Climate Migration

- Why it happens
- Who defines what it is
- How is it measured
- Intersection of Climate and Migration
- When it happens: past present and future
- Who it affects
- Where it happens:past , present and future

Who defines Global Warming

- NASA

  - Global warming is the long-term heating of Earth's surface observed since the pre-industrial period (between 1850 and 1900) due to human activities, primarily fossil fuel burning, which increases heat-trapping greenhouse gas levels in Earth's atmosphere. This term is not interchangeable with the term "climate change."

United Nations

- Climate change refers to long-term shifts in temperatures and weather patterns. These shifts may be natural, such as through variations in the solar cycle. But since the 1800s, human activities have been the main driver of climate change, primarily due to burning fossil fuels like coal, oil and gas.
- Multiple Reports

UN position

Evaluation and communication of degree of certainty in AR5 and AR6 findings

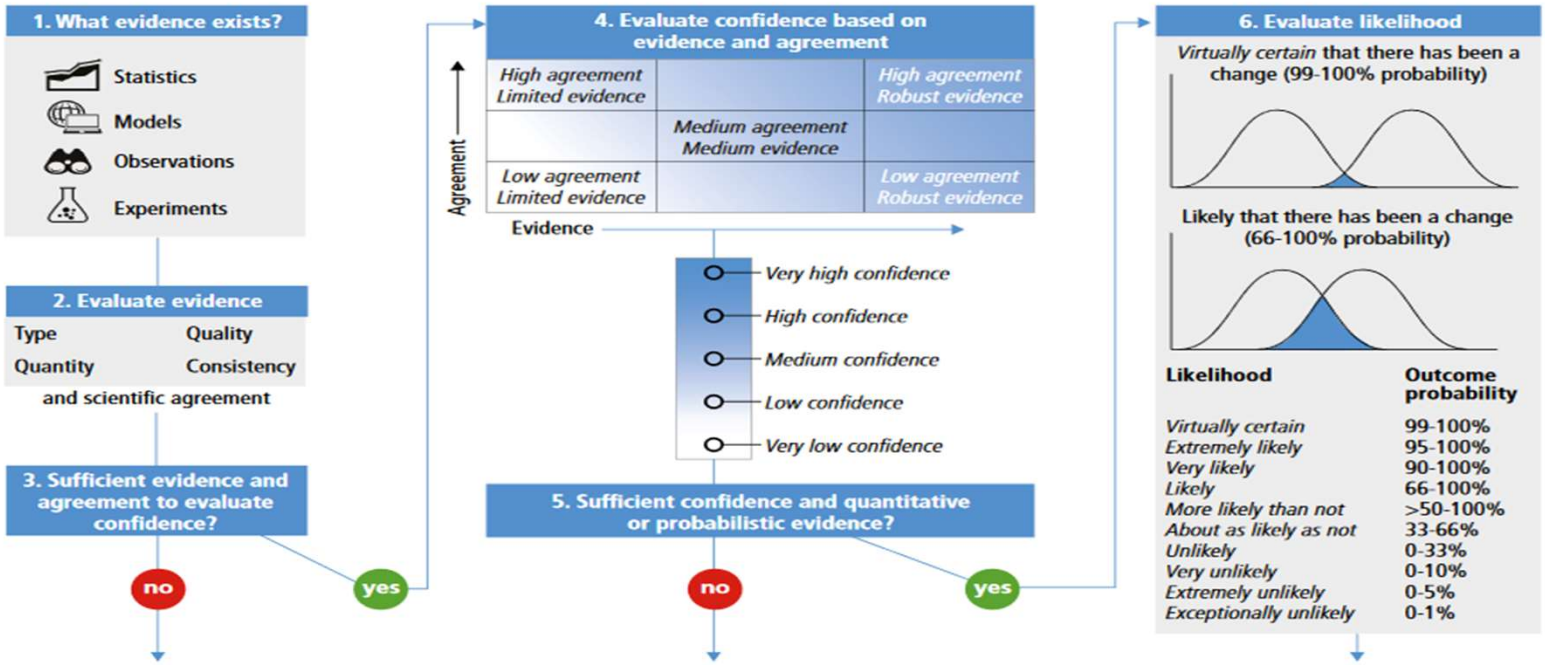


Figure TS.1 | The IPCC AR5 and AR6 framework for applying expert judgement in the evaluation and characterisation of assessment findings. This illustration depicts the process assessment authors apply in evaluating and communicating the current state of knowledge. {Figure 1.6}

