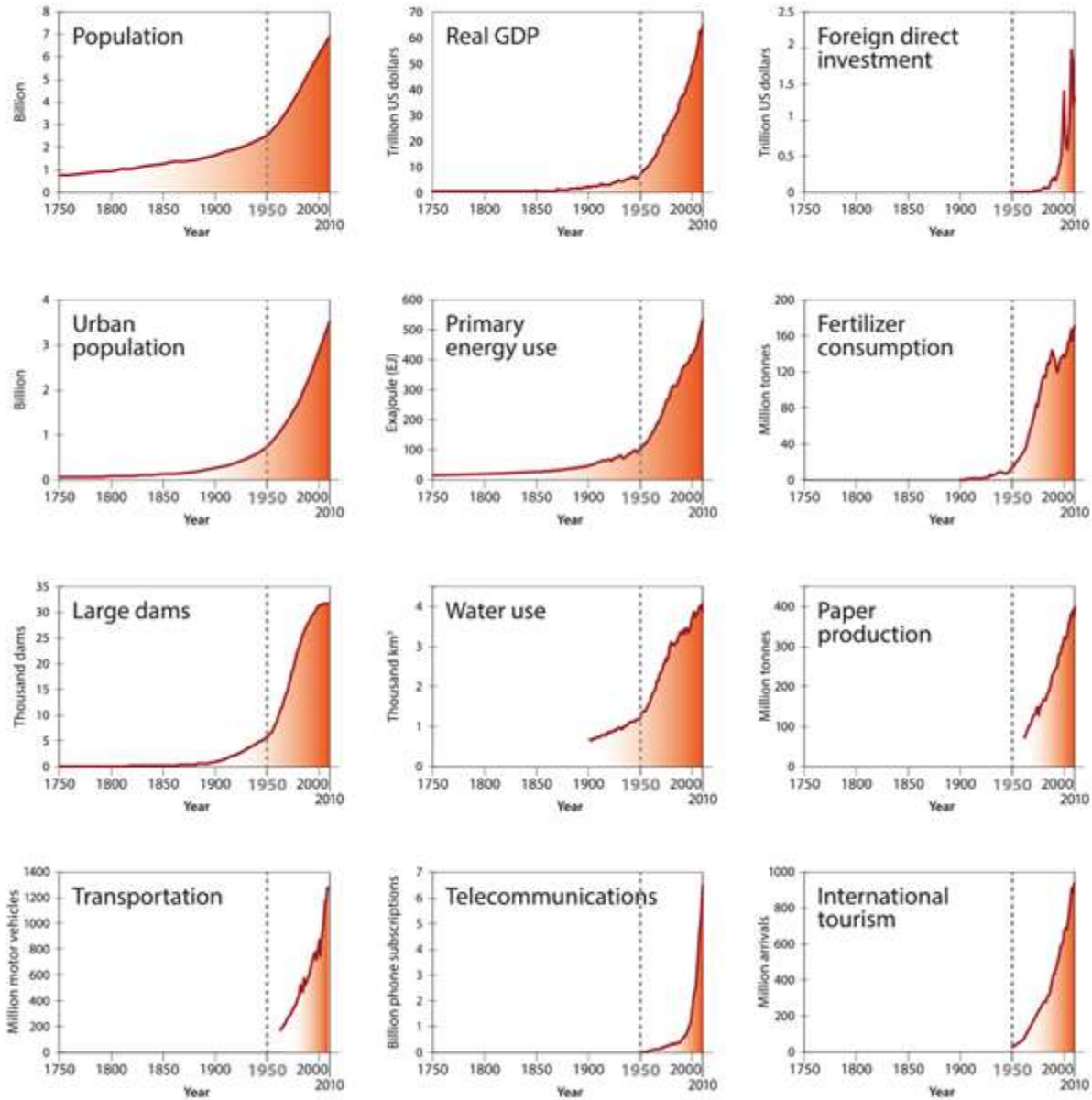
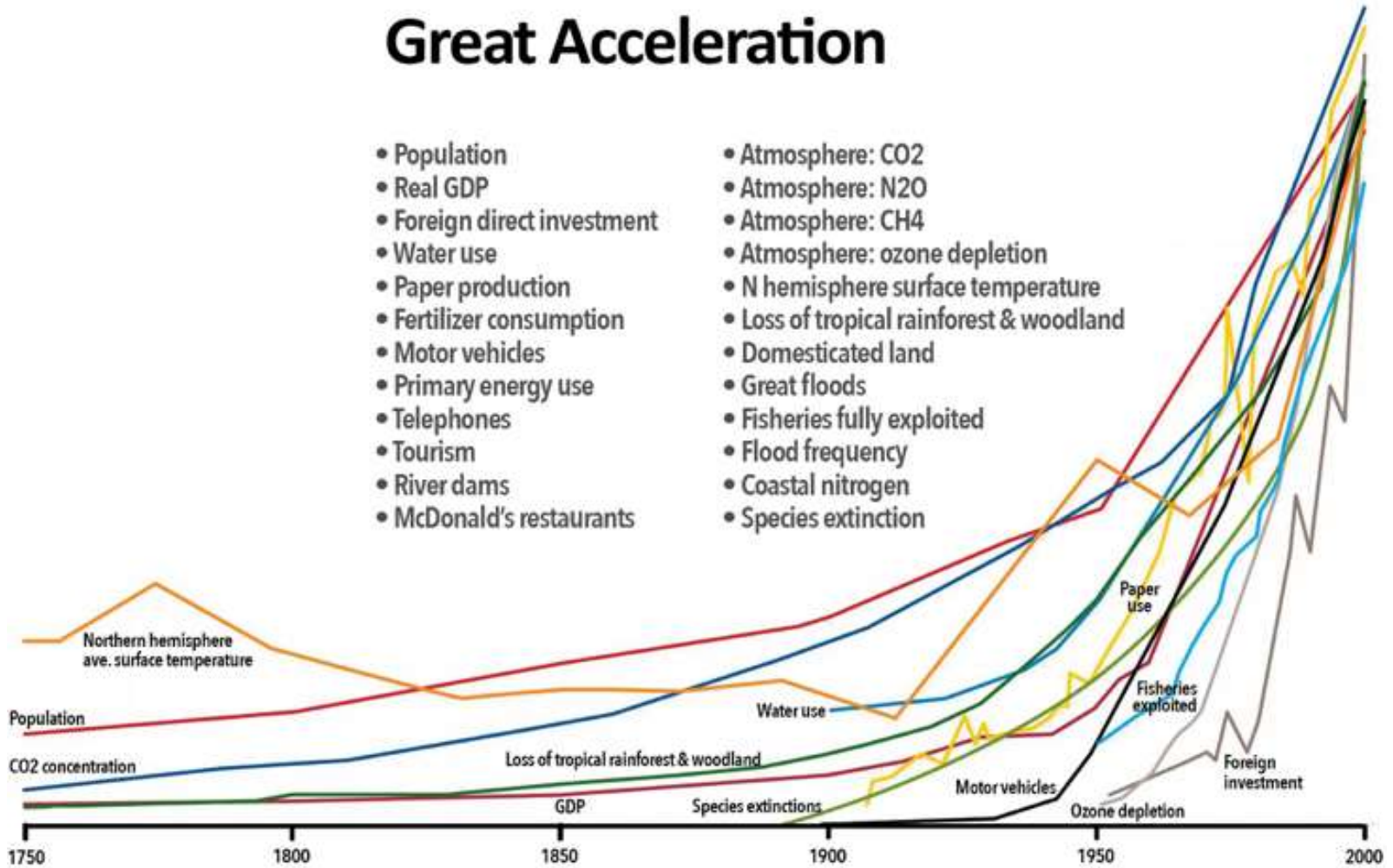


