

**Fire propelling the launch of Apollo 11**

*Figure 1*

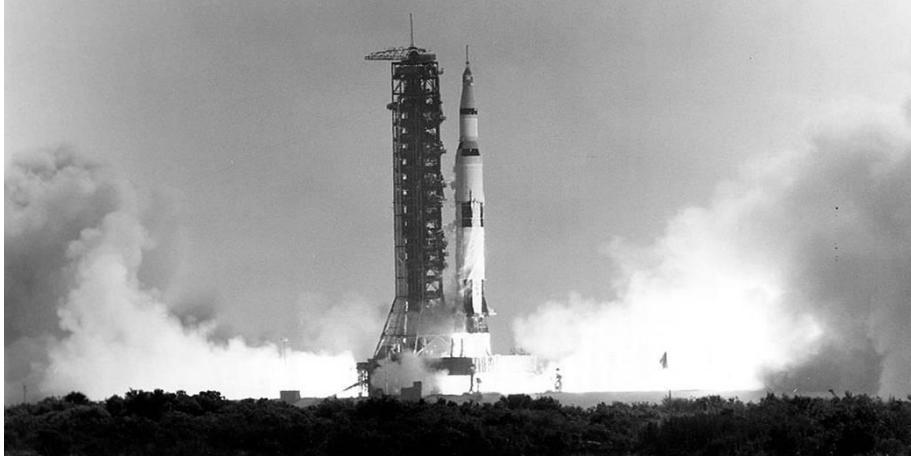


Photo Credit: NASA

**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

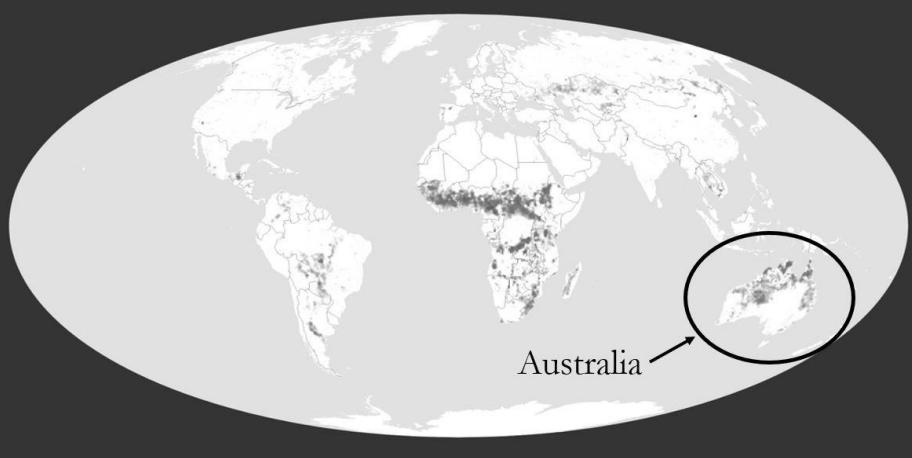


Image Credit: Adapted from NASA<sup>1</sup>

<sup>1</sup> **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 Service<sup>2</sup>