Measurable Data

- The planet is changing, getting hotter and CO_2 levels are rising
  - Some say it is a good thing
- Plants thrive with higher CO_2 levels
- Plants can tolerate higher heat with increased CO_2
- Plants need less water with increased CO_2

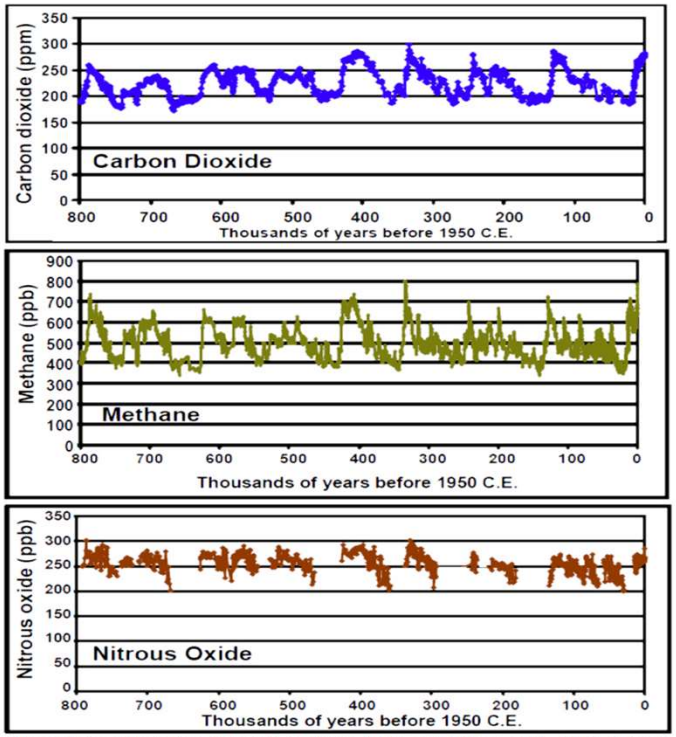
Temperature is a Simple Data Point

- First thermometer made in 1654
- 1714 Daniel Gabriel Fahrenheit invents temperature scale, other follow
- A brief dip into how the sausage is made
- US Historical Climatology Network (USHCN)
  - 1200 thermometers recording max and min temps daily. Stations spaced evenly around 48 states. The data from network is compiled by National Climatic Data Center (NCDC) is Asheville, North Carolina, part of the National Oceanic and Atmospheric Administration (NOAA)

