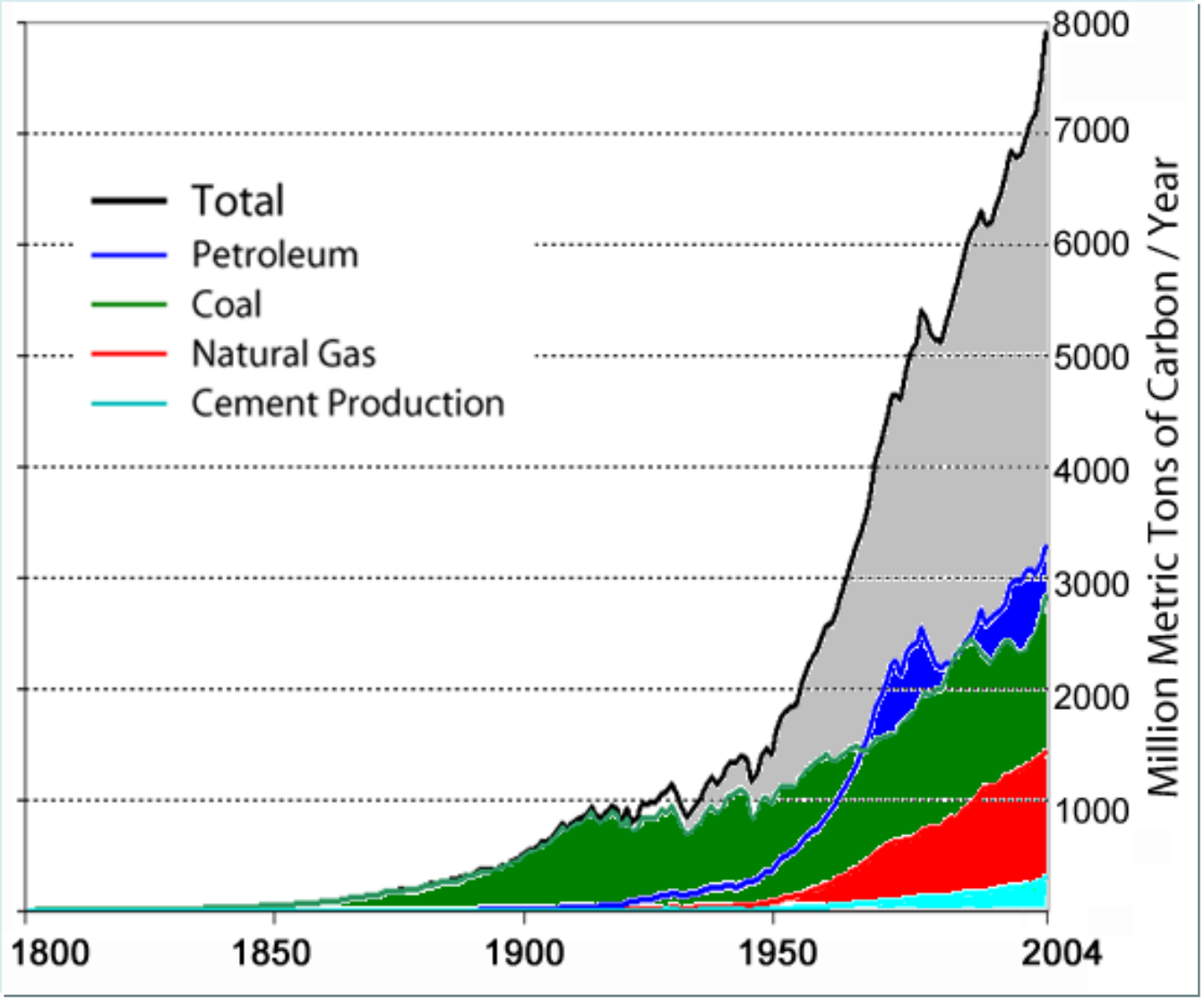


World Population Density



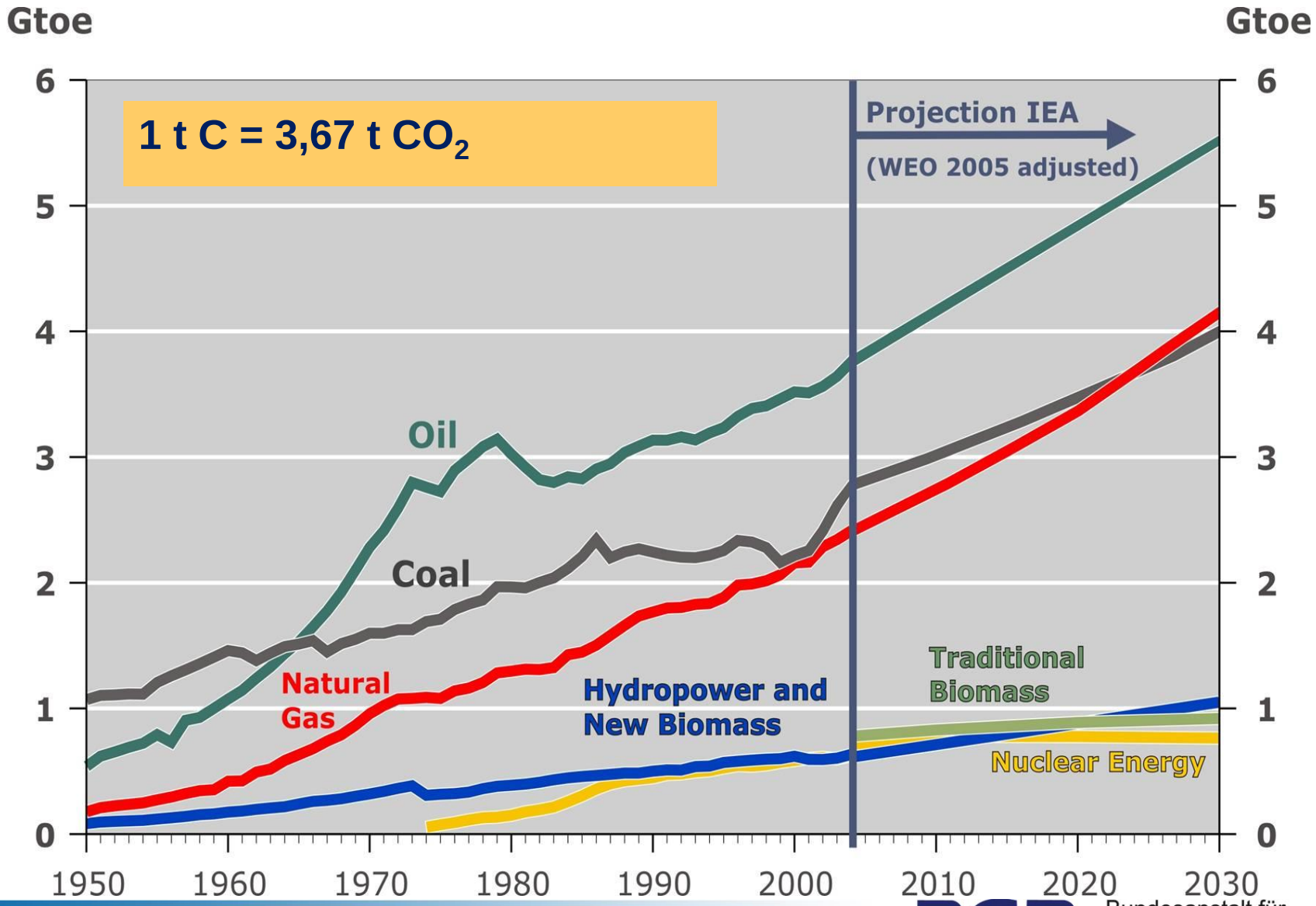
Source:United Nations Populations Prospects - The 2004 Revision