Socio-economic trends



Great Acceleration

- Population
- Real GDP
- Foreign direct investment
- Water use
- Paper production
- Fertilizer consumption
- Motor vehicles
- Primary energy use
- Telephones
- Tourism
- River dams
- McDonald's restaurants
- Atmosphere: CO2
- Atmosphere: N2O
- Atmosphere: CH4
- Atmosphere: ozone depletion
- N hemisphere surface temperature
- Loss of tropical rainforest & woodland
- Domesticated land
- Great floods
- Fisheries fully exploited
- Flood frequency
- Coastal nitrogen
- Species extinction

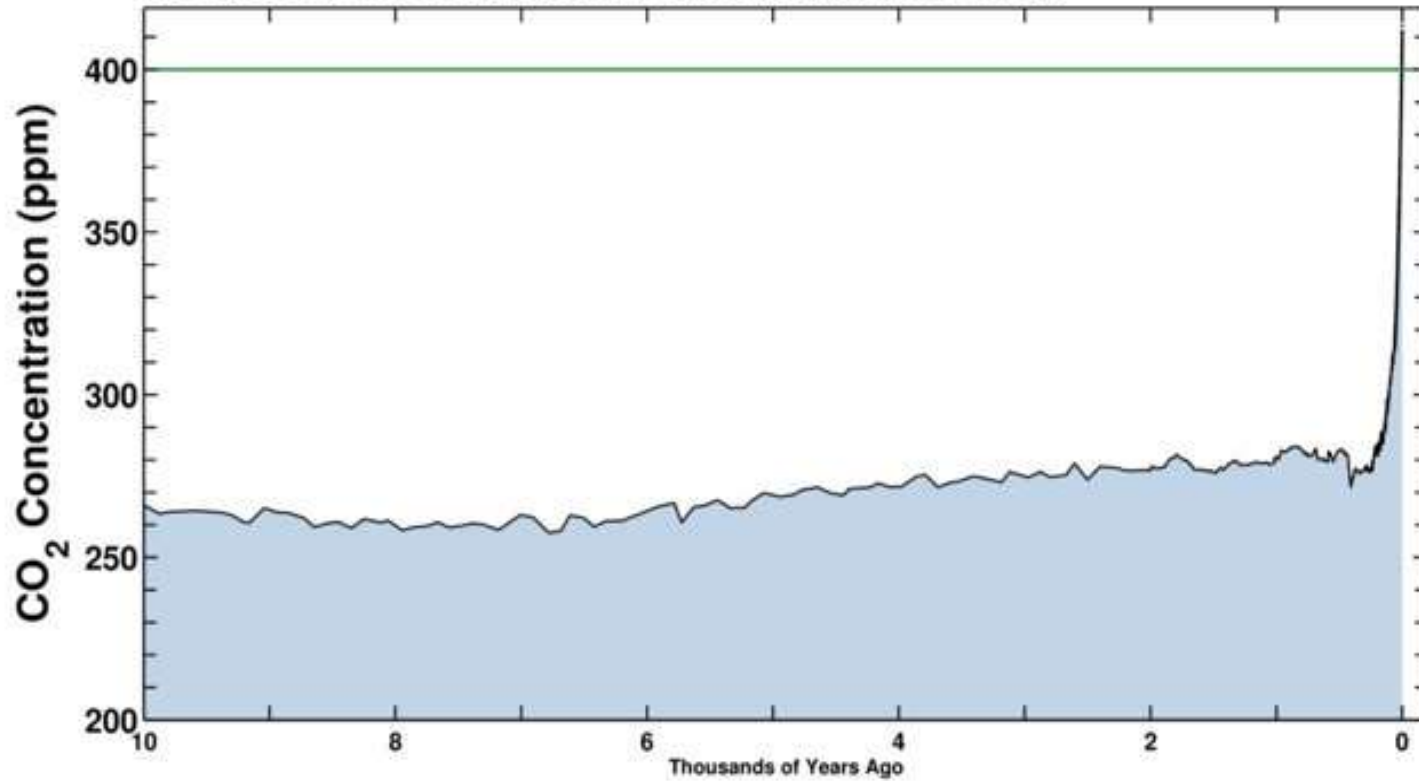


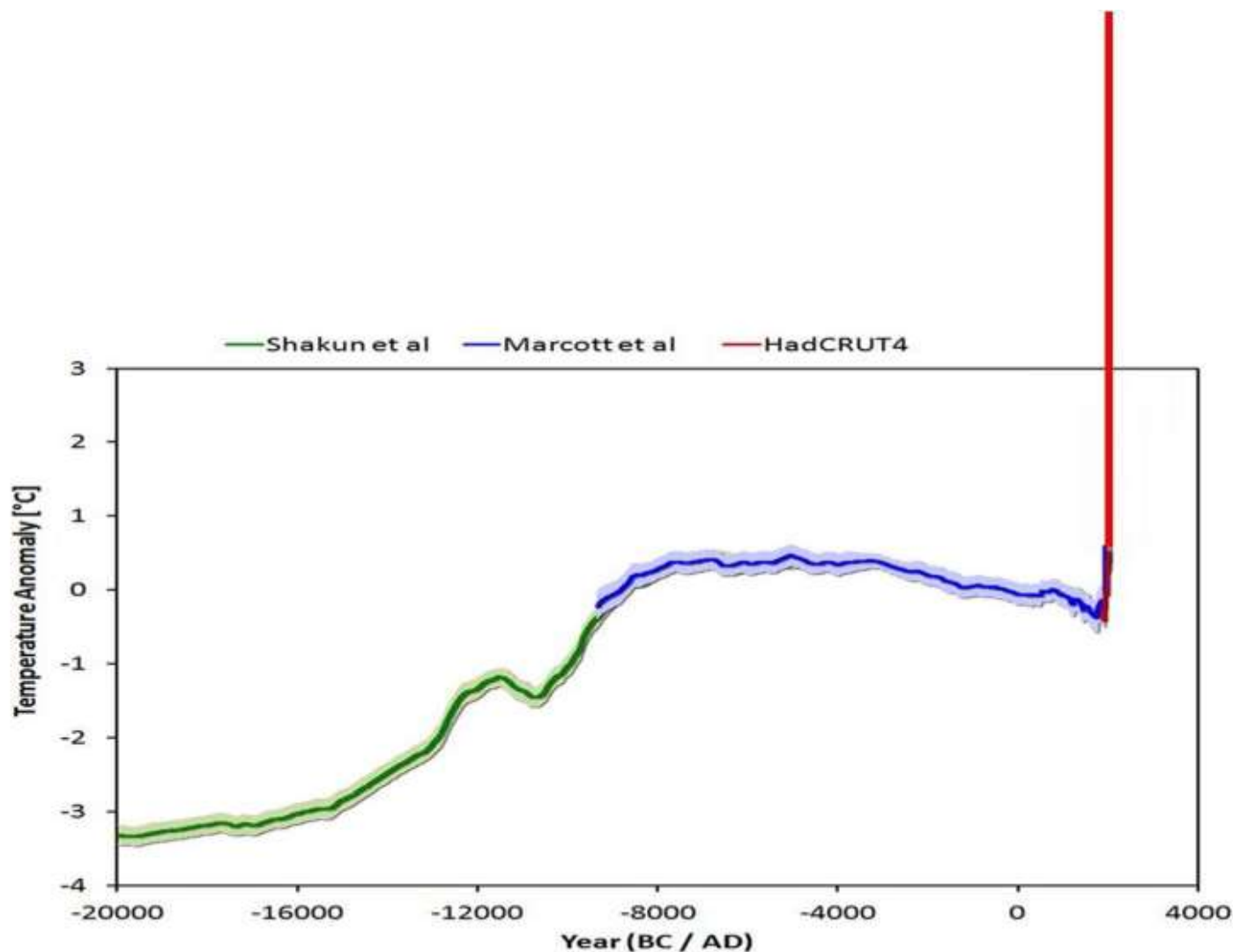
The Keeling Curve

Latest CO₂ reading
May 11, 2019

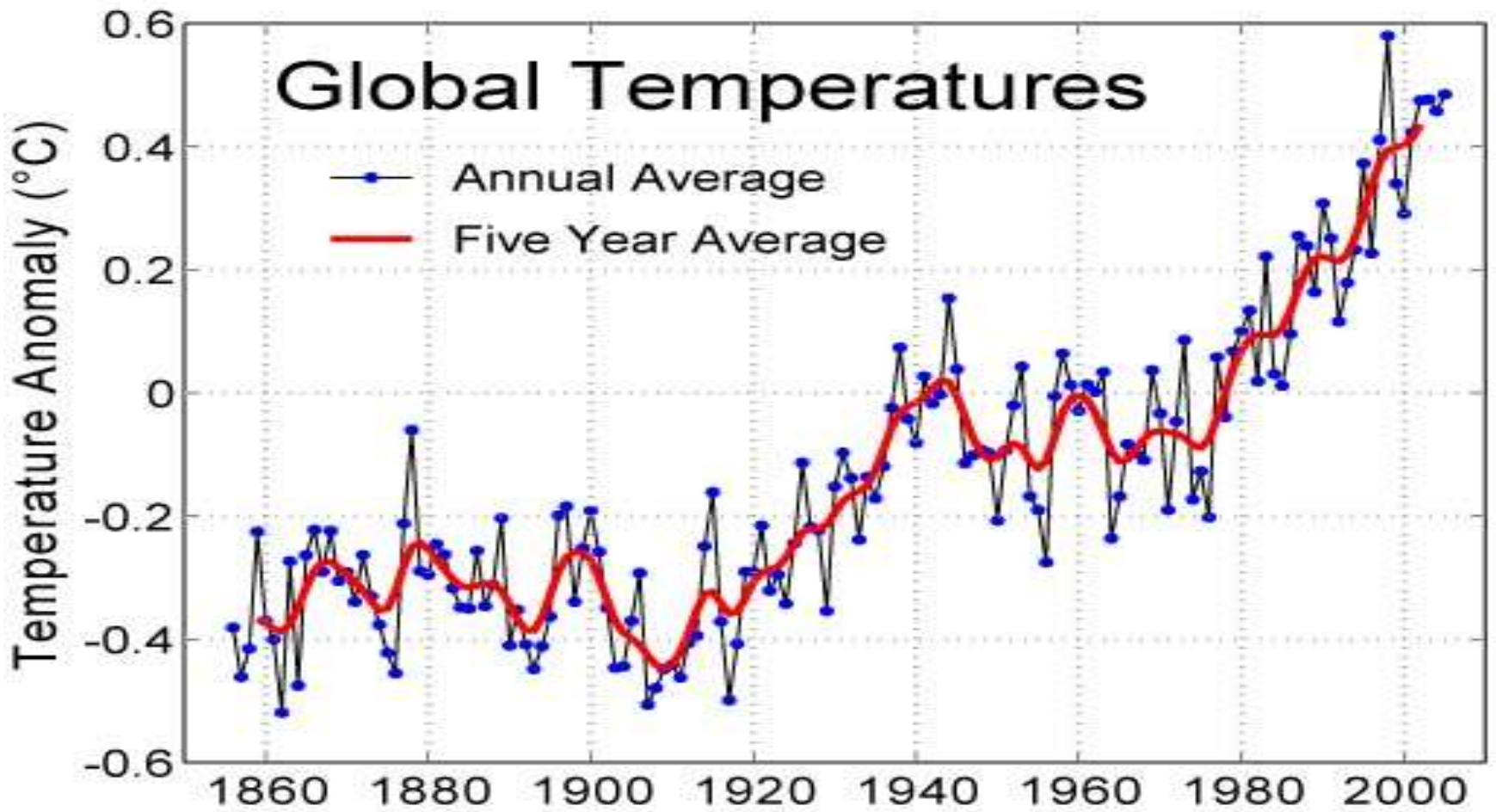
415.26 ppm

Ice-core data before 1958. Mauna Loa data after 1958.

