

ACRONYMS

AET	Apparent equivalent temperature	NRCS	Natural Resources Conservation Service
ANPP	Aboveground net primary productivity	NRCS SCAN	Natural Resources Conservation Service Soil Climate and Analysis Network
AOGCM	Atmosphere-ocean general circulation models	NRC	National Research Council
BT	Body temperature	NWS COOP	National Weather Service Cooperative Observer Program
CCSM	Community Climate System Model	PCMDI	(Lawrence Livermore National Laboratory's) Program for Climate Model Diagnosis and Intercomparison
CCSP	U.S. Climate Change Science Program	PDO	Pacific Decadal Oscillation
CGC	Canadian Global Coupled Model	PE	Potential evaporation
DOY	Day of year	ppb	Parts per billion
ET	Evapotranspiration	ppm	Parts per million
ENSO	El Niño-Southern Oscillation	RH	Relative humidity
FACE	Free-Air CO ₂ Enrichment	RMSE	Root mean square error
GCM	General Circulation Model	RR	Respiration rate
GFDL	Geophysical Fluid Dynamics Laboratory	SOM	Soil organic matter
HadCM2	Hadley Centre for Climate Prediction and Research's Climate Model 2	SRAD	Solar radiation
HCN	Historical Climatology Network	SRES	Special Report on Emissions Scenarios
HI	Harvest index	SWE	Snow water equivalent
HLI	Heat load index	TBCA	Total carbon allocation belowground
IBP	International Biome Project	THI	Temperature-humidity index
IPCC	Intergovernmental Panel on Climate Change	USDA	United States Department of Agriculture
IPCC AR4	Intergovernmental Panel on Climate Change 4 th Assessment Report	USGS	United States Geological Survey
IPCC TAR	Intergovernmental Panel on Climate Change 3 rd Assessment Report	USGS HCDN	United States Geological Survey Hydro-Climatic Data Network
IPM	Integrated pest management	VFI	Voluntary feed intake
LAI	Leaf area index	VIC	Variable Infiltration Capacity
ILTER	Long Term Ecological Research	VOC	Volatile organic compound
LWSI	Livestock weather safety index	VPD	Vapor pressure deficit
NCAR	National Center for Atmospheric Research	WS	Wind speed
NEON	National Ecological Observatory Network	WUE	Water use efficiency
NPP	Net primary productivity		

GLOSSARY

Anthesis

The period during which a flower is fully open and functional.

Boll

The seed-bearing capsule of certain plants, especially cotton and flax.

C₃ species

Almost all plant life on Earth can be divided into two categories based on the way they assimilate carbon dioxide into their systems. During the first steps in CO₂ assimilation, C₃ plants form a pair of three carbon-atom molecules. C₃ species continue to increase photosynthesis with rising CO₂. C₃ plants include more than 95 percent of the plant species on Earth.

C₄ species

C₄ plants initially form four carbon-atom molecules. C₄ plants include such crop plants as sugar cane and corn. They are the second-most prevalent photosynthetic type, and do not assimilate CO₂ as well as C₃ plants.

Carbon sink

A carbon reservoir. Carbon sinks include the oceans, and plants and other organisms that remove carbon from the atmosphere via photosynthetic processes.

Carbon source

The term describing processes that add carbon dioxide to the atmosphere.

Carbon sequestration

The term describing processes that remove carbon dioxide from the atmosphere.

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 quantities over a period of time ranging from months to thousands or millions of years. The classical period is 30 years, as defined by the World Meteorological Organization (WMO). These 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*.

Climate Change

Climate change refers to a statistically significant variation in either the mean state of the *climate* or in its variability, persisting for an extended period (typically decades or longer). Climate change may be due to natural internal processes or *external forcings*, or to persistent *anthropogenic* changes in the composition of the *atmosphere* or in *land use*. Note that the *United Nations Framework Convention on Climate Change*

(UNFCCC), in its Article 1, defines “climate change” as: “a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods.” The UNFCCC thus makes a distinction between “climate change” attributable to human activities altering the atmospheric composition, and “climate variability” attributable to natural causes. See also *climate variability*.

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 *temporal and spatial scales* beyond that of individual weather events. Variability may be due to natural internal processes within the *climate system* (internal variability), or to variations in natural or *anthropogenic external forcing* (external variability). See also *climate change*.