Global Fossil Carbon Emissions



Source: http://cdiac.ornl.gov/trends/emis/glo.html

Global Energy Consumption (International Energy Agency IEA)

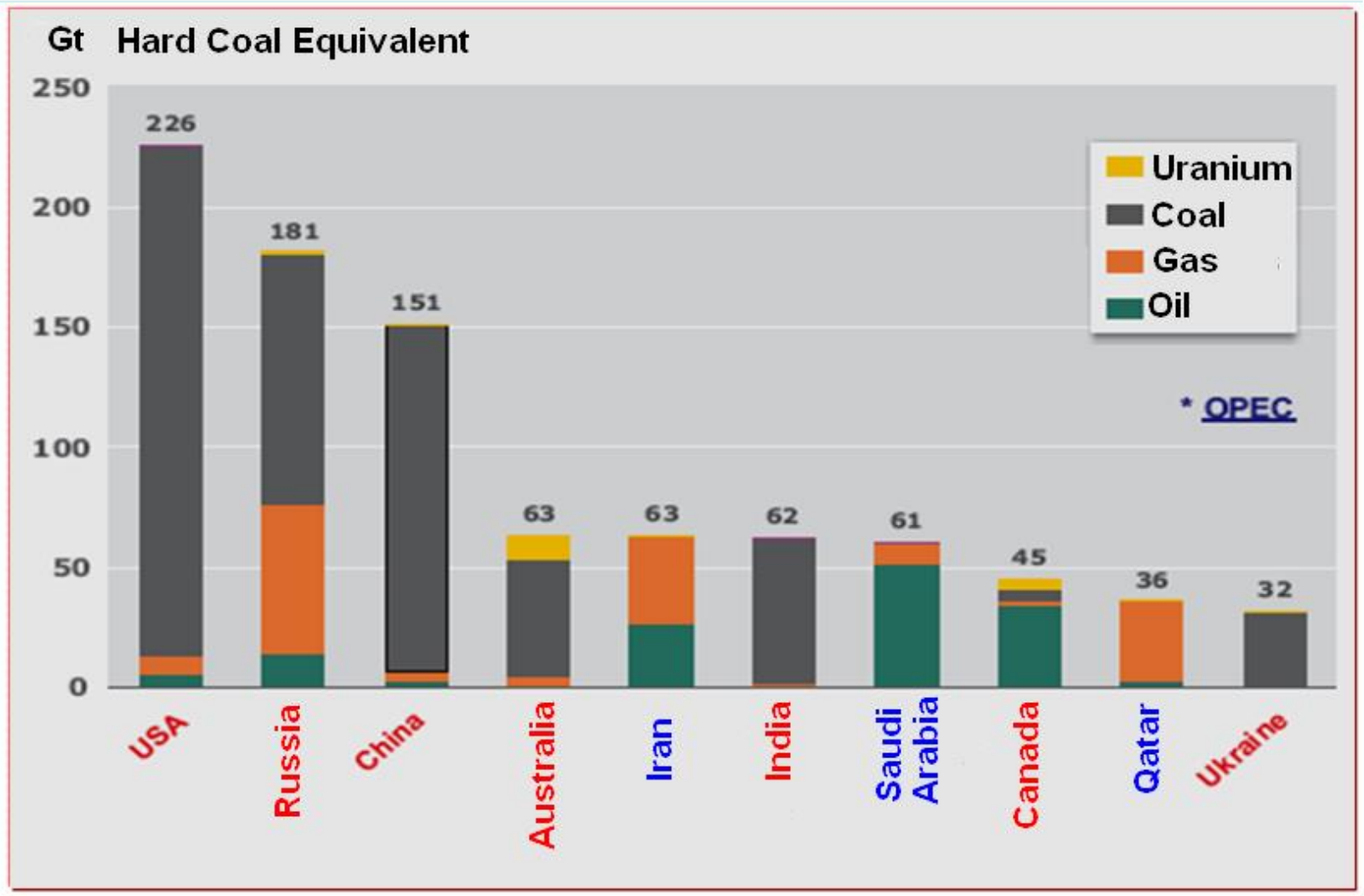


World Energy Resources:

Coal is the dominating future source of fossil energy

Problem: Increasing emissions of CO_2 and SO_2 into the atmosphere

Option: „Clean Coal“, Carbon Capture and Storage, CCS ?

