Given the tremendous toll in human lives and attendant economic losses, it is appropriate that scientists are working hard to understand better earthquakes, with the aim of forecasting and, ultimately, predicting them.

In the last decades increasing attention has been paid to the coseismic effects on the natural environment, creating a solid base of empirical data for the estimation of source parameters of strong earthquakes based on geological observations. The recently introduced INQUA scale (Environmental Seismic Intensity–ESI 2007 Scale) of macroseismic intensity clearly shows how the systematic study of earthquake surface faulting, coseismic liquefaction, tsunami deposits and other primary and secondary ground effects can be integrated with 'traditional' seismological and tectonic information to provide a better understanding of the seismicity level of an area and the associated hazards. At the moment this is the only scientific means of equating the seismic records to the seismic cycle time-spans extending the seismic catalogues even to tens of thousands of years, improving future seismic hazard analyses.

This Special Publication covers some of the latest multidisciplinary work undertaken to achieve that aim. Eighteen papers from research groups from all continents address a wide range of topics related both to palaeoseismological studies and assessment of macroseismic intensity based only on the natural phenomena associated with an earthquake.