

MAGNITUDE

Magnitude is a «numerical measure that expresses the intensity, in an absolute sense, of an earthquake, as it is linked to the energy released at the hypocentre (Encyclopaedia Treccani)». In 1935, C.F. Richter introduced an instrumental and logarithmic scale to measure magnitude, designed to quantify the strength of an earthquake on the basis of the maximum amplitude of seismic waves recorded by a standard seismograph located approximately 100 kilometres from the epicentre. This scale, known as the “Richter scale”, is also referred to as *local magnitude* (ML) and provides an indirect estimate of the energy released by an earthquake through the analysis of recorded seismic waves.

From the 1970s onwards, a different scale came into use, known as *moment magnitude* (M_w), based on the seismic moment, that is, the product of the fault rupture area, the average displacement of the rocks and the rigidity of the ground. In this way, *moment magnitude* is directly linked to the physical characteristics of the earthquake source and provides a robust estimate of the size of an earthquake, closely related to the energy released. It yields values that are comparable at the global level. It surpasses *local magnitude* in precision for very strong and distant earthquakes, does not suffer from saturation effects, is more reliable, and represents the measure used by the National Institute of Oceanography and Experimental Geophysics (Istituto Nazionale di Oceanografia e di Geofisica Sperimentale – OGS), by the National Institute of Geophysics and Volcanology (Istituto Nazionale di Geofisica e Vulcanologia – INGV), as well as by international seismological institutions.

Another way to measure the severity and intensity of an earthquake is the Mercalli scale (MCS), which has twelve degrees: the higher the degree, the more disastrous the earthquake. Named after the Italian seismologist who, at the beginning of the 20th century, defined the classification of earthquakes by measuring the effects of seismic events on the environment, objects, and people, it is a subjective scale. To estimate earthquake intensity, teams of specialist technicians survey the affected areas and collect data to produce macroseismic maps for different localities, which are then grouped according to the intensity of the seismic activity.