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Glossary

A

Altimetry

see Satellite altimetry

Anthropogenic

Resulting from or produced by human beings.

Anthropogenic emissions

Emissions of greenhouse gases, greenhouse gas precursors and aerosols associated with human activities, including the burning of fossil fuels, deforestation, land use changes, livestock, fertilisation, etc.

Anomaly

In climate science, a deviation from the normal value of a variable. It is usually the deviation of a variable from the average value at a specific place and time.

Austral

see also Boreal

Relating to the southern hemisphere.

Average return interval

An annual return (or recurrence) interval is sometimes also known as 'return period'. It is the average number of years that it is predicted will pass before an event of a given magnitude occurs. For example, a 50-year ARI event would happen, on average, every 50 years.

B

Boreal

see also Austral

Relating to the northern hemisphere.

C

Climate

Climate in a narrow sense is usually defined as the average weather, or more rigorously, as the statistical description in terms of the mean and variability of relevant parameters over a period of time ranging from months to thousands or millions of years. The classic period for averaging these variables is 30 years, as defined

by the World Meteorological Organization (WMO). The relevant quantities are most often surface variables such as temperature, precipitation and wind. Climate in a wider sense is the state, including a statistical description, of the climate system. In various parts of this report, different averaging periods, such as a period of 20 years, are also used.

Climate change

see also Climate variability

Climate change refers to a change in the state of the climate that can be identified (e.g. by using statistical tests) by changes in the mean and/or the variability of its properties and that persists for an extended period, typically decades or longer. Climate change may be due to natural internal processes or external forcing, or to persistent anthropogenic changes in the composition of the atmosphere or in land use.

Climate projection

see also Projection

A projection of the response of the climate system to emission or concentration scenarios of greenhouse gases and aerosols, or radiative forcing scenarios, often based upon simulations by climate models. Climate projections are distinguished from climate predictions in order to emphasise that climate projections depend upon the radiative forcing scenario used, which are based on assumptions concerning, for example, future socioeconomic and technological developments that may or may not be realised and are therefore subject to substantial uncertainty.

Climate variability

see also Climate Change, Modes of climate variability

Climate variability refers to variations in the mean state and other statistics (such as standard deviations, the occurrence of extremes, etc.) of the climate on all spatial and temporal scales beyond that of individual weather events. Variability may be due to natural internal processes within the climate system, or to variations in natural or anthropogenic external forcing.

Climatology

- The description and scientific study of climate.
- The long-term average state of a particular climate variable or process (e.g. the 30-year average temperature at a location). Climatology is used in this context within this report.

Climate and Ocean Support Program in the Pacific (COSPPac)

COSPPac, extended for five years from 2018, builds on the success of the first phase from 2012. In Phase 2, the program is funded by the Australian Government with additional investment from New Zealand Aid. Implementation partners include: Bureau of Meteorology (The Bureau), Pacific Community (SPC), Secretariat of the Pacific Regional Environment Programme (SPREP), Geoscience Australia (GA) and National Institute of Water and Atmospheric Research (NIWA). Phase 2 continues the collaborative partnership between 15 Pacific Island countries and territories in the western tropical Pacific and the implementation partners. The program includes three projects: the Pacific Sea Level and Geodetic Monitoring (PSLGM) project – continuing a 30-year South Pacific Sea Level and Climate Monitoring project (SPSLCMP) to establish high-quality data records for the Pacific region; the Climate Data for the Environment (CliDE) and Services Client (CliDEsc) project – to archive meteorological data locally in 15 countries and territories and provide sector-specific products; and the Seasonal Prediction project (SPP), which supports seasonal and intraseasonal climate and ocean monitoring and prediction services. The three projects are supported by training and communications that build capability and climate resilience and incorporate traditional knowledge.

Convergence

In meteorology, where winds flow from different directions towards each other, thus meeting at one point or along one line. Similarly, in oceanography, where water currents flow towards each other and meet. Horizontal convergence usually forces vertical motion to occur, such as convection.

Coral bleaching

Coral bleaching results from a breakdown of the symbiotic relationship between corals and unicellular algae (zooxanthellae). The symptoms of bleaching include a gradual loss of colour as the algae are expelled from the coral tissue. In severe cases, it can result in the death of the coral. The stress factor most commonly associated with bleaching is elevated sea temperature, although it also occurs in response to any number of environmental pressures, whether natural or anthropogenic, such as changes in solar radiation, salinity (freshwater input), disease, sedimentation, nutrients and pollution.

D

Driver (of climate)

Any natural or human-induced factor that directly or indirectly causes a change.

E

El Niño

see also El Niño–Southern Oscillation (ENSO), La Niña

This is the warm phase of the El Niño–Southern Oscillation (ENSO). El Niño events occur on average once every two to seven years. They are associated with basin-wide warming of the tropical Pacific Ocean east of the dateline and a weakening of the Walker Circulation.

