Antropocen – epoka człowieka i jej wyzwania

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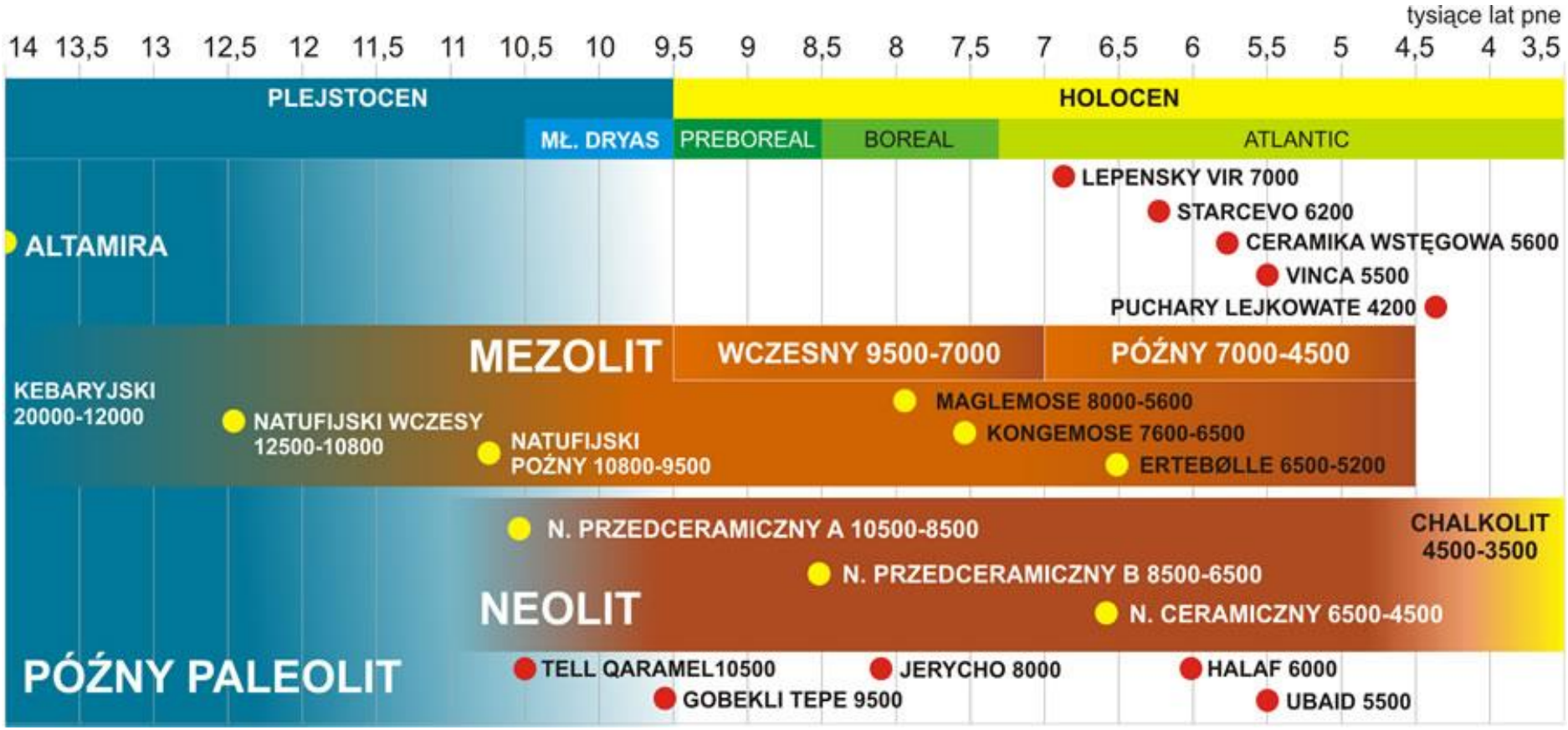
Historia pojęcia

Ch. Lyell zaproponował w 1833 roku, by czasy współczesne nazwać **holocenem** (ang. *Recent whole*, aktualnie, całkiem niedawno).

W 1885 r. międzynarodowe grono naukowców zaakceptowało tę propozycję i od tej pory ostatnią epoką geologiczną jest holocen, który poprzedzony jest plejstocenem, czyli epoką lodową.

Holocen rozpoczyna się więc wraz z końcem ostatniej epoki lodowej, czyli +/- 12 do 10 tys. lat temu. Plejstocen i holocen tworzą czwartorzęd.



Historia pojęcia

POCZĄTEK HOLOCENU ZBIEGA SIĘ TAKŻE Z GWAŁTOWNYM ROZWOJEM KULTUR LUDZKICH.

Historia pojęcia

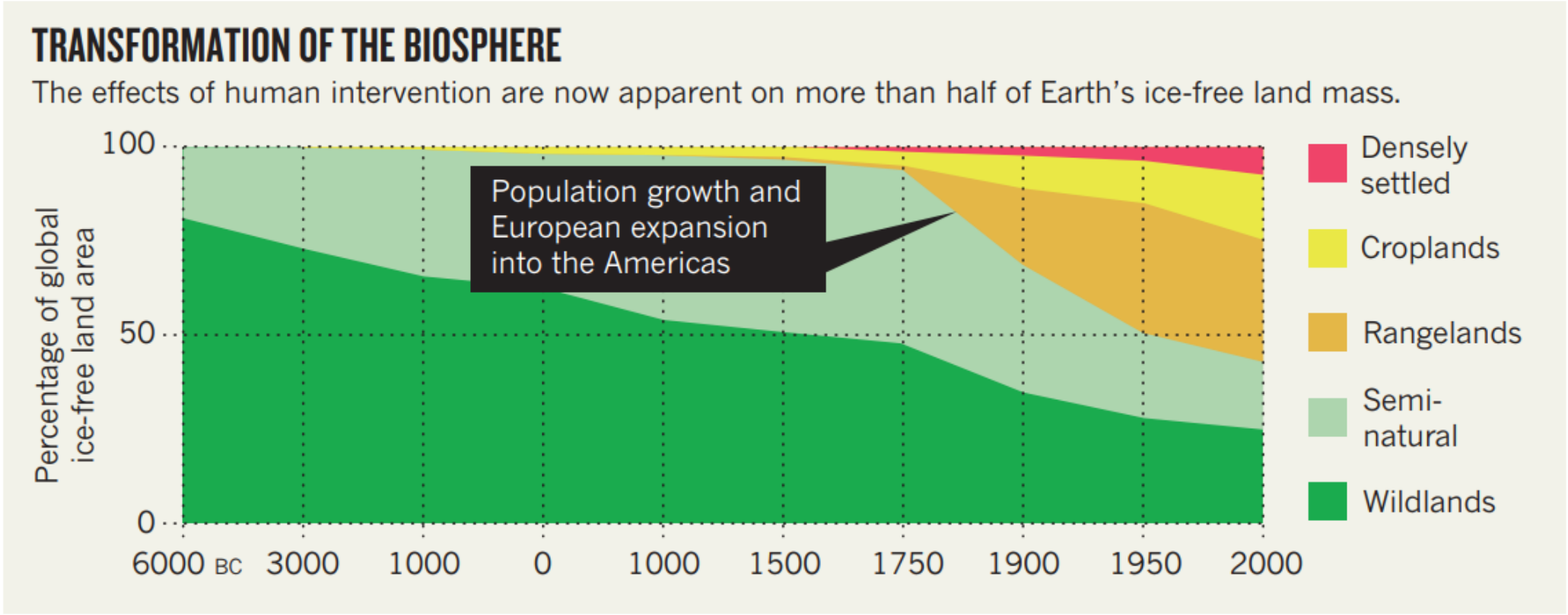
Tuż po wprowadzeniu pojęcia holocen zorientowano się także, że ludzkość wywiera bardzo duży wpływ na otoczenie.

Ludzkość to "new telluric force which in power and universality may be compared to the greater forces of earth" (Stoppani, 1873).

Stoppani zaproponował wręcz erę człowieka - **antropozoic**.

Francuzi na początku XX w. wprowadzili też termin *noösphere,* czyli epokę myśli (umysłu).

Stop using the word Holocene. We're not in the Holocene any more. We're in the...the...the...[searching for the right word]...the **Anthropocene**!'

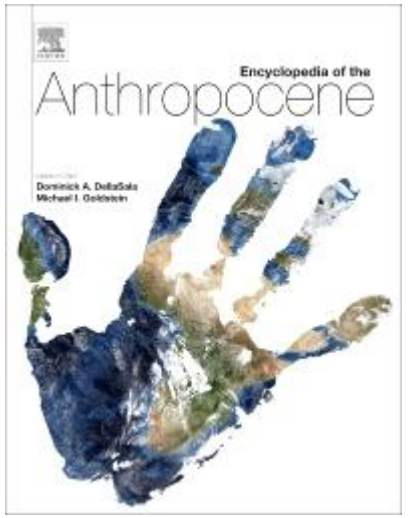


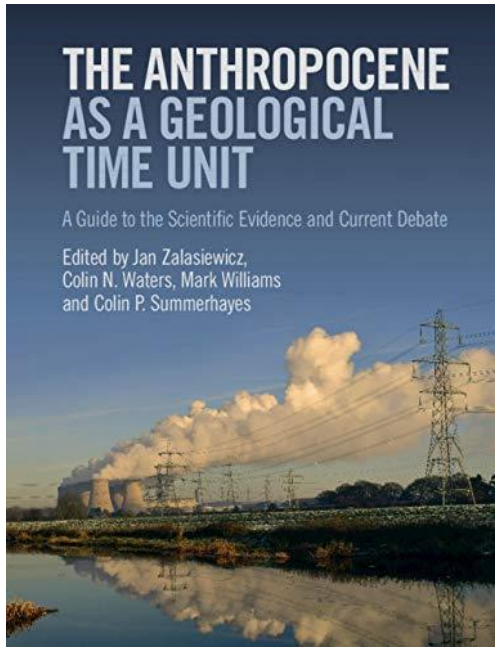
Przekształcenia biosfery pod wpływem człowieka w ciągu ostatnich 8 tys lat.

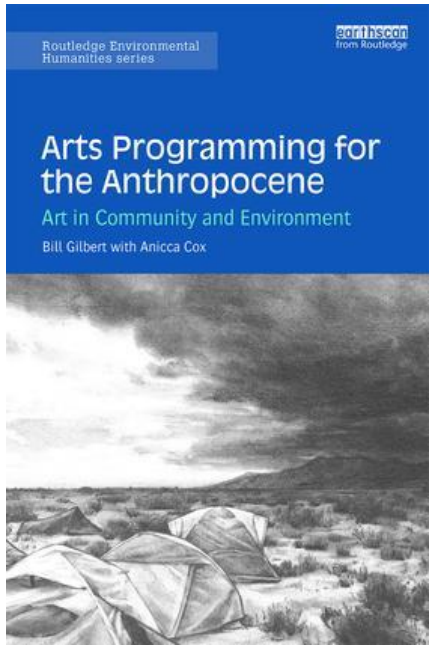
Czy jest jedna definicja antropocenu?

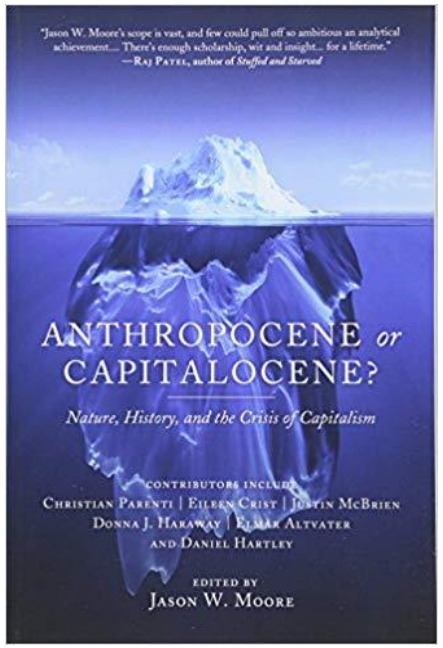
"the term has come to mean different things as it has spread to different groups, a situation that can only end in headaches ... We need a common understanding" (Waters, 2019)

A więc co?









Antropocen jako jednostka czasu geologicznego, ranga jednostki

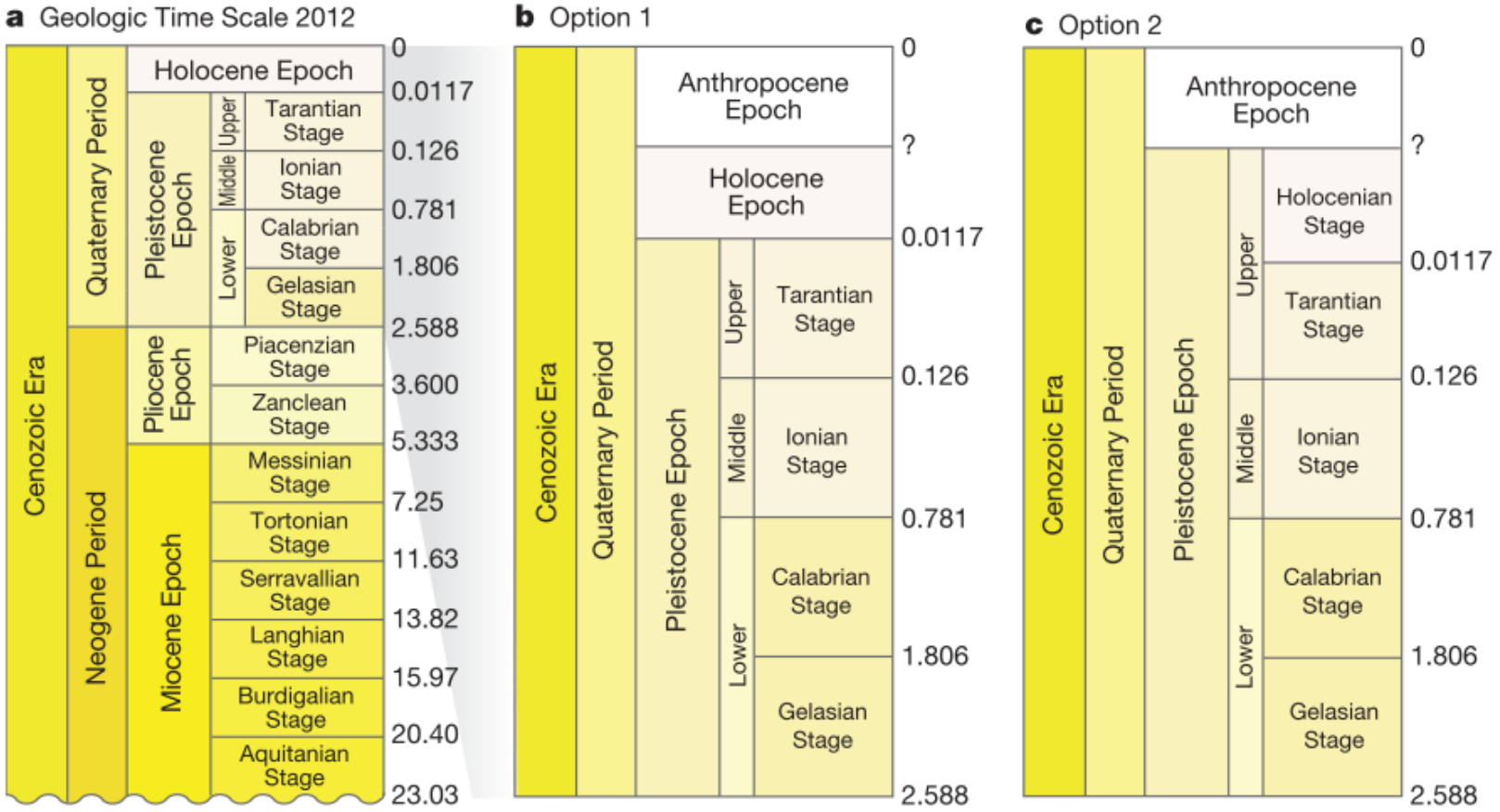


Figure 1 | Comparison of the current Geologic Time Scale[10] (GTS2012), with two alternatives. **a**, GTS2012, with boundaries marked in millions of years (ref. 10). **b**, **c**, The alternatives include a defined Anthropocene Epoch following either the Holocene (**b**) or directly following the Pleistocene (**c**). Defining the Anthropocene as an epoch requires a decision as to whether the Holocene is as distinct as the Anthropocene and Pleistocene; retaining it or not distinguishes between **b** and **c**. The question mark represents the current debate over the start of the Anthropocene, assuming it is formally accepted as an epoch (see Box 1, Fig. 2). Colour coding is used according to the Commission for the Geological Map of the World[10], except for the Anthropocene.

