

INTRODUCTION TO APPLIED GEOPHYSICS

EXPLORING THE SHALLOW SUBSURFACE

H. Robert Burger

SMITH COLLEGE

Anne F. Sheehan

UNIVERSITY OF COLORADO

Craig H. Jones

UNIVERSITY OF COLORADO

Applied geophysics is the study of the physical properties of the earth's crust and upper mantle, and their use in solving practical problems.

INTRODUCTORY

BASIC CONCEPTS

CONTINUOUS WAVE

OSCILLATOR

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Contents

1	Approaching the Subsurface	1	8
1.1	What Are the Options?	1	1.8
1.2	Some Fundamental Considerations	2	1.8
1.3	Defining Objectives	3	1.8
1.4	Limitations	4	1.8
1.5	The Advantage of Multiple Methods	5	1.8
2	Seismic Exploration: Fundamental Considerations	7	1.8
2.1	Seismic Waves and Wave Propagation	7	1.8
2.1.1	Wave Terminology	9	1.8
2.1.2	Elastic Coefficients	11	1.8
2.1.3	Seismic Waves	14	1.8
2.1.4	Seismic Wave Velocities	18	1.8
2.2	Ray Paths in Layered Materials	21	1.8
2.2.1	Huygens' Principle	21	1.8
2.2.2	Fermat's Principle	22	1.8
2.2.3	Reflection	23	1.8
2.2.4	Refraction	25	1.8
2.2.5	Snell's Law	27	1.8
2.2.6	Critical Refraction	28	1.8
2.2.7	Diffraction	29	1.8
2.2.8	Wave Arrivals at the Surface	35	1.8

2.3	Wave Attenuation and Amplitude	39
2.3.1	Spherical Spreading	40
2.3.2	Absorption	40
2.3.3	Energy Partitioning	42
2.3.4	Additional Factors	46
2.4	Energy Sources	47
2.4.1	Source Types	47
2.4.2	Source Considerations	49
2.5	Seismic Equipment	50
2.5.1	Signal Detection	50
2.5.2	Signal Conditioning	53
2.5.3	Signal Recording	56
2.6	Summary	60
	Problems	61
	References Cited	63

3	Seismic Exploration: The Refraction Method	65
3.1	A Homogeneous Subsurface	65
3.2	A Single Subsurface Interface	67
3.2.1	Derivation of a Travel-Time Equation	67
3.2.2	Analysis of Arrival Times	70
3.2.3	Determining Thickness	72
3.2.4	Crossover Distance	73
3.2.5	Critical Distance	74
3.2.6	Constructing a Travel-Time Curve from a Field Seismogram	76
3.2.7	Using REFRACT	78
3.2.8	The Mohorovicic Discontinuity	79
3.3	Two Horizontal Interfaces	81
3.3.1	Derivation of a Travel-Time Equation	81
3.3.2	Determining Thickness	83
3.3.3	Critical Distance	85
3.3.4	Analyzing a Second Field Seismogram	87
3.4	Multiple Interfaces	90
3.5	Dipping Interfaces	91
3.5.1	Analyzing the Problem	91
3.5.2	Derivation of a Travel-Time Equation	97
3.5.3	Determining Thickness	99
3.6	Multiple Dipping Interfaces	100
3.6.1	Travel-Time Equation	100
3.6.2	Analyzing Field Seismograms	102

The Nonideal Subsurface	106
Hidden Zones: The Low-Velocity Layer	107
Hidden Zones: The Thin Layer	111
Laterally Varying Velocity	114
Interface Discontinuities	116
The Delay-Time Method	120
Current Density	120
Other Methods	127
Wave Front Method	127
Ray Tracing and the Generalized Reciprocal Method	129
Field Procedures	129
Site Selection and Planning Considerations	129
Equipment Considerations	130
Geophone Spread Geometries and Placements	131
Corrections to Data	134
Applications Using Seismic Refraction	136
Whately, Massachusetts	136
Southeastern New Hampshire	137
Waste Disposal Site	138
Maricopa Area, Arizona	139
Problems	141
References Cited	147
Suggested Reading	148

Seismic Exploration: The Reflection Method	149
A Single Subsurface Interface	150
Using REFLECT	150
Derivation of a Travel-Time Equation	151
Arrival Time Determination	151
Analysis of Arrival Times	156
Normal Move-Out	160
Determining Velocity and Thickness	163
Applying the $x^2 - t^2$ Method to a Field Seismogram	165
Multiple Horizontal Interfaces	167
The Dix Equation	170
Determining Velocities	170
Determining Thicknesses	174
Further Discussion of the Dix Method	175
Analyzing a Field Seismogram Containing Multiple Reflections	181
Dipping Interface	182
Derivation of a Travel-Time Equation	183
Determining Dip, Thickness, and Velocity	186