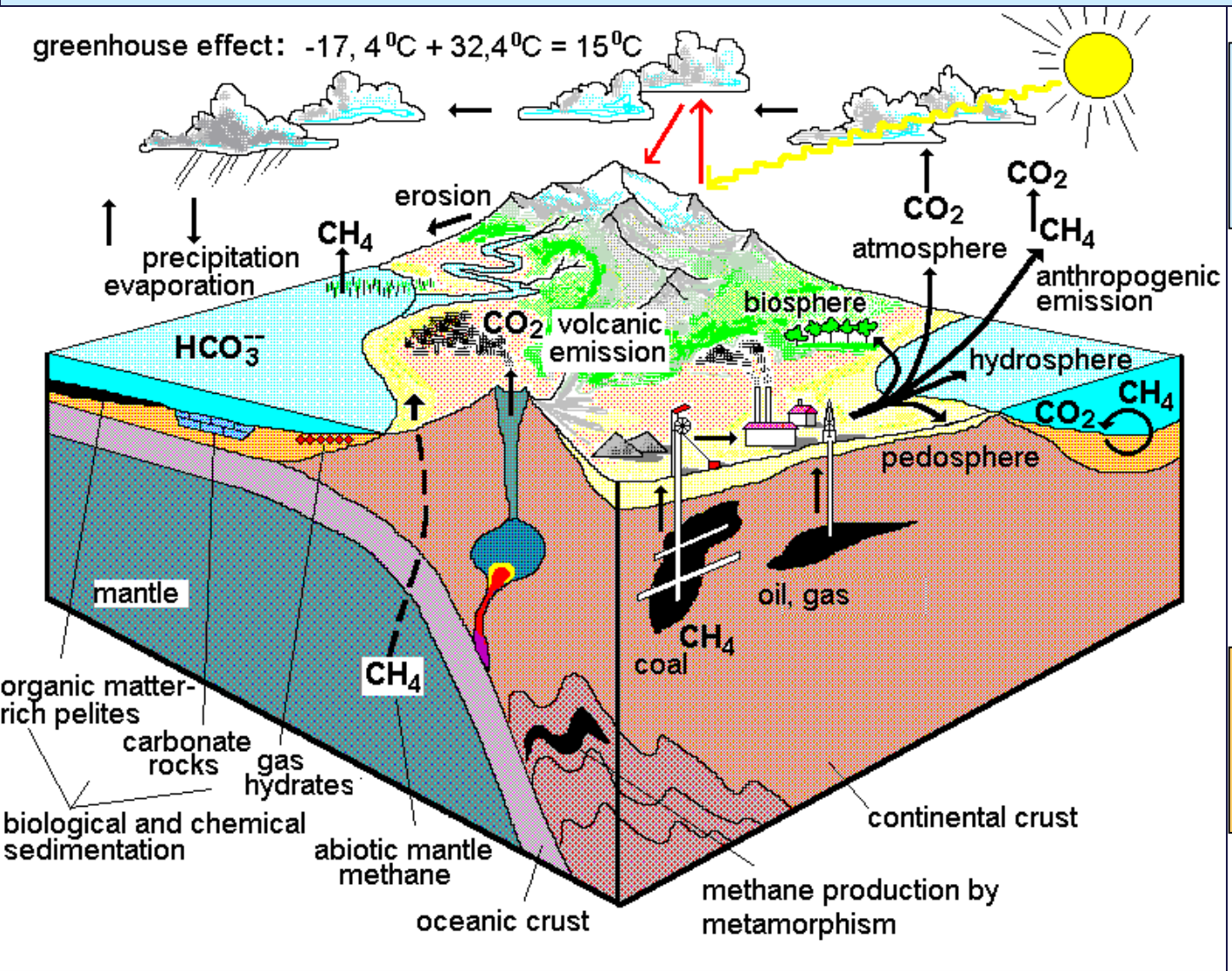


Global Carbon Cycle: Greenhouse Gas Effect

CO_2-Emissions: Anthropogen 32 Gt /year (10^9 t/a)

Geogen 550 Gt /per year

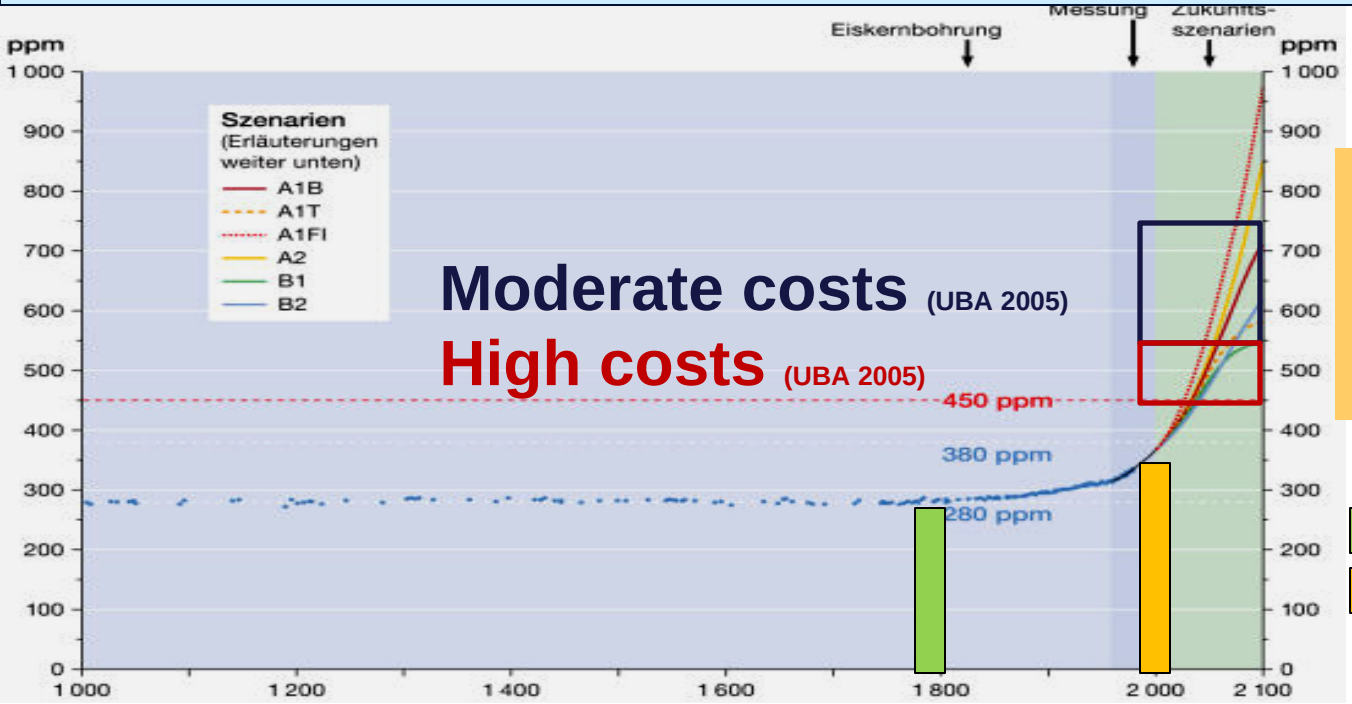
Geogene emissions are link with geogene sinks, but not the anthropgene ones



Small reservoirs, rapid exchange

Giant reservoirs, slow exchange processes

CO_2 in the Atmosphere and Projected Temperatures



Post-Kyoto Regime ?