Problem – czas geologiczny i historyczny

Antropocen jako jednostka czasu geologicznego zrównuje pojęcie czasu geologicznego z czasem historycznym.

W tym sensie, działalność człowieka traktowana jest jako siła, która trwale wpływa na historię geologiczną planety i pozostanie czytelna "na zawsze".

Czy tak jest w istocie?

Człowiek jako główna siła geologiczna

Człowiek

- transportuje więcej osadów niż wszystkie rzeki świata

- ogrzewa planetę (globalne ocieplenie)

- podnosi globalny poziom morza

- niszczy warstwę ozonową

- obniża odczyn pH wody morskiej (zakwasza oceany)

-zaburza cykl obiegu węgla, azotu, fosforu etc

- zmienia krajobraz (urbanizacja)

- powoduje wielkie wymieranie

- wytwarza nowe materiały (technoskamieniałości), nowe minerały i nowe skały

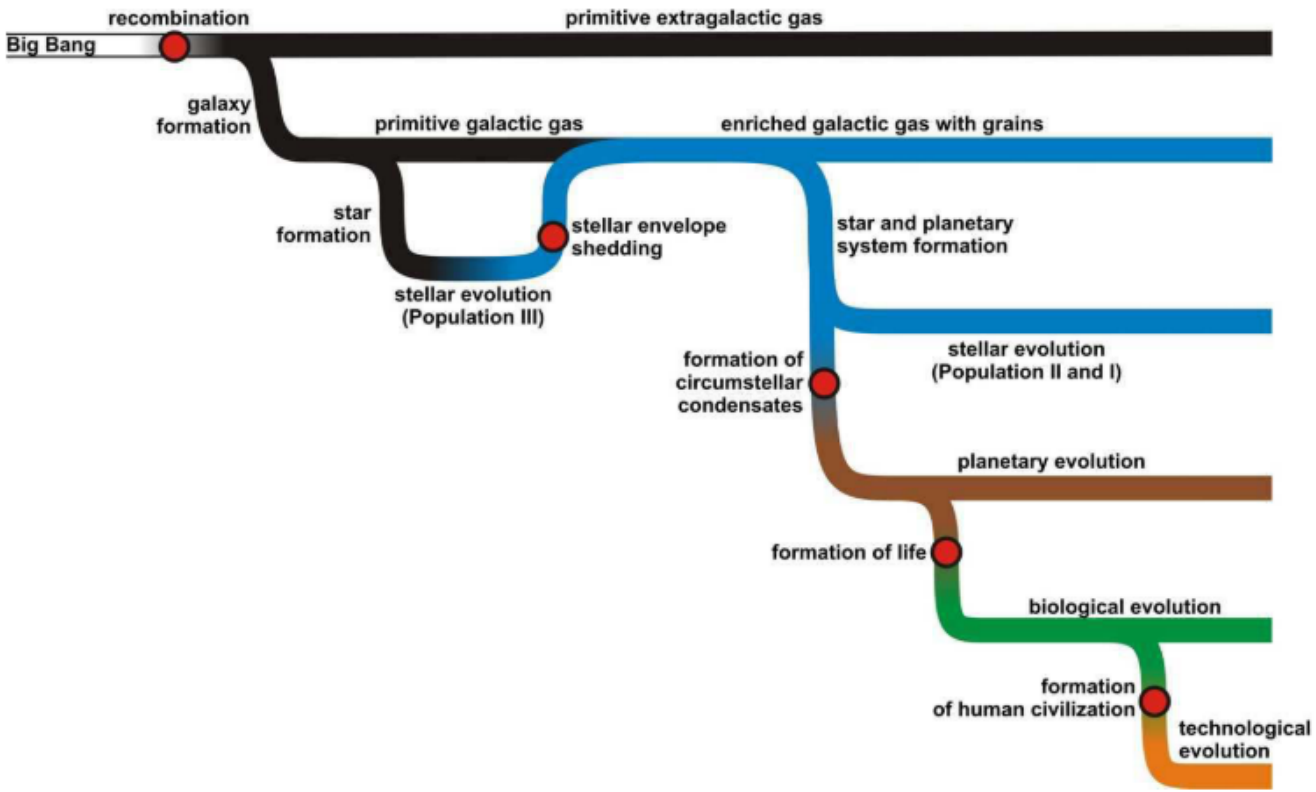
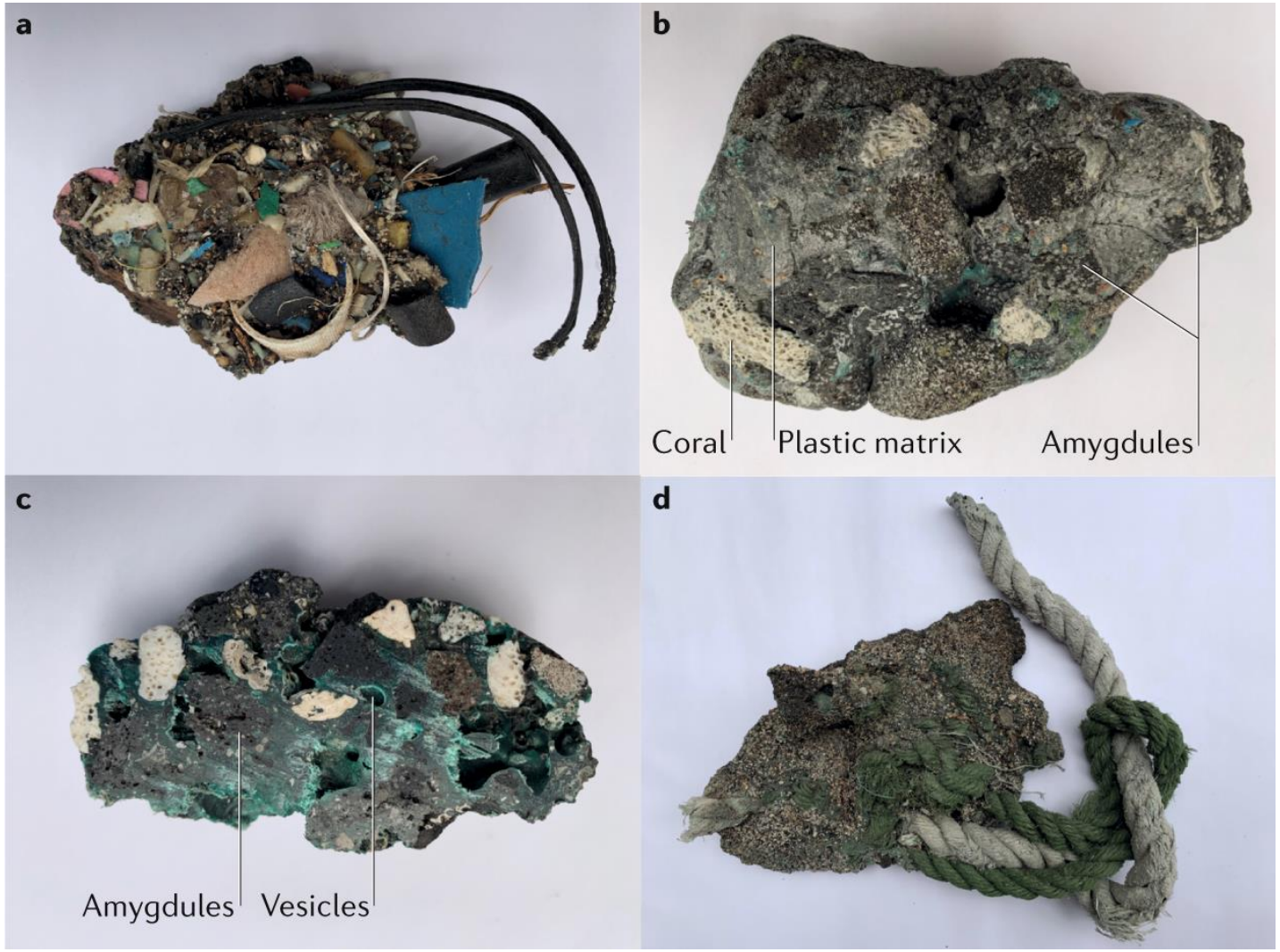
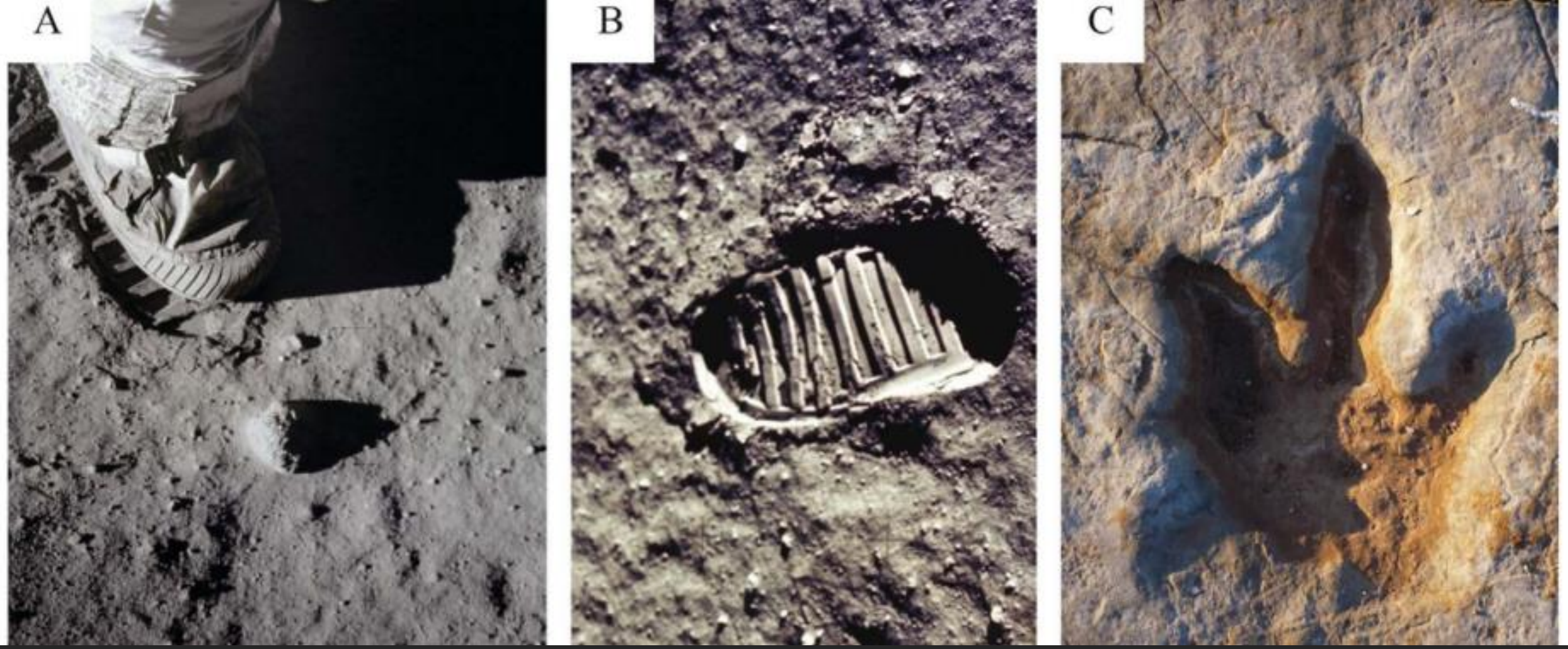


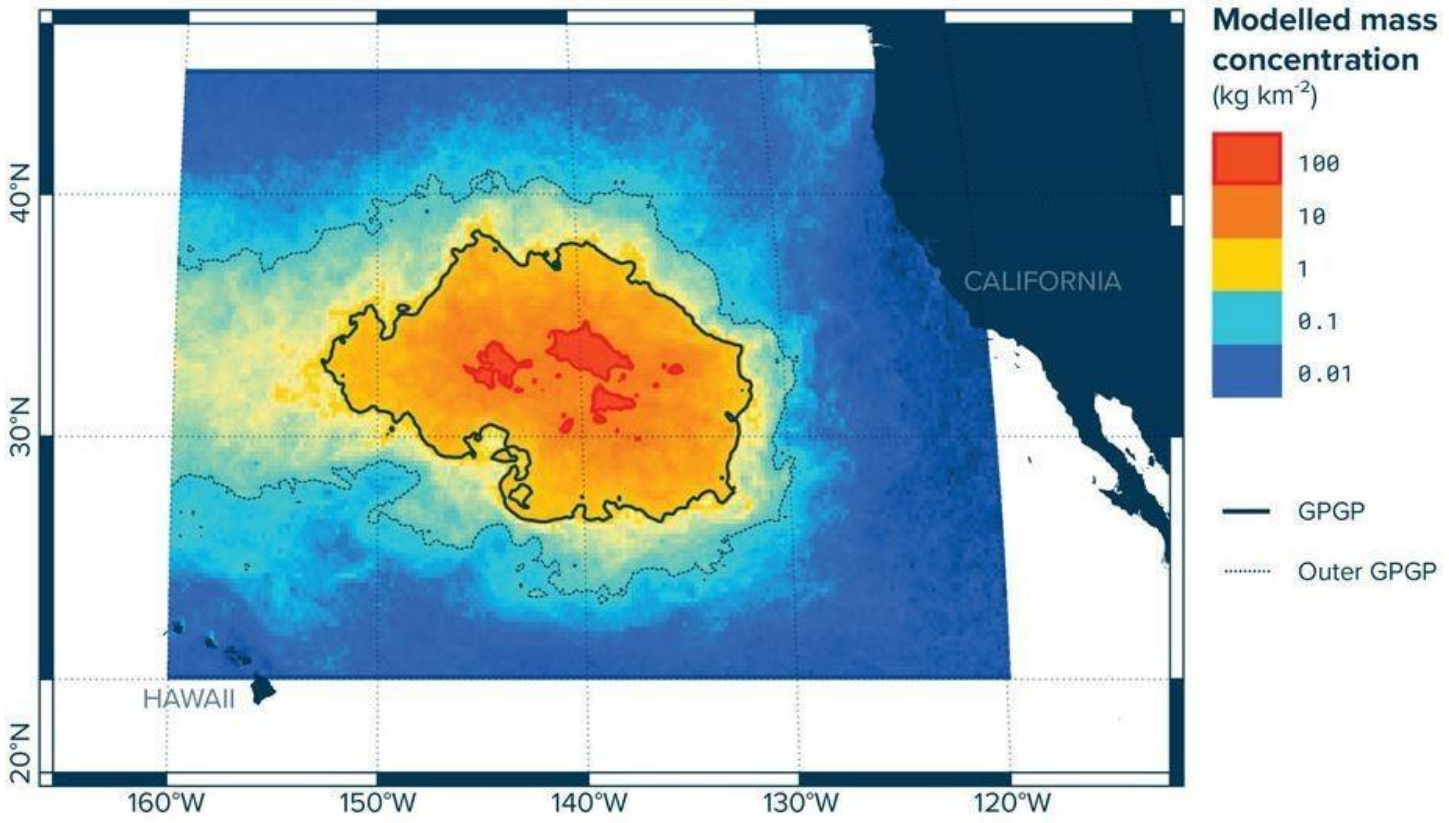
Figure 1: The big picture of cosmic evolution, time runs from left to right. Six phases of cosmic chemical evolution described in the article are symbolized by six colors and red spots indicate areas and processes in the Universe that lead to the emergence of new such phases. More information in text.

