State of the Climate 2022

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References, further reading and notes

Many sections in this report draw on the Working Group I part of the Intergovernmental Panel on Climate Change (IPCC) Sixth Assessment Report (**https://www.ipcc.ch/report/ar6/wg1/**), released in 2021 (hereafter referred to as IPCC AR6). Specific IPCC assessment findings or material used are cited in the individual sections below. The full citation for the IPCC report is:

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General climate information

State of the Climate 2012: **http://www.bom.gov.au/state-of-the-climate/2012/Climate-Snapshot-2012-Brochure.pdf**

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Kennaook/Cape Grim greenhouse gas data **https://www.csiro.au/greenhouse-gases/**

CSIRO Oceans and Atmosphere: Sea-level data, Sea-Level Rise, **https://research.csiro.au/slrwavescoast/sea-level/**

National Snow and Ice Data Centre: **https://nsidc.org**

NOAA Global greenhouse gas reference network **http://www.esrl.noaa.gov/gmd/ccgg/trends/global.htm**

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Report at a Glance

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Trewin, B., Braganza, K., Fawcett, R., Grainger, S., Jovanovic, B., Jones, D., Martin, D., Smalley, R. and Webb, V. (2020). An updated long-term homogenized daily temperature data set for Australia. *Geosci. Data J.*, 7, 149-169. **https://doi.org/10.1002/gdj3.95**.

Australian temperature data used in figures in this section are drawn from version 2.3 of the Australian Climate Observations Reference Network – Surface Air Temperature (ACORN-SAT) dataset (Trewin et al., 2020) (**http://www.bom.gov.au/climate/data/acorn-sat/**). Sea surface temperature data are drawn from version 5 of the Extended Reconstructed Sea Surface Temperature (ERSSTv5) dataset (Huang et al., 2017) (**www.esrl.noaa.gov/psd/**).

The figure showing global temperatures is adapted and updated from Figure 4 in the World Meteorological Organization (WMO) Statement on the Status of Global Climate in 2012 (**https://library.wmo.int/doc_num.php?explnum_id=7809**). Global temperature data used are a mean of four different global data sets as described in IPCC AR6 Section 2.3.1.1.3 and Table 2.3. The Oceanic Nino Index (ONI) is defined as the three-month mean of ERSSTv5 sea surface temperature anomalies in the Niño 3.4 region (5 °N to 5 °S, 120 °W to 170 °W), based on a rolling 30-year base period updated every 5 years (**https://origin.cpc.ncep.noaa.gov/products/analysis_monitoring/ensostuff/ONI_v5.php/**). Moderate and strong El Niño (La Niña) events in this figure are defined as those where the NOAA Oceanic Niño Index is +1.2 °C or above (–1.2 °C or below) in at least one three-month period during the 12 months from July to June, with weak events being those which do not meet that criterion. Based on data from the World Meteorological Organization.

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Australia's changing climate

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Oceans

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The assessment of the contribution of ice sheet melting to global sea level rise draws from IPCC AR6 Table 9.5.

Data sources for the figures are as follows:

Figure 1. Sea-ice extent values are calculated from satellite passive-microwave ice concentration data obtained from the National Snow and Ice Data Center (Cavalieri et al. 1996, updated annually for 1979-2021, and Maslanik and Stroeve 1999 for 2022).

Figure 2. Duration values are calculated from satellite passive-microwave ice concentration data obtained from the National Snow and Ice Data Center (Cavalieri et al. 1996, updated annually for 1979-2021, and Maslanik and Stroeve 1999 for 2022).

Greenhouse Gases (including Global carbon budget)

Notes

Figure of emissions of three greenhouse gases in past 200 years (additional detail): Data in both panels are from *in situ* monitoring by CSIRO and the Bureau of Meteorology (commencing Kennaook/Cape Grim, Tasmania, 1976) and the Advanced Global Atmospheric Gases Experiment (global, including Kennaook/Cape Grim, commencing 1978) and from measurements of flask air samples (global, including Kennaook/Cape Grim, commencing 1992), the Kennaook/Cape Grim Air Archive (1978-2019) at the CSIRO GASLAB (Aspendale, Melbourne), and air from Antarctic firn (compacted snow) and ice cores measured at CSIRO GASLAB and ICELAB (Aspendale, Melbourne).

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Information is drawn from the following IPCC reports, notably AR6:

- Future temperature and heat extremes: Chapter 11.3, Atlas 6.4 and Interactive Atlas.
- Rainfall and drought: Chapters 8.3, 8.4, 11.6, 12.4.3, Atlas 6.4 and Interactive Atlas
- Extreme rainfall: Chapters 8.3, 8.4, 11.4 and 12.4.3
- Tropical cyclones and storms: Chapters 11.7 and 12.3
- Coastal and marine: Box 9.2, Chapters 9.6, 12.3.5 and 12.4.3
- Compound events: 11.8, 12.4 and Special Report on the Ocean and Cryosphere in a Changing Climate, Chapter 6

Australian Bureau of Meteorology and CSIRO, 2022, State of the Climate 2022, 28pp.

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