Basin Evolution and Petroleum Prospectivity of the Continental Margins of India

R. Bastia
Oil and Gas Consultant
Mulund (West)
Mumbai, India

M. Radhakrishna
Department of Earth Sciences
Indian Institute of Technology Bombay
Mumbai, India
Contents

1. Introduction

1.1 General Introduction 1
1.2 Breakup of Continents and Development of Ocean Basins and Margins 2
1.3 Continental Margins—Types, Characteristics, and Processes 9
1.4