

Fire propelling the launch of Apollo 11

Figure 1

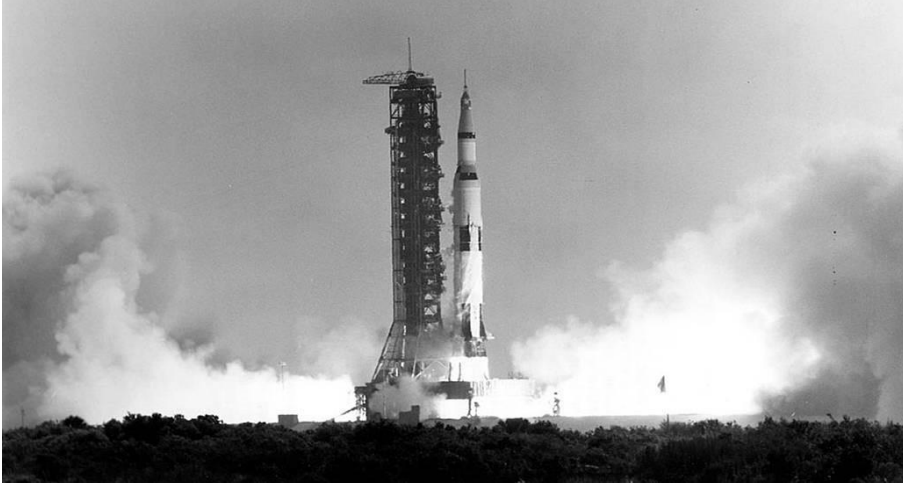


Photo Credit: NASA

Wildfires presented as a threat to Bambi

Figure 2



Image Credit: US Department of Agriculture, Forest Division

We must prevent wildfires

Figure 3



Image Credit: US Department of Agriculture, Forest Division

Regions with reduced burn areas (1998-2015)

Figure 4

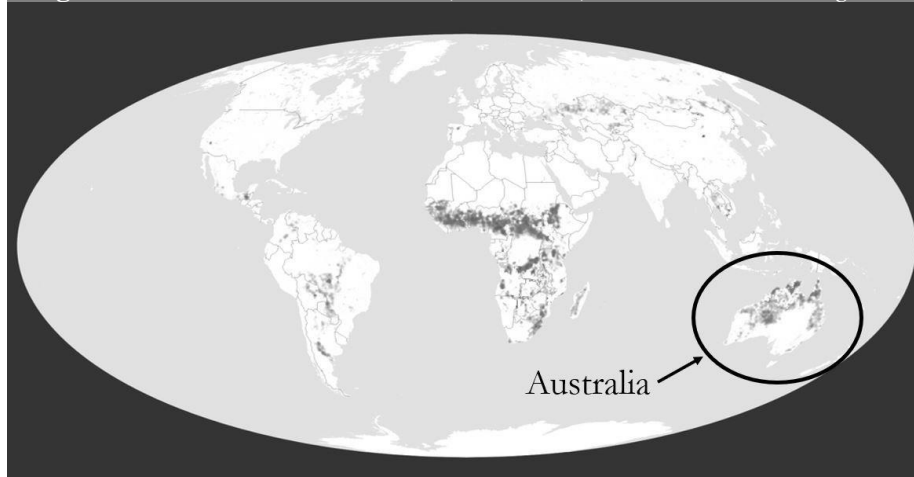


Image Credit: Adapted from NASA¹

¹ **NASA Detects Drop in Global Fires** – Image Credit: Joshua Stevens, NASA's Earth Observatory – <https://www.nasa.gov> – Accessed: February 2021

Spread of non-native eucalyptus trees in California

Figure 5



Image Credit: US Forest Service²

Wildfires promote grasslands at the expense of trees

Figure 6



Photo Credit: Marcel Kocačič on Unsplash (Location: Serengeti, Tanzania)

² **Eucalyptus Globulus, Fire Effects Information System** – US Forestry Service – <https://www.fs.fed.us> – Accessed: October 2020

Amazon deforestation rate (km² per year)