Plastiglomerat
Przykład antropogenicznego osadu





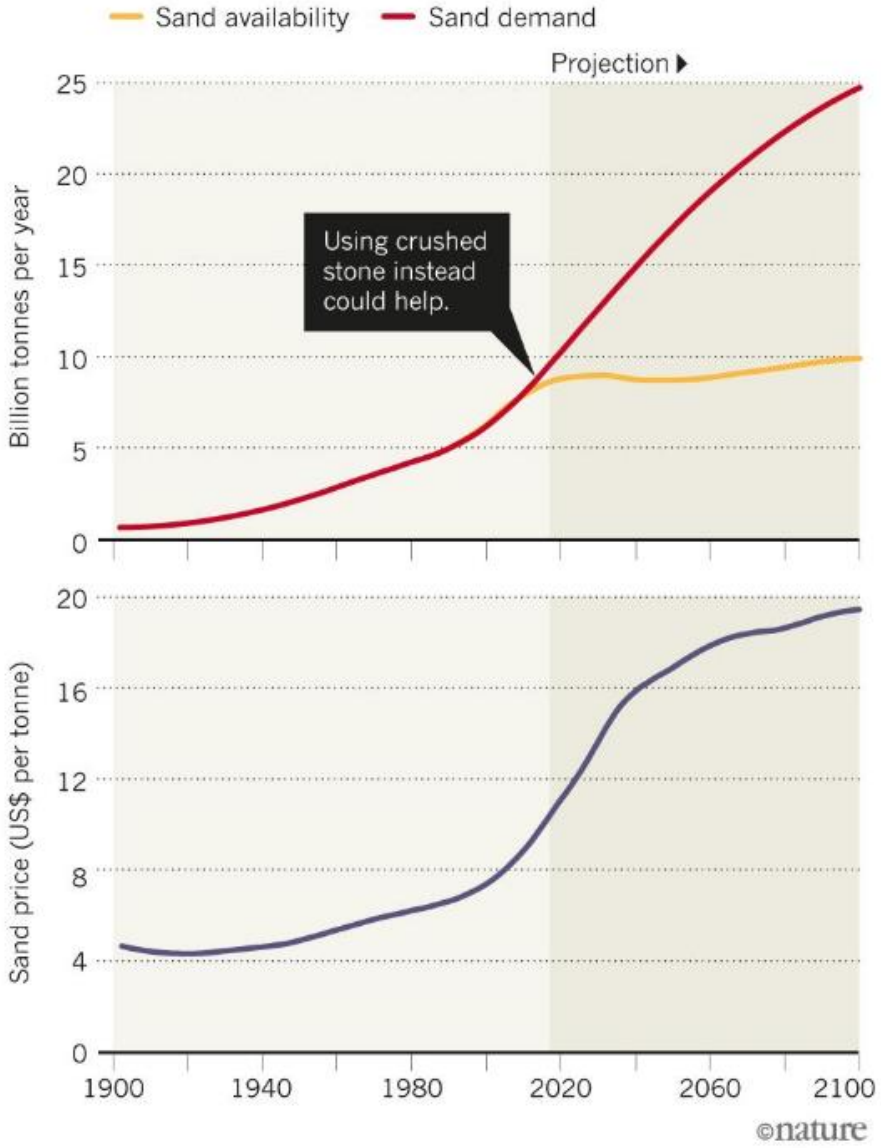
Technoskamieniałości



Ławica plastiku na Oceanie Spokojnym

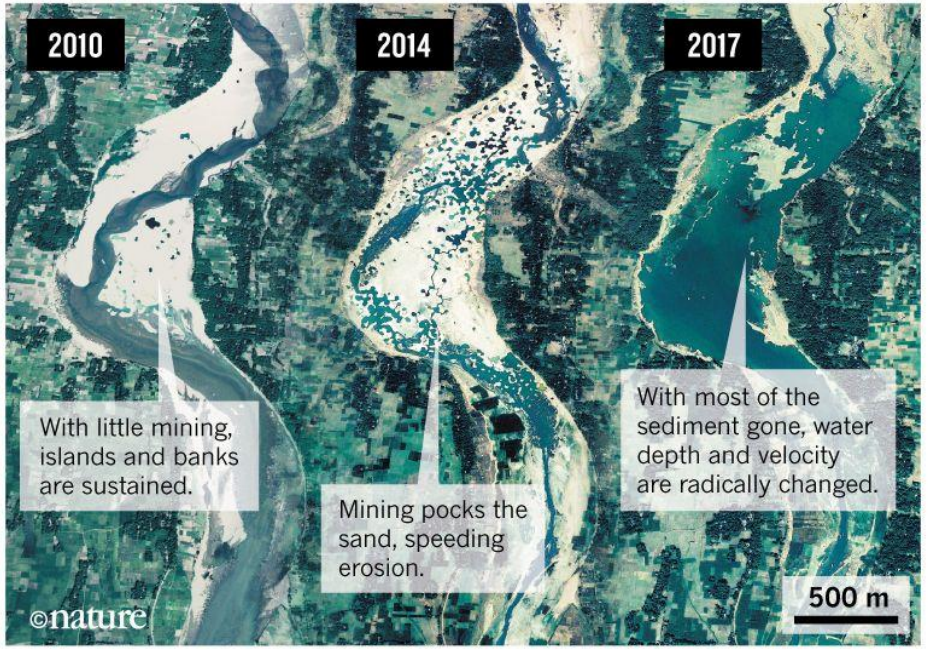
GLOBAL SCARCITY

Demand for sand and gravel for construction is rising faster than natural sources can sustain, so prices will soar.

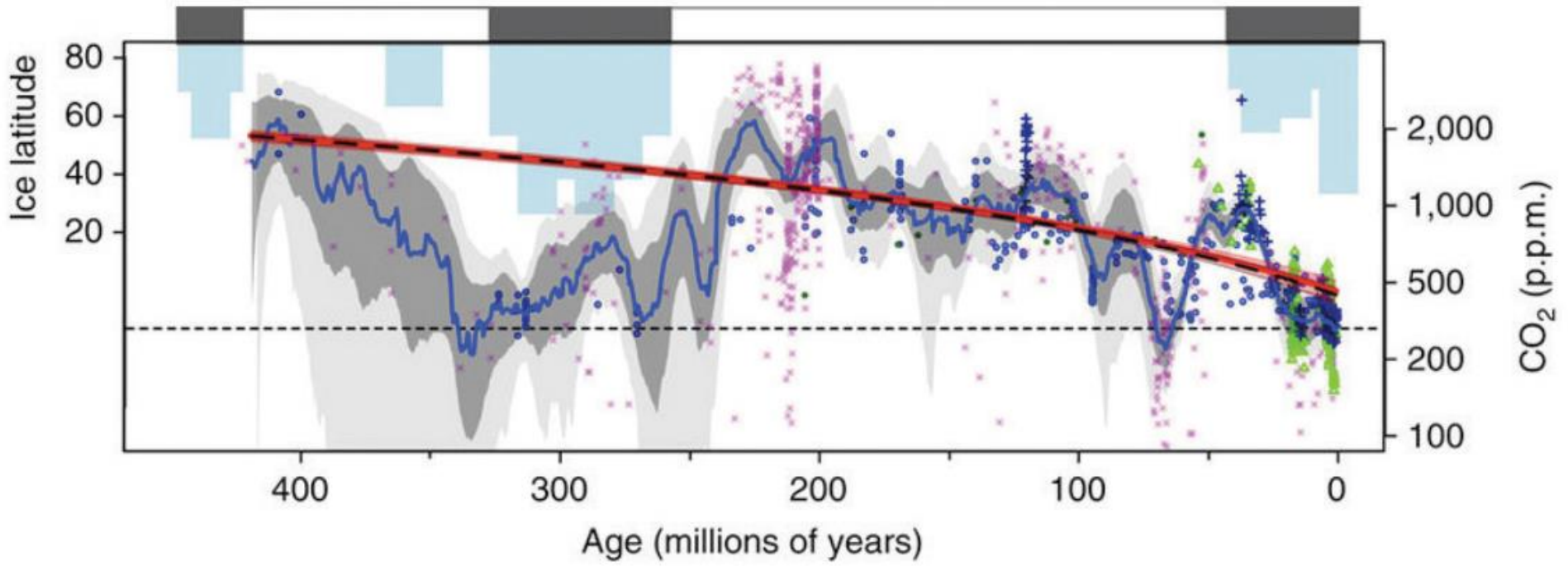


SHIFTING SANDS

Satellite images of the Umngi River in northern Bangladesh reveal the dramatic impact of sand extraction.

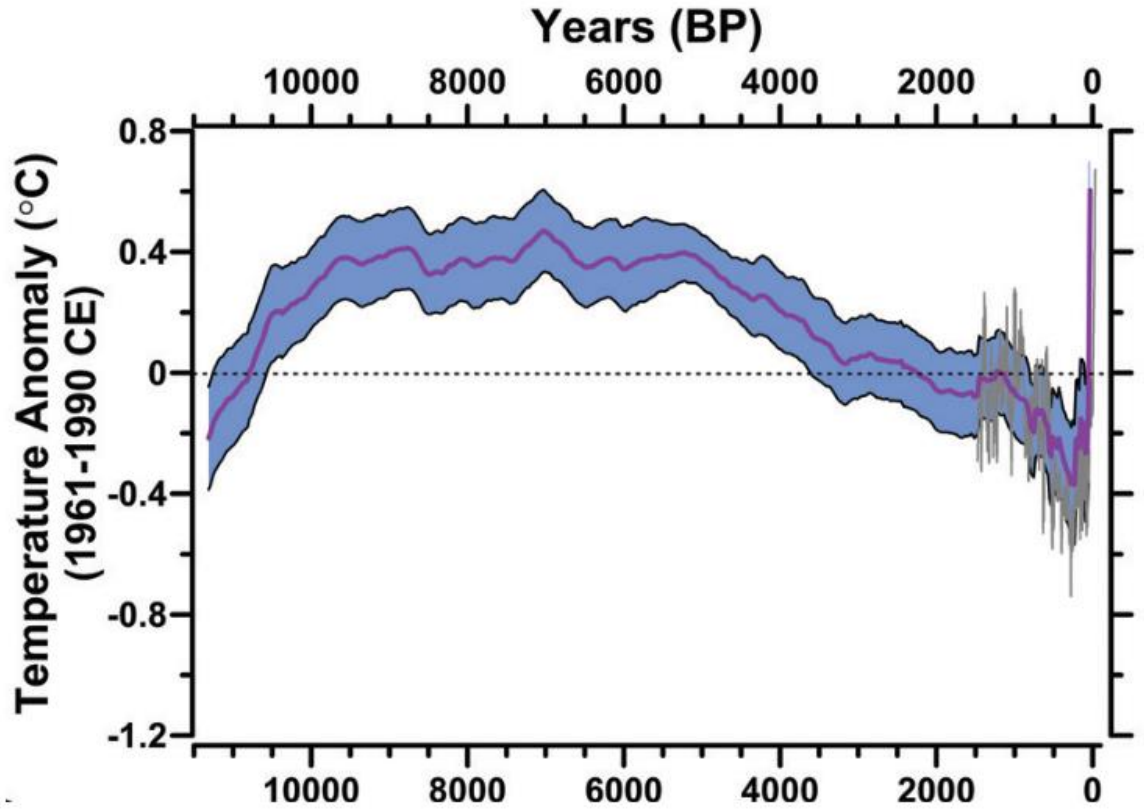


Zapotrzebowanie na piasek budowlany



Poziom CO_2 i zlodowacenia w dziejach Ziemi

Fig. 6. Global temperature stack for 73 cores largely from marine archives. 0 years BP refers to 1950 CE, and temperature anomalies are calculated with respect to the instrumental mean for 1961–1990. (Marcott, S.A., Shakun, J.D., Clark, P.U. & Mix, A. 2013. *Science*, v.339, pp.1198–1201.)

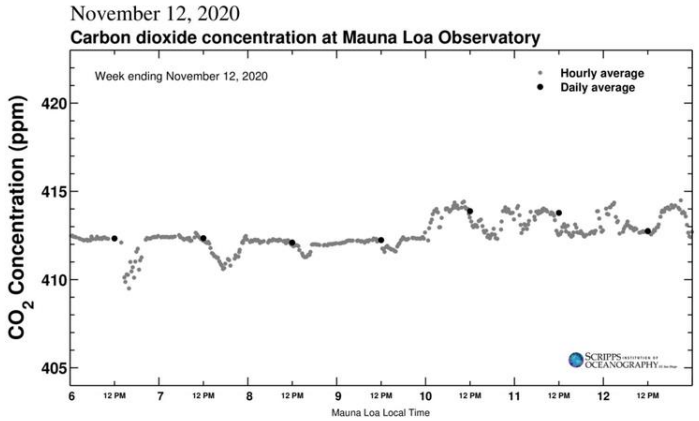


Anomalia temperatury globalnej

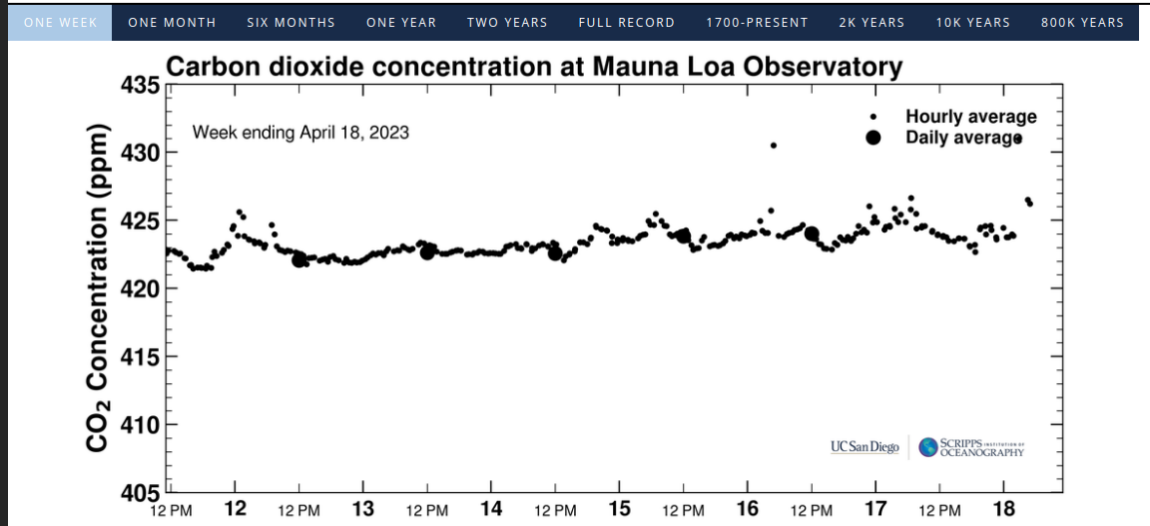
Keeling curve – a daily record of atmospheric CO_2

https://sioweb.ucsd.edu/programs/keelingcurve/

Latest CO_2 reading: 412.75 ppm

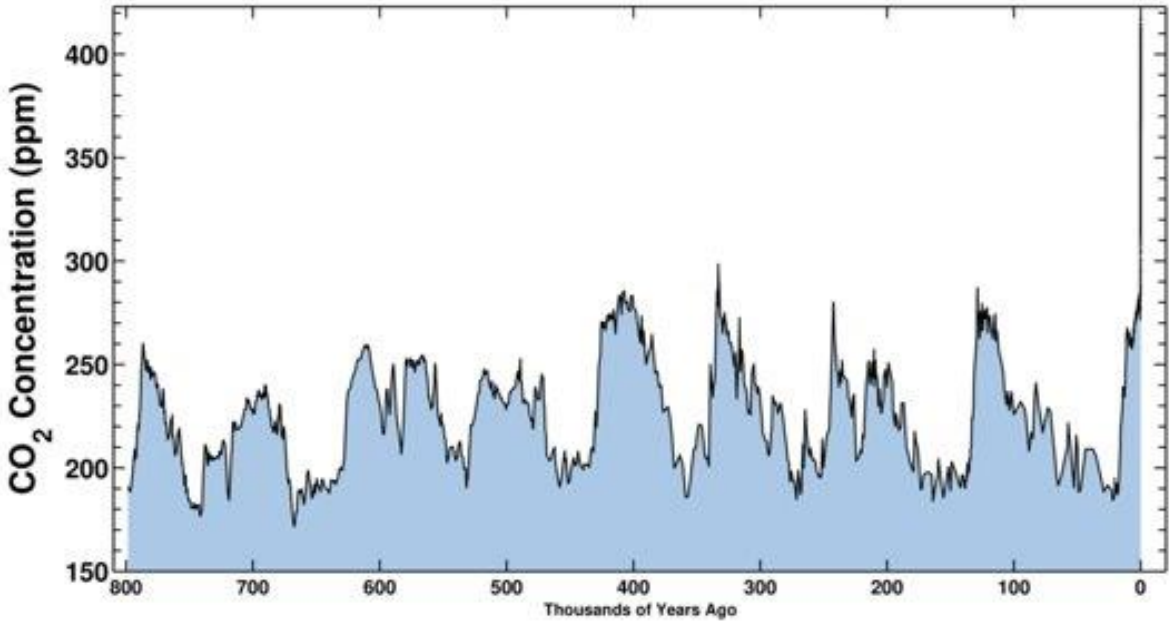


*Latest CO_2 reading: 424.03 ppm



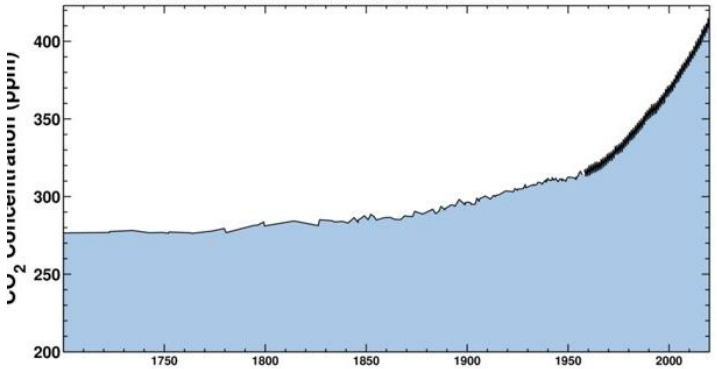
November 12, 2020

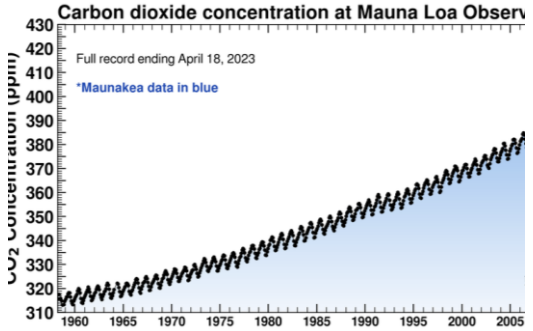
Ice–core data before 1958. Mauna Loa data after 1958.

