



- 15.2.1.1 Location
- 15.2.1.2 Magnitude \*
- 15.2.1.3 Fault types
- 15.2.1.4 Focal mechanisms \*
- 15.2.2 The Earthquake Process
  - 15.2.2.1 Rupture propagation velocity
  - 15.2.2.2 Rupture velocity
  - 15.2.2.3 Rupture duration
  - 15.2.2.4 Rupture dimensions
  - 15.2.2.5 Fault rupture models
  - 15.2.2.6 Strong motion duration
  - 15.2.2.7 Energy considerations
- 15.2.3 Earthquake clustering
  - 15.2.3.1 Foreshocks and aftershocks
  - 15.2.3.2 Earthquake swarms
  - 15.2.3.3 Precursory earthquakes
  - 15.2.3.4 Adjustment earthquakes
  - 15.2.3.5 Earthquake cycles
  - 15.2.3.6 Triggered and induced earthquakes
  - 15.2.3.7 Declustering for recurrence estimates
- 15.2.4 Earthquake catalogues
  - 15.2.4.1 Parameters
  - 15.2.4.2 Uncertainties
  - 15.2.4.3 Independent or dependent
  - 15.2.4.4 Earthquake effects
  - 15.2.4.5 Historical earthquakes
    - *Estimating source parameters*
- 15.2.5 Geological Data
  - 15.2.5.1 Structural geology
  - 15.2.5.2 Neotectonics
  - 15.2.5.3 Palaeoseismology
  - 15.2.5.4 Calibration of methods using recent earthquakes
- 15.2.6 Earthquake Magnitude Recurrence
  - 15.2.6.1 Gutenberg-Richter: *Seismicity b-value*
  - 15.2.6.2 Characteristic earthquakes
- 15.2.7 Maximum credible magnitudes
- 15.2.8 Use of earthquake source zones
  - 15.2.8.1 Volume or area source zones
  - 15.2.8.2 Active faults
- 15.2.9 Quantification of source zones
  - 15.2.9.1 Catalogue completeness
  - 15.2.9.2 Maximum likelihood, least squares
- 15.3 Ground motion models**
  - 15.3.1 Source, travel path, site and structure
  - 15.3.2 Source
    - 15.3.2.1 Magnitude and attenuation
    - 15.3.2.2 Magnitude scales
    - 15.3.2.3 Variations depending on rupture size and orientation
  - 15.3.3 Travel path
    - 15.3.3.1  $Q(f)$

- 15.3.4 Attenuation
- 15.3.5 Ground motion models
- 15.3.6 Next generation attenuation
- 15.4 Site response**
  - 15.4.1 Impedance effects
  - 15.4.2 Resonance effects
  - 15.4.3 Basin effects
  - 15.4.4 Other site phenomena
  - 15.4.5 Methods for considering site response
  - 15.5.6 SHAKE
  - 15.4.7 2D and 3D modelling
- 15.5 Hazard, as defined by ground motion recurrence**
  - 15.5.1 Measures of ground motion
    - 15.5.1.1 Intensity \*
    - 15.5.1.2 Displacement, velocity and acceleration
      - *Time series*
      - *Peak values and their limitations*
    - 15.5.1.3 Fourier spectra
    - 15.5.1.4 Response spectra
    - 15.5.1.5 Arias Intensity
  - 15.5.2 Deterministic and probabilistic Methods
  - 15.5.3 Extreme value methods
  - 15.5.4 Cornell Method
  - 15.5.5 Choice of ground motion models
    - 15.5.5.1 Limits applicable to ground motion models
  - 15.5.6 Engineering considerations
    - 15.5.6.1 Minimum considered magnitude
  - 15.5.7 Computation of ground motion recurrence
- 15.6 Time series analysis**
  - 15.6.1 Engineering models of structures
  - 15.6.2 Engineering site/structure models
  - 15.6.3 Selection of representative time series
  - 15.6.4 Spectral scaling
  - 15.6.5 Spectral matching
- 15.7 Strong motion monitoring**
  - 15.7.1 Data required for earthquake risk mitigation
    - 15.7.1.1 Global, regional and local monitoring
    - 15.7.1.2 High resolution seismology
      - *Location*
      - *Magnitude*
      - *Focal mechanisms*
      - *Attenuation*

- 15.7.2 Instrumentation
  - 15.7.2.1 Original analogue accelerographs
  - 15.7.2.2 Digital accelerographs
- 15.7.3 Processing Instrumental Data
  - 15.7.3.1 Calibration
  - 15.7.3.2 Acceleration, velocity and displacement
  - 15.7.3.3 Computing response spectra
- 15.7.4 Strong motion databases
- 15.8 Induced seismicity/triggered earthquakes ???**  
**???**