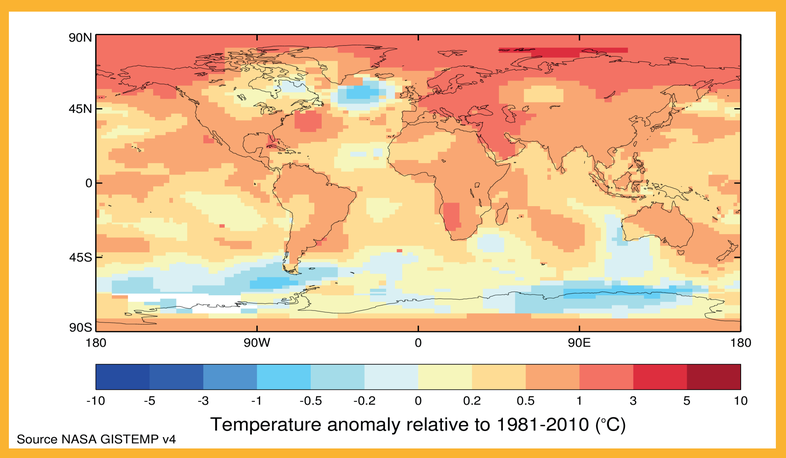
THE GLOBAL CLIMATE 2015–2019

GLOBAL TEMPERATURE RISE



Global five-year average temperature anomalies (relative to 1981–2010) for 2015– 2019. Data are from NASA GISTEMP v4. Data for 2019 to June 2019.

2015–2019

- Warmest five-year period
- 0.2 °C higher than 2011–2015

2016

- Is the warmest year on record, over 1 °C higher than pre-industrial period

GREENHOUSE GAS CONCENTRATIONS INCREASE

Global mean surface concentrations 2015–2017

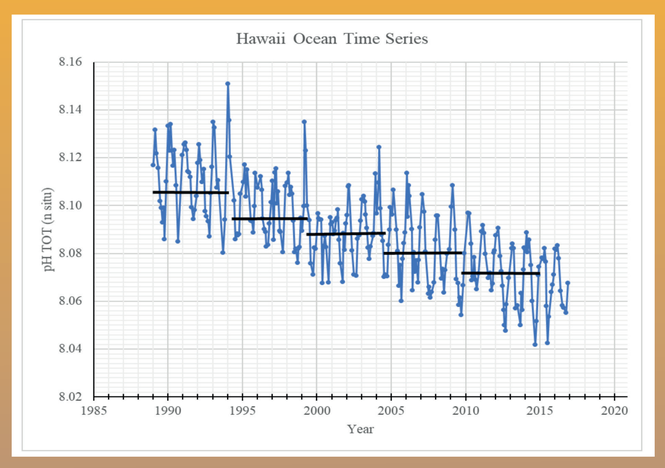
CO_2
403 parts per million

N_2O
329 parts per billion

CH_4
1852 parts per billion

OCEAN ACIDIFICATION

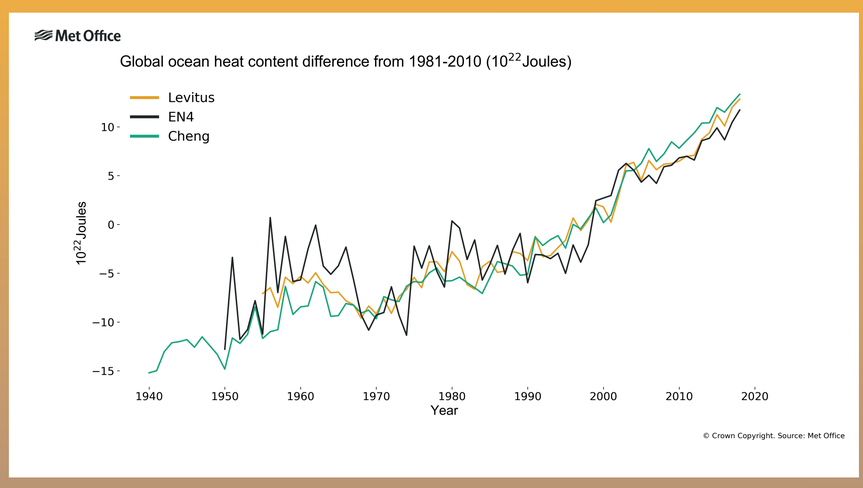
Ocean acidity increasing due to rising $C0_2$



pCO_2 and pH records from three long-term ocean observation stations.
Credit: IOC-UNESCO, NOAA-PMEL, IAEA OA-ICC.

OCEAN WARMING

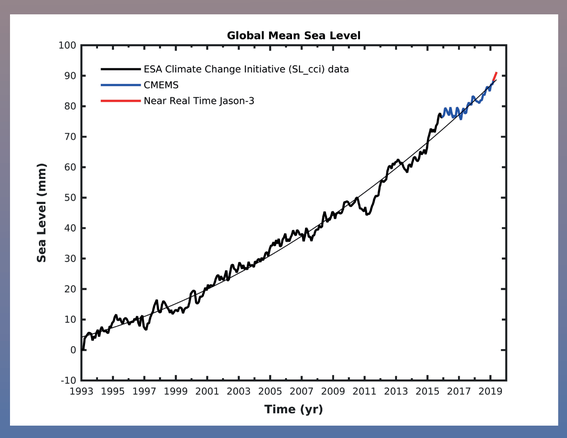
In 2018, global ocean heat content reached record levels



Source: NOAA NCEI, UK Met Office, IAP.