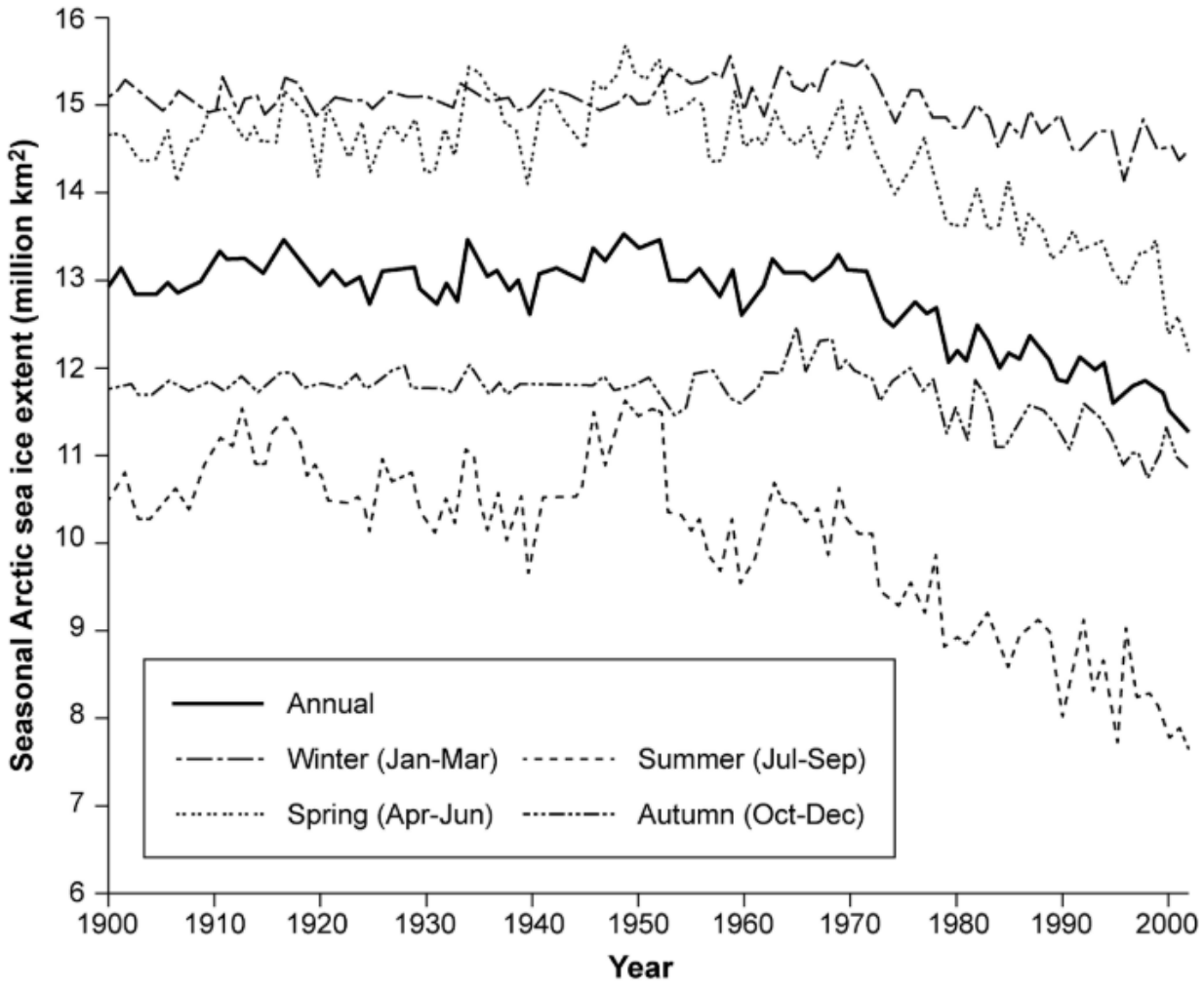


November 12, 2020

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







Zasięg lodu arktycznego

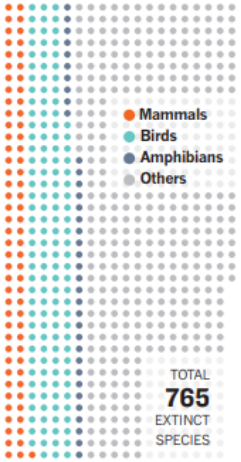
Life under threat

Thousands of species are currently deemed to be threatened, but the true number of species at risk of extinction may be much higher. Estimates suggest that between 500 and 36,000 species might be disappearing each year. The best data are for well-studied groups — mammals, birds and amphibians. Much less is known about threats to other groups, such as insects and fish.

ALREADY EXTINCT

TOTAL DOCUMENTED SINCE 1500

79 145 36 505



CURRENTLY THREATENED

Mammals
1,199
THREATENED SPECIES
26% of described species

Birds
1,373
THREATENED SPECIES
13% of described species


Burramys parvus

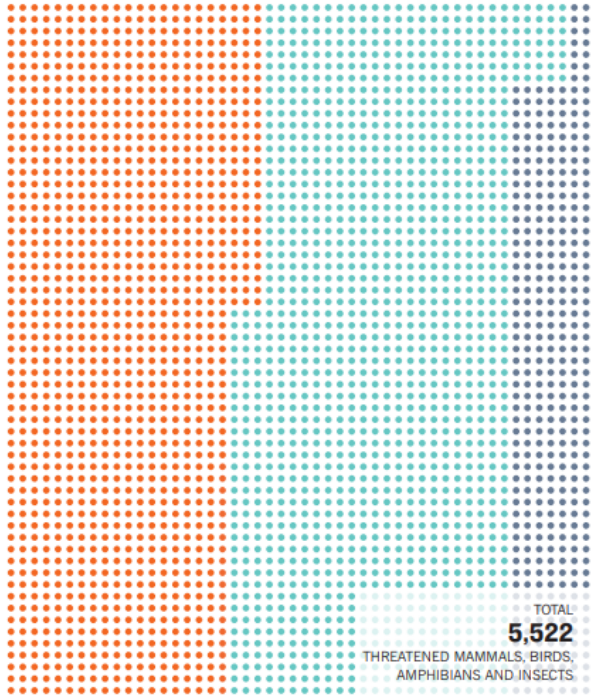

Spheniscus demersus

Amphibians
1,957
THREATENED SPECIES
41% of described species


Ranitomeya summersi

Insects
993
THREATENED SPECIES
(Only 0.5% of roughly 1 million described have been evaluated. Number of living species may exceed 5 million)


Nicrophorus americanus



EXTINCTIONS PER WEEK

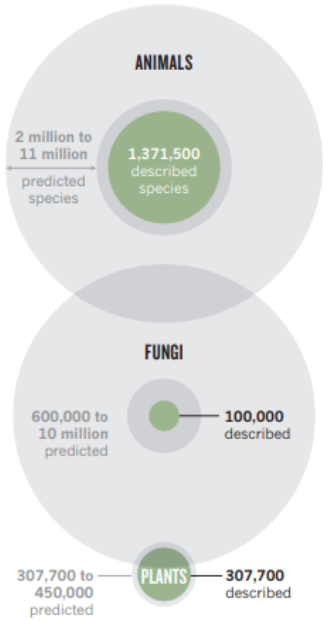
March towards mass extinction

Mass extinctions — loss of 75% of existing species — have happened 5 times in the planet's history. If there are 5 million animal species and they are disappearing at rate of 0.72% per year (the upper end of estimates), a sixth mass extinction could happen by the year 2200. At the low end of the estimated range, a mass extinction would not happen for thousands of years.

BY RICHARD MONASTERSKY | GRAPHIC BY 5W INFOGRAPHIC

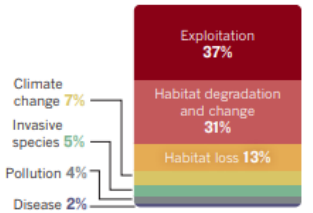
How many species are there?

Estimates of the number of species of animals, fungi and plants vary significantly. That uncertainty clouds understanding of how many species are threatened and how many are going extinct.



Main threats

Hunting, fishing and other forms of exploitation are a major factor in declines in animal populations, according to the Living Planet Index. Habitat degradation and loss are also dominant threats. Climate change is expected to become a bigger factor over time.



FIGURES HAVE BEEN ROUNDED

PHOTO CREDITS: *B. parvus* and *N. americanus*: Joel Sartore/National Geographic Creative; *S. demersus*: Life on white/Alamy; *R. summersi*: Joel Sartore/National Geographic Creative/Getty.

SOURCES: Already Extinct, Currently threatened: IUCN Red List. How many species are there?: S. L. Pimm *et al. Science* **344,** 1246752 (2014); B. R. Scheffers *et al. Trends Ecol. Evol.* **27,** 501–510 (2012); IUCN Red List. March towards mass extinction: Pimm *et al.*; C. Mora *et al. Science* **341,** 237 (2013). Main threats: *WWF Living Planet Report 2014.*

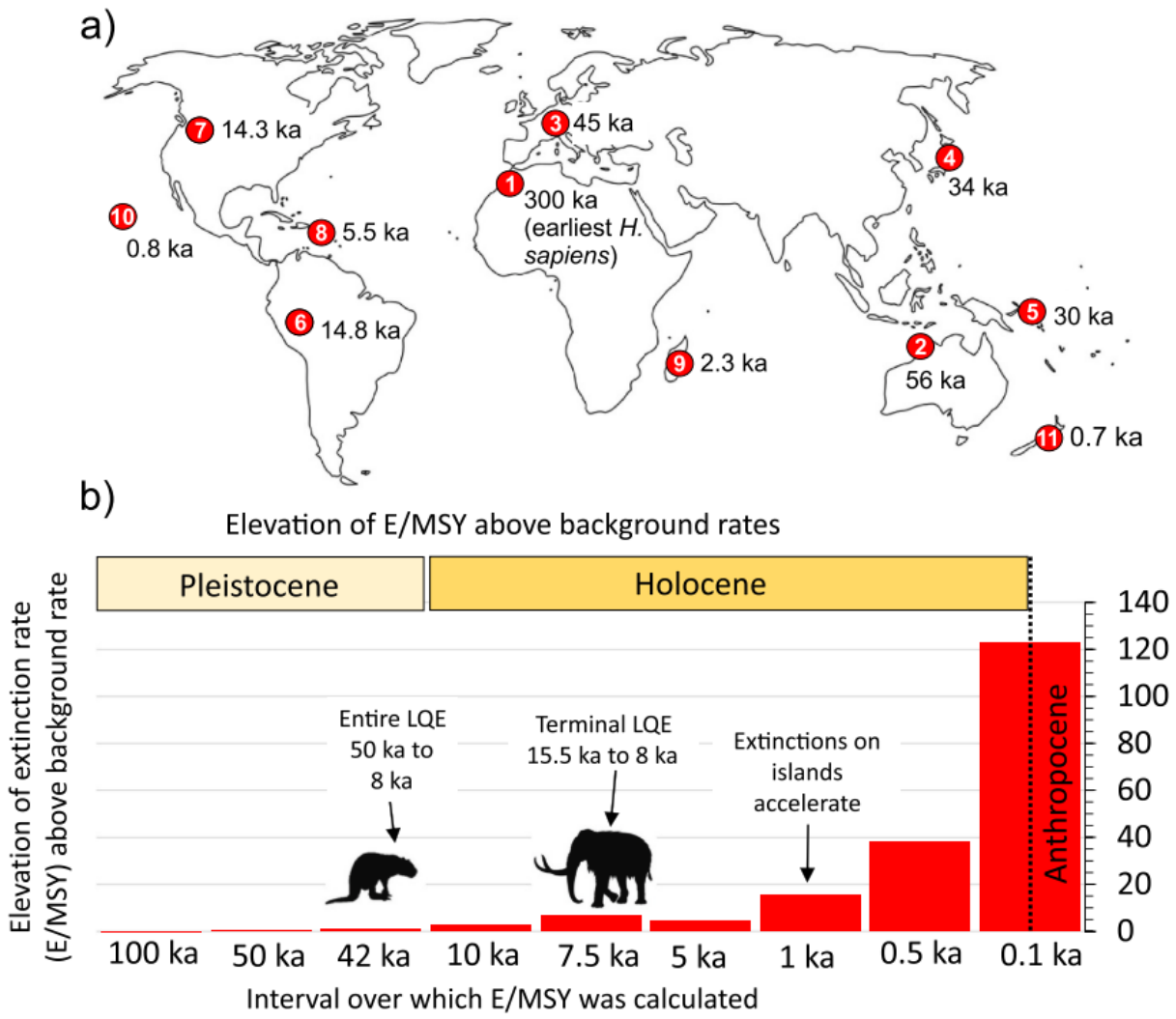


Fig. 6. a) Map indicating the timing of the first documented arrival of *Homo sapiens*, contributing to the diachronous onset of extinction pulses for the LQE; b) The rise in mammal extinction rates since 100 ka. The bars at each labelled time interval indicate the amount the extinction rate was elevated above the average background extinction rate calculated for the time interval. Except for the two LQE bars indicated by extinct-animal icons, the intervals begin at ~2014 CE and reach back the number of years indicated on the scale. For the LQE rates marked by the animal icons, the 42 ka interval encompasses the entire LQE episode from 50 ka to 8 ka. The 7.5 ka interval encompasses the terminal LQE pulse fuelled mostly (but not entirely) by extinctions in the Americas from ~15.5 to 8 ka. The average background rate was computed for each individual time span, to account for the observation that shorter time spans are likely to show higher average extinctions per million species/year (E/MSYs) (Barnosky et al., 2011). The background E/MSYs so calculated ranged between 1.1 and 2.05 E/MSY. Expressing E/MSY for time intervals shorter than 100 years is problematic so shorter time intervals are not included. Data are from Barnosky et al. (2011) updated with information from Ceballos et al. (2015) for the 500 and 100 year intervals.