750-550 ppmV CO_2

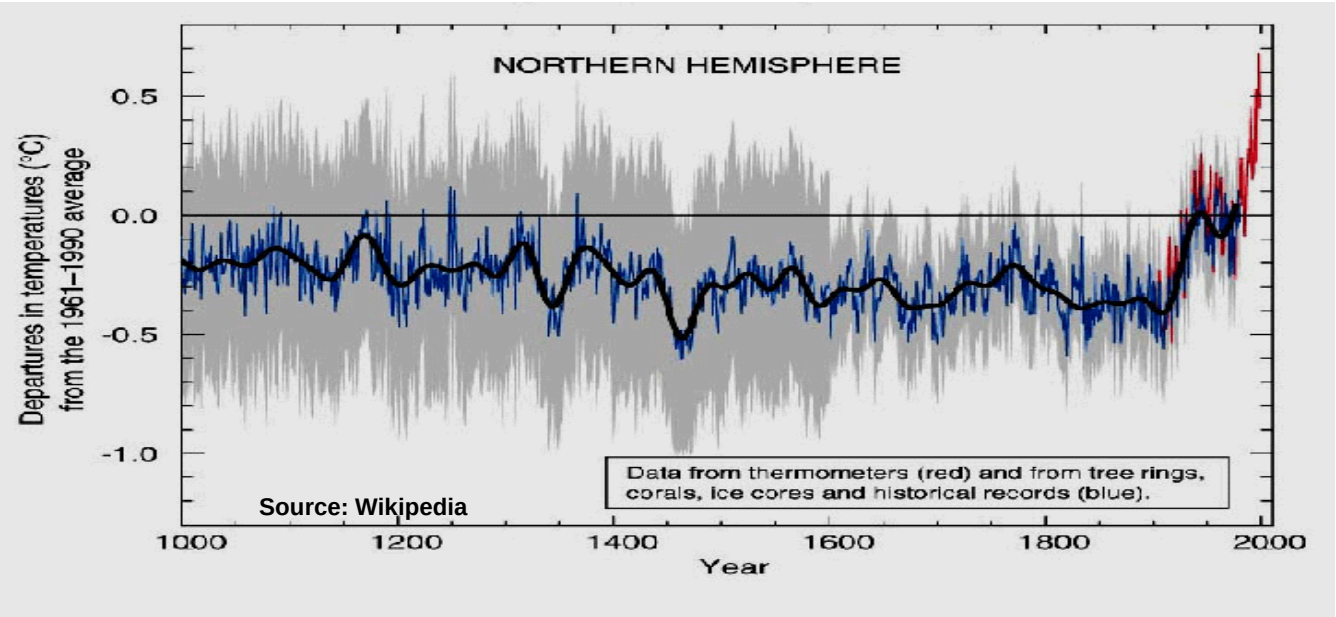
550-450 ppmV CO_2

Year

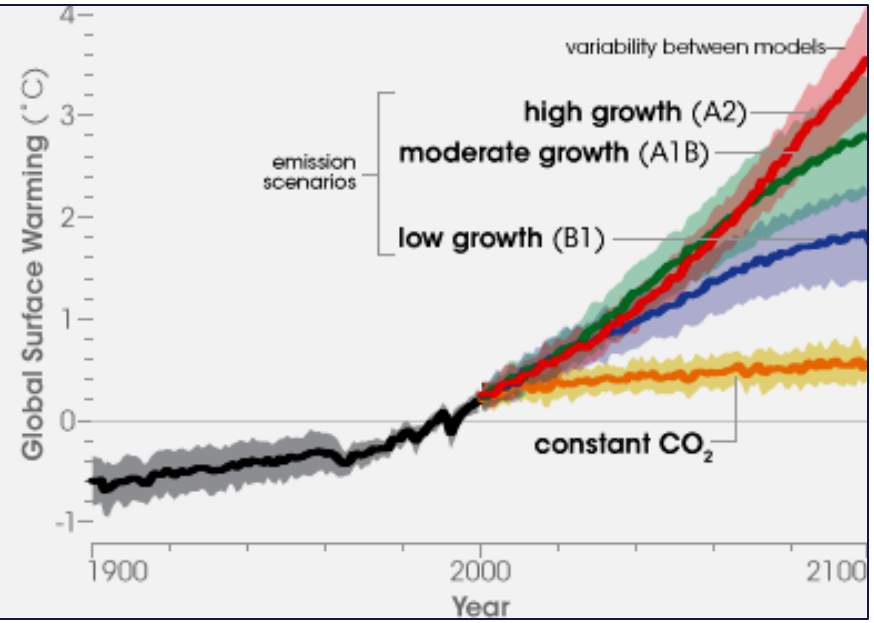
1800: 280 ppm V

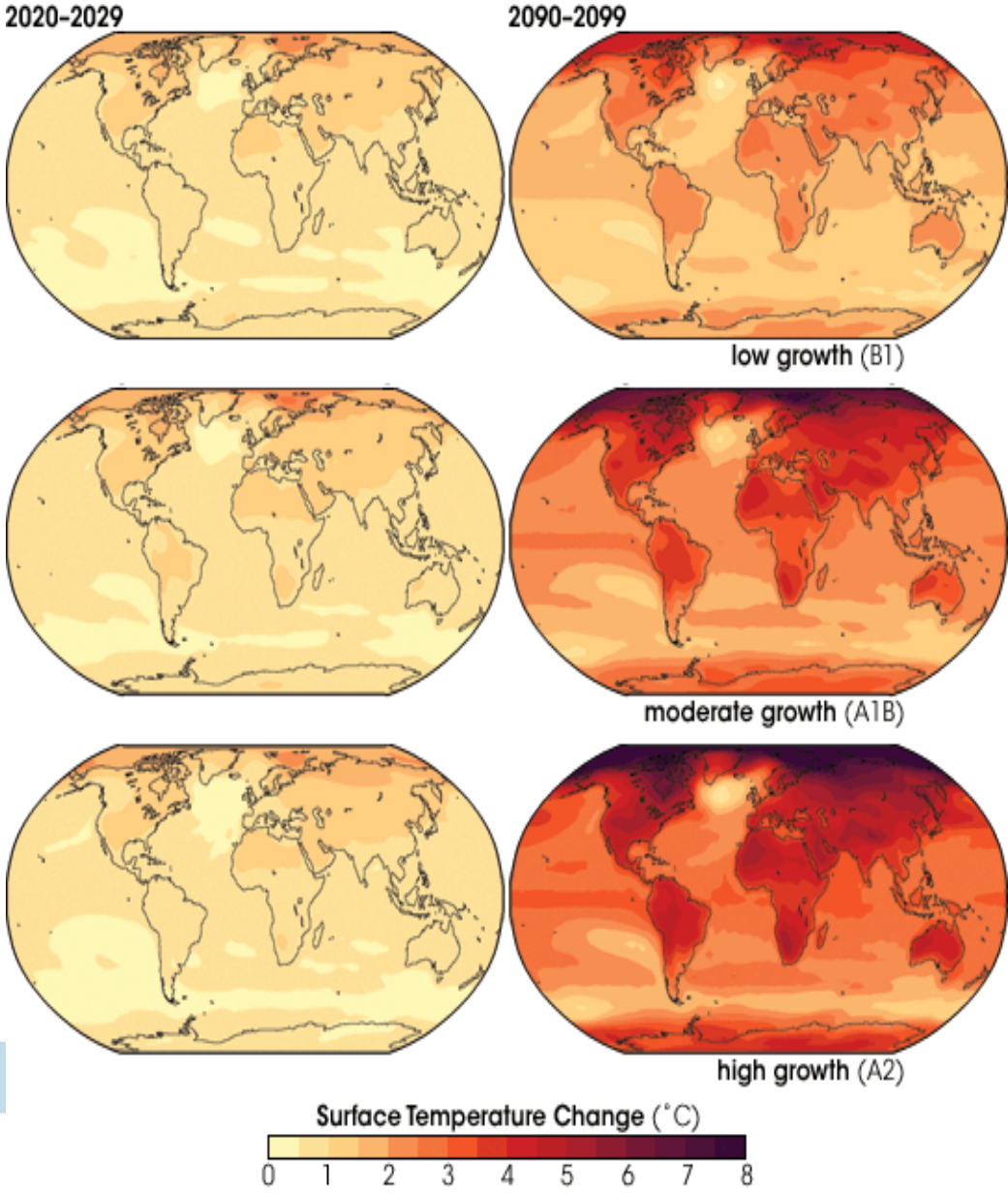
2007: 380 ppmV

Increase of +35 %



IPCC Emission Scenarios and Projected Global Average Temperature Change Intergovernmental Panel on Climate Change (IPCC)





Chances and Challanges for Africa

Chances: Renewable Energies, Geothermal Energy

GEOTHERM II : Co-operation African Union Commission and BGR (AUC, Addis Abeba, Ethiopia)

- Strategic concept for exploration of geothermal resources in East Afica
- Support of decision makers and co-ordination of regional acteurs
- Development of a regulation concept for the geothermal energy sector
- Geothermal Risk Mitigation Facility (GRMF).