El Niño–Southern Oscillation (ENSO)

see also El Niño, La Niña, neutral

The term El Niño was initially used to describe a warm water current that periodically flows along the coast of Ecuador and Perú, disrupting the local fishery. It has since become identified with a basin-wide warming of the tropical Pacific Ocean east of the dateline. This oceanic event is associated with a fluctuation of a global-scale tropical and subtropical surface pressure pattern called the Southern Oscillation. This naturally occurring, coupled atmosphere–ocean phenomenon, with timescales of approximately two to seven years, is known as the El Niño–Southern Oscillation (ENSO). The state of ENSO is often measured by the Southern Oscillation Index (SOI) and sea surface temperatures in the central and eastern equatorial Pacific. During an ENSO event, the prevailing trade winds weaken, reducing upwelling and altering ocean currents such that the sea surface temperatures warm, further weakening the trade winds. This event has a great impact on the wind, sea surface temperature and precipitation patterns in the tropical Pacific. It has climatic effects throughout the Pacific region and in many other parts of the world. The cold phase of ENSO is called La Niña.

ERA5

see also Reanalysis

ERA5 is the fifth generation European Centre for Medium-Range Weather Forecasts (ECMWF) atmospheric reanalysis of the global climate covering the period from January 1950 to present. ERA5 is produced by the Copernicus Climate Change Service (C3S) at ECMWF. ERA5 provides hourly estimates of a large number of atmospheric, land and oceanic climate variables. The data cover the Earth on a 30 km grid and resolve the atmosphere using 137 levels from the surface up to a height of 80 km. ERA5 includes information about uncertainties for all variables at reduced spatial and temporal resolutions.

Evapotranspiration

Evapotranspiration is the sum of evaporation from land surface (e.g. from the soil and bodies of water such as lakes and rivers) and transpiration from vegetation.

Exclusive economic zone (EEZ)

An exclusive economic zone, as prescribed by the 1982 United Nations Convention on the Law of the Sea, is an area of the sea in which a sovereign state has special rights regarding the exploration and use of marine resources, including energy production from water and wind. It stretches from the baseline out to 200 nautical miles from the coast of the state in question.

External forcing

see Forcing

Extreme weather event

An event that is rare at a particular place and time of year. An extreme weather event would normally be as rare as or rarer than the 10th or 90th percentile of the observed distribution. For example, warm nights or hot days are those exceeding the 90th percentile of temperature, while cold nights or days are those falling below the 10th percentile.

G**Generalized Pareto distribution**

In statistics, the generalized Pareto distribution (GPD) is a family of continuous probability distributions. It is often used to model the tails of another distribution. It is specified by three parameters: location, scale and shape.

Glacial isostatic adjustment

The last Ice Age occurred just 16 000 years ago, when great sheets of ice, two miles thick, covered much of Earth's northern hemisphere. Though the ice melted long ago, the land once under and around the ice is still rising and falling in reaction to its Ice Age burden. This ongoing movement of land is called glacial isostatic adjustment.

Gridded datasets

see also Reanalysis

A set of climate data that are given for the same time or average period on a regular grid in space. Data at each grid point represent the average value over a grid box whose size is determined by the spacing between the grid points (also called the grid resolution). Global climate model and reanalysis data are produced as gridded data.

H**Hindcast**

see also Reanalysis

A statistical calculation determining probable past conditions. In this case, reanalysis wind data (i.e. wind data which has been calculated for a regular global grid based on directly and indirectly measured data on an irregular grid) is applied to a wave model to compute the likely wave structure over a historical time period in lieu of directly sensed wave data.

Homogenisation

see also Inhomogeneities

Climate data homogenisation aims to adjust data if necessary, so that all variations in the data series are caused by real changes in the climate and are not due to artificial changes in the way or location at which the data were recorded.

Humidity

see Relative humidity

I**Index/indices**

A number representing a measure of a particular feature of the climate system at a given time, varying with time and used as a measure of variability.

Inhomogeneities

see also Homogenisation

Inhomogeneities in climate data are caused when artificial changes affect the climate observations through time. These changes may be abrupt or gradual. The main causes of inhomogeneities are changes in instrumentation, station moves, changes in the local environment such as urbanisation, or the introduction of different observing practices. These inhomogeneities can interfere with the proper assessment of any climate trends and extremes. To account for these artificial changes, homogenisation methods are applied to the data.

Interannual

From year to year.

Interdecadal Pacific Oscillation (IPO)

see also Pacific Decadal Oscillation (PDO)

The Interdecadal Pacific Oscillation is a natural recurring pattern of variability in tropical Pacific Ocean sea surface temperatures occurring over periods of about 15 years and longer. While defined differently, the IPO and PDO (Pacific Decadal Oscillation) describe essentially the same variability.