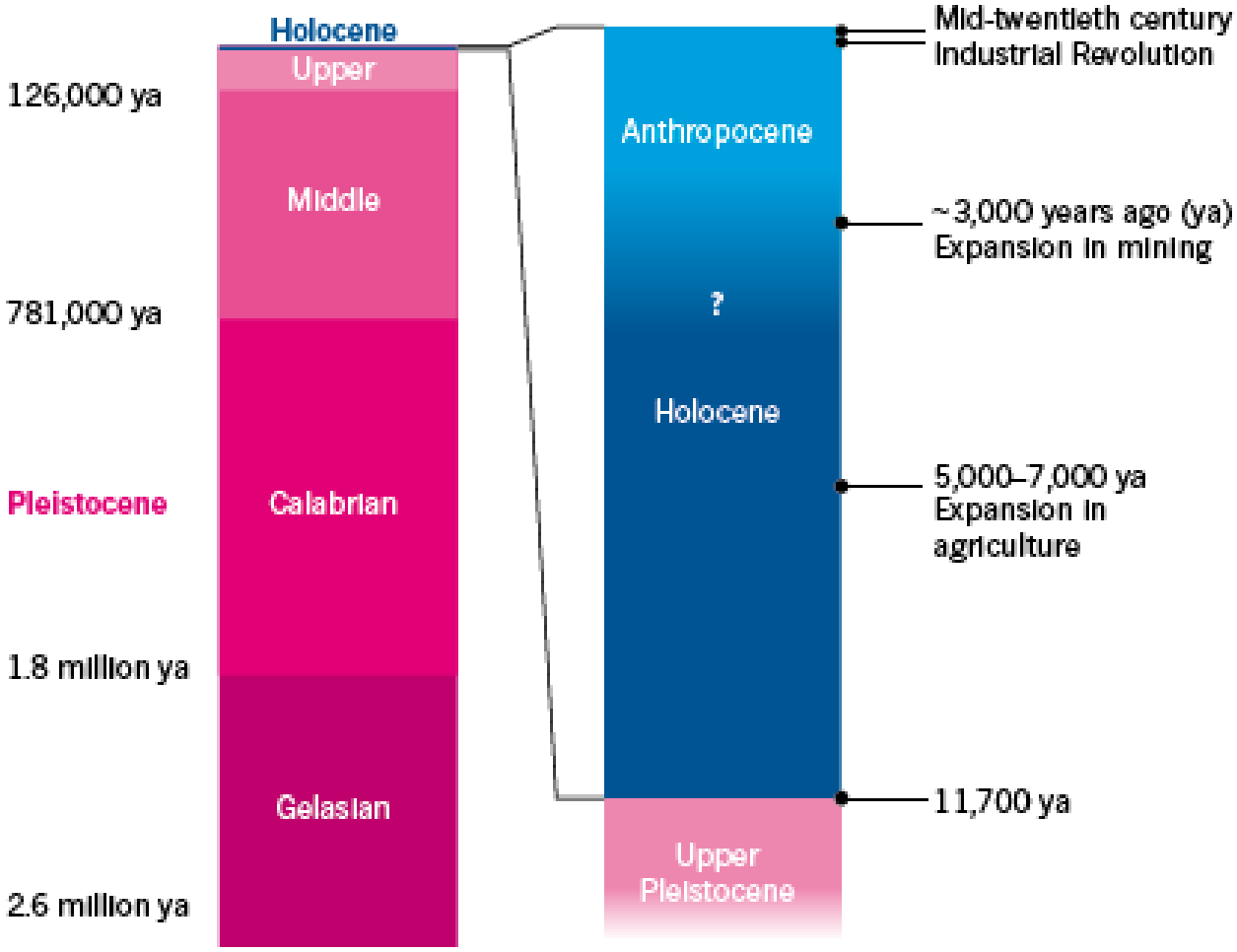
E/MSY - extinctions per million species/year

Table 1 | Potential start dates for a formal Anthropocene Epoch

Event	Date	Geographical extent	Primary stratigraphic marker	Potential GSSP date*	Potential auxiliary stratotypes
Megafauna extinction	50,000–10,000 yr BP	Near-global	Fossil megafauna	None, diachronous over ~40,000 yr	Charcoal in lacustrine deposits
Origin of farming	~11,000 yr BP	Southwest Asia, becoming global	Fossil pollen or phytoliths	None, diachronous over ~5,000 yr	Fossil crop pollen, phytoliths, charcoal
Extensive farming	~8,000 yr BP to present	Eurasian event, global impact	CO_2 inflection in glacier ice	None, inflection too diffuse	Fossil crop pollen, phytoliths, charcoal, ceramic minerals
Rice production	6,500 yr BP to present	Southeast Asian event, global impact	CH_4 inflection in glacier ice	5,020 yr BP CH_4 minima	Stone axes, fossil domesticated ruminant remains
Anthropogenic soils	~3,000–500 yr BP	Local event, local impact, but widespread	Dark high organic matter soil	None, diachronous, not well preserved	Fossil crop pollen
New–Old World collision	1492–1800	Eurasian–Americas event, global impact	Low point of CO_2 in glacier ice	1610 CO_2 minima	Fossil pollen, phytoliths, charcoal, CH_4, speleothem $\delta^{18}O$, tephra†
Industrial Revolution	1760 to present	Northwest Europe event, local impact, becoming global	Fly ash from coal burning	~1900 (ref. 94); diachronous over ~200 yr	^{14}N:^{15}N ratio and diatom composition in lake sediments
Nuclear weapon detonation	1945 to present	Local events, global impact	Radionuclides (^{14}C) in tree-rings	1964 ^{14}C peak§	^{240}Pu: ^{239}Pu ratio, compounds from cement, plastic, lead and other metals

Kiedy to się zaczęło?

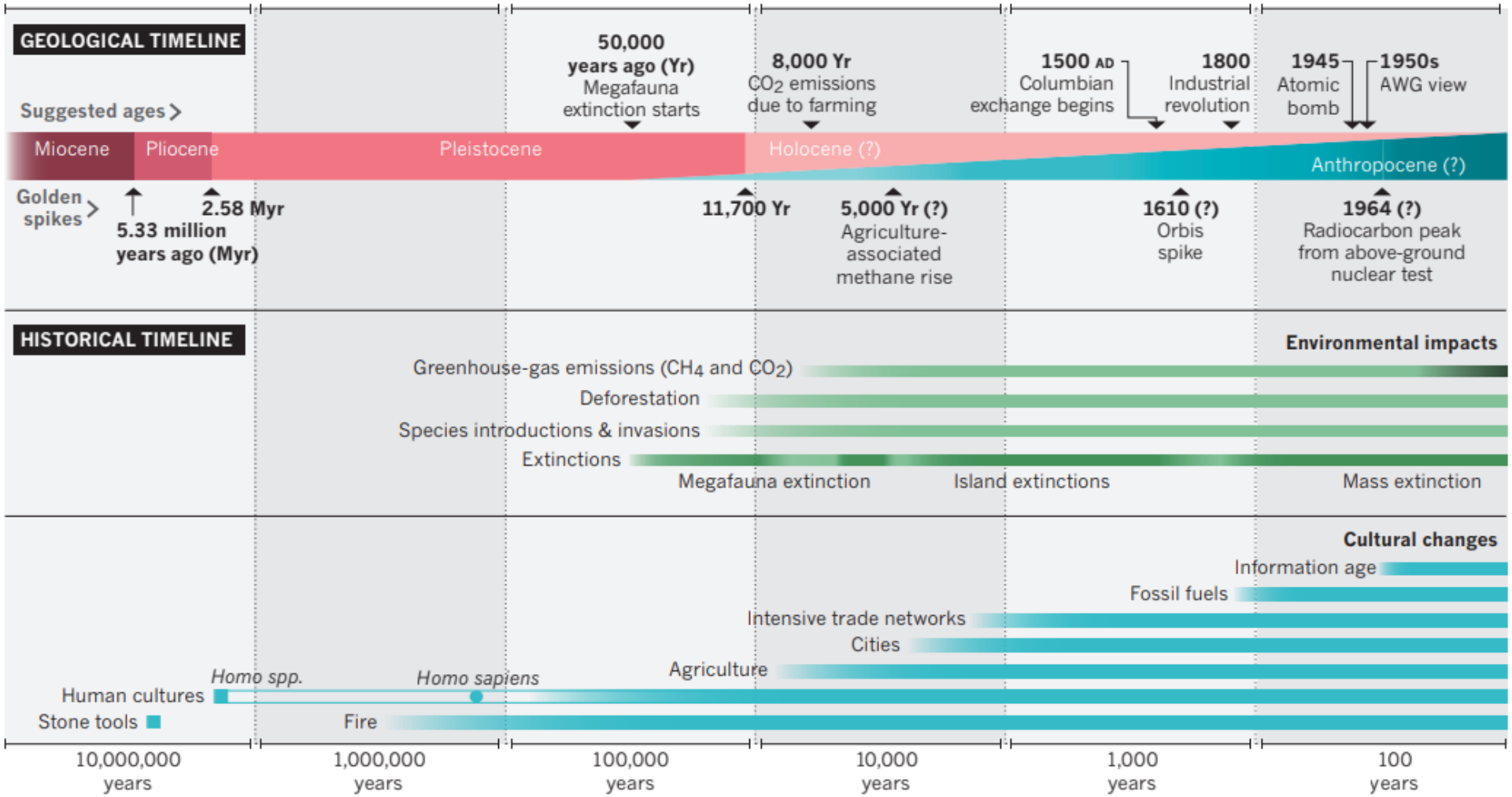
The Anthropocene could be added as a new epoch on top of the Holocene. Or the timescale could remain unchanged, in which case the Anthropocene would function as an informal time unit.



SOURCE: M.M., E.E., N.B., A.B./*NATURE*

THE DEEP ROOTS OF THE ANTHROPOCENE

Human societies began altering Earth long ago. Human social and cultural capacities to alter its environmental processes have accumulated, scaled up and reinforced each other in complex and historically contingent ways. Defining an Anthropocene epoch should involve examining these transformative social-environmental changes, rather than solely focusing on globally instantaneous environmental transitions. 'Golden spikes' mark stratigraphic boundaries of geological time periods; '?' highlight recent boundary proposals.



AWG, Anthropocene Working Group

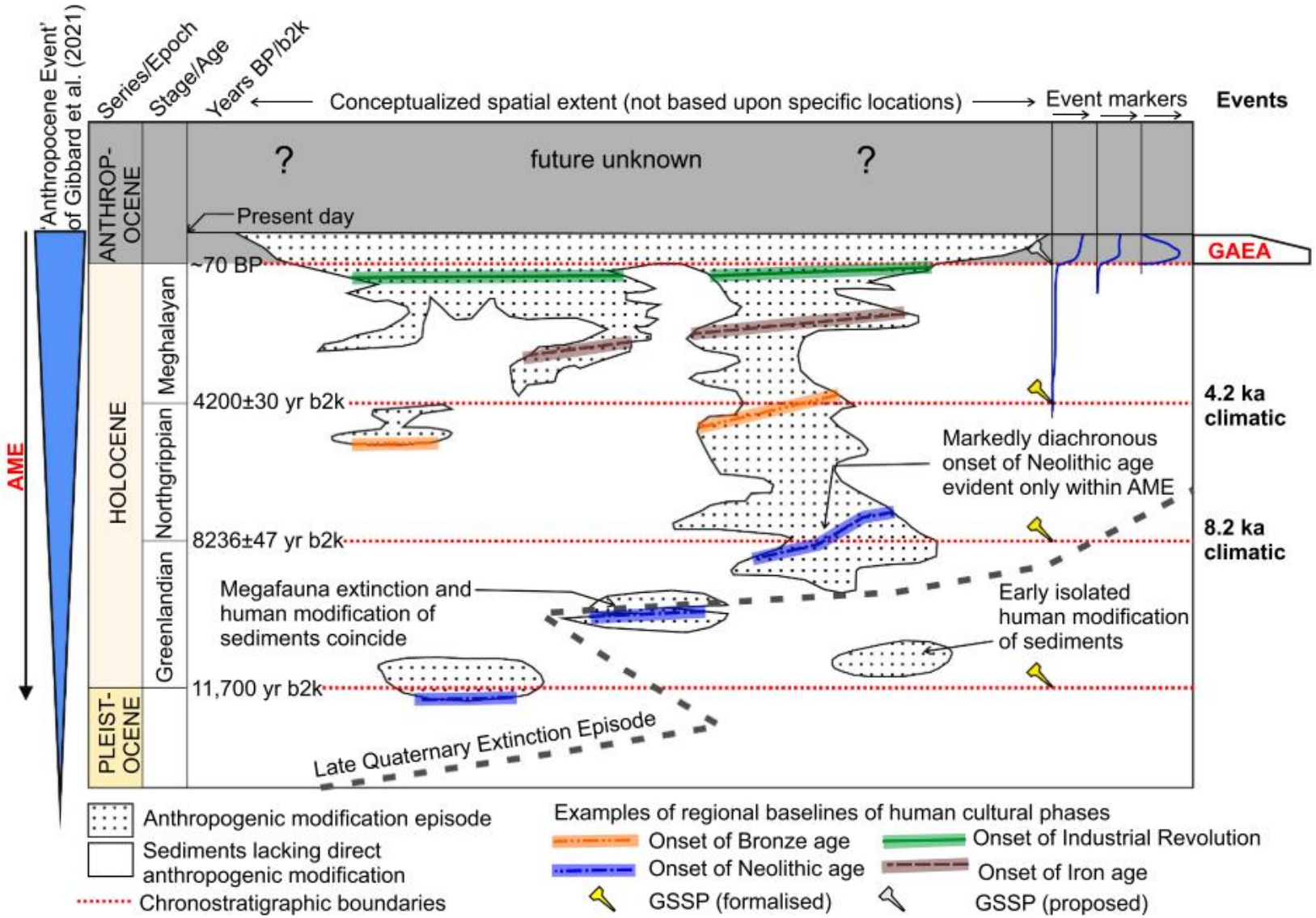
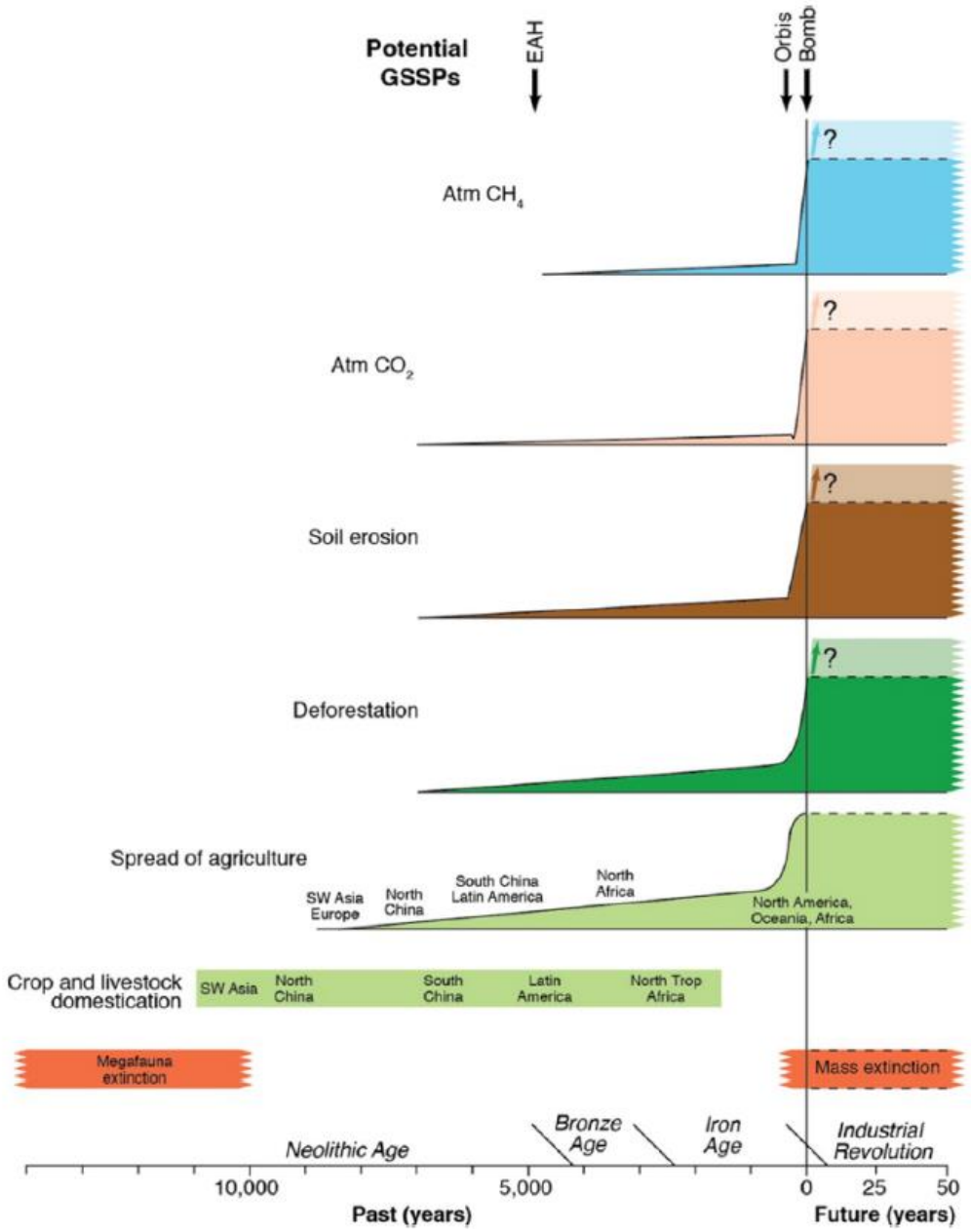
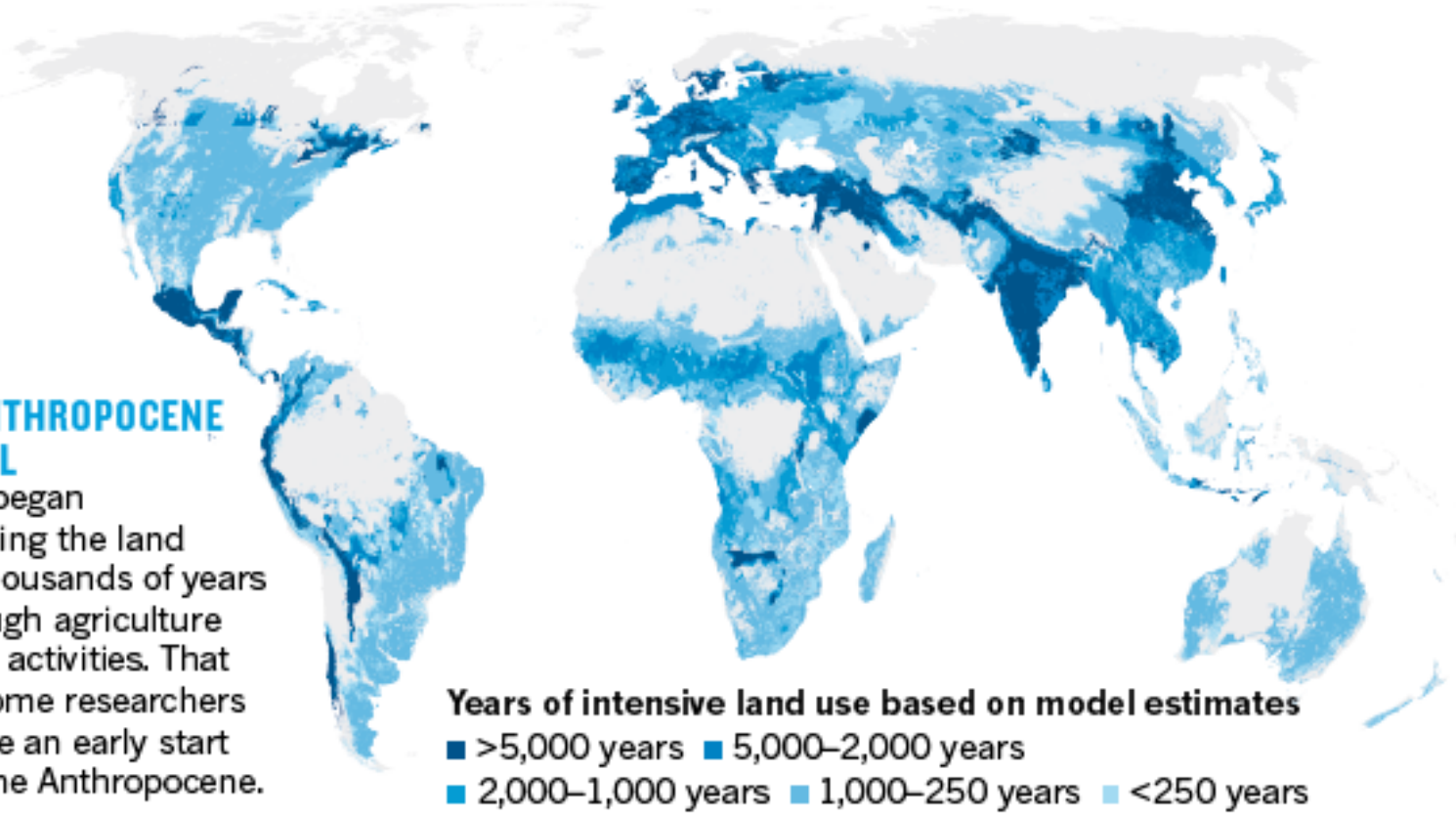