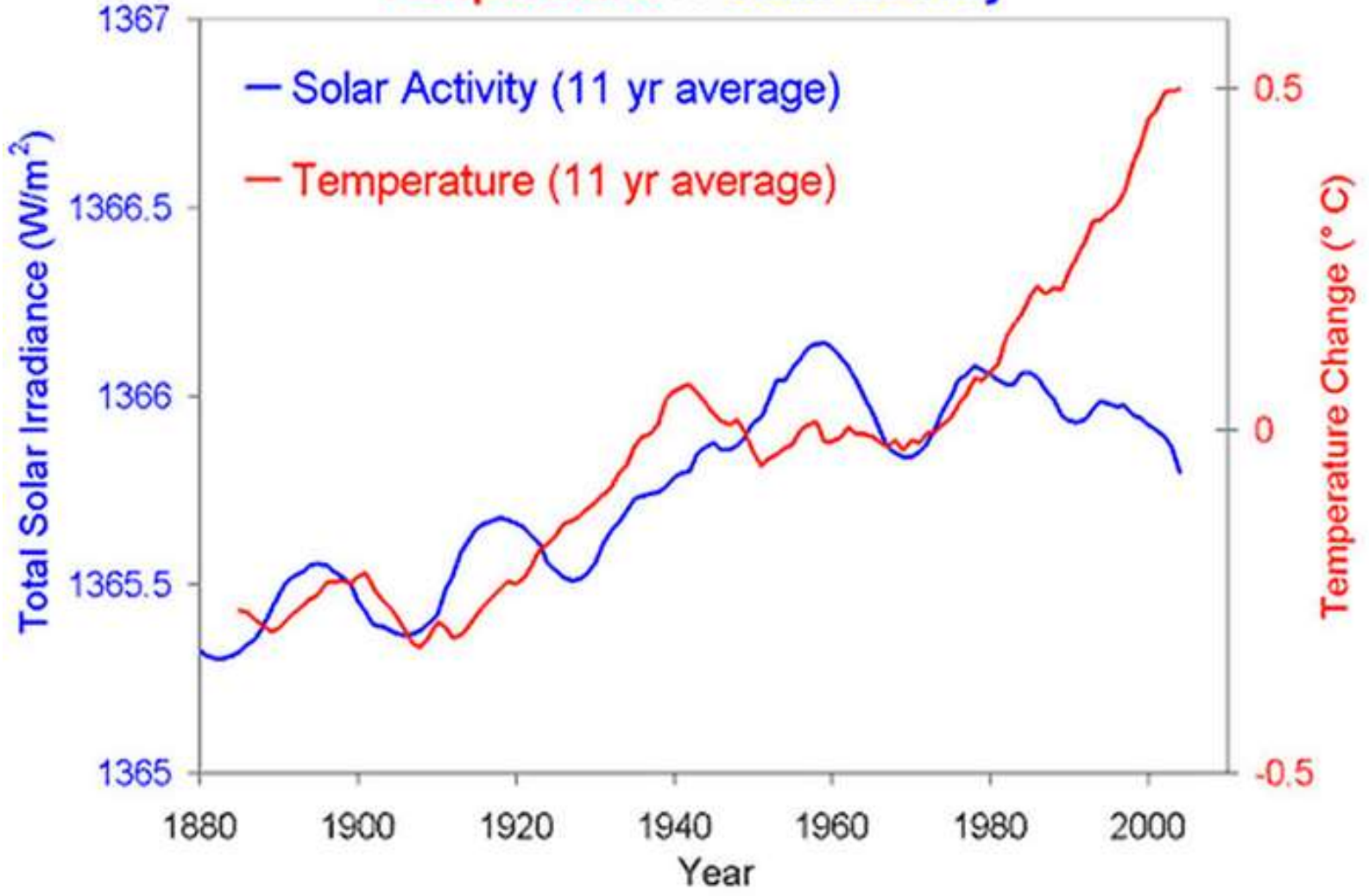




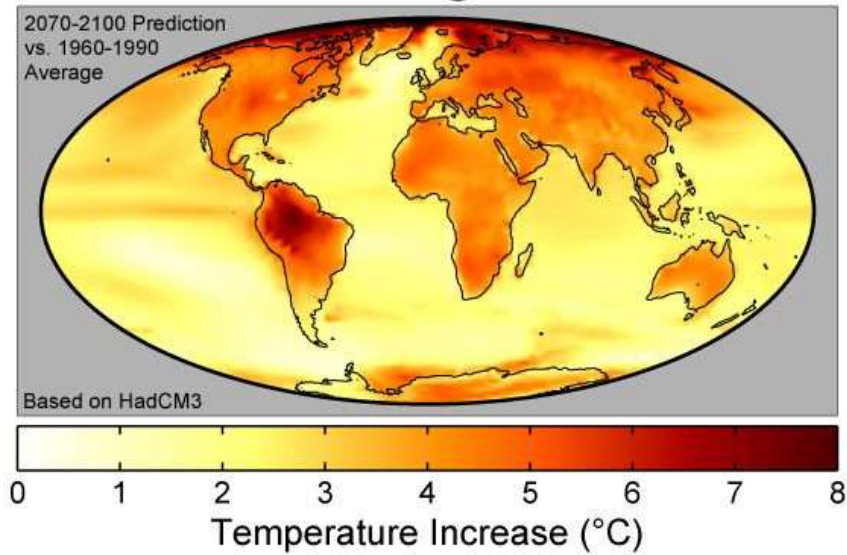
Rysunek 13: Zmiany temperatury w ostatnich 22 000 lat. Źródła: [Shakun 2012](#) (linia zielona), [Marcott 2013](#) (linia niebieska), [HadCRUT4](#), przedłużenie w przyszłość w oparciu o scenariusz RCP8.5 [Meinshausen 2011](#) (linia czerwona). W przeciągu dwóch stuleci temperatura powierzchni Ziemi wzrośnie o 7-8°C. Katapultujemy się ze stabilnego klimatu Holocenu, po drodze minimy maksymalne temperatury ciepłych okresów interglacjalnych z ostatniego miliona lat (+1,5°C), klimat Pliocenu z ostatnich kilku milionów lat (+3°C), klimat z eocenu (+4°C) i nawet ten z ery dinozaurów (+5°C). [Mit: Globalne ocieplenie, nawet jeśli będzie, wcale nie będzie takie złe](#)