CO₂ enrichment

Addition of CO₂ to the atmosphere.

Coefficient of variation of annual runoff

A measure of the variability of runoff

Complementary hypothesis

This hypothesis states that trends in actual evaporation and pan evaporation should be in opposite directions.

Cucurbits

Any of various mostly climbing or trailing plants of the family Cucurbitaceae, which includes the squash, pumpkin, cucumber, gourd, watermelon, and cantaloupe.

Endophyte

A plant living within another plant, usually as a parasite.

Evaporation paradox

Temperature, precipitation, stream flow and cloud cover records indicate that warmer, rainier weather is now more common in many regions of the world. However, pan evaporation readings, taken at weather stations, indicate that less moisture has been rising back into the air from these pans.

Evapotranspiration

The sum of evaporation and plant transpiration. Evaporation accounts for the movement of water to the air from sources such as the soil, canopy interception, and water bodies. Transpiration accounts for the movement of water within a plant and the subsequent loss of water as vapor through stomata in its leaves.

Free-Air CO₂ Enrichment (FACE)

FACE is a method and infrastructure used to experimentally enrich the atmosphere enveloping portions of a terrestrial ecosystem with controlled amounts of carbon dioxide (and in some cases, other gases), without using chambers or walls.

Forb

A broad-leaved herb (not a grass), especially one growing in a field, prairie, or meadow.

Global dimming

The gradual reduction in the amount of global direct irradiance at the Earth's surface that was observed for several decades after the start of systematic measurements in 1950s.

Herbivores

Animals that feed chiefly on plants.

Homeostasis

The scientific study of periodic biological phenomena, such as flowering, breeding, and migration, in relation to climatic conditions.

Instream flow

The term used to identify a specific stream flow (typically measured in cubic feet per second, or cfs) at a specific location for a defined time, and typically following seasonal variations. Instream flows are usually defined as the stream flows needed to protect and preserve instream resources and values, such as fish, wildlife and recreation. Instream flows are most often described and established in a formal legal document, typically an adopted state rule.

Irrigation Modes

Drip irrigation allows water to drip slowly to the roots of plants through a network of valves, pipes, tubing, and emitters.

Flood irrigation pumps water onto the fields. The water then flows freely along the ground among the crops.

Spray irrigation relies on machinery to spray water in all directions.

Latent heat

The heat required to change the phase of a substance, for example a solid to vapor (sublimation), liquid to vapor (vaporization) or solid to liquid (melting); the temperature does not change during these processes. Heat is released for the reverse processes, for example vapor to solid (frost), liquid to solid (freezing), or vapor to liquid (condensation).

Leaf area index (LAI)

The ratio of total upper leaf surface of a crop divided by the surface area of the land on which the crop grows.

Lignin

An organic substance that, with cellulose, forms the chief part of woody tissue.

Lysimeter

A device for collecting water from the pore spaces of soils, and for determining the soluble constituents removed in the drainage.

Mutualistic relationship

A positive, reciprocal relationship between two species. Through this relationship, both species enhance their survival, growth or fitness.

Net primary productivity (NPP)

The ratio of all biomass accumulation and biomass losses in units of carbon, weight or energy, per land surface unit, over a set time interval (usually a year).

Pan evaporation

Pans used to determine the quantity of evaporation at a given location. These are generally located in agricultural areas, and have been used as an index to potential evaporation.

Panicle

The complete assembly of spikelets on a rice plant.

Phenology

The study of periodic biological phenomena (flowering of plants, breeding, and species migration) in relation to climatic conditions.

Potential Evapotranspiration

A representation of the environmental demand for evapotranspiration and represents the evapotranspiration rate of a short green crop, completely shading the ground, of uniform height and with adequate water status in the soil profile. It is a reflection of the energy available to evaporate water, and of the wind available to transport the water vapor from the ground up into the lower atmosphere.

Runoff ration

The total amount of runoff divided by the total moisture that falls during a precipitation event.

Ruminant

Even-toed, cud-chewing, hoofed mammals of the suborder *Ruminantia*, such as domestic cattle.

Sensible heat

Heat that can be measured by a thermometer.

Spikelet

The individual places on a rice plant where a grain develops.

Stomatal

One of the minute pores in the epidermis of a leaf or stem through which gases and water vapor pass.

Tiller

New shoots that develop at the base of the plant.