Fig. 13. Conceptualized visualisation of the relationships between chronostratigraphic units, isochronous event markers and the highly diachronous Anthropogenic Modification Episode (AME) and Late Quaternary Extinction Episode across the globe (regions schematic with no scale). The onset of archaeological ages (Neolithic, Bronze and Iron ages) and characteristics of the onset of the Industrial Revolution are diachronous and preserved within the AME.

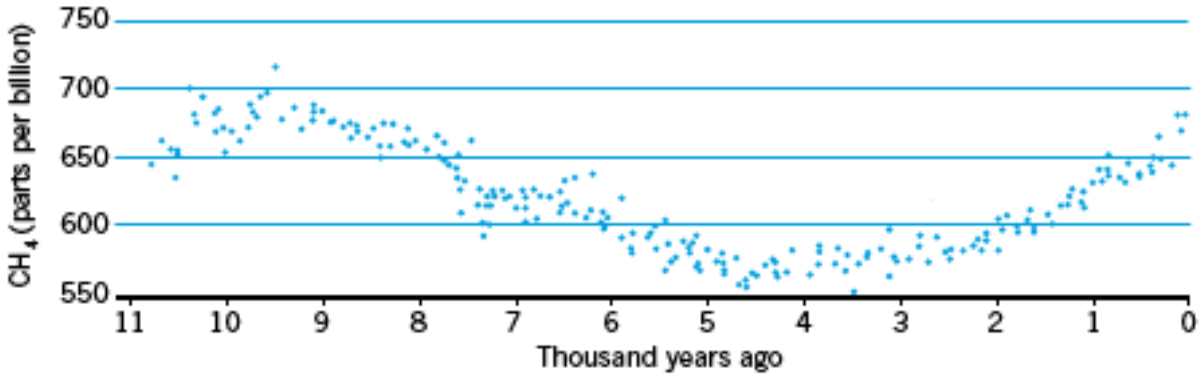

Potential GSSPs
EAH
Orbis
Bomb
Atm CH_4
Atm CO_2
Soil erosion
Deforestation
Spread of agriculture
SW Asia
Europe
North China
South China
Latin America
North Africa
North America,
Oceania, Africa
Crop and livestock domestication
SW Asia
North China
South China
Latin America
North Trop Africa
Megafauna extinction
Mass extinction
Neolithic Age
Bronze Age
Iron Age
Industrial Revolution
10,000
5,000
0
25
50
Past (years)
Future (years)

EARLY-ANTHROPOCENE PROPOSAL

Humans began transforming the land surface thousands of years ago, through agriculture and other activities. That has led some researchers to propose an early start date for the Anthropocene.



One potential stratigraphic marker is a rise in the atmospheric concentration of methane millennia ago, which is recorded in glacial ice. This could reflect increases in farming and animal herding.



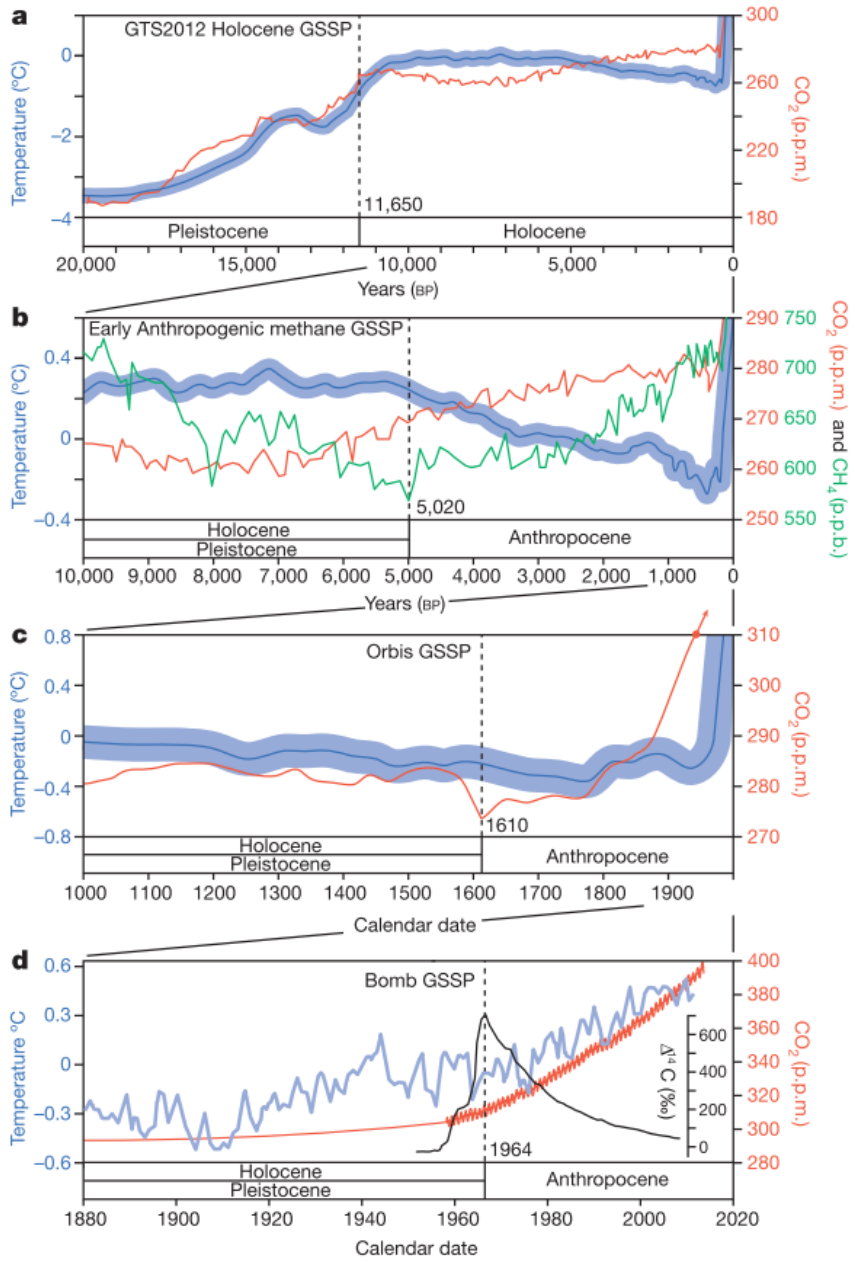
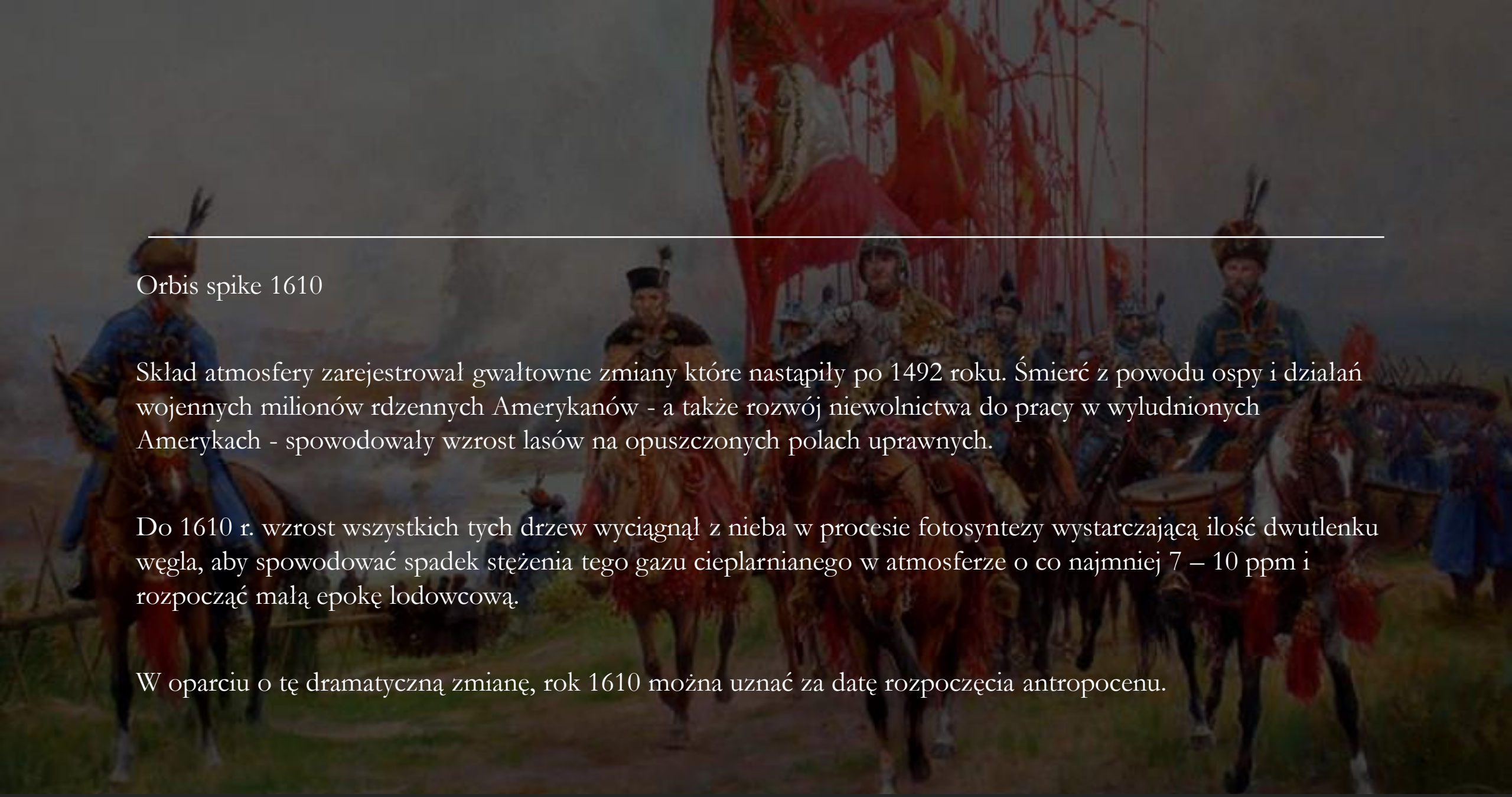


Figure 2 | Defining the beginning of the Anthropocene. **a**, Current GTS2012 GSSP boundary between the Pleistocene and Holocene[38] (dashed line), with global temperature anomalies (relative to the early Holocene average over the period 11,500 BP to 6,500 BP)[112] (blue), and atmospheric carbon dioxide composite[113] on the AICC2012 timescale[114] (red). **b**, Early Anthropogenic Hypothesis GSSP suggested boundary (dashed line), which posits that early extensive farming impacts caused global environmental changes, defined here by the inflection and lowest level of atmospheric methane (in parts per billion, p.p.b.) from the GRIP ice core[59] (green), with global temperature anomalies (relative to the average over the period 1961 to 1990)[115] (blue), and atmospheric carbon dioxide[113] (red). **c**, Orbis GSSP suggested boundary (dashed line), representing the collision of the Old and New World peoples and homogenization of once distinct biotas, and defined by the pronounced dip in atmospheric carbon dioxide (dashed line) from the Law Dome ice core[75,76] (blue), with global temperature data anomalies (relative to the average over the period 1961 to 1990)[115] (red). **d**, Bomb GSSP suggested boundary (dashed line), characterized by the peak in atmospheric radiocarbon from annual tree-rings (black)[103] (the $\Delta^{14}C$ value is the relative difference between the absolute international standard (base year 1950) and sample activity corrected for the time of collection and $\delta^{13}C$), with atmospheric carbon dioxide from Mauna Loa, Hawaii, post-1958[116], and ice core records pre-1958[75,76] (red), and global temperature anomalies (relative to the average over the period 1961 to 1990)[116] (blue).