Intertropical Convergence Zone (ITCZ)

see also *Trade winds*

An east–west band of low-level wind convergence near the equator where the southeast trade winds of the southern hemisphere meet the northeast trade winds of the northern hemisphere. It has an associated band of heavy rainfall as the winds converge and moist air is forced upward.

L

La Niña

see also *El Niño, El Niño–Southern Oscillation (ENSO), neutral*

The most common of several names given to cold phase of the El Niño–Southern Oscillation (ENSO). La Niña is the counterpart to the El Niño warm event, although La Niña events tend to be somewhat less regular in their behaviour and duration. La Niña is associated with large-scale cooling of the surface waters of the eastern tropical Pacific Ocean and a strengthening of the Walker Circulation.

M

Madden–Julian Oscillation (MJO)

The Madden–Julian Oscillation is the major fluctuation in tropical weather on weekly to monthly timescales. The MJO can be characterised as an eastward moving ‘pulse’ of cloud and rainfall near the equator that typically recurs every 30 to 60 days.

Mean sea level

see also *Relative sea level, Sea level change/rise*

Mean sea level is normally defined as the average relative sea level over a period, such as a month or a year, long enough to average out transients such as waves and tides.

Meridional

see also *Zonal*

In meteorology, a flow in a direction that is parallel to a line of longitude; along a meridian; northerly or southerly; as opposed to zonal.

Modes of climate variability

see also *Climate variability*

Natural variability of the climate system, in particular on seasonal and longer timescales, predominantly occurs with preferred spatial patterns and timescales through the dynamical characteristics of the atmospheric circulation and through interactions with the land and ocean surfaces. Such patterns are often called regimes or modes. Modes of variability often involve a connection between a remote driver and a local effect, termed a teleconnection. An example is the El Niño–Southern Oscillation (ENSO).

N

Neutral (ENSO)

see also *El Niño, El Niño–Southern Oscillation (ENSO), La Niña*

In the neutral state (neither El Niño nor La Niña), trade winds blow east to west across the surface of the tropical Pacific Ocean, bringing warm moist air and warmer surface waters towards the western Pacific and keeping the central Pacific Ocean relatively cool. The thermocline is deeper in the west than the east.

P

Pacific–Australia Climate Change Science Adaptation Planning program (PACCSAP program)

see also *PCCSP*

The 2011–2014 Pacific–Australia Climate Change Science Adaptation Planning program (PACCSAP) built on the success of the 2009–2011 Pacific Climate Change Science Program (PCCSP). With support from Australian Aid (AusAID), the Department of the Environment, the Bureau of Meteorology and the Commonwealth Scientific and Industrial Research Organisation (CSIRO), PACCSAP continued the collaborative partnership between Australian scientists, 14 Pacific Island countries and East Timor, and regional and non-government organisations in the western tropical Pacific. Using climate observations, projections and targeted communication, it has helped fill the climate information and knowledge gap and generated scientific insight into the state of climate change in the Pacific region.

Pacific Climate Change Science Program (PCCSP)

see also *PACCSAP*

The Pacific Climate Change Science Program (PCCSP) was a collaborative research partnership between the Bureau of Meteorology and CSIRO, Australian Government agencies (AusAID and the Department for Climate Change and Energy Efficiency), 14 Pacific Island countries and East Timor, and regional and international organisations which ran from 2009 to 2011. It provided critical climate scientific research and was instrumental in building the capacity of Pacific Island countries to manage the effects of climate change.

Projection

see also *Climate projection*

The term ‘projection’ is used in two senses in the climate change literature. In general usage, a projection can be regarded as any description of the future and the pathway leading to it. However, a more specific interpretation has been attached to the term ‘climate projection’ by the IPCC when referring to model-derived estimates of future climate.

R

Reanalysis

see also *Gridded data, Hindcast*

An analysis combining many irregular meteorological or oceanographic observations from close to the same time into a physically consistent, complete gridded dataset for a given time and usually for the whole globe. A reanalysis may be used to drive a hindcast.

Relative humidity

Relative humidity is defined as the amount of water vapour in the air, relative to the maximum amount of water vapour that the air is able to hold, without it condensing (expressed as a percentage).

Relative sea level

see also *Mean sea level*

Relative sea level is sea level measured by a tide-gauge with respect to the land upon which it is situated.

Relative sea-level change/rise

see also *Mean sea level, Sea-level change/rise*

Relative sea-level rise occurs where there is a local increase in the level of the ocean relative to the land, which might be due to ocean rise and/or land level subsidence.