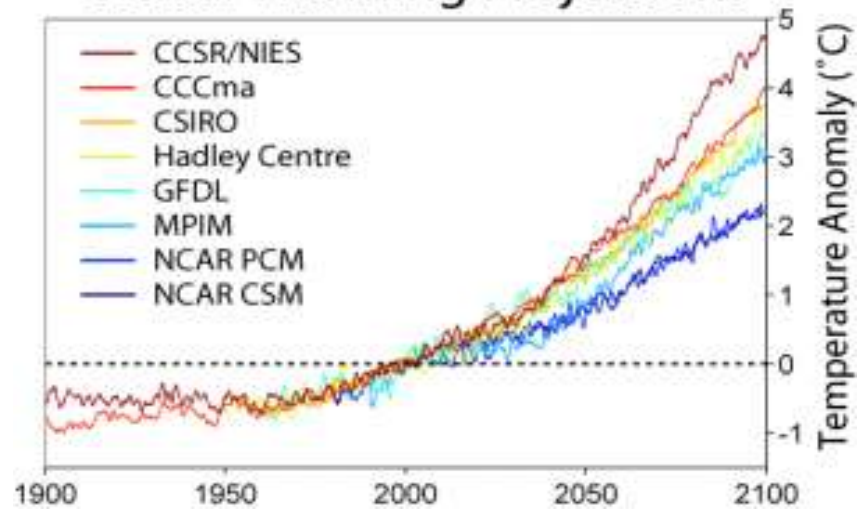
Temperature vs Solar Activity



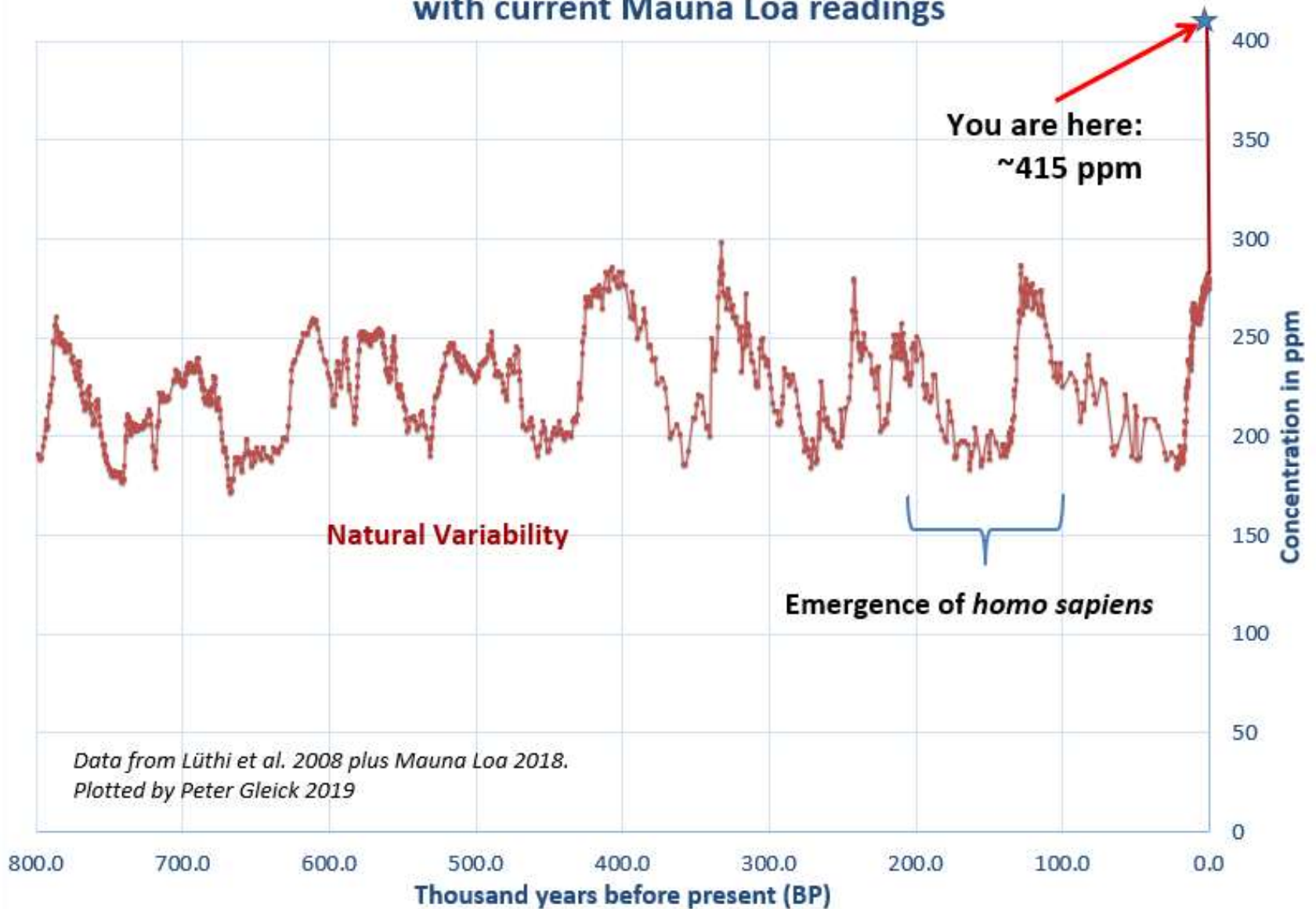
Global Warming Predictions