Orbis spike 1610

Skład atmosfery zarejestrował gwałtowne zmiany które nastąpiły po 1492 roku. Śmierć z powodu ospy i działań wojennych milionów rdzennych Amerykanów - a także rozwój niewolnictwa do pracy w wyludnionych Amerykach - spowodowały wzrost lasów na opuszczonych polach uprawnych.

Do 1610 r. wzrost wszystkich tych drzew wyciągnął z nieba w procesie fotosyntezy wystarczającą ilość dwutlenku węgla, aby spowodować spadek stężenia tego gazu cieplarnianego w atmosferze o co najmniej 7 – 10 ppm i rozpocząć małą epokę lodowcową.

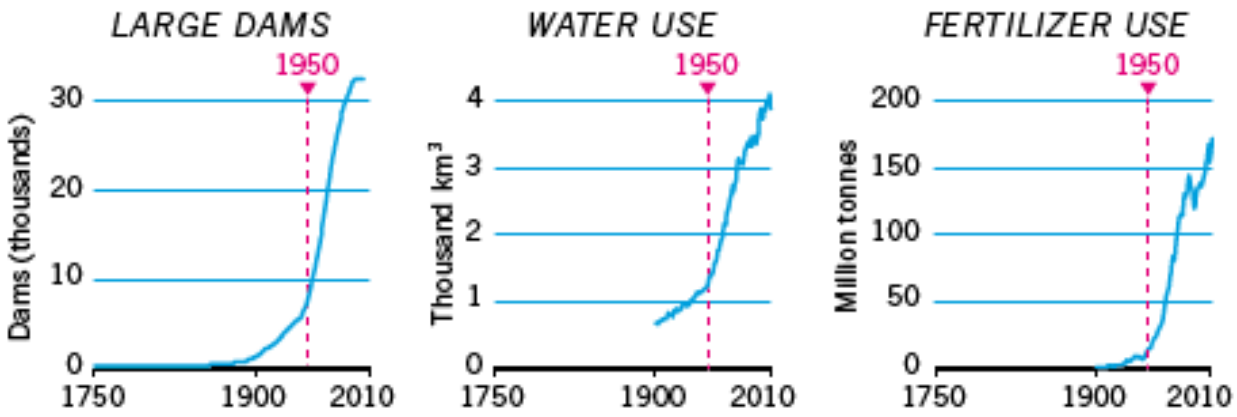
W oparciu o tę dramatyczną zmianę, rok 1610 można uznać za datę rozpoczęcia antropocenu.

Humans at the helm

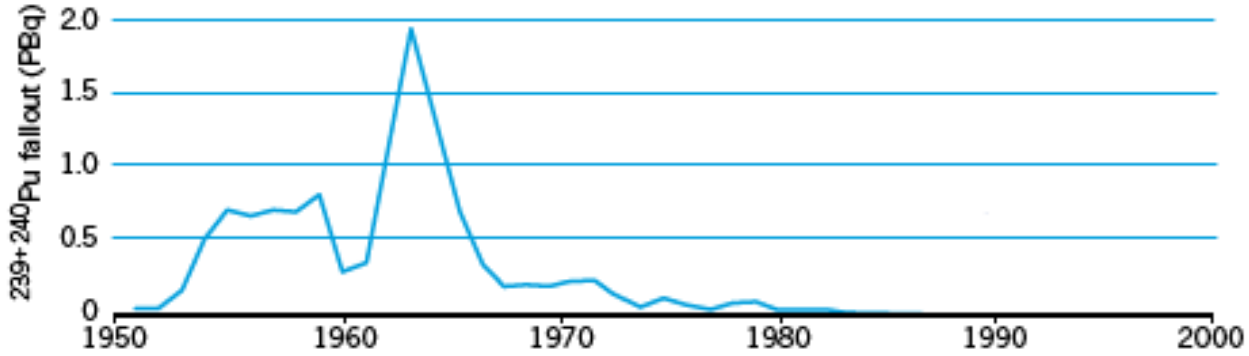
Researchers are studying whether the geological timescale should be modified to include the Anthropocene, a unit of time during which humans became a major force on the planet. Some support starting the Anthropocene in the mid-twentieth century, whereas others propose much earlier dates.

LATE-ANTHROPOCENE PROPOSAL

Human impacts on the environment surged in the mid-twentieth century, a trend visible in many records. That time has been called the Great Acceleration.



Radioactive fallout from nuclear blasts peaked in the mid-twentieth century, leaving a signal visible in sediments that has been proposed as a marker for the start of the Anthropocene.



Article

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IUGS

by Philip L. Gibbard[1], Andrew M. Bauer[2], Matthew Edgeworth[3], William F. Ruddiman[4], Jacquelyn L. Gill[5], Dorothy J. Merritts[6], Stanley C. Finney[7], Lucy E. Edwards[8], Michael J. C. Walker[9], Mark Maslin[10,11], and Erle C. Ellis[12]*

A practical solution: the Anthropocene is a geological event, not a formal epoch

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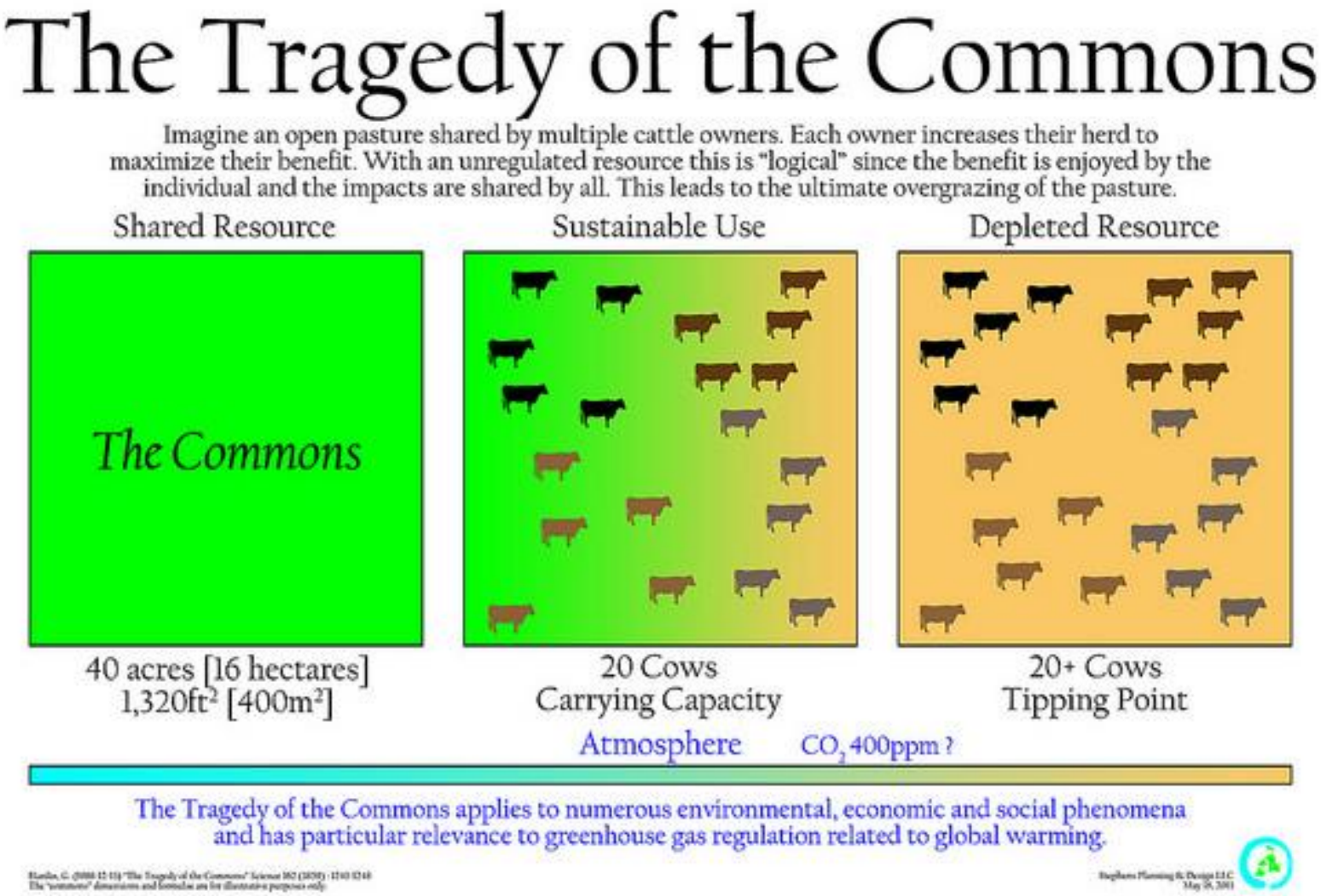
(Received: July 6, 2021; Revised accepted: October 4, 2021)

https://doi.org/10.18814/epiiugs/2021/021029

Zagrożenia antropocenu

THE SPACE IS NO ESCAPE



Garret Hardin

The Tragedy of the Commons

1. degradacja środowiska
2. przeludnienie
3. ograniczone zasoby
4. dostęp do zasobów (prywatyzacja)

The population problem has no technical solution; it requires a fundamental extension in morality

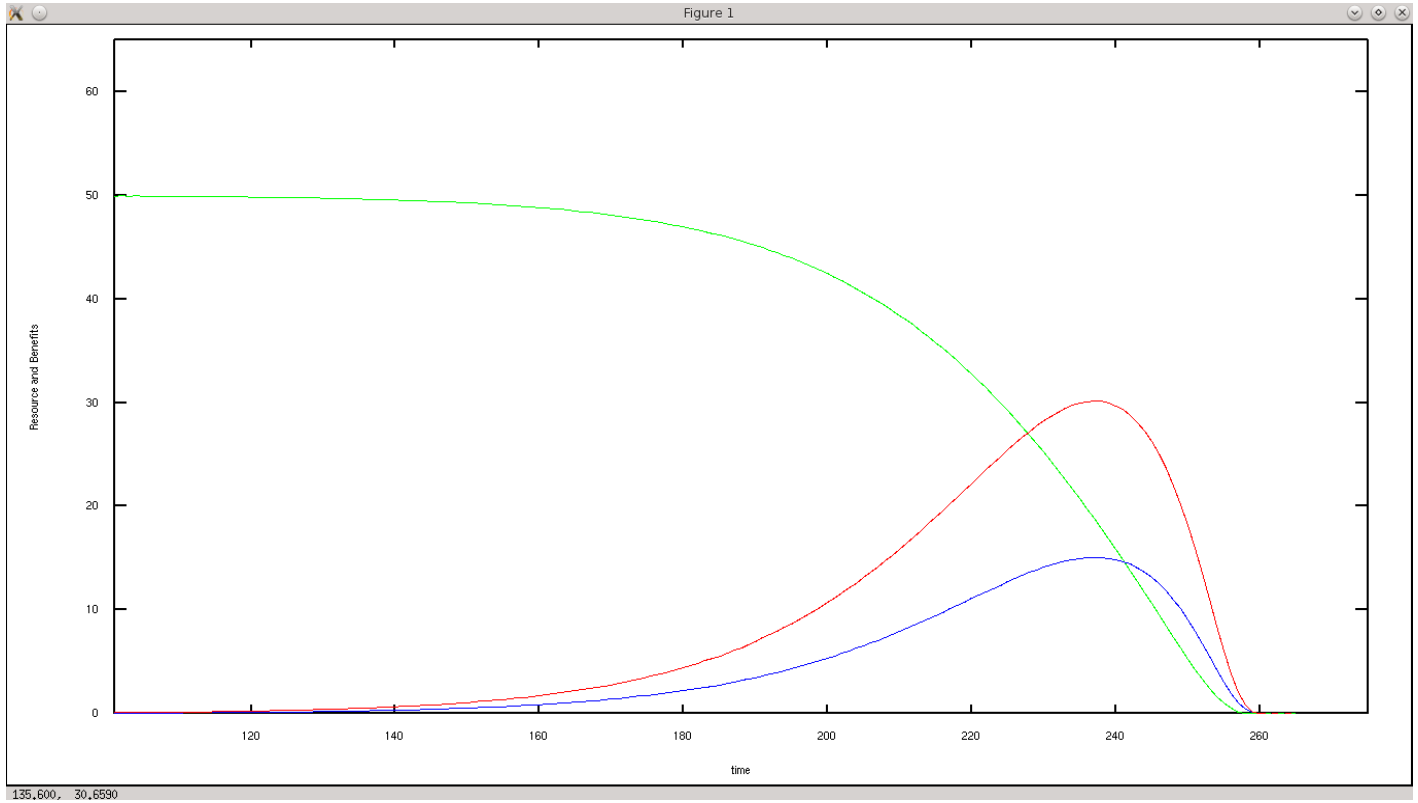
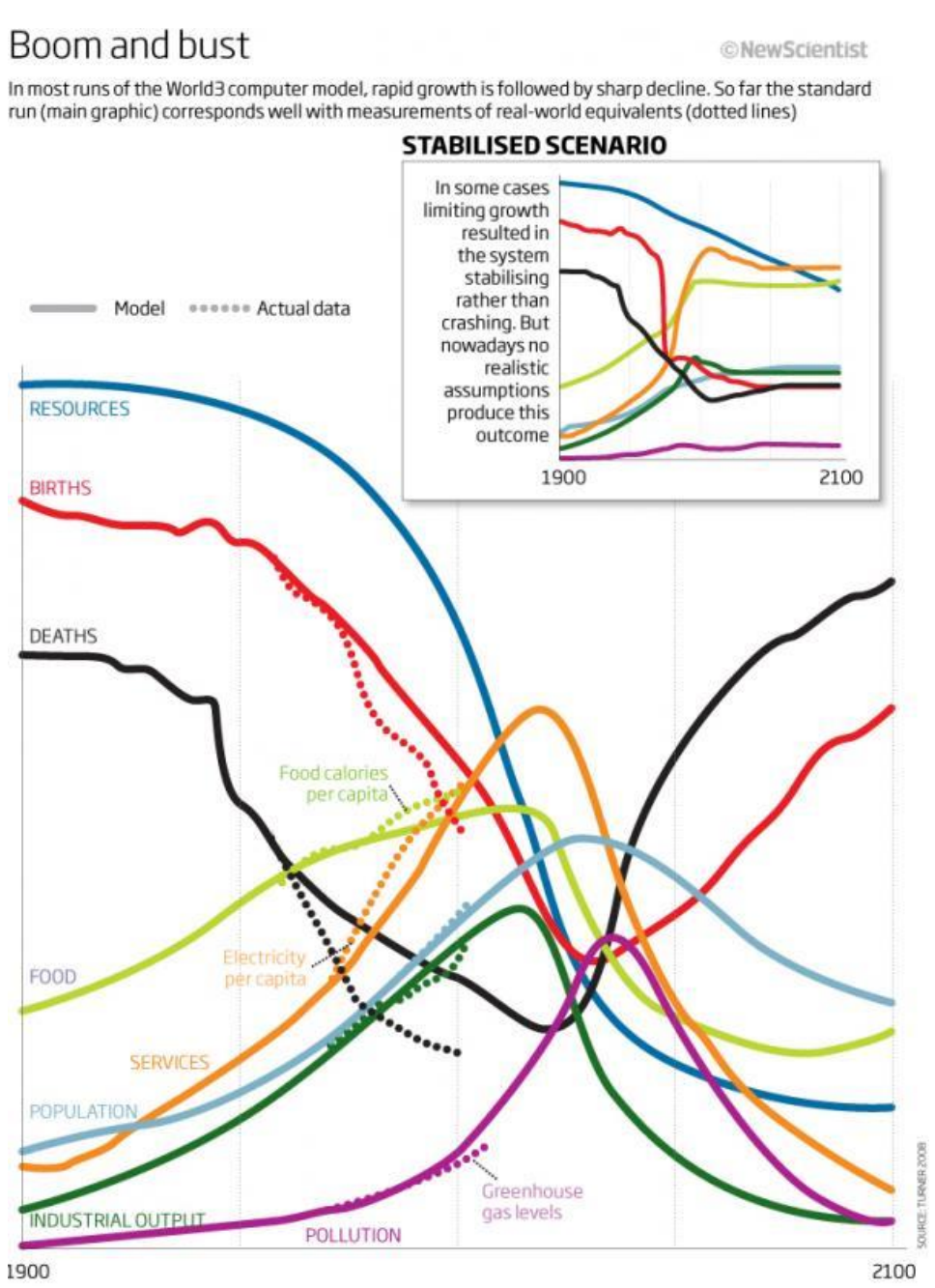
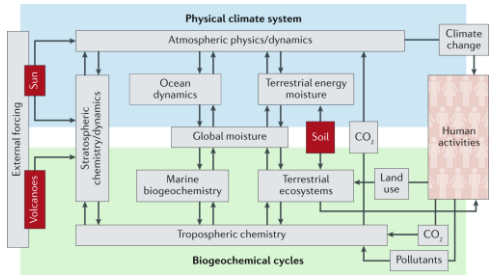
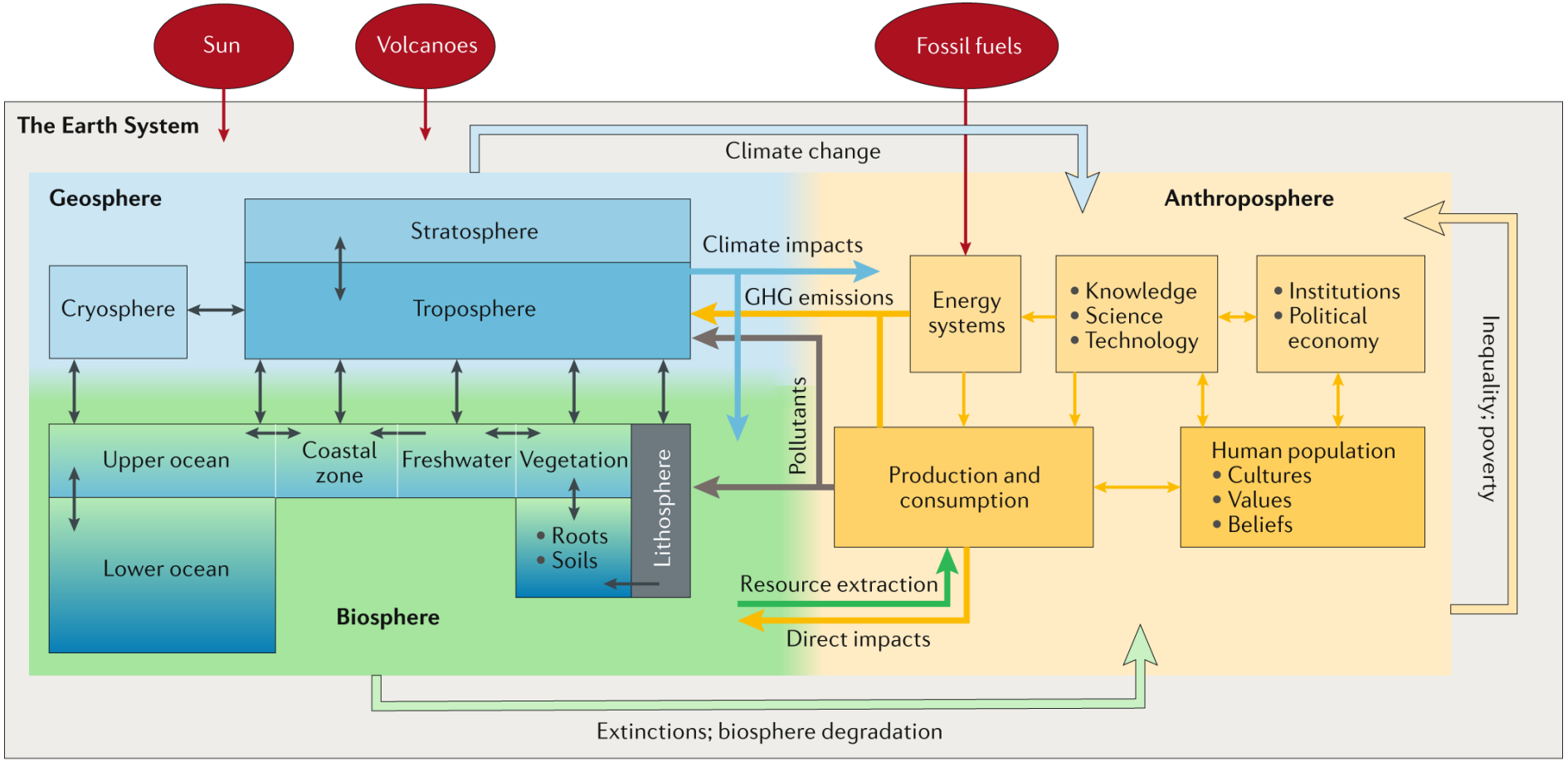