AUC/BGR Mission - Moroni, Comoros

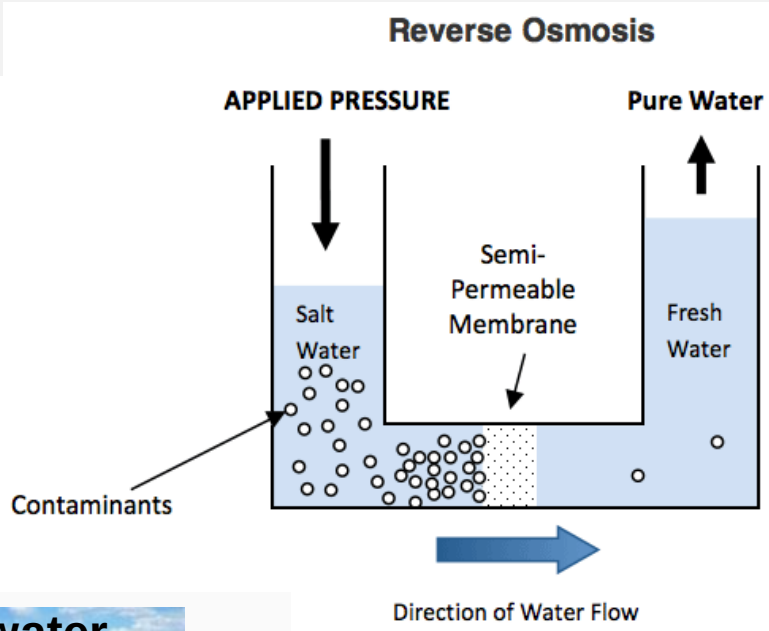
Corbetti - Ethiopia

Alid Volcano - Eritrea

Chances: Renewable energies for desalination of salt water

Processes for separating the salt out of water:
Evaporate, freeze, or filter.

Watercone destillation



A greenhouse farm irrigated with desalinated water

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Chances: Africa´s unrealised potential - Aquaculture

- 30% of people in Africa remain hungry
- Fish provides around 18% of their animal protein
- Capture fisheries largely reach their limits
- Although the potential of aquaculture to reduce poverty and hunger has been recognised in Africa, growth in the sector is small up-to-now, providing less than 2% of fish.

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Challenges for Africa: Extreme weather events

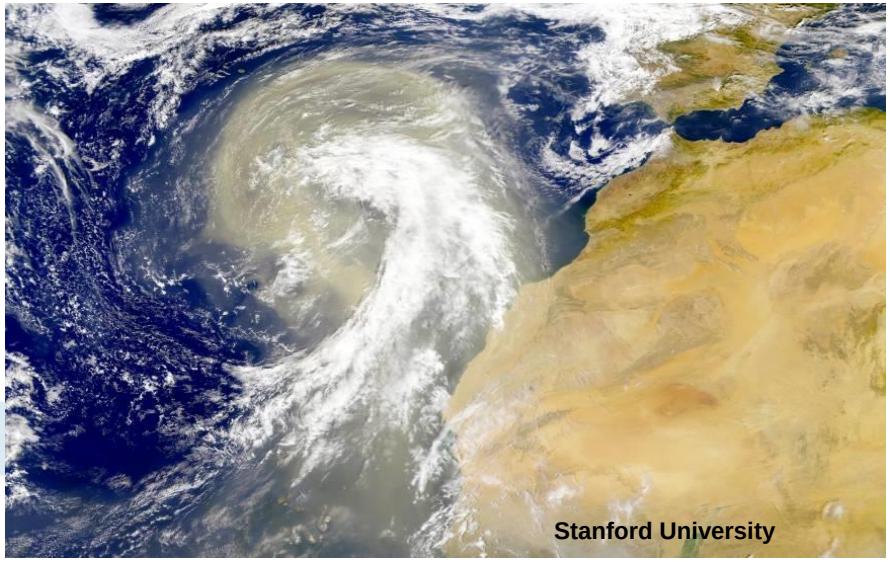
Increasing vulnerability of the society, economy, health, water and food supply, mobility and transport