S

Satellite altimetry

see also *for sea-level change/rise*

An altimeter measures how high something is. Satellite radar altimeters measure the ocean surface height (sea level) by measuring the time it takes a radar pulse to make a round-trip from a satellite to the sea surface and back.

Sea-level change/rise

see also *Mean sea level, Relative sea-level change/rise*

Sea level can change, both globally and locally, due to: (1) changes in the shape of the ocean basins; (2) changes in the total mass of water; and (3) changes in water density. Factors leading to sea-level rise under global warming include both increases in the total mass of water from the melting of land-based snow and ice, and changes in water density from an increase in ocean water temperatures and salinity changes.

Seasonal cycle

As the earth moves around the sun, it spins on its axis at a constant angle. Due to this angle, the northern and southern hemispheres are tilted away from the sun at opposite points of the year. When a hemisphere is tilted away from the sun, it experiences cooler days and nights and longer nights. When a hemisphere is tilted towards the sun, it experiences warmer days and nights and longer days. At the equator, daylight patterns remain fairly consistent throughout the year there is less variation in temperature.

In climatology, the seasonal cycle also refers to variation in climate (for one or more parameters) through the year.

Sea surface temperature (SST)

The temperature of the ocean surface. The term 'sea surface temperature' is generally representative of the upper few metres of the ocean as opposed to the skin temperature, which is the temperature of the upper few centimetres.

Significant wave height

The significant wave height is defined as the mean wave height (from trough to crest) of the highest one third of waves and corresponds to the wave height that would be reported by an experienced observer.

Southern Oscillation

see also *El Niño–Southern Oscillation (ENSO)*

Fluctuation of a global-scale tropical and subtropical surface pressure pattern.

Southern Oscillation Index (SOI)

The Southern Oscillation Index (SOI) is calculated from the monthly or seasonal fluctuations in the air pressure difference between Tahiti and Darwin.

South Pacific Convergence Zone (SPCZ)

A persistent and greatly elongated zone of low-level convergence extending from approximately 140°E near the equator to approximately 120°W at 30°S. The zone is not quite linear but is oriented more west to east near the equator and has a more diagonal orientation (northwest to southeast) at higher latitudes.

Storm surge

The temporary increased height of the sea above the level expected from tidal variation alone at that time and place due to extreme meteorological conditions.

Surface mass balance

The mass balance is the net gain or loss of ice and snow for an ice sheet. It is related to difference between snow accumulation versus melt, run-off and iceberg calving.

Subsidence

The sinking of the land. In Pacific Island countries this is usually caused by the natural event of tectonic movements often brought on by earthquakes. Subsidence can also be caused by human activity such as removing groundwater or other mining activities.

T

Thermal expansion

see also Sea-level change/rise, Mean sea level

The increase in volume (and decrease in density) that results from warming water.

Timeseries

The values of a variable generated successively in time. Graphically, a timeseries is usually plotted with time on the horizontal axis (x-axis) and the values of the variable on the vertical axis (y-axis).

Trade winds

see also Intertropical Convergence Zone (ITCZ)

The wind system occupying most of the tropics that blows from subtropical high-pressure areas towards the equator.

Tropical cyclone

A tropical cyclone is a tropical depression of sufficient intensity to produce sustained gale force winds (at least 63 km per hour). A severe tropical cyclone produces sustained hurricane force winds (at least 118 km per hour). Severe tropical cyclones correspond to the hurricanes or typhoons of other parts of the world.

W

Walker Circulation

Warm sea surface temperatures in the western Pacific pump heat and moisture into the atmosphere above. In a process known as atmospheric convection, this warm air rises high into the atmosphere and, if the air is moist enough, causes towering cumulonimbus clouds and rain. This now drier air then travels east before descending over the cooler eastern tropical Pacific. The pattern of air rising in the west and falling in the east with westward moving air at the surface is referred to as the Walker Circulation.

Warm Pool (also known as West Pacific Warm Pool)

An extensive pool of the world's warmest water, with temperatures exceeding 28–29 °C, extending from the central Pacific to the far eastern Indian Ocean.

Wave period

The wave period is usually reported in seconds as a peak or an average time interval between two waves. Swell waves are energetic and faster waves that are often defined as having periods of 8 to 20 seconds. Smaller choppy waves are referred to as wind sea and have a period of between 3 and 8 seconds.

West Pacific Monsoon (WPM)

A monsoon is a tropical and subtropical seasonal reversal of both surface winds and associated rainfall caused by differential heating between a continental scale land mass and the adjacent ocean. The West Pacific Monsoon is the eastern edge of the Indonesian or Maritime Continent Monsoon and the southern extension of the larger Asian–Australian Monsoon system.

Z

Zonal

see also Meridional

In meteorology, latitudinal, that is, easterly or westerly; opposed to meridional.



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