Temperature Continued

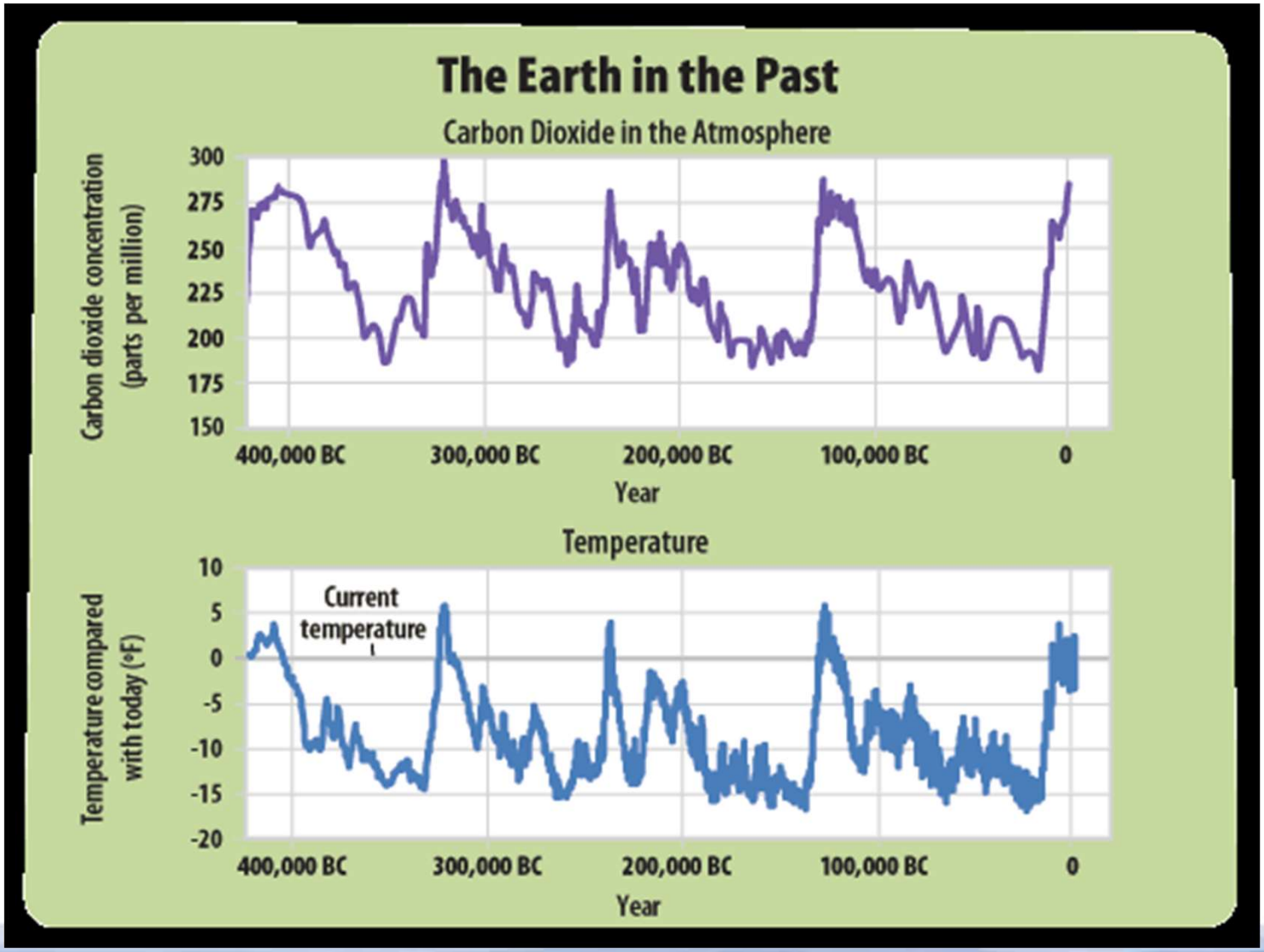
- NOAA makes adjustments to the USHCN temperature data and passes the adjusted data to Godard Institute for Space Studies (GISS). GISS publishes charts for US and global temperature changes. GISS compiles US and international data and produces a global dataset. This dataset informs the United Nations Intergovernmental Panel on Climate Change. GISS makes what it considers necessary changes to historic temperature data as relates to time of observation (TOB) The theory is that many station observers used to reset their min and max thermometers once a day in the afternoon, leading to double counting of hot days. Per NOAA records from 1930 to the 1950's Farmington Missouri reset at 7 am while nearby Warrenton reset at 5 pm. They are about 100 miles apart, equidistant from St. Louis. The justification for adjustments is different TOB require changing of data to remove TOB bias. Actual temperature records from the respective stations reveal no bias at all, and track in near perfect harmony. Temperature is not so simple.

