

# Contents

<b>Introduction</b> .....	<b>1</b>
<b>1. Excitation of Microseisms and Infrasound Vibrations</b> .....	<b>5</b>
1.1 Formation of Microseisms from Sea Waves .....	5
1.1.1 Hydrodynamics .....	5
1.1.2 Pressure at the Bottom in the Case of Running Waves	7
1.1.3 Pressure at the Bottom in the Case of Standing Waves .....	8
1.2 SMS Excitation .....	10
1.2.1 Coherent Model .....	11
1.2.2 Noncoherent Model .....	11
1.3 Comparison of Existing Theories of SMS Excitation .....	13
1.4 Theories of SMS and Infrasound Generation by Standing Sea Waves .....	14
1.4.1 Theory of Miche and Longuet-Higgins .....	14
1.4.2 Hieblot and Rocard Theory on the Origin of SMS	16
1.4.3 Theory of Infrasound Radiation by Standing Sea Waves .....	18
1.5 Hasselman Theory .....	20
1.6 Nanda Theory of SMS Generation .....	23
1.7 Primary and Secondary Shore Microseisms .....	24
<b>2. Sources of Excitation of SMS and IS</b> .....	<b>27</b>
2.1 Observations on the Caspian Sea. Establishment of Fundamental Relations .....	28
2.2 Observations of SMS on Lake Baikal .....	37
2.3 Microseismic Storms on the Okhotsky Sea .....	38
2.4 Observations of Hydrometeorological Conditions and SMS on Oceans. Recording of Alternating Pressures on the Ocean Bottom .....	39
2.5 Recording Infrasound Vibrations in the Atmosphere and Microseisms .....	42
2.6 Observations on SMS in the Shore Zone and on the Ocean Bottom .....	43
2.7 Experimental Confirmation of the Theory of Standing Waves, MS and Infrasound .....	44

<b>3. Decomposition of MS Noise into Discrete Sources of MS Excitation</b>	45
3.1 Separation of MS Noise According to Frequency Synchronism	45
3.1.1 Examples	47
3.2 SMS Spectra	49
3.3 Separation of Seismic "Noise" into Components Arriving from Different Sources	52
3.3.1 Measurements	54
<b>4. Determination of Power, Energy and Positions of Sources of MS Excitation</b>	59
4.1 Source Position	59
4.1.1 The Amplitude Field	59
4.1.2 Amplitude Centroid Method	62
4.2 Source Power and Energy	65
4.2.1 Typical Source Strengths (Hydrodynamic Model)	66
4.2.2 Seismic Station Measurements of MS Excitation Sources	67
4.2.3 Calibration Curves	70
4.2.4 Estimates of the Power in Actual Cases	72
4.2.5 Comparison of MS Energy with Cyclone Energy	73
4.2.6 Method of Centroids in MS Source Position and Power Determination. An Example	74
4.3 Determination of Position and Power of MS Sources Using the Power Constant	77
4.3.1 Graphical Method	77
4.3.2 Cayley's Determinant	79
4.3.3 Method of Power Discrepancy	81
4.3.4 MS Sources in the Northern Atlantic and Northwestern Pacific	84
4.4 Shape and Size of MS Sources	87
<b>5. MS as an Indicator of Storm Phenomena, Water Wave Regimes, Infrasound Waves and Geometric Excitations</b>	93
5.1 Phenomena Which Arise with SMS	93
5.2 Formation of Standing Sea Waves and SMS	94
5.3 Influence of the Velocity of a Cyclone Center on MS Formation	95
5.4 Directionality of SMS and IS Radiation by an Array of Standing Sea Waves	100
5.5 Velocity of a Cyclone Center, SMS and Magnetic Storms	106
5.6 Perturbations in the Ionosphere and Fluctuations of the Geomagnetic Field	111
5.7 Geomagnetic Storms, Telluric Currents, Geomagnetic Micropulsations and SMS	113
5.7.1 Geomagnetic Storms and MS	113

5.7.2	SMS, Geomagnetic Micropulsations and Telluric Currents .....	116
5.8	Variations of Global MS Vibrations .....	118
5.9	Propagation of Radiowaves and MS Storms on Oceans ....	121
6.	<b>MS Vibrations in Engineering Seismology</b> .....	127
6.1	Use of MS in Estimating the Seismic Response of Soils. Electrodynamic Analogy .....	127
6.2	High Frequency MS .....	131
6.2.1	Spontaneous MS .....	131
6.2.2	Mechanical Vibrators .....	133
6.3	Low Frequency MS .....	135
6.4	Further Possible Applications of MS .....	138
	<b>References</b> .....	141
	<b>Subject Index</b> .....	149