Annex 2

Chapter 14:

Strong-motion recordings and data analysis for applications in earthquake risk mitigation, seismology and engineering (Gary Gibson).

(Note: * Means references to already existing chapters in the Manual**)**

14.1. HAZARD, VULNERABILITY AND RISK

14.1.1. Definitions of hazard, vulnerability and risk

14.1.2. Earthquake hazard, vulnerability and risk

14.1.3. Risk Mitigation

Past events

Hazard studies

Present events

Warnings and alarms

Future events

Alerts, forecasts and predictions

14.1.4. Earthquake Risk mitigation

Past earthquakes

Earthquake hazard studies

Present earthquakes

Earthquake warnings and alarms

Future earthquakes

Earthquake alerts, forecasts and predictions

Ground motion recurrence

14.1.5. Acceptable and Unacceptable Risk

14.1.6. Earthquake Risk Criteria

Probability of exceedence per year

Return period

Design life of structures

Probability of exceedence in design life

Specified risk criteria

Maximum Design Earthquake

Operating Basis Earthquake

14.2. SEISMICITY MODELS

14.2.1. Earthquake source parameters

Location

Magnitude *

Fault types

Focal mechanisms *

Fault rupture models

Rupture dimensions *

Rupture duration

Strong motion duration

14.2.2. Earthquake clustering

Foreshocks and aftershocks

Earthquake swarms

Precursory earthquakes

Adjustment earthquakes

Earthquake cycles

Triggered and induced earthquakes

Declustering for recurrence estimates

14.2.3. Earthquake catalogues

Parameters

Uncertainties

Independent or dependent

Earthquake effects

Historical earthquakes

Estimating source parameters

14.2.4. Geological Data

Structural geology

Neotectonics

Palaeoseismology

Calibration of methods using recent earthquakes

14.2.5. Earthquake Magnitude Recurrence

Gutenberg-Richter

Seismicity b-value

Characteristic earthquakes

14.2.6. Maximum credible magnitudes

14.2.7. Use of earthquake source zones

Volume or area source zones

Active faults

14.2.8. Quantification of source zones

Catalogue completeness

Maximum likelihood, least squares

14.3. GROUND MOTION MODELS

14.3.1. Source, travel path, site and structure

14.3.2. Source

Magnitude and attenuation

Magnitude scales

Variations depending on rupture size and orientation

14.3.3. Travel Path

Q(f)

14.3.4. Site Response

Impedance effects

Resonance effects

Basin effects

Other site phenomena

Methods for considering site response

14.3.5.

14.3.6. Attenuation

14.3.7. Ground Motion Models

14.3.8. Next Generation Attenuation

14.4. HAZARD, AS DEFINED BY GROUND MOTION RECURRENCE

14.4.1. Measures of ground motion

Intensity *

Displacement, velocity and acceleration

Time series

Peak values and their limitations

Fourier spectra

Response spectra

14.4.2. Deterministic and probabilistic Methods

14.4.3. Extreme value methods

14.4.4. Cornell Method

14.4.5. Choice of ground motion models

Limits applicable to ground motion models

14.4.6. Computation of Ground Motion Recurrence

Minimum considered magnitude

14.4.7.

14.5. TIME SERIES ANALYSIS

14.5.1. Engineering models of structures

14.5.2. Engineering site/structure models

14.5.3. Selection of representative time series

14.5.4. Spectral scaling

14.5.5. Spectral matching

14.6. STRONG MOTION MONITORING

14.6.1. Data required for earthquake risk mitigation

Global, regional and local monitoring

High resolution seismology

Location

Magnitude

Focal mechanisms

Attenuation

14.6.2. Instrumentation

Original analogue accelerographs

Digital accelerographs

14.6.3. Strong motion databases