

## Glossary

**Anthropogenic:** Caused, resulting from or related to the influence of humans on nature.

**Climate:** The statistical expression in terms of means and variability of observations of temperature, precipitation, cloudiness and wind over a given period – 30 years as set in standard practice is the period used to define climate “normal” by the World Meteorological Organization. It is in essence “long-term average weather conditions” that can be characteristically be found in specific geographic zones or altitude bands.

**Climate change:** When measurements of climate variability reveal persistent “anomalous” conditions in reference to regional climate parameters (conditions that do not fit in the historic record of climate variability), the climate is said to be changing. The revelation of “climate change” is therefore dependent upon a reference state – or more precisely a reference period. In terms of measuring the anthropogenic influence of GHG emissions on climate change, the reference period has typically been the latter part of the pre-industrial period (~ climate of the late 18<sup>th</sup> early-19<sup>th</sup> century). For detecting ongoing changes in climate, the reference state is typically the most recent 30-year “climate normal” period as defined by the World Meteorological Organization. All measurements of climate change are sensitive to starting and end dates due to natural variability and for this reason, longer time periods are preferred for climate change assessment. Simply put, weather observations, when averaged over a 30 or more year period are the basis for defining “climate” and this statistical definition, in turn, is used to express extreme weather occurrences and provides the baseline against which long-term changes in climate are measured.

**Climate variability:** The World Meteorological Organization defines climate variability as “variations in the mean state and other statistics (such as standard deviations and the occurrence of extremes) of the climate on all temporal and spatial scales beyond that of individual weather events. The term is often used to denote deviations of climatic statistics over a given period of time (e.g. a month, season or year) from the long-term statistics relating to the corresponding calendar period. In this sense, climate variability is measured by those deviations, which are usually termed anomalies. 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)”.

**Cryosphere:** The cryosphere is comprised of all of the frozen surfaces of the earth, including areas covered by ice sheets and glaciers, permafrost regions, and sea areas covered by ice, at least in winter.

**El Niño/La Niña:** The US National Oceanic and Atmospheric Administration defines El Niño and La Niña as opposite phases of what is known as the El Niño-Southern Oscillation (ENSO) cycle. The ENSO cycle is a scientific term that describes the fluctuations in temperature between the ocean and atmosphere in the east-central Equatorial Pacific. La Niña is sometimes referred to as the cold phase of ENSO and El Niño as the warm phase of ENSO. These deviations from normal surface temperatures can have large-scale impacts not only on ocean processes, but also on global weather and climate.

**Exposure:** In terms of this report, exposure is the presence of physical infrastructure assets or transport-related activities in places that could be adversely affected by climate-related hazards (IPCC, 2014; 2012). In terms of risk management, exposure is a necessary variable in order to determine risk. If there is no exposure to a hazard, then the hazard continues to exist but poses no risk (Ropeik and Gray, 2002).

**Extreme weather (event):** A weather event that through its intensity or scale places it at the outlying part of the distribution of similar observed events for a set temporal range and locale. For instance, one way of defining extreme weather events are those that are as rare as or rarer than the 10<sup>th</sup> and 90<sup>th</sup> percentiles of the observed probability distribution for a reference period.

**Hazard:** An event or process that may create damage or losses (Ropeik and Gray, 2002). In the context of this report, weather and hazards are not synonymous though extreme weather incidents may lead to the occurrence of hazards: e.g. rain and temperature are weather variables that in their extreme may lead to hazards such as flooding or heat waves. Likewise, sea level rise is a climate-related phenomenon but coastal flooding is a hazard linked to sea level rise.

**Radiative forcing:** The Intergovernmental Panel on Climate Change defines radiative forcing as “the change in net (down minus up) irradiance (solar plus longwave; in  $W\ m^{-2}$ ) at the tropopause after allowing for stratospheric temperatures to readjust to radiative equilibrium, but with surface and tropospheric temperatures and state held fixed at the unperturbed values”.

**Resilience:** In the context of this report, resilience connotes the ability for infrastructure or transport networks to adjust easily to or recover rapidly from negative impacts linked to climate or weather-related hazards.

**Risk:** The function of a hazard and exposure to that hazard. In terms of this report, it refers to the probability of deleterious impacts of hazards on transport infrastructure and networks (Ropeik and Gray, 2002). Probabilistic risk refers to risks that can be quantified and statistically described via a probability distribution.

**Robustness:** Infrastructure or networks that are robust are sturdily constructed in such a way as to perform without failure under a wide range of conditions.

**Uncertainty or “deep” uncertainty:** Describes outcomes whose probability of occurring cannot be quantified or characterised by a probability distribution. These are outcomes for which insufficient information exists as to the likelihood of their realisation or not.

**Vulnerability:** The propensity or predisposition to be adversely affected by a hazard (IPCC, 2014). It is a function of the character and magnitude of a hazard, exposure to that hazard and its capacity to adapt or otherwise absorb the damaging impacts of that hazard.

**Weather:** The state of the atmosphere at a given time and place with regards to temperature, precipitation, cloudiness and wind.