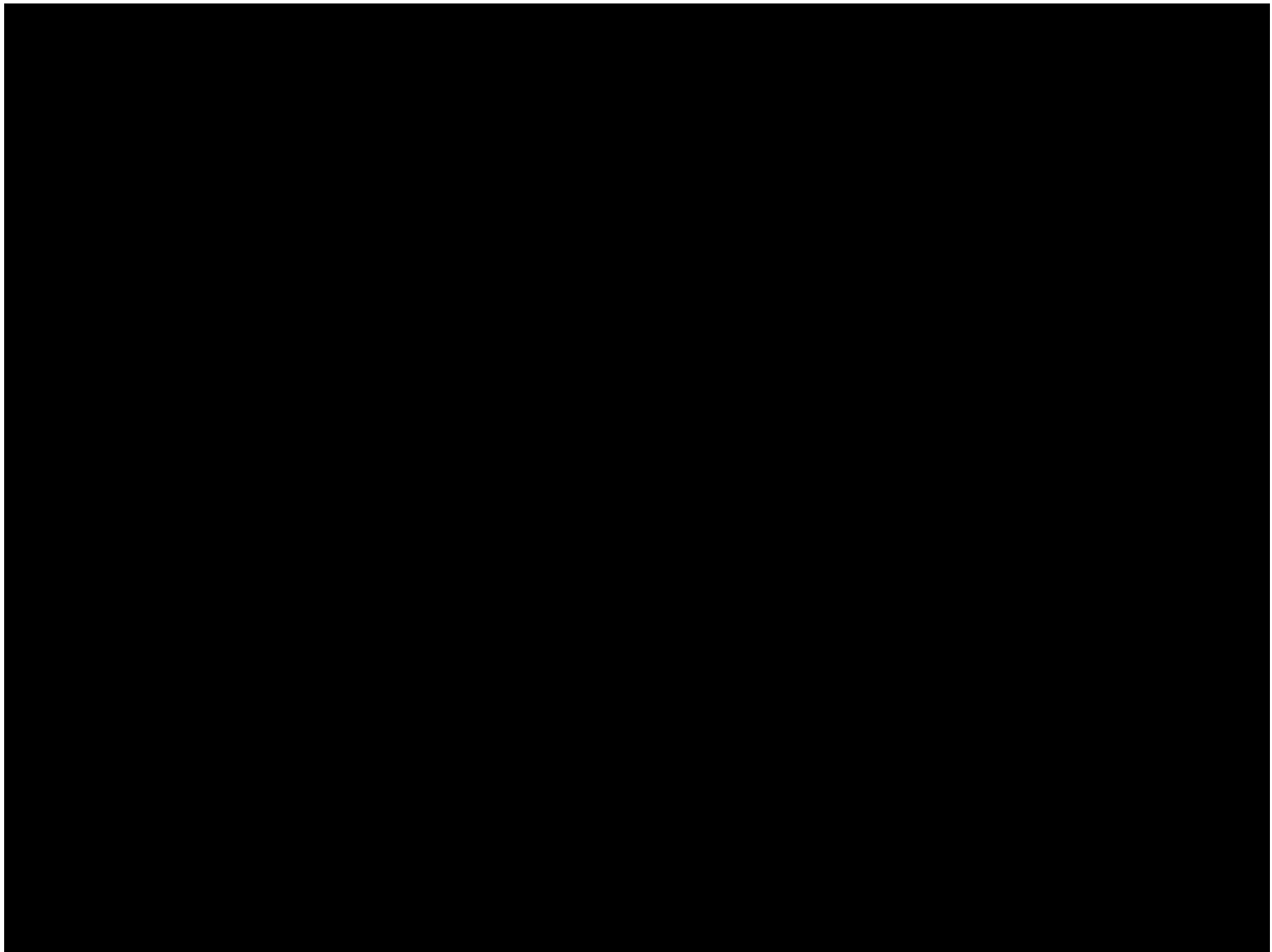


Global Warming Projections



Composite Antarctic CO₂ record (0-800 kyr before present) with current Mauna Loa readings