•800,000-year Ice-Core Records of Atmospheric Carbon Dioxide (CO2) ending 1950



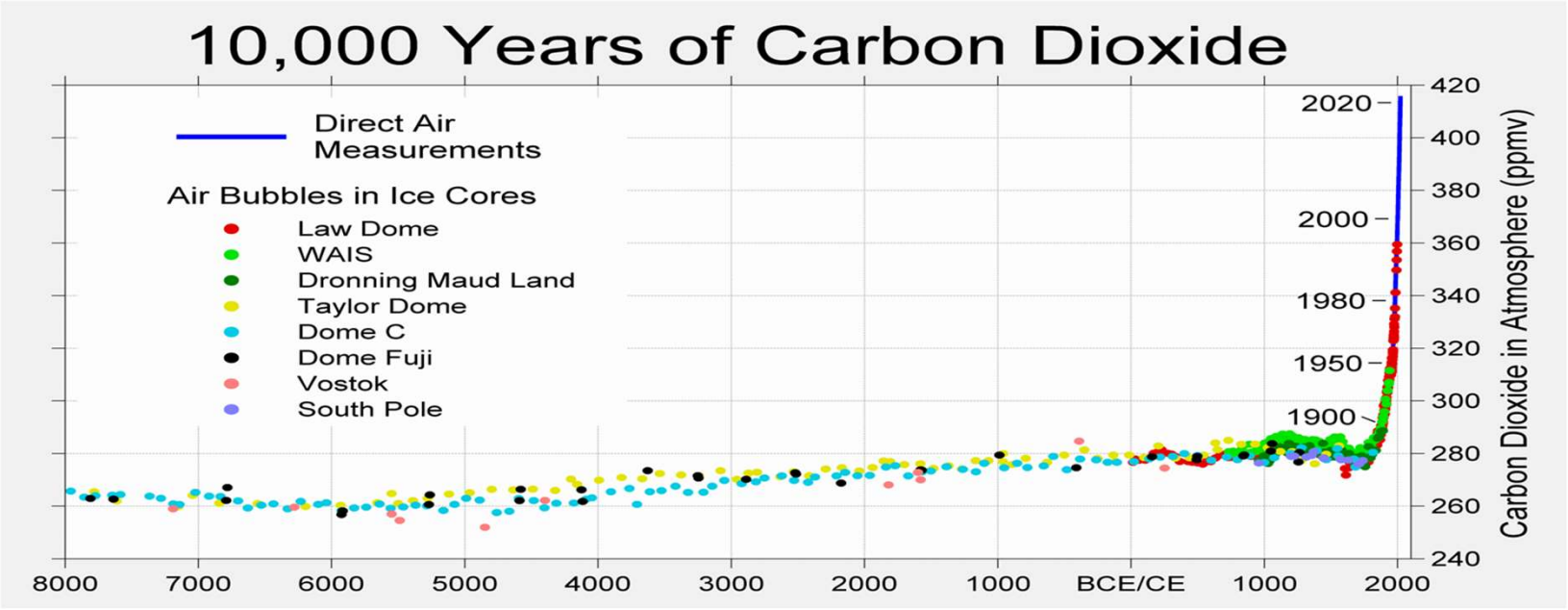
Atmospheric carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O) derived from air bubbles trapped in ice at Dome C, Antarctica. Units are parts per million (ppm) for CO_2 and parts per billion (ppb) for CH_4 and N_2O. Year zero can be taken as 1950 of the Christian Era (C.E.) Minus signs indicate years before 1950 C.E.

Comparison of CO2 and Temperature



Recent Data CO2 ppmv

- Source Berkeley Earth



Why migrate

- Too hot
  - Extreme heat over 20% by 2070 compared to <1%now
- Too wet
  - 100 year coastal flooding events annually by 2100
- Too Dry
  - 2/3 of humanity experience water scarcity 1 month a year
  - Half live in China or India..21 cities in India will run out of groundwater by 2025 affecting 100 million people
  - Glacial runoff is already decreasing

Evolving

- The intersection of Climate and Migration is complex
  - Migration scholars talk about displacement (sudden) vs migration(slow)
  - Climate scientists distinguish between sudden onset and slow onset impacts
- Multiple reasons for migration
  - Finances, slow onset climate change, violence, politics
  - Family, job education

Who and Where Affected

- 42 million people in the Pacific and Asia in 2010 and 2011
- 70,000 people in the Sundarbans (Bay of Bengal)
- 650 families of Satbhaya in Kendrapara District Odisha, India
- 10,000 in Minqin Gansu Province China
- Alaskan villages: Kivalina, Newtok, Shaktoolik, Shishmaref
- Louisiana Isle de Jean Charles, Biloxi, Chitmacha and Choctaw tribes
- Etc, etc

Sources

- NYT “The Great Climate Migration” Abraham Lustgarten
- “Chesapeake Requiem” Earl Swift
- “Nomad Century” Gaia Vince
- “Climate Change: The Facts 2017” Jennifer Marohasy editor
- “The Skeptical Environmentalist” Bjorn Lomborg (pgs.258-322)