

CONTENTS

Figures and Tables	222
I. Chapter I. Introduction to Military Oceanography	9
I.1. Branches of Oceanography	9
Generalities	9
Geological and Geophysical Oceanography	12
Physical Oceanography	13
Chemical Oceanography	13
Biological Oceanography	14
I.2. Oceanography History	15
General Overview	15
Pre-Hms Challenger Period	16
The Expedition Period	18
Postwar Period (After World War II)	19
I.3. Techniques Used in Oceanographic Studies	20
Generalities	20
Geological Oceanography	21
Physical Oceanography	21
Chemical Oceanography	22
Biological Oceanography	22
I.4. Marine Resources and Legislation	23
General Overview	23
Non-Biological Resources	23
Biological Resources	24
Marine Energy	25
Use of Ocean Space	26
Maritim Legislation	26
Chapter II. Dynamics of Marine Waters	28
II.1. The Tides Phenomenon - Tide Patterns	28
II.2. Tidel Theories and Tide Predicing Forces - Equilibrium Tidal Theory	31
II.3. Tidal Theories - Dynamic Tidal Analysis	35
II.4. The Tides Phenomenon - Dynamic Tidal Analysis – Progressive Wave Tides	37
II.5. The Tides Phenomenon - Dynamic Tidal Analysis – Standing Wave Tides	38
The Tides Phenomenon - Dynamic Tidal Analysis – Rotating Tidal Current	38
The Tides Phenomenon - Dynamic Tidal Analysis	39

The Tides Phenomenon - Tide Harmonic Analysis	40
The Tides Phenomenon - Tidal Current Tables	41
The Tides Phenomenon – Tide Measuring From Space	41
II.6. Waves, Ocean Currents Flow And Their Influence On Navigation...	42
Ocean Waves - Classification of the Waves.....	42
Ocean Waves - Elements of A Wave, Wave Motion and Speed.....	43
Ocean Waves - Deep-Water Waves	44
Ocean Waves – Storm Centers	45
Ocean Waves – Wave Dispersion	45
Ocean Waves – Wave Interaction	46
Ocean Waves – Wave Height.....	47
Ocean Waves – Wave Energy	47
Ocean Waves – Universal Sea State Code	48
Ocean Waves – Shallow-Water Waves.....	48
Ocean Waves – Wave Refraction.....	49
Ocean Waves – Wave Reflection.....	50
Ocean Waves – Wave Diffraction.....	51
Ocean Waves – Breakers.....	51
Ocean Waves – Rip Currents	52
Ocean Waves – Tsunami	53
Ocean Waves – Internal Waves.....	53
Ocean Waves – Standing Waves.....	54
II.7. Ocean Curenets.....	55
Ocean Curenets - Origin of Ocean Currents	55
Ocean Curenets – Classification	56
Ocean Curenets – Surface Currents and Gyres	57
Ocean Curenets – The Ekman Spiral and Ekman Transport.....	58
Ocean Curenets – Geostrophic Flow.....	59
General Ocean Current Circulation and Drift Currents.....	60
Ocean Curenets – Eddies	61
Ocean Curenets – Convergence and Divergence	61
Chapter III. Nato Metoc	62
III.1. Introductions.....	62
III.2. Meteorological & Ocenographic Services	64
III.3. Meteorological & Ocenographic Support	66
Chapter IV. Oceanography (Using Metoc Data in Route Planning)...	72
IV.1. Metoc Data in Route Planning.....	72
Project: <i>Optimization in Route Planning, Executing Navigational Watch in Safe Conditions and Ship Management in Order to Ensure A Good Seaworthiness of the Ship Use Metoc Information Coming from Decoding the Synoptic Maps</i>	104
Chapter V. Underwater Acustics.....	162

V.1 Basic Concepts	162
V.2. Speed of Sound in Sea Water	164
V.3. Sound Propagation in Water.....	167
Linear Propagation	169
Positive Refraction	170
Negative Refraction.....	171
Underwater Sound Chanel.....	172
Positive Refraction in the Upper Layer and Negative in the Lower Layer.....	173
V.4. Acoustic Parameters	175
Acoustic Attenuation	175
Speed of Sound in the Sea Water	175
Backscatter Coefficient	175
Lybin - Sonar Prediction Model	176
V.5. Sound of the Sea.....	178
V.6. Propagation Loss Mechanism	180
Absorption	181
Geometrical Spreading Loss	182
Dissipation.....	183
Reflection and Refraction.....	183
Chapter VI. Sonars	184
VI.1. Sonar Overview.....	184
VI.2. Sonar Principle.....	185
VI. 3. Active Sonar.....	188
VI.4. Passive Sonars.....	192
Chapter VII. Ocean Waves	193
VII.1. Generating And Restoring Force	193
VII.2. Elemets Of A Wave, Wave Motion And Speed	194
VII.3. Deep-Water Waves.....	196
VII.4. Shallow-Water Waves	205
VII. 5. Tsunami	212
VII.6. Internal Waves	214
VII.7. Standing Waves	215
Bliography	219