Source: World Bank


Sweet Crude Reports

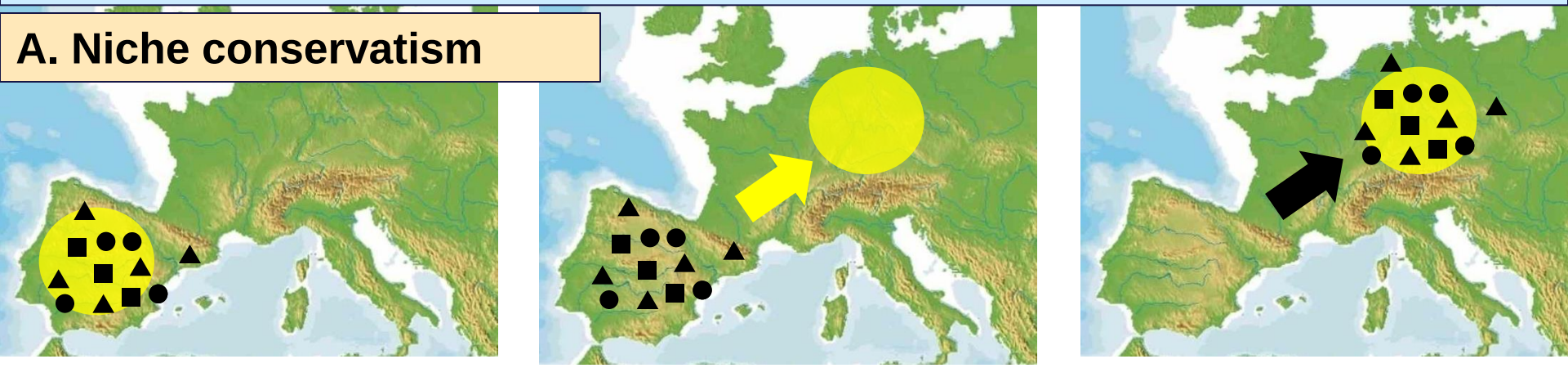
Storms, floods, droughts, wild fires


By Mikhail Metzel, AP

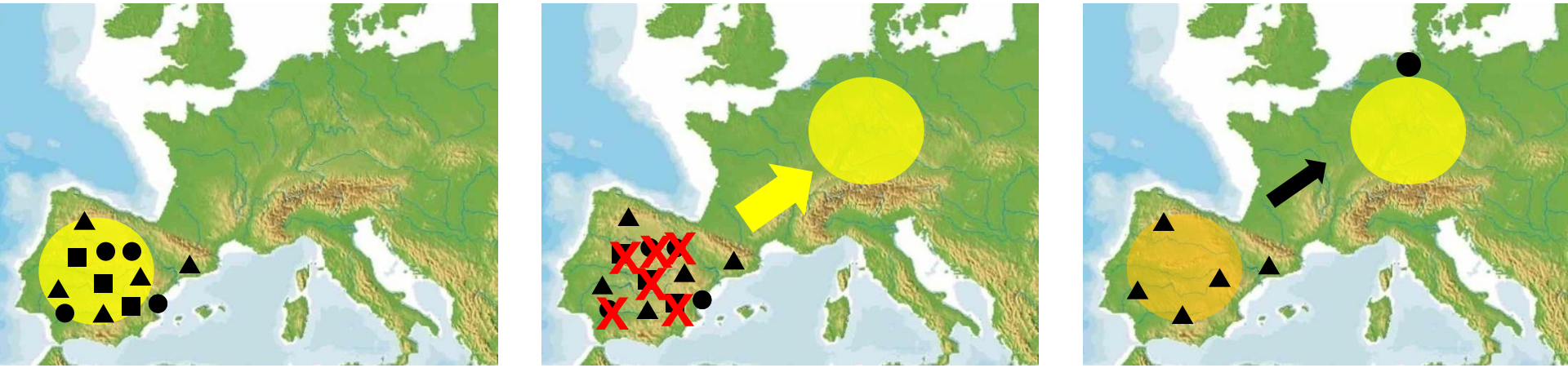

Stanford University

Climate change: Distribution ranges of species, climate and ecological niche shifts (Imke Schmidt, BiK –F, 2011)

A. Niche conservatism



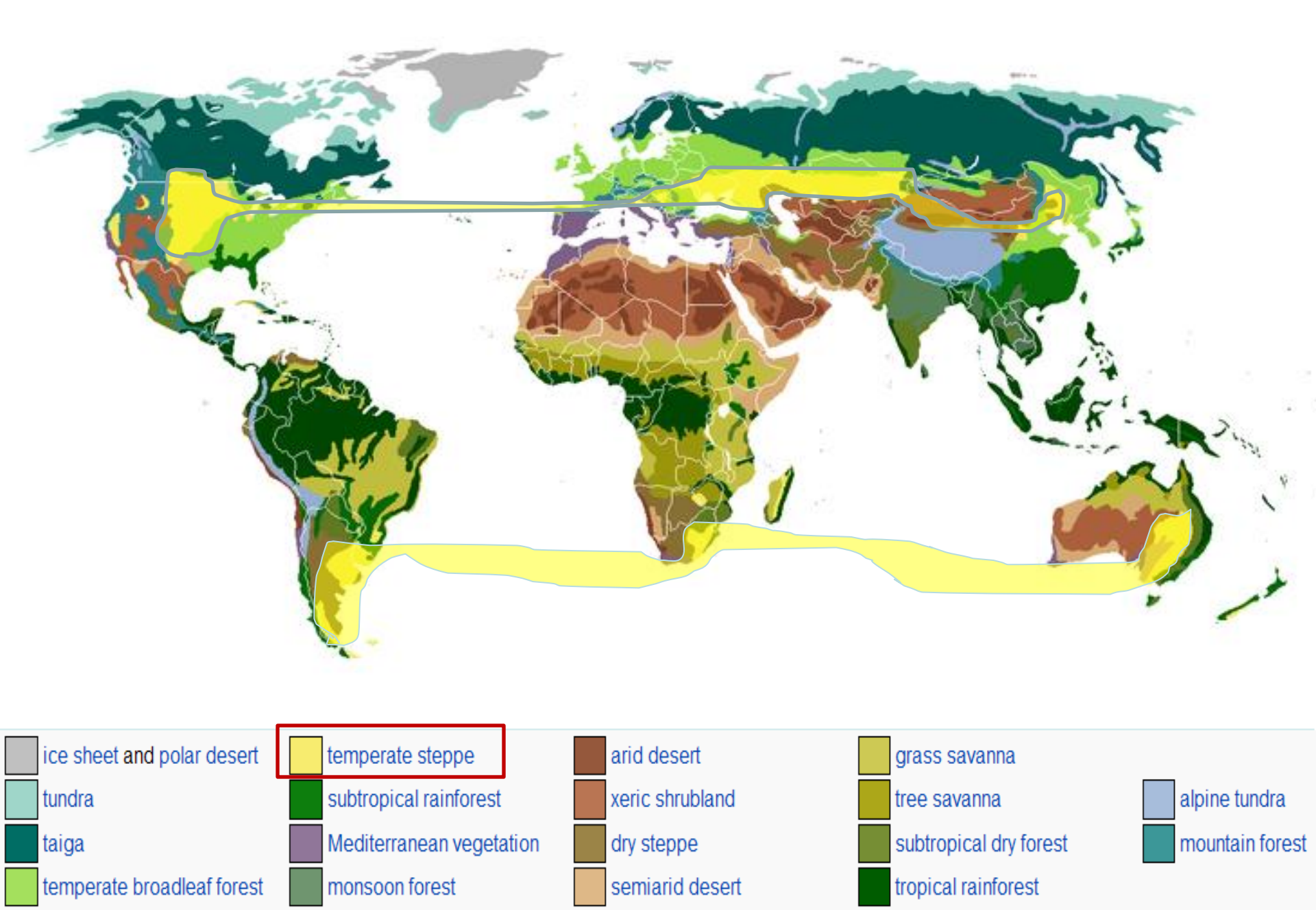
B. Adaptation, extinction migration



Can species adapt to climate change within short time spans (e.g. genetically, physiologically, through behavior)?