Wildfires promote grasslands at the expense of trees

Figure 6



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

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

**Amazon deforestation rate (km<sup>2</sup> per year)**

*Figure 7*

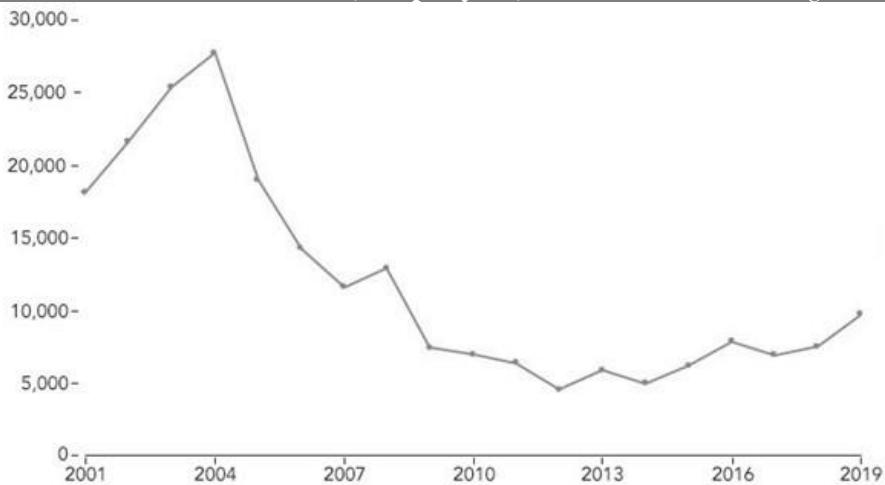


Image Credit: NASA, PRODES<sup>3</sup>

**Glacial and interglacial periods**

*Figure 8*

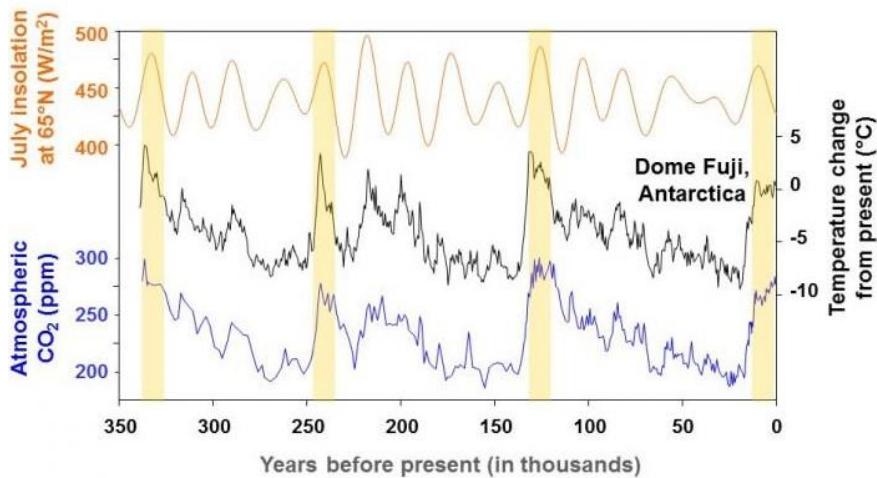


Image Credit: US National Oceanic and Atmospheric Administration<sup>4</sup>

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

<sup>4</sup> **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*

Solar energy by surface area is greatest in the Tropics

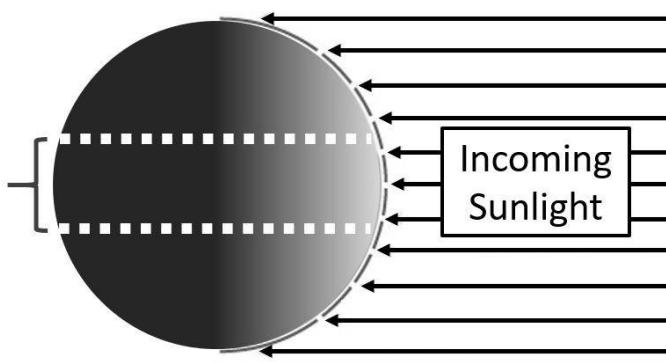
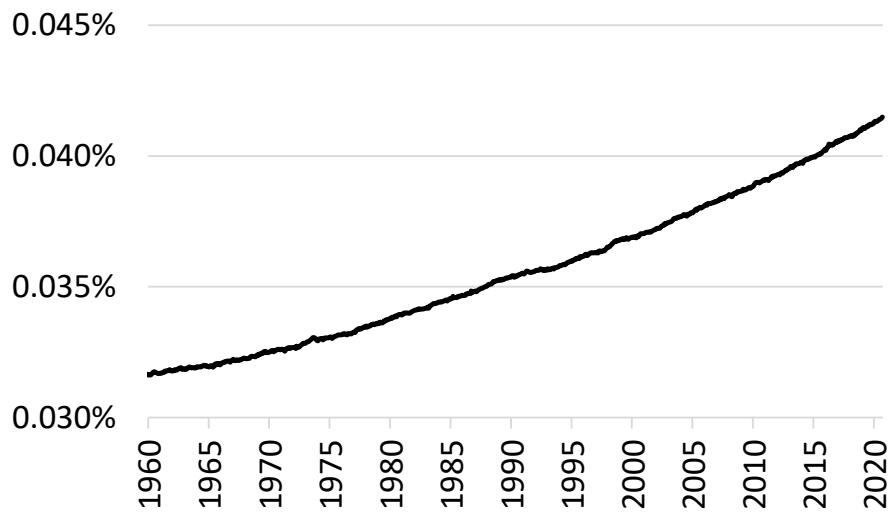