6	Exploration Using Gravity	349
6.1	Fundamental Relationships	350
6.1.1	Gravitational Acceleration	350
6.2	Measuring Gravity	351
6.2.1	Relative Measurements Using a Pendulum	351
6.2.2	Relative Measurements Using a Gravimeter	352
6.2.3	Absolute Measurements	355
6.2.4	International Gravity Standardization Net 1971 (IGSN71)	355
6.3	Adjusting Observed Gravity	356
6.3.1	Variation in g as a Function of Latitude	356
6.3.2	Correcting for the Latitude Effect	357
6.3.3	Elevation Correction 1: The Free-Air Correction	358
6.3.4	Elevation Correction 2: The Bouguer Correction	360
6.3.5	Elevation Correction 3: The Terrain Correction	364
6.3.6	The Isostatic Anomaly	369
6.4	Basic Field Procedures	370
6.4.1	Drift and Tidal Effects	370
6.4.2	Establishing Base Stations	373
6.4.3	Determining Elevations	373
6.4.4	Determining Horizontal Position	375
6.4.5	Selecting a Reduction Density	376
6.4.6	Survey Procedure	376
6.5	Gravity Effects of Simple Geometric Shapes	378
6.5.1	Rock Densities	378
6.5.2	Gravity Effect of a Sphere	379
6.5.3	Gravity Effect of a Horizontal Cylinder	383
6.5.4	Gravity Effect of a Vertical Cylinder	386
6.5.5	Gravity Effect of an Inclined Rod	388
6.5.6	Gravity Effect of a Horizontal Sheet	390
6.5.7	GRAVMAG	397
6.6	Analyzing Anomalies	399
6.6.1	Regionals and Residuals	399
6.6.2	Trend Surfaces	402
6.6.3	Upward and Downward Continuation	403
6.6.4	Second Derivatives	407
6.6.5	Filtering	409
6.7	Gravity Interpretation	409
6.7.1	Half-Maximum Technique	410
6.7.2	Second Derivative Techniques	411
6.7.3	Revisiting Some Bouguer Anomaly Values	413
6.8	Applications of the Gravity Method	415

6.8.1	Bedrock Depths	415	5.8.1
6.8.2	Subsurface Voids	416	5.8.2
6.8.3	Landfill Geometry	417	5.8.3
	Problems	420	5.8.4
	References Cited	426	5.8.5
	Suggested Reading	427	5.8.6

7	Exploration Using the Magnetic Method	429	
	Fundamental Relationships	430	
7.1	Magnetic Force	431	7.1
7.2	Magnetic Field Strength	431	7.2
7.3	Magnetic Moment	432	7.3
7.4	Intensity of Magnetization	433	7.4
7.5	Magnetic Susceptibility	434	7.5
7.6	Magnetic Potential	437	7.6
7.7	The Earth's Magnetic Field	438	
7.7.1	Field Elements	438	7.7.1
7.7.2	Dipolar Nature of the Earth's Field	439	7.7.2
7.7.3	Variations of the Earth's Field	441	7.7.3
7.7.4	Dipole Equations	444	7.7.4
7.8	Measuring the Magnetic Field	446	
7.8.1	Flux-Gate Magnetometer	446	7.8.1
7.8.2	Proton-Precession Magnetometer	447	7.8.2
7.8.3	Total-Field Anomalies	447	7.8.3
7.9	Basic Field Procedures	450	
7.9.1	Magnetic Cleanliness	450	7.9.1
7.9.2	Diurnal Corrections	450	7.9.2
7.9.3	Elevation Corrections	451	7.9.3
7.9.4	Correcting for Horizontal Position	452	7.9.4
7.10	Magnetic Effects of Simple Geometric Shapes	454	
7.10.1	Rock Susceptibilities	454	7.10.1
7.10.2	Magnetic Effect of an Isolated Pole (Monopole)	456	7.10.2
7.10.3	Magnetic Effect of a Dipole	457	7.10.3
7.10.4	Magnetic Effect of a Sphere	465	7.10.4
7.10.5	Magnetic Effect of a Thin, Horizontal Sheet	470	7.10.5
7.10.6	Magnetic Effects of Polygons with Infinite Strike Length (Using GRAVMAG)	478	7.10.6
7.11	Interpretation of Magnetic Data	482	
7.11.1	Disadvantages and Advantages	482	7.11.1
7.11.2	Quantitative Interpretation Techniques	484	7.11.2
7.11.3	Half-Maximum Techniques	484	7.11.3