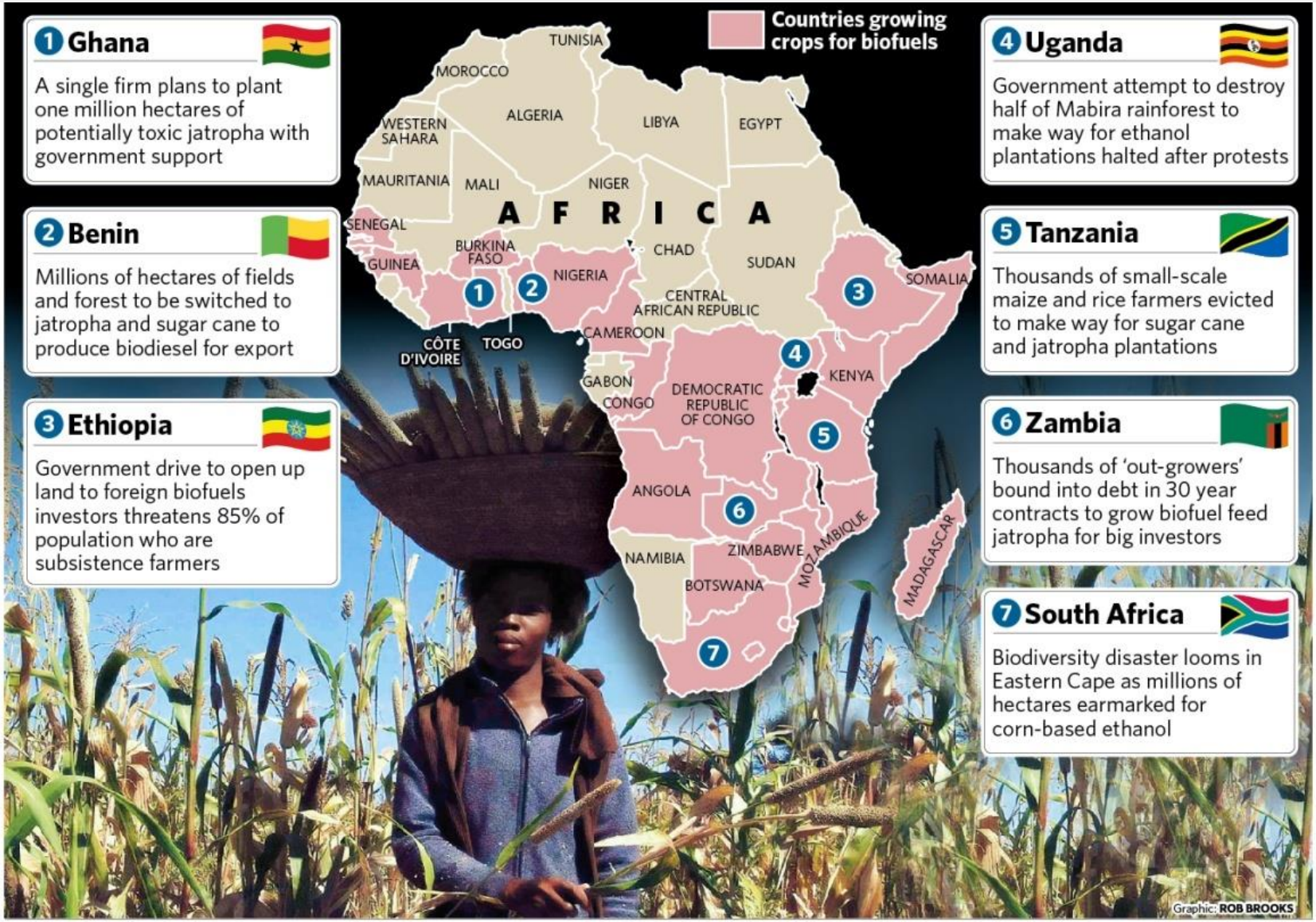
Global distribution of vegetations zones

Modified after Walter H, Breckle (1991)

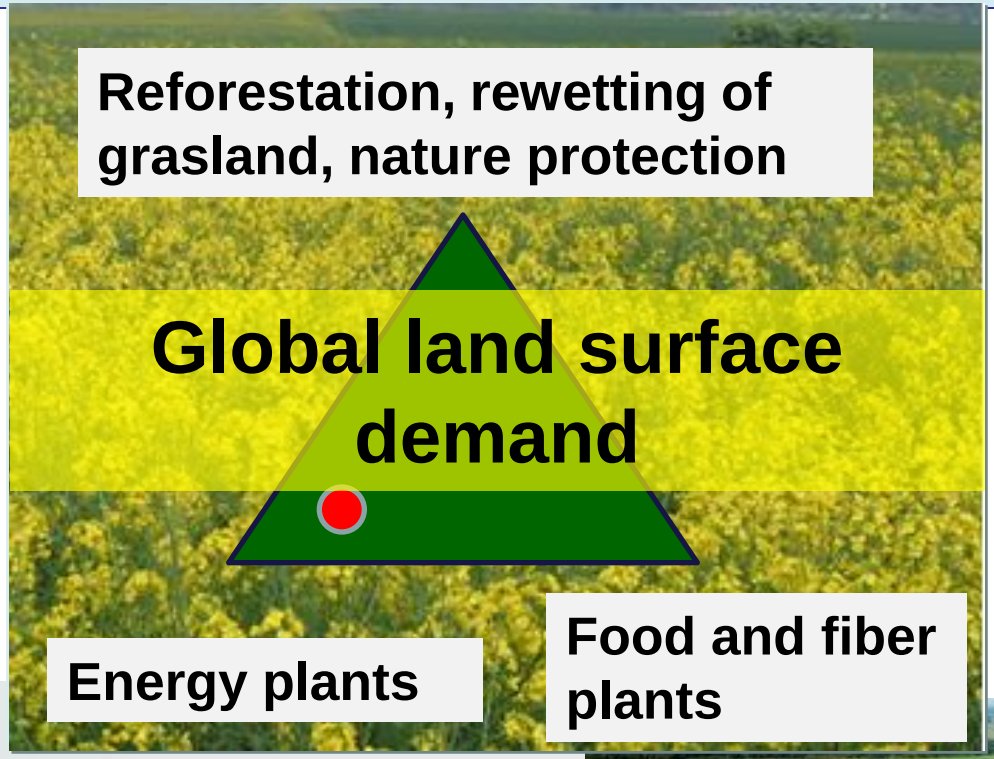


Challenges for Africa: Land grabbing

Increase of world population: Until 2030 crop soil per capita will reduce by 50 %



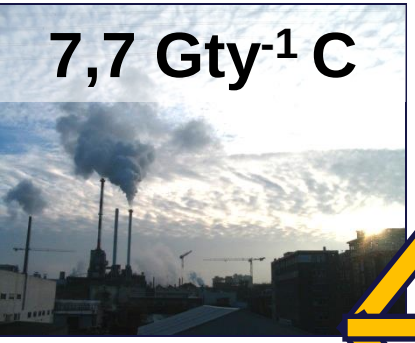
Challenges for Africa: Conflicts of land use

