

# Meteorology Statistics

## **E91 Meteorological Statistics**

### **E91010 Air Temperature**

Air temperature represents the thermodynamic state of the surrounding air, which changes at different heights. The World Meteorological Organization defines air temperature as “the temperature indicated by a thermometer exposed to the air in a place sheltered from direct solar radiation at a height of between 1.25 and 2 m above ground level”.

1. Daily/Monthly/Yearly mean temperature: average temperature of the day/month/year.
2. Absolute maximum/minimum temperature: The highest/lowest temperature in a given period.
3. Mean maximum/ minimum temperature: average of the daily highest/lowest temperatures in a given period.

### **E91020 Precipitation**

Precipitation is defined as the liquid or solid products of the condensation of water vapor falling from clouds or deposited from air onto the ground. The difference between precipitation and cloud fog, dew or frost is that the former falls on the ground. The forms of precipitation include drizzle, rain, snow, snow grain, ice crystal, ice pellet and hail.

The total amount of precipitation which reaches the ground in a stated period is expressed in terms of the vertical depth of water (or water equivalent in the case of solid forms), which is usually measured with a rain gauge fixed on the ground.

While “rainfall” is commonly used in meteorology, climatology and hydrology, the word “rain” denotes liquid water which can be absorbed by earth or rivers. Thus “precipitation” rather than “rainfall” would be more appropriate in most situations. The terms related to precipitation observation include “precipitation”, “rainfall hours”, “precipitation intensity” and “number of rainy days”.

### **E91030 Visibility**

In meteorology, visibility is a measure of the distance at which an object can be clearly discerned, and is not always the same in all direction. “Prevailing visibility” is determined by the greatest visibility at least half the horizon circle, and is the lowest sector visibility within these combined sectors. Visibility was first defined for meteorological purposes as a quantity to be estimated by a human observer, and observations made in that way are widely used.

The measurement of visibility in daytime is subjectively determined on the basis of atmospheric attenuation and contrast. At night, visibility is measured on the basis of flux density. These two kinds of visibility data should be clearly distinguished as they are obtained by entirely different methods.

The visibility of visual observations is limited or affected by the surrounding environment and terrain conditions, weather conditions, illuminance, and the adaptation of the eyes to the light intensity at the time, and thus visibility in various directions is often inconsistent. In terms of weather conditions, fog is the main factor affecting visibility. The Central Weather Bureau(CWB) will issue dense fog advisory in case of fog with horizontal visibility less than 200 meters.

#### E91040 Apparent Temperature

Apparent temperature is the temperature equivalent perceived by humans, caused by the combined effects of air temperature, relative humidity, wind speed, solar radiation and human metabolic rate.

The Central Weather Bureau uses the universal scale of apparent temperature as published in Robert Steadman's 1984 paper:

$$\text{Apparent temperature} = 1.07 \times T + 0.2 \times e - 0.65 \times V - 2.7$$

$$e = \text{RH}/100 \times 6.105 \times \exp(17.27 \times T / (237.7 + T))$$

where T is air temperature (°C), e is vapor pressure (hPa), V is wind speed (m/s) and RH is relative humidity(%)

As can be seen from the equations above, apparent temperature increases when humidity increases or wind speed decreases.

#### E91050 Heavy Rain Warning by the Central Weather Bureau

To improve disaster prevention and early warning performance and to reflect the catastrophic nature of short-delay heavy rainfall, the CWB has set the following criteria for cumulative rainfall within 24 hours and rainfall within 1 hour and 3 hours, for the general public's and disaster prevention and relief units' reference (see the table below).

Class	Rain Level	Definition
Heavy rain warning	Heavy rain	Rainfall more than 80mm within 24 hours or 40mm within 1 hour.
Extremely heavy rain warning	Extremely heavy rain	Rainfall more than 200mm within 24 hours or 100mm within 3 hours.
	Torrential rain	Rainfall more than 350mm within 24 hours or 200mm within 3 hours.
	Extremely torrential rain	Rainfall more than 500mm within 24 hours.

### E92 Weather Statistics

#### E92010 Invading Typhoon

Invading typhoon is defined as a typhoon whose eye has made landfall on Taiwan proper, Penghu, Kinmen or Mastu, or a typhoon passing offshore without landfall but still causing disaster on land.

## **E93 Earthquake Statistics**

### **E93010 Earthquake Early Warning**

When a large earthquake occurs, early seismic wave data observed at several seismic stations near the epicenter is used to quickly calculate its magnitude, location, and depth, and to estimate the intensity and arrival time of the seismic wave in different areas. The EEW system provides the warning a few to tens of seconds in advance of impending disastrous ground motions, allowing for immediate mitigation actions to be taken. It is currently the most effective earthquake disaster reduction technology.