7.6.2.2	Slope Methods	485	1.8.3
7.6.2.3	Computer Modeling	488	1.8.3
7.7	Applications of the Magnetic Method	488	E.B.3
7.7.1	Archaeological Surveys	488	1.8.3
7.7.2	Detection of Voids and Well Casings	490	1.8.3
7.7.3	Defining Landfill Geometry	493	1.8.3
	Problems	494	
	References Cited	496	
	Suggested Reading	497	

8	Electromagnetic Surveying	499	
8.1	Electromagnetic Waves	500	
8.1.1	Wavelengths	502	1.8.3
8.1.2	AC/DC	504	1.8.3
8.1.3	Electrical Properties of Geologic Materials	504	1.8.3
8.1.3.1	Electrical Resistivity and Conductivity	505	1.8.3
8.1.3.2	Dielectric Properties	505	1.8.3
8.1.4	Absorption and Attenuation	507	1.8.3
8.2	EM Sounding	509	
8.2.1	Near-Field Continuous-Wave Methods of Frequency Domain Electromagnetics (FDEM)	512	1.8.3
8.2.1.1	Moving Transmitter-Plus-Receiver System (Slingram)	512	1.8.3
8.2.1.2	Noncontacting Ground Conductivity Measurements	514	1.8.3
8.2.2	Other FDEM Systems	519	1.8.3
8.2.3	Time Domain Electromagnetics (TDEM)	519	1.8.3
8.3	EM Field Techniques	521	
8.3.1	Profiling versus Sounding	521	1.8.3
8.3.1.1	Sounding	521	1.8.3
8.3.1.2	Profiling	523	1.8.3
8.3.2	Interpretation	523	1.8.3
8.4	Ground-Penetrating Radar	524	
8.4.1	Radar Velocity	525	1.8.3
8.4.2	Data Acquisition	527	1.8.3
8.4.3	GPR Velocity Analysis	533	1.8.3
8.4.3.1	Burial of Known Object	533	1.8.3
8.4.3.2	Walkaway Test	533	1.8.3
8.4.3.3	Diffraction Hyperbola	537	1.8.3
8.5	Applications of Electromagnetic Surveying	539	
8.5.1	Archaeological Surveys	539	1.8.3
8.5.1.1	Aztec Ruins, New Mexico	539	1.8.3

E5.1.2	Ceren, El Salvador	541
E5.2	Geologic Applications	543
E5.3	Snow and Ice Mapping	546
E5.4	Environmental and Engineering Applications	546
	Problems	548
	References Cited	553
	Suggested Reading	554

Appendices

A	Instructions for Using REFRAC	A1
B	Instructions for Using REFLECT	A6
C	Instructions for Using RESIST	A13
D	Instructions for Using GRAVMAG	A17
E	Instructions for Using DIFFRACT	A24
	Appendix E contains material that is more advanced than the other appendices. It is directed at advanced undergraduate students and graduate students majoring in geophysics. However, this text also includes material that may be useful to intermediate students and students majoring in other disciplines such as earth science, environmental science, and engineering.	
	Index	A33

In addition to increasing interest in the shallow subsurface and the ability of geophysicists to conduct their own field experiments, we focus on methods that are relatively inexpensive and that are appropriate for the shallow target. Examples, illustrations, discussions, and problem sets all emphasize shallow exploration—so much so that this book is more typical geophysics text, which contains material directed primarily at depths greater than 1 km.

The organization of this book follows, in a general way, the relative utility of various geophysical methods for exploring the shallow subsurface. Seismic methods are discussed first. After a brief chapter devoted to the propagation of elastic waves, instrumentation, and so forth, we turn to seismic seismology because this still is the most common method used in shallow work. The longest chapter in the book concentrates on seismic methods. The use of this technique in shallow work is relatively well known, although applications are not covered in most existing texts. Other geophysical methods follow seismic methods because these often are used in conjunction with seismic work for investigations at shallow depths. These include gravity, magnetic, and electrical methods. Gravity and magnetic methods are especially useful in shallow work, having a large range of resolution and providing useful information; so applications to shallow as well as deep targets are compared, and contrasted. Magnetic surveys were introduced earlier in this book, so this is the least common method currently used for shallow work. It is used more often than for mineral exploration and locating buried iron and steel objects.

The last chapter of the book covers electromagnetic methods. These methods are based on the physical principles introduced in the seismic, electrical, and magnetic chapters. They are used for shallow work, but they are not as useful as seismic methods for shallow work.