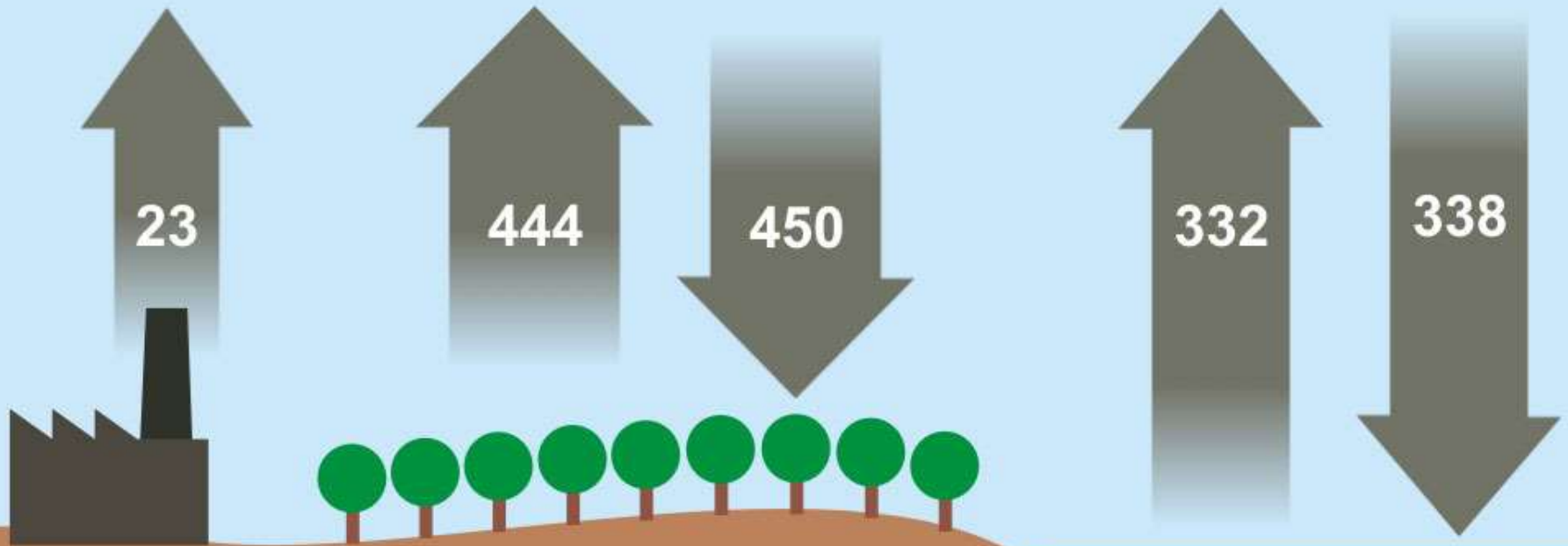


The complete picture of the carbon cycle

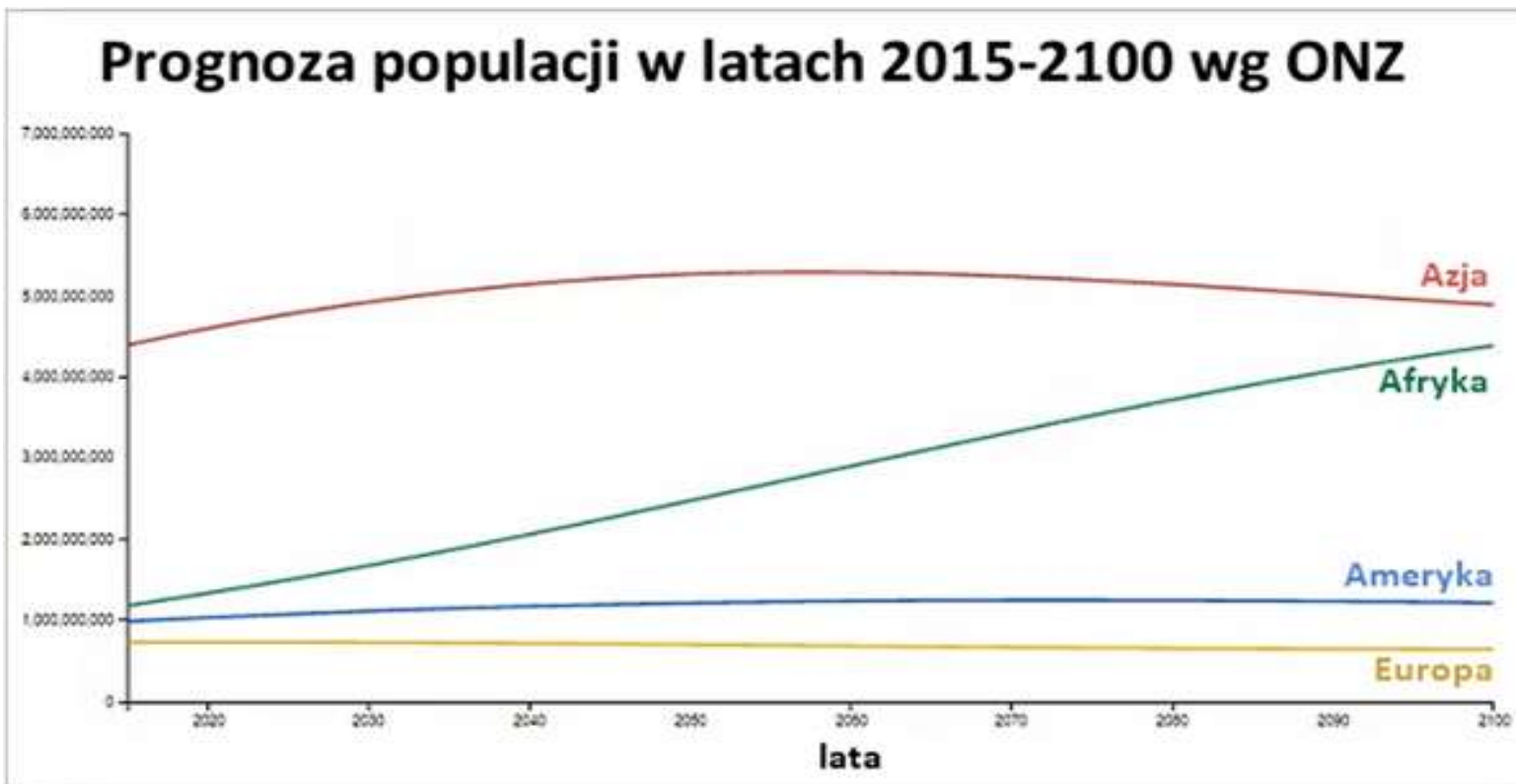
**Fossil Fuel
Burning**

**Vegetation
& Land**

Ocean

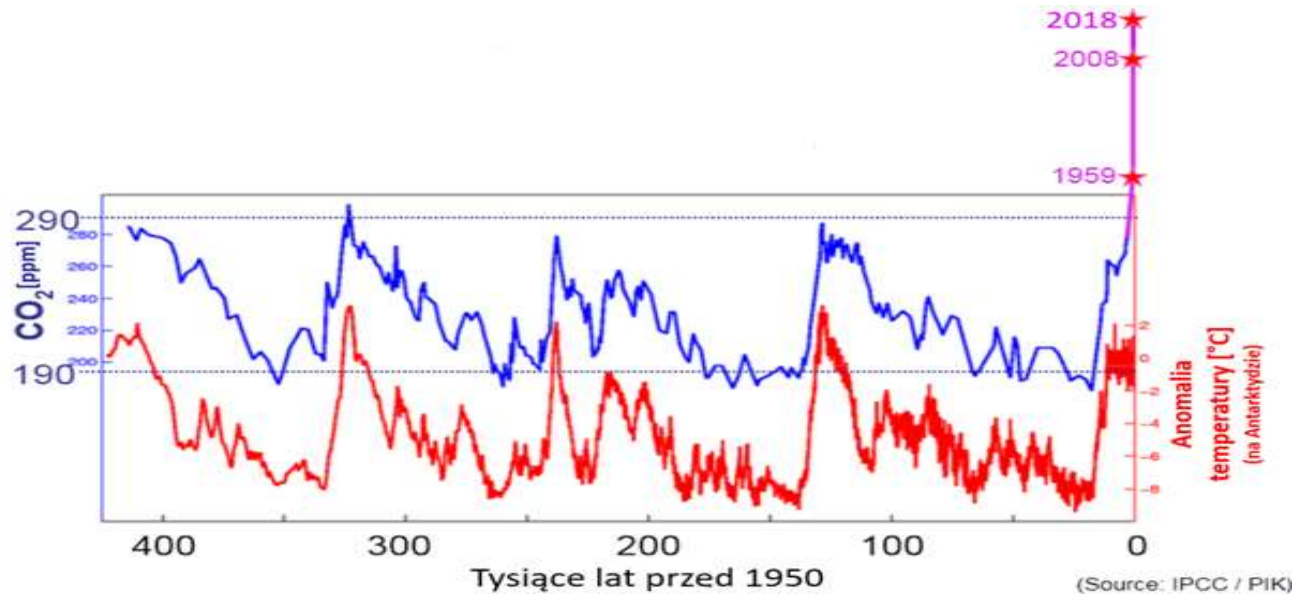
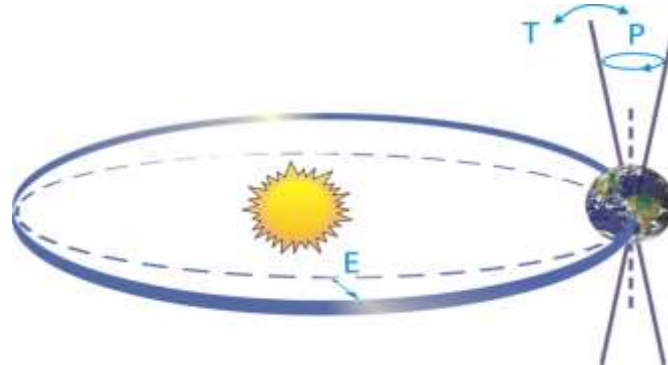


Carbon cycle for the 1990s. Numbers are in billion tonnes of CO2 (IPCC AR4).



Prognoza populacji na poszczególnych kontynentach w latach 2015-2100.
Dane: ONZ / Max Galka.

MILANKOVITCH CYCLES



- **The 2030 Agenda for Sustainable Development with its 17 Sustainable Development Goals by UN**
- **Civil Engineers' Vision 2025 by American Society of Civil Engineers**
- **Madrid declaration “Civil engineers committed to UN’s objectives of sustainable development and climate action”**