Figure 1
Resource and Benefits
time
0
10
20
30
40
50
60
120
140
160
180
200
220
240
260
135.600, 30.6590


Boom and bust
©NewScientist
In most runs of the World3 computer model, rapid growth is followed by sharp decline. So far the standard run (main graphic) corresponds well with measurements of real-world equivalents (dotted lines)
STABILISED SCENARIO
In some cases limiting growth resulted in the system stabilising rather than crashing. But nowadays no realistic assumptions produce this outcome
1900
2100
Model
Actual data
RESOURCES
BIRTHS
DEATHS
Food calories per capita
Electricity per capita
FOOD
SERVICES
POPULATION
INDUSTRIAL OUTPUT
POLLUTION
Greenhouse gas levels
1900
2100

Earth System science (nauka o ziemskim systemie)





Ocena wpływu człowieka na każdy element systemu ziemskiego

Atmosphere

- Includes the troposphere, the lowermost layer up to the elevation where jet planes fly and in which all weather systems and habitats for air-breathing life and photosynthesis exist.
- Anthropogenic impacts include reduced air quality due to pollution, warming due to burning of fossil fuels, ozone layer damage due to aerosols, extreme weather causing floods, wildfires and droughts, and altered averages of season length, temperature and precipitation patterns.

Hydrosphere

- All oceans and seas that contain 96.5% of the world's water and cover 71% of its surface, and all freshwater in lakes, rivers, and groundwater from which all drinking water (aside from desalination products) is derived.
- Anthropogenic impacts include widespread pollution, ocean warming causing hurricane intensification and reduction of Arctic and Antarctic sea ice, ecosystem shifts, river flow disruptions, coral reef bleaching, ubiquitous plastic debris, and sea-level rise mainly due to melting ice sheets, icecaps and glaciers, locally exacerbated by coastal subsidence.

Cryosphere

- All frozen areas of the Earth's surface, including ice-sheets, icecaps, glaciers, and tundra.
- The Antarctica ice sheet and Greenland icecap contain the equivalents of approx. 60m and 6m of worldwide sea-level rise, respectively.
- Anthropogenic impacts include melting of permafrost with methane emissions and accelerated melting of glacial ice which is often a vital source to river flow and water for piedmont communities and agriculture.

Koster, Emlyn. 2020. "GEOSCIENCE CANADA Anthropocene: Transdisciplinary Shorthand for Human Disruption of the Earth System." *Geoscience Canada*, July, 59–64. https://doi.org/10.12789/geocanj.2020.47.160

Summary of anthropogenic impacts on each 'shell' of Earth system

Biosphere

- All life-supporting habitats on, just below and above land and ocean surfaces.
- Includes the virosphere, the world of virus diversity such as Covid-19.
- Extensively inhabited and affected by humanity (the Earth's dominant species) and these impacts have grown with the Great Acceleration since the mid-20th century.
- Anthropogenic impacts include pollution, disruptions of ecosystems, overfishing, and sharply reduced biodiversity in all major faunal and floral groups, including extinctions.

Lithosphere

- Crustal layer, 5 to 65 km thick, in which plate tectonics operates, volcanic activity and earthquakes originate, and from where fossil fuels and mineral resources are extracted.
- Includes the pedosphere: the thin outermost layer of agriculture-enabling soil where rock and sediment are altered by linked physical, chemical, and organic processes.
- Includes the archaeosphere: proposed term for the altered, highly varied, surface layer of the lithosphere containing evidence of human activities and impacts.
- Anthropogenic impacts include disposal of radioactive waste, groundwater pollution, aquifer alteration, impacts from hydraulic fracturing of rocks for recovery of hydrocarbons, and the predicted imminence of 'peak soil' and 'peak oil'.

Koster, Emlyn. 2020. "GEOSCIENCE CANADA Anthropocene: Transdisciplinary Shorthand for Human Disruption of the Earth System." *Geoscience Canada*, July, 59–64. https://doi.org/10.12789/geocanj.2020.47.160

Geoinżynieria

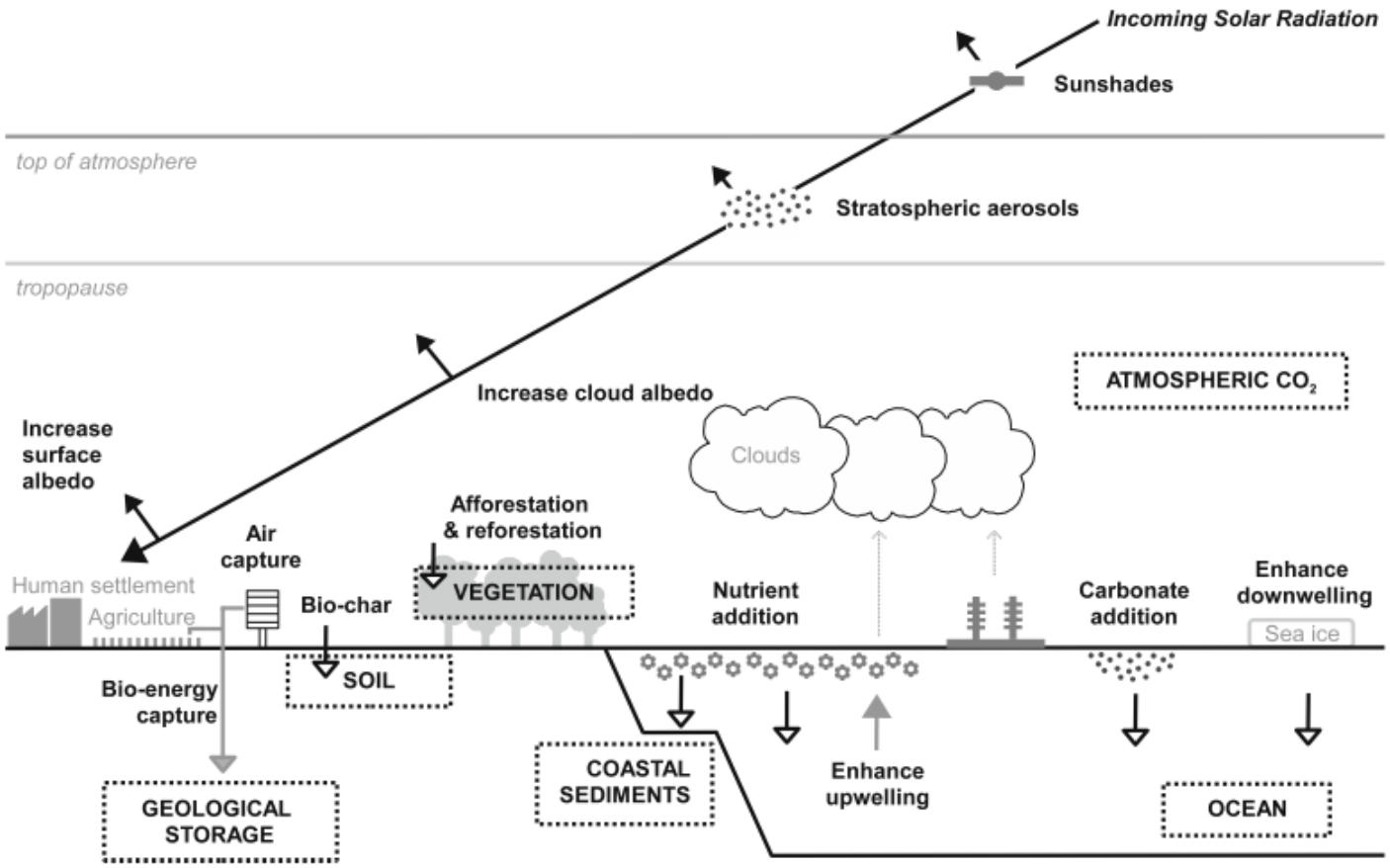


Fig. 1 Schematic overview of the climate geoengineering proposals reviewed. *Black arrowheads* indicate short wave radiation, *white arrowheads* indicate enhancement of natural flows of carbon, *grey downward arrow* indicates engineered flow of carbon, *grey upward arrow* indicates engineered flow of water, *dotted vertical arrows* illustrate sources of cloud condensation nuclei and *dashed boxes* indicate carbon stores. Not to scale

Antropocen inaczej

The Shock of the Anthropocene

Bonneuil i Fressoz przekonująco kwestionują to, co nazywają "geokratyczną" wielką narracją, która przedstawia Ziemię jako "widzianą znikąd" i redukuje historię "do zestawu wykładniczych wykresów".

Teraz to nauki o systemie ziemskim, a nie historycy, nazywają epokę, w której żyjemy.

Można obecnie pisać całe książki o kryzysie ekologicznym, o polityce natury, o antropocenie i sytuacji Gai, nie wspominając nawet o kapitalizmie, wojnie czy Stanach Zjednoczonych, ani nawet o jednej dużej korporacji.

Antropocen inaczej

The Shock of the Anthropocene

1. **Thermocene** (history of the carbon-industrial complex),
2. **Thanatocene** (history of total war and ecocide),
3. **Phagocene** (history ofmass consumption),
4. **Phronocene** (history of scientific "environmentalreflexivity"),
5. **Agnotocene** (history of "ignorance"),
6. **Capitalocene** (historyof capitalist world accumulation), and
7. **Polemocene** (history of environmental justice movements)

DYSKURSY ANTROPOCENU A MARAZM ŚRODOWISKOWY POCZĄTKÓW XXI WIEKU (E. Bińczyk, 2017)

W obrębie refleksji środowiskowej XXI stulecia pisze się o frustracji badaczy, bezradności, rozczarowaniach, braku alternatyw, ograniczoności wyobraźni, a nawet apatii. Można wobec tego wysunąć hipotezę, że epoka antropocenu to epoka marazmu. Pochodzący z języka greckiego termin „marazm" (marasmós) oznacza gaśnięcie i uwiąd. W naukach medycznych marazm odnosi się do takiej kondycji organizmu, która poważnie zagraża sprawności myślenia i działania, wiodąc do apatii.

Nie ma wątpliwości, że w stanie tego rodzaju bezwładu i otępienia znaleźliśmy się dzisiaj, jeżeli chodzi o politykę klimatyczną, przyszłość planety i refleksję na temat ewentualnych pozytywnych alternatyw wobec obecnego *status quo*.

DYSKURSY ANTROPOCENU A MARAZM ŚRODOWISKOWY POCZĄTKÓW XXI WIEKU (E. Bińczyk, 2017)

Równocześnie, kategoria **sprawiedliwości klimatycznej** nie jest już czysto abstrakcyjnym pojęciem stricte filozoficznym, ale problemem domagającym się konkretnych rozstrzygnięć. To kwestia rozpatrywana i operacjonalizowana od ponad 20 lat przez konferencje ONZ UNFCCC.

W dobie drastycznych,narastających nierówności ekonomicznych, oraz podziału na bogaczy w krajach rozwiniętych i nędzarzy w krajach rozwijających się, bardziej narażonych na anomalie pogodowe, odnajdujemy się w antropocenie na bardzo różne sposoby.

Kryzys środowiskowy XXI wieku ma bardzo wyraźne oblicze klasowe, wzmacniając istniejące już nierówności ekonomiczne.


FROM THE MAKERS OF MANUFACTURED LANDSCAPES AND WATERMARK
ANTHROPOCENE
THE HUMAN EPOCH
a film by JENNIFER BAICHWAL NICHOLAS de PENCIER and EDWARD BURTYNSKY
narrated by ALICIA VIKANDER
tiff
69 Internationale Filmfestspiele Berlin
Berlinale Special
OFFICIAL SELECTION 2019
sundance
film festival