Image credit: Author

**Atmospheric carbon dioxide concentrations (%)**

*Figure 13*

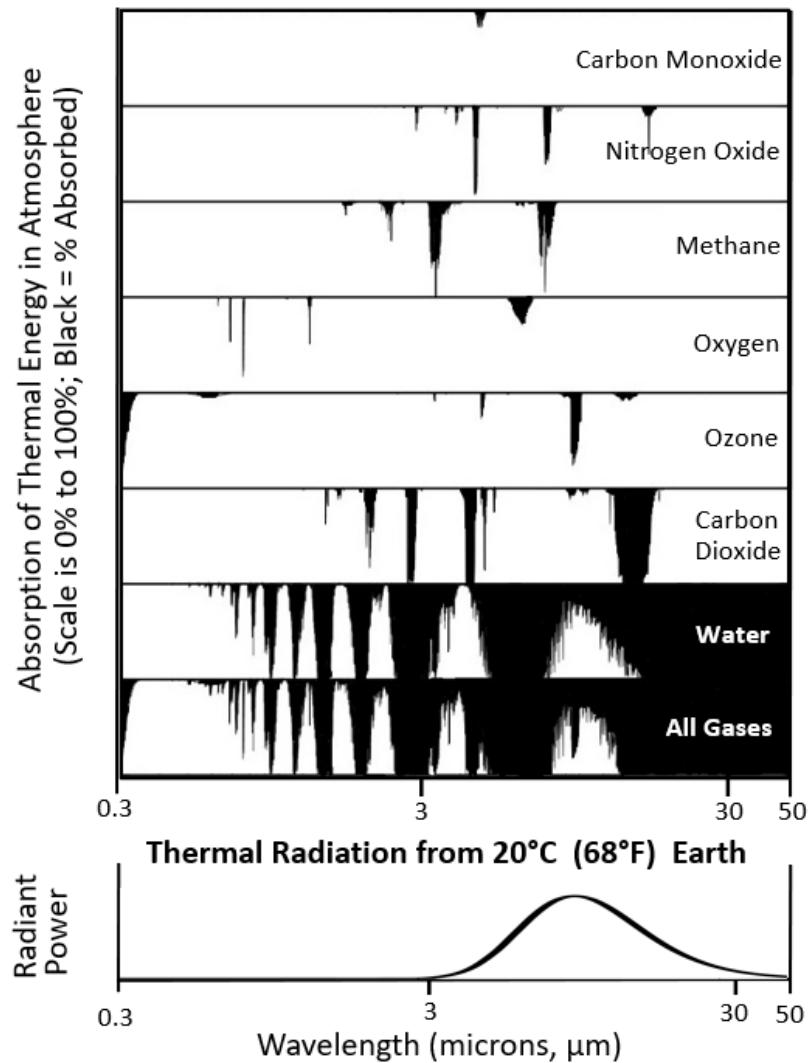


Source: US National Oceanic and Atmospheric Administration (deseasonalised data)<sup>5</sup>

<sup>5</sup> Monthly Average Mauna Loa CO<sub>2</sub> – 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 various<sup>6</sup>)

<sup>6</sup> 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



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

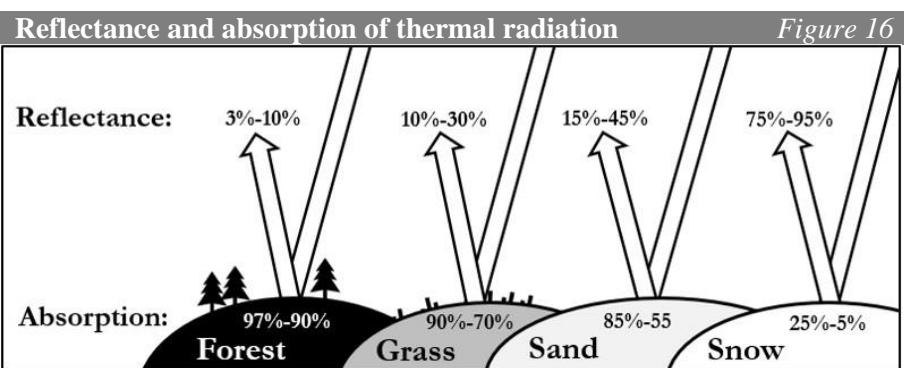


Image Credit: Author; data source: Goddard Institute for Space Studies NASA<sup>7</sup>