- **IPCC reports and publications**



SUSTAINABLE DEVELOPMENT GOALS

1 NO POVERTY

2 ZERO HUNGER

3 GOOD HEALTH AND WELL-BEING

4 QUALITY EDUCATION

5 GENDER EQUALITY

6 CLEAN WATER AND SANITATION

7 AFFORDABLE AND CLEAN ENERGY

8 DECENT WORK AND ECONOMIC GROWTH

9 INDUSTRY, INNOVATION AND INFRASTRUCTURE

10 REDUCED INEQUALITIES

11 SUSTAINABLE CITIES AND COMMUNITIES

12 RESPONSIBLE CONSUMPTION AND PRODUCTION

13 CLIMATE ACTION

14 LIFE BELOW WATER

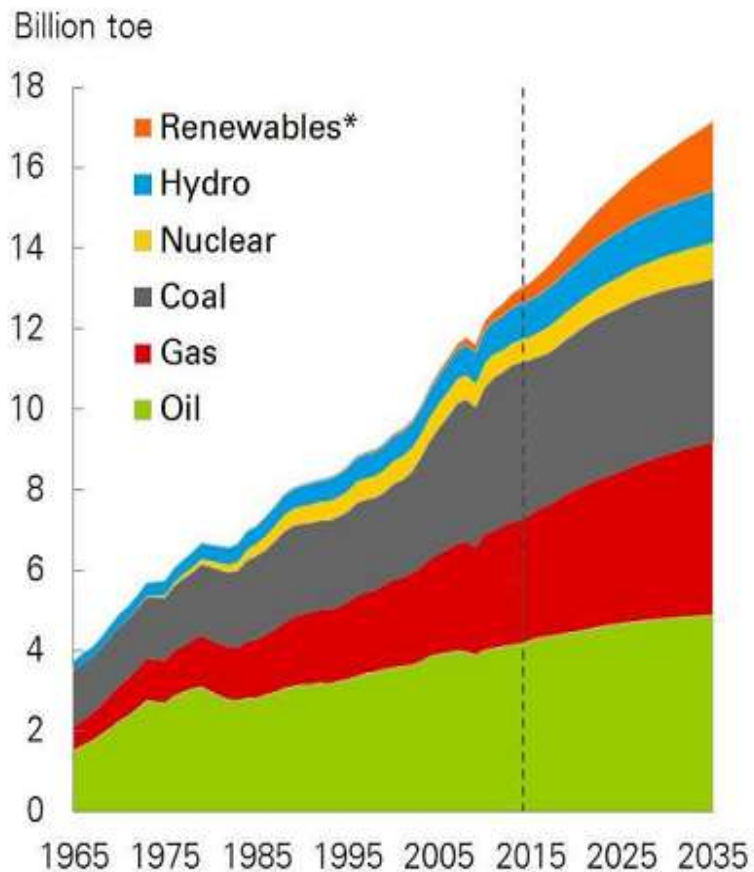
15 LIFE ON LAND

16 PEACE, JUSTICE AND STRONG INSTITUTIONS

17 PARTNERSHIPS FOR THE GOALS


SUSTAINABLE DEVELOPMENT GOALS

Primary energy consumption by fuel



*Renewables includes wind, solar, geothermal, biomass, and biofuels

Shares of primary energy