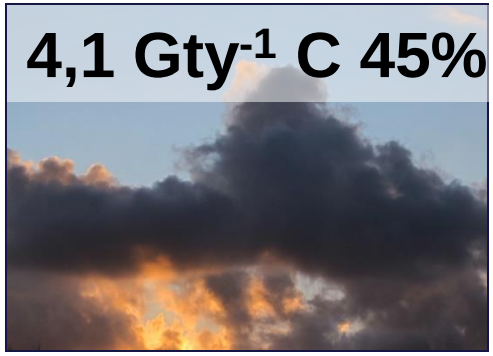


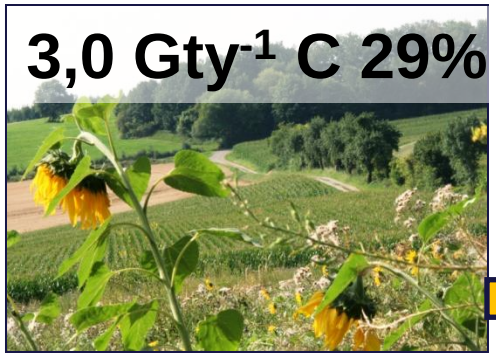
Turning food to fuel

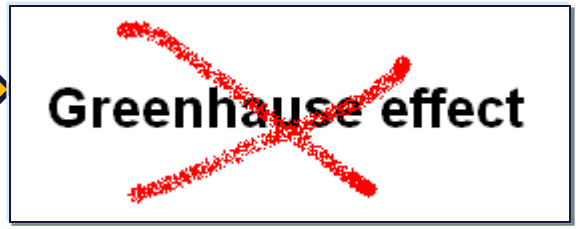
erneuerbareenergien.de

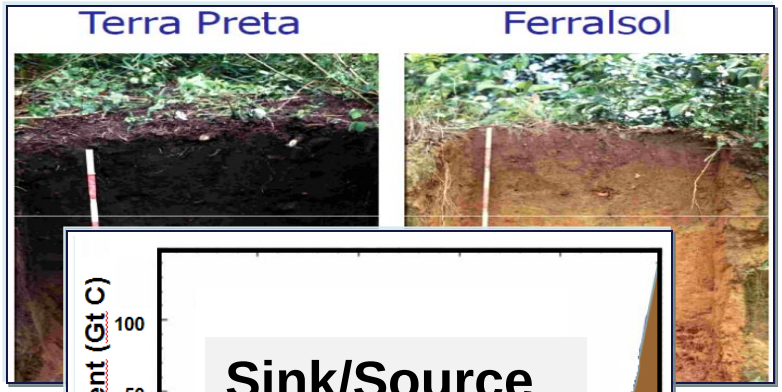
Global solution: Lowering sources, enlarging sinks

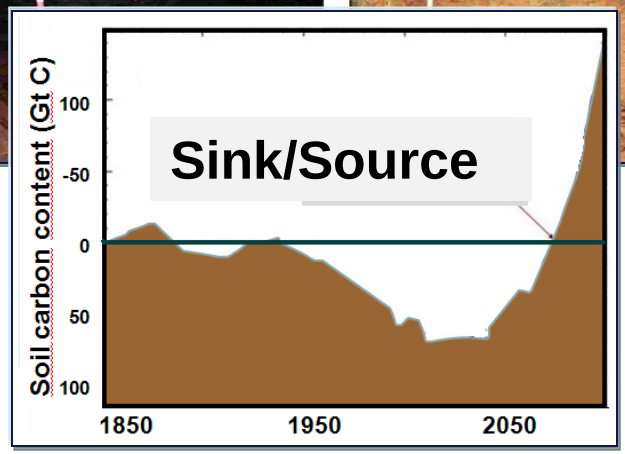












C-storage in the pedo- and hydrosphere via vital terrestric and marine ecosystems instead of geo-engineering

Local sustainable solutions

Solar energy

CO_2-Sequestration in timber instead of steel, alumina and concrete

E-mobility, biking

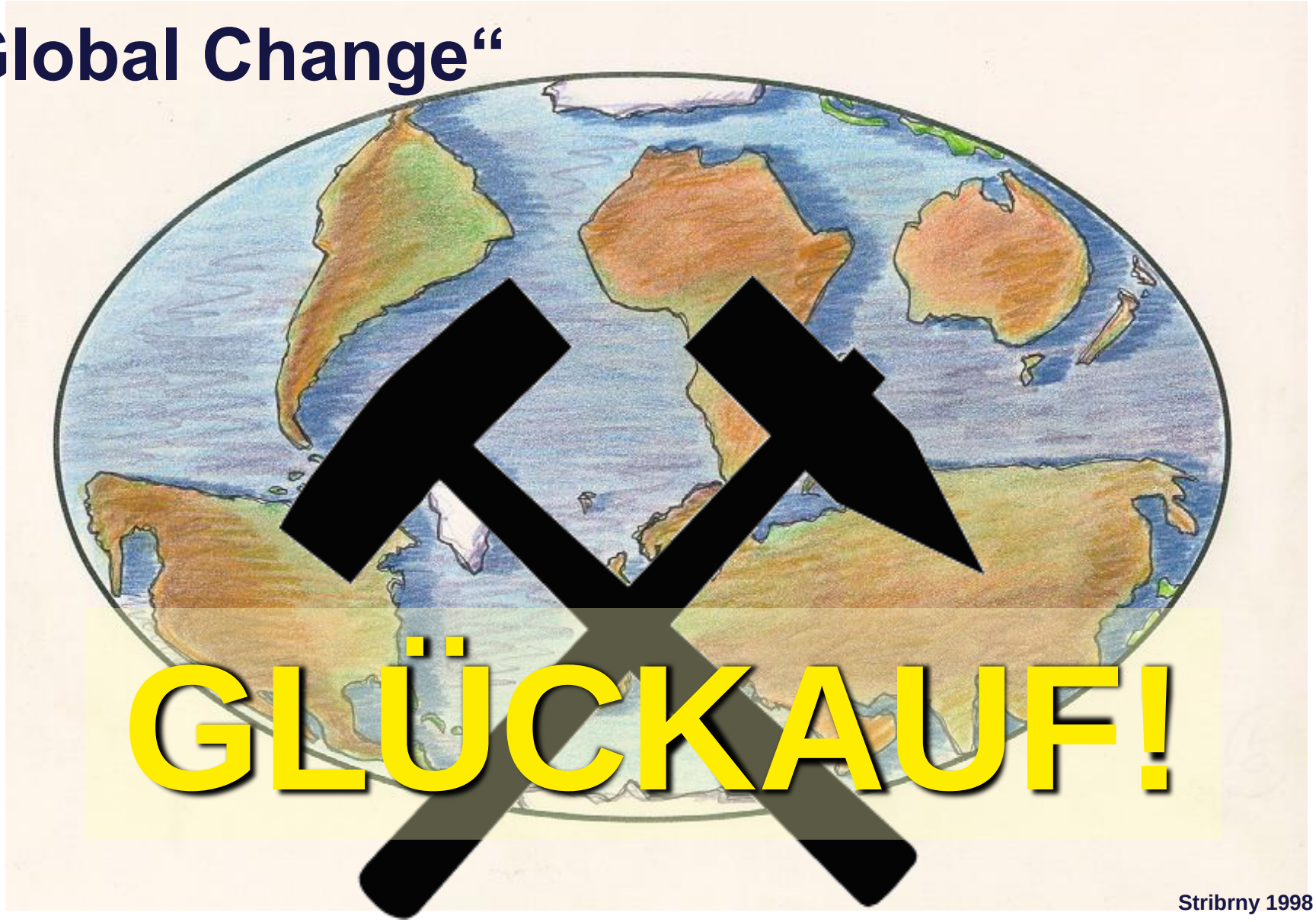
Wind and hydro power

Recycled building ground

Prevention of georisks and extreme weather events

Geothermal heating and cooling

„Global Change“



Stribrny 1998