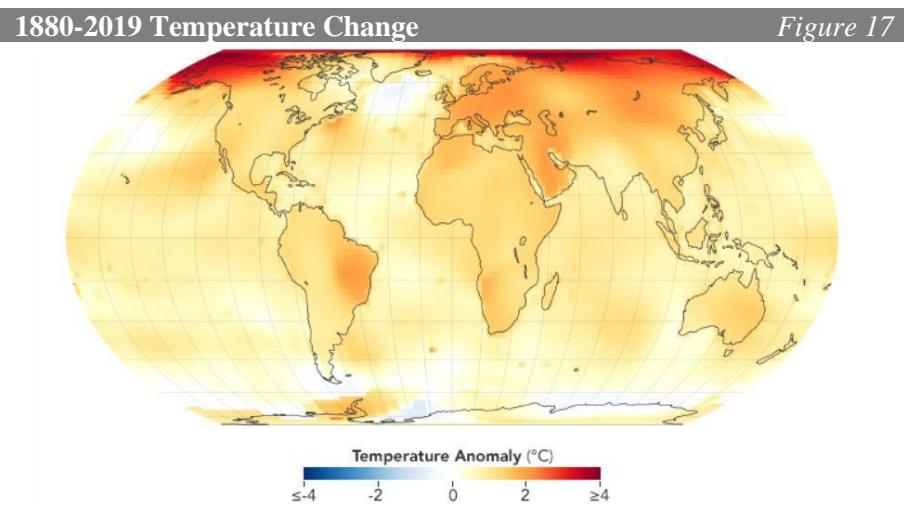


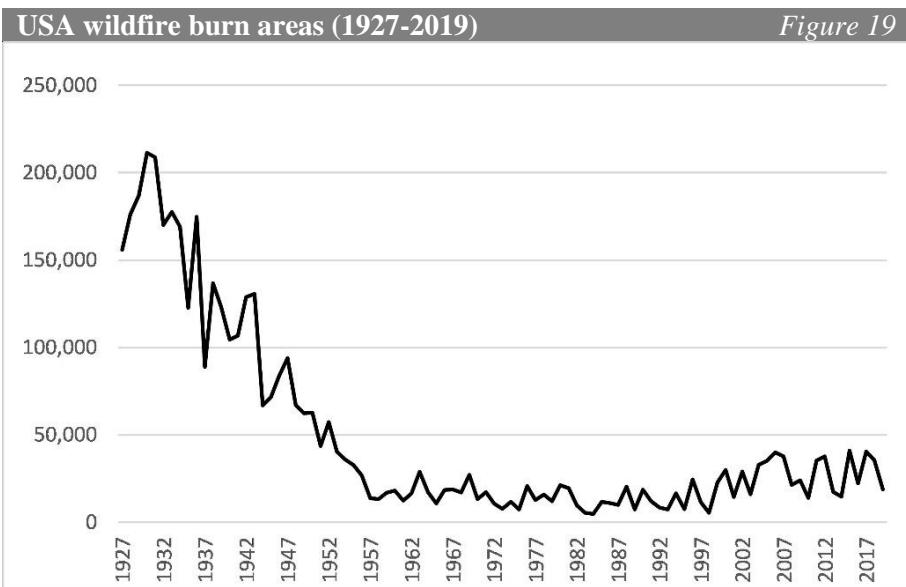
Image Credit: NASA Earth Observatory<sup>8</sup>

<sup>7</sup> **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

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



Sources: The Guardian and TIME Magazine<sup>9</sup>

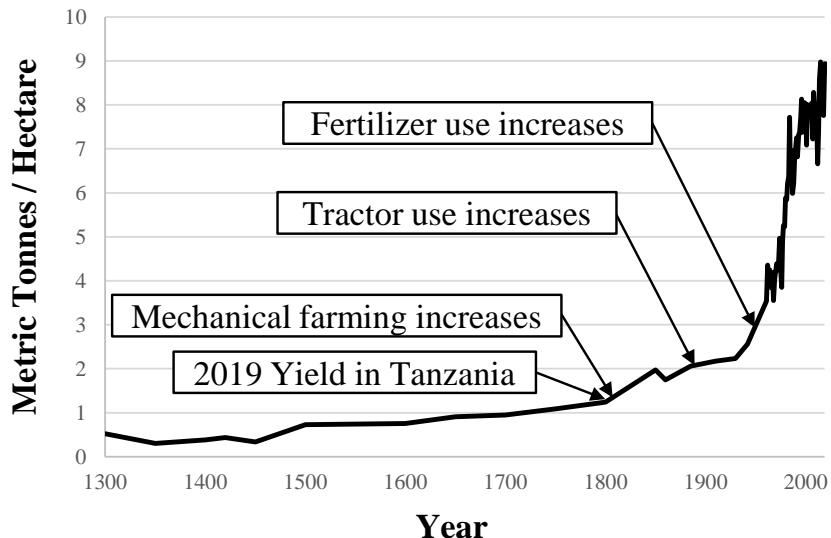


Source: US National Interagency Fire Centre – <https://www.nifc.gov>

<sup>9</sup> '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



Sources<sup>10</sup>

<sup>10</sup> **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