1. Record Nr. UNINA9910463326603321

Autore	Douglas Alan <1936->
Titolo	Forensic seismology and nuclear test bans / / Alan Douglas, Atomic Weapons Establishment Blacknest, Brimpton, UK [[electronic resource]]
Pubbl/distr/stampa	Cambridge : , : Cambridge University Press, , 2013
ISBN	1-107-32710-5 1-107-23830-7 1-107-33686-4 1-107-33275-3 1-107-33354-7 1-107-33520-5 1-299-40327-1 1-107-33603-1 1-139-52400-3
Descrizione fisica	1 online resource (xliii, 514 pages) : digital, PDF file(s)
Disciplina	623.4/51190287
Soggetti	Underground nuclear explosions - Detection Nuclear weapons - Testing - Detection Seismic waves - Analysis Seismology Nuclear arms control - Verification
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Note generali	Title from publisher's bibliographic system (viewed on 05 Oct 2015).
Nota di bibliografia	Includes bibliographical references and indexes.
Nota di contenuto	Contents; Preface; Abbreviations and mathematical symbols; Abbreviations; Seismological stations; Mathematical symbols; Prologue; Forensic seismology and UK policy on a CTBT; 1 Seismology: ancient and modern; 1.1 The long march begins; 1.2 Seismic signals and noise; 1.3 Seismometers; 1.4 Seismometer arrays; 1.5 Identification; 1.6 Epicentres and OSIs; 1.7 Seismograms and seismological bulletins; 1.8 Earth models and seismic sources; 1.9 Seismic source size and explosion yield; 1.10 The International Monitoring System (IMS); 1.11 Scope of the book 2 Statistical solutions to seismological problems2.1 Introduction; 2.2

The method of least squares; 2.2.1 Linear least squares; 2.2.2 Generalized least squares; 2.2.3 Least squares with constraints; 2.2.4 Non-linear least squares - hypocentre estimation from P-wave arrival times; 2.2.5 Confidence limits and significance tests; 2.3 Maximum-likelihood estimators; 2.4 Weighting; 3 Seismograms as time series; 3.1 Introduction; 3.2 Analogue and digital beamforming; 3.3 Fourier spectra; 3.4 Digital filtering; 3.5 Least squares estimation of approximate filters
3.6 Modelling and measuring the effects of anelastic attenuation3.7 The Hilbert transform and its uses; 3.8 Seismogram synthesis as filtering; 3.9 Group and phase speed; 3.10 Noise analysis; 3.11 Signals and noise in frequency/wave-number space; 4 Seismographs and seismograms; 4.1 Introduction; 4.2 Direct-reading seismometers without feedback; 4.3 The velocity transducer without feedback; 4.3.1 The response of seismometer--amplifier systems; 4.3.2 LP seismometers; 4.3.3 Calibration; 4.4 Miniature broad-band seismometers; 4.4.1 System noise; 4.4.2 The AWE--Guralp borehole seismometer
4.4.3 Borehole operation4.5 Sources of seismic noise; 4.6 Siting seismographs; 4.7 Estimating broad-band signals from SP recordings; 4.8 Recording systems for forensic seismology; 5 Seismometer arrays and processing methods; 5.1 Introduction; 5.2 Optimum array processing for four noise models; 5.3 Array sum response in frequency/wave-number space; 5.3.1 Line arrays; 5.3.2 UK-type arrays; 5.3.3 The correlator response; 5.4 Wave-number filtering; 5.4.1 Signals and noise at EKA; 5.4.2 Estimating MP filters and measuring their effectiveness; 5.5 Automatic processing
5.5.1 Errors due to spatial aliasing in array estimates of vector slowness5.6 The design and performance of the UK-type arrays; 5.7 Performance of other arrays; 5.8 Future of arrays for signal extraction; 5.9 Using arrays to measure travel-time gradients; 5.9.1 Single-array methods; 5.9.2 Multiple-array methods; 5.9.3 dT/d and phase identification; 6 Seismogram interpretation and synthesis; 6.1 Introduction; 6.2 Synthesizing P seismograms; 6.2.1 P seismograms from earthquakes; 6.2.2 P seismograms from explosions; 6.3 Analysis and synthesis of surface-wave seismograms
6.3.1 Measuring dispersion: analyst methods

Sommario/riassunto

With the signing in 1996 of the Comprehensive Nuclear Test Ban Treaty, interest has grown in forensic seismology: the application of seismology to nuclear test ban verification. This book, based on over 50 years of experience in forensic seismology research, charts the development of methods of seismic data analysis. Topics covered include: the estimation of seismic magnitudes, travel-time tables and epicentres; seismic signal processing; and the use of seismometer arrays. Fully illustrated with seismograms from explosions and earthquakes, the book demonstrates methods and problems of visual analysis. Each chapter provides exercises to help the reader familiarise themselves with practical issues in the field of forensic seismology, and figures and solutions to exercises are also available online. The book is a key reference work for academic researchers and specialists in the area of forensic seismology and Earth structure, and will also be valuable to postgraduates in seismology and solid earth geophysics.