

## Appendix B. Acronym List and Glossary

### Acronyms

<b>AET</b>	Apparent equivalent temperature
<b>ANPP</b>	Aboveground net primary productivity
<b>AOGCM</b>	Atmosphere-ocean general circulation models
<b>BT</b>	Body temperature
<b>CCSM</b>	Community Climate System Model
<b>CCSP</b>	U.S. Climate Change Science Program
<b>CGC</b>	Canadian Global Coupled Model
<b>DOY</b>	Day of year
<b>ET</b>	Evapotranspiration
<b>ENSO</b>	El Niño-Southern Oscillation
<b>FACE</b>	Free-Air CO <sub>2</sub> Enrichment
<b>GCM</b>	General Circulation Model
<b>GFDL</b>	Geophysical Fluid Dynamics Laboratory
<b>HadCM2</b>	Hadley Centre for Climate Prediction and Research's Climate Model 2
<b>HCN</b>	Historical Climatology Network
<b>HI</b>	Harvest index
<b>HLI</b>	Heat load index
<b>IBP</b>	International Biome Project
<b>IPCC</b>	Intergovernmental Panel on Climate Change
<b>IPCC AR4</b>	Intergovernmental Panel on Climate Change 4 <sup>th</sup> Assessment Report
<b>IPCC TAR</b>	Intergovernmental Panel on Climate Change 3rd Assessment Report
<b>IPM</b>	Integrated pest management
<b>LAI</b>	Leaf area index
<b>LTER</b>	Long Term Ecological Research
<b>LWSI</b>	Livestock weather safety index

<b>NCAR</b>	National Center for Atmospheric Research
<b>NEON</b>	National Ecological Observatory Network
<b>NPP</b>	Net primary productivity
<b>NRCS</b>	Natural Resources Conservation Service
<b>NRCS SCAN</b>	Natural Resources Conservation Service Soil Climate and Analysis Network
<b>NRC</b>	National Research Council
<b>NWS COOP</b>	National Weather Service Cooperative Observer Program
<b>PCMDI</b>	(Lawrence Livermore National Laboratory's) Program for Climate Model Diagnosis and Intercomparison
<b>PDO</b>	Pacific Decadal Oscillation
<b>PE</b>	Potential evaporation
<b>ppb</b>	Parts per billion
<b>ppm</b>	Parts per million
<b>RH</b>	Relative humidity
<b>RMSE</b>	Root mean square error
<b>RR</b>	Respiration rate
<b>SOM</b>	Soil organic matter
<b>SRAD</b>	Solar radiation
<b>SRES</b>	Special Report on Emissions Scenarios
<b>SWE</b>	Snow water equivalent
<b>TBCA</b>	Total carbon allocation belowground
<b>THI</b>	Temperature-humidity index
<b>USDA</b>	United States Department of Agriculture
<b>USGS</b>	United States Geological Survey
<b>USGS HCDN</b>	United States Geological Survey Hydro-Climatic Data Network
<b>VFI</b>	Voluntary feed intake
<b>VIC</b>	Variable Infiltration Capacity
<b>VOC</b>	Volatile organic compound
<b>VPD</b>	Vapor pressure deficit

<b>WS</b>	Wind speed
<b>WUE</b>	Water use efficiency

## 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.

### **C<sub>3</sub> 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 CO<sub>2</sub> assimilation, C<sub>3</sub> plants form a pair of three carbon-atom molecules. C<sub>3</sub> species continue to increase photosynthesis with rising CO<sub>2</sub>. C<sub>3</sub> plants include more than 95 percent of the plant species on Earth.

### **C<sub>4</sub> species**

C<sub>4</sub> plants initially form four carbon-atom molecules. C<sub>4</sub> plants include such crop plants as sugar cane and corn. They are the second-most prevalent photosynthetic type, and do not assimilate CO<sub>2</sub> as well as C<sub>3</sub> 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*.

**CO<sub>2</sub> enrichment**

Addition of CO<sub>2</sub> 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 CO<sub>2</sub> 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.