SEA LEVEL CONTINUES TO RISE

Global sea level continued to rise
Ice melt major contributor



Data source: European Space Agency (ESA) Climate Change Initiative (CCI) sea level data until December 2015,extended by data from the Copernicus Marine Service (CMEMS) as of January 2016

CRYOSPHERE

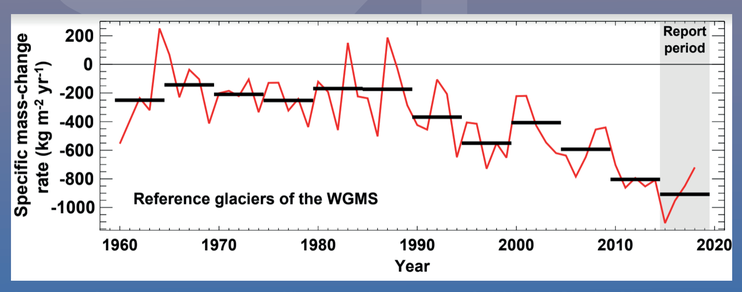
Ice melt is an indicator of global warming.

Arctic

Arctic average summer minimum and winter maximum sea-ice extents were well below the 1981–2010 average every year from 2015 to 2019.

Antarctic

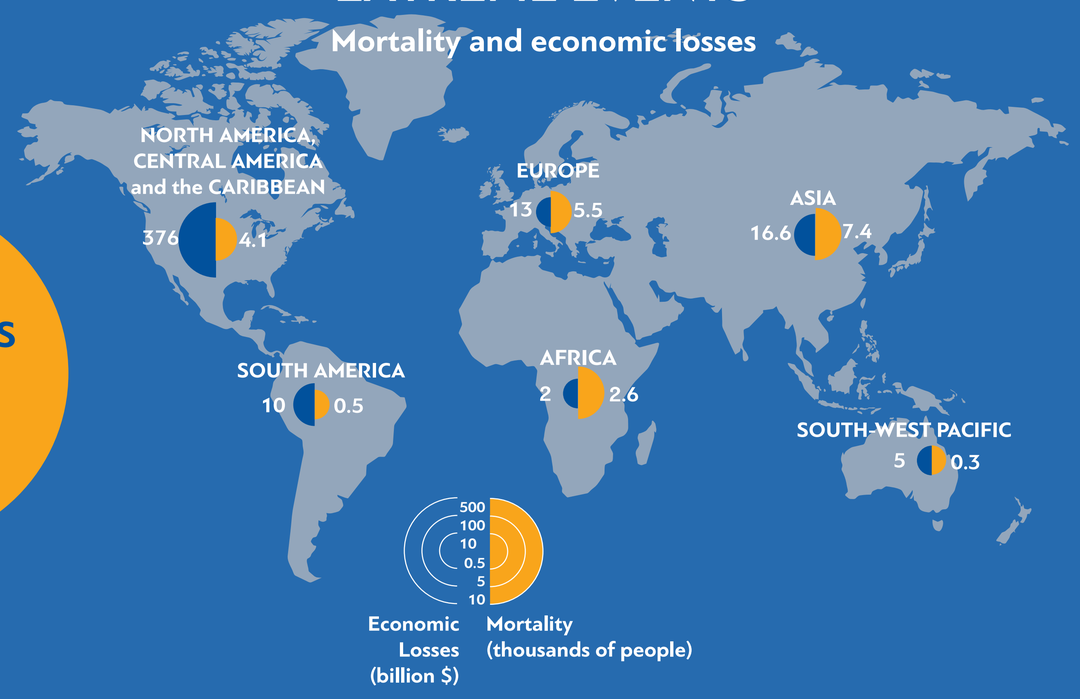
Antarctic experienced its lowest and second lowest summer sea-ice extent in 2017 and 2018, respectively.



Average of observed annual specific mass-change rate of all World Glacier Monitoring Service (WGMS) reference glaciers,including pentadal means.

EXTREME EVENTS

Mortality and economic losses



2017
>2 000 DEATHS
attributed to Hurricane *Maria*, Puerto Rico and Dominica

2015–2019
>8 900 DEATHS
attributed to heatwaves worldwide

2017
>US$ 125 billion
Economic losses attributed to Hurricane *Harvey*

Large-scale heat extremes attributable to human influence

2016
>US$ 16 billion
Economic losses attributed to the wildfires in California

WATER
CLIMATE
WEATHER

WORLD METEOROLOGICAL ORGANIZATION

The Global Climate in 2015–2019 is part of the WMO Statements on Climate providing authoritative information on the state of the climate and impacts. It builds on operational monitoring systems at global, regional and national scales. Authored by; Peter Siegmund, lead author (Royal Netherlands Meteorological Institute), Jacob Abermann (University of Graz, Austria), Omar Baddour (WMO), Pep Canadell (CSIRO Climate Science Centre , Australia), Anny Cazenave (Laboratoire d'Etudes en Géophysique et Océanographie Spatiales CNES and Observatoire Midi-Pyrénées, France), Chris Derksen (Environment and Climate Change Canada), Arthur Garreau (Météo-France), Stephen Howell (Environment and Climate Change Canada), Kirsten Isensee (IOC-UNESCO), John Kennedy (UK Met Office), Ruth Mottram (Danish Meteorological Institute), Matthias Huss (ETH Zürich), Rodica Nitu (WMO), Selvaraju Ramasamy (Food and Agriculture Organization of the United Nations (FAO)), Katherina Schoo (IOC-UNESCO), Michael Sparrow (WMO), Oksana Tarasova (WMO), Blair Trewin (Bureau of Meteorology, Australia), Markus Ziese (Deutscher Wetterdienst (DWD))