Figure 7

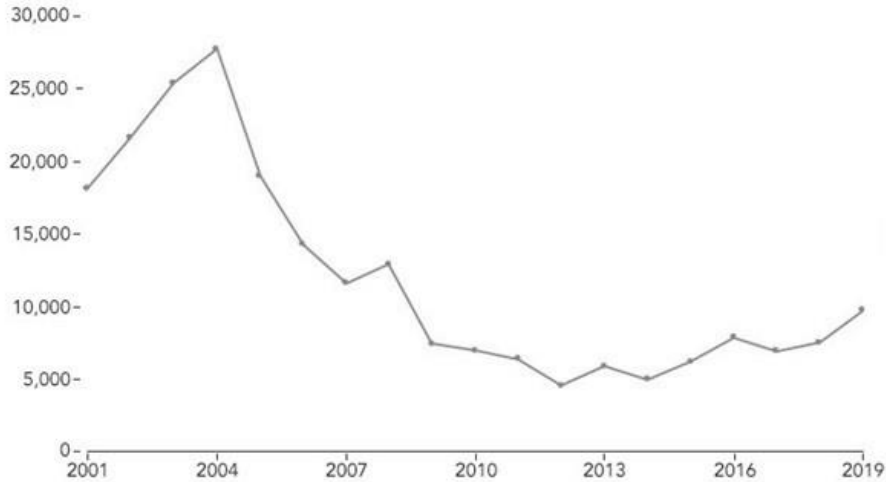


Image Credit: NASA, PRODES³

Glacial and interglacial periods

Figure 8

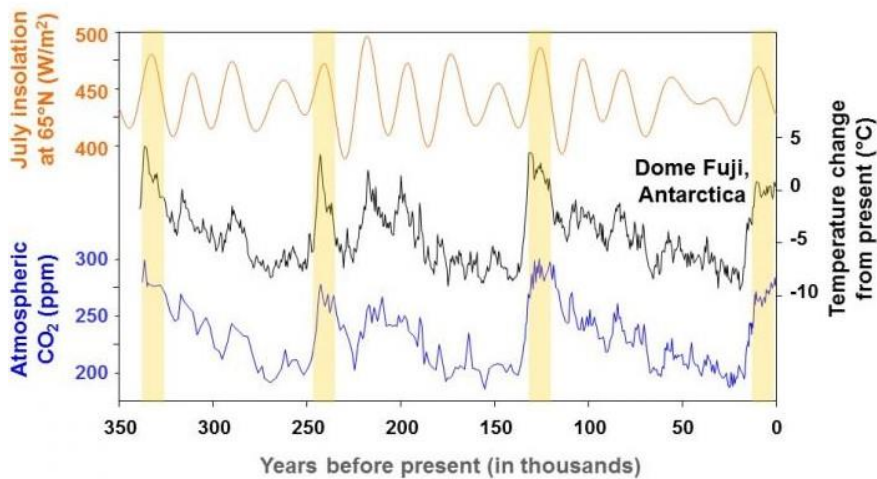


Image Credit: US National Oceanic and Atmospheric Administration⁴

³ **Making Sense of Amazon Deforestation Patterns** – Adam Voiland – NASA Earth Observatory – <https://earthobservatory.nasa.gov> – Accessed: October 2020

⁴ **Glacial-Interglacial Cycles** – National Oceanic and Atmospheric Administration – <https://www.ncdc.noaa.gov> – Accessed: July 2020

From fire: the 29,000-year-old Venus of Dolni Vestoci

Figure 9



Photo Credit: Author

From fired bricks: the Great Ziggurat of Ur

Figure 10



Photo Credit: US Air Force, Staff Sergeant Christopher Marasky

Minimal land use – oil operations in Alaska

Figure 11



Image Credit: ConocoPhillips (adapted; left) and US Bureau of Land Management (right)

Solar radiance by latitude

Figure 12

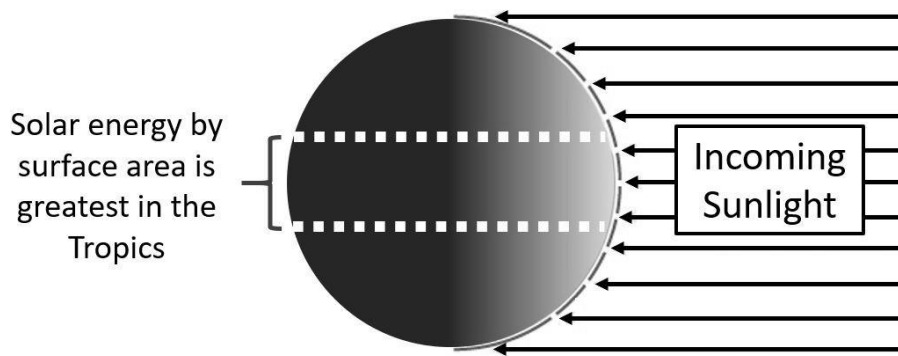
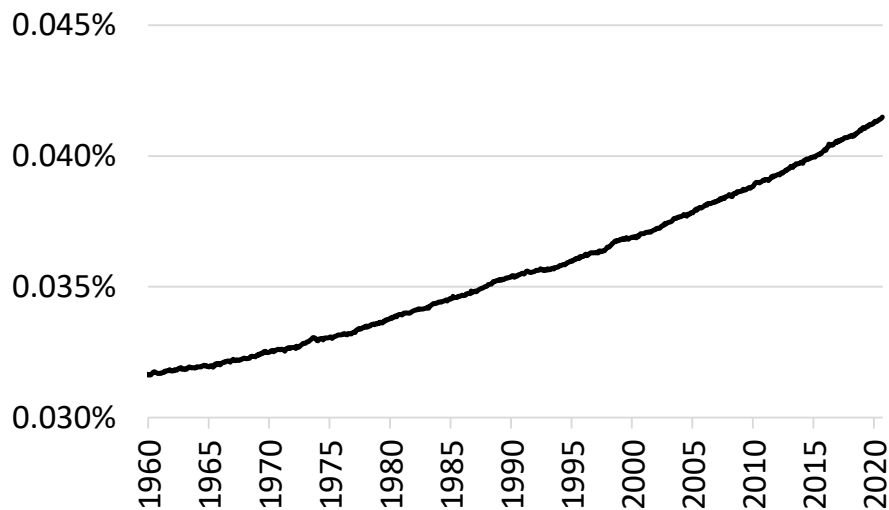


Image credit: Author

Atmospheric carbon dioxide concentrations (%)

Figure 13

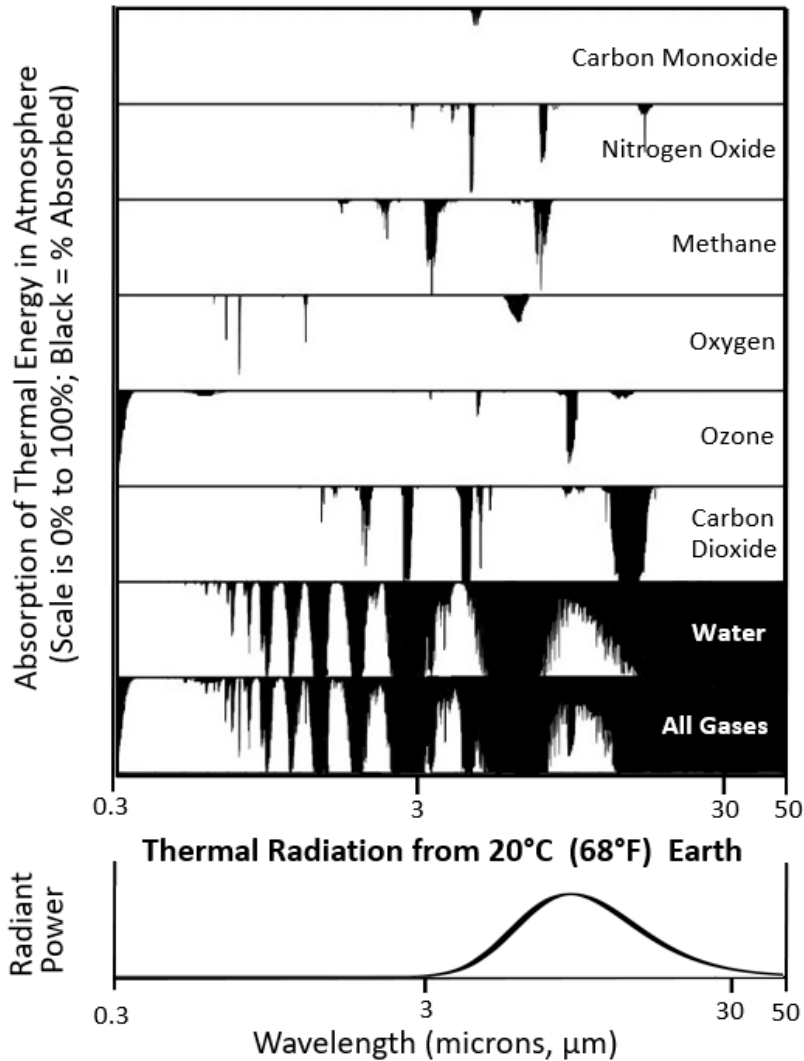


Source: US National Oceanic and Atmospheric Administration (deseasonalised data)⁵

⁵ **Monthly Average Mauna Loa CO₂** – US National Oceanographic and Atmospheric Administration – <https://www.esrl.noaa.gov> – Accessed: August 2020

Atmospheric absorption of thermal energy

Figure 14



Source: Author (adapted from various⁶)

⁶ Adapted by Author from: **Handbook of Geophysics and Space Environments** – Shea L. Valley – McGraw Hill – 1965;
Radiation Transmitted by the Atmosphere – Wikipedia (Accessed: September 2020);
Global Warming Art – Robert Rohde – via Climate Forcings and Global Warming – NASA Earth Observatory – <https://Earthobservatory.nasa.gov> – Accessed: September 2020; and
Black Body Radiation Equation – Courtesy of Professor Kurt Hollocher – Geology Department, Union College, New York

Every tree is a water fountain

Figure 15



Photo Credit: Marek Piwnicki on Unsplash (Location: Bieszczady Mountains, Poland)

Reflectance and absorption of thermal radiation

Figure 16

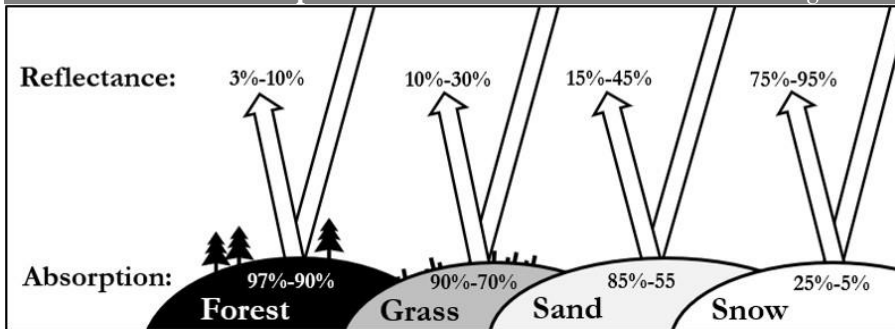


Image Credit: Author; data source: Goddard Institute for Space Studies NASA⁷

1880-2019 Temperature Change

Figure 17

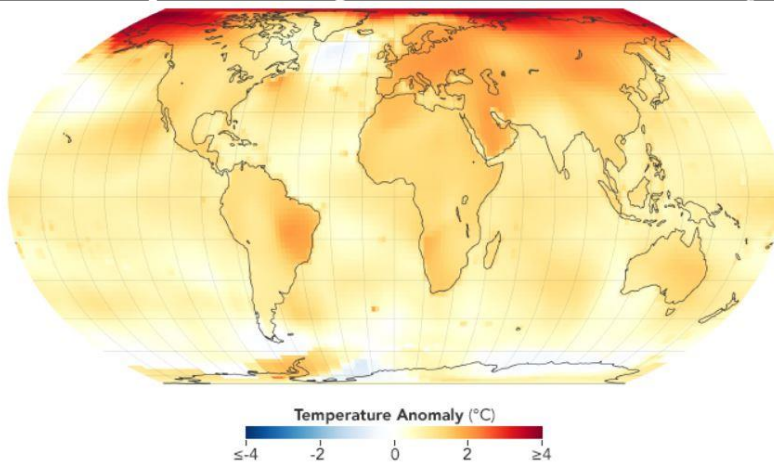


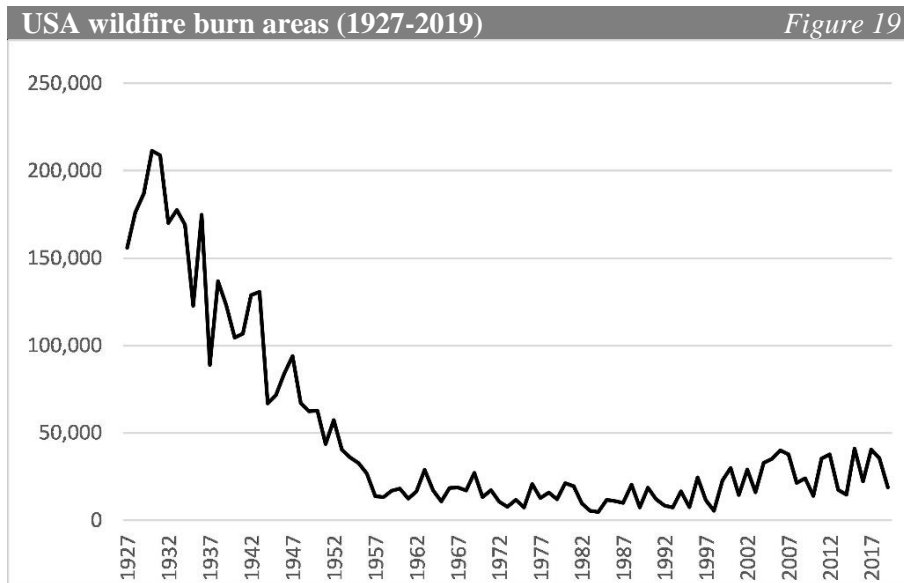
Image Credit: NASA Earth Observatory⁸

⁷ **NASA Goddard Institute** for Space Studies (GISS) Climate Change Research Initiative (CCRI) Applied Research STEM Curriculum Unit Portfolio; Unit: Earth's Energy Budget – Nicole Dulaney, Allegra LeGrande and Matthew Pearce – <https://www.giss.nasa.gov/> – Accessed: September 2020

⁸ **World of Change: Global Temperatures** – NASA Earth Observatory – <https://earthobservatory.nasa.gov/> – Accessed February 2021



Sources: The Guardian and TIME Magazine⁹

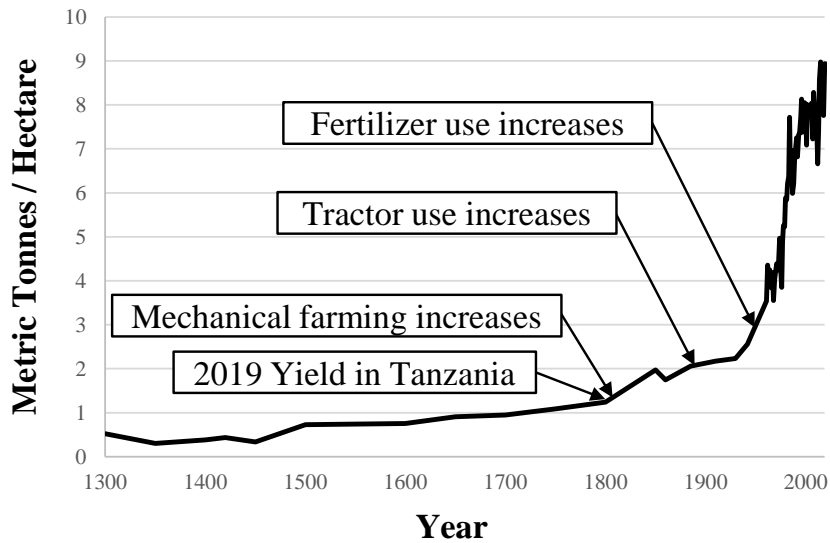


Source: US National Interagency Fire Centre – <https://www.nifc.gov>

⁹ **'Relentless' climate crisis intensified in 2020, says UN report** – Damian Carrington – The Guardian – 19 April 2021; and **TIME Magazine Cover** – Edward Felsenthal, Editor-in-Chief and CEO of TIME – 26 April 2021

Evolution of Wheat Yields in the UK (1300-2019)

Figure 20



Sources¹⁰

¹⁰ **British Economic Growth, 1270-1870: an output-based approach** – Stephen Broadberry, Bruce Campbell, Alexander Klein and Mark Overton and Bas Van Leeuwen – British Economic Growth – December 2011;

Output and technical change in twentieth-century British agriculture – Paul Brassley – The Agricultural History Review – 2000;

Food and Agricultural Organization of the United Nations – FOAStat – <http://www.fao.org> – Accessed: March 2021; and

Tanzania Grain and Feed Annual 2019 – Benjamin Mtaki – US Department of Agriculture Foreign Agricultural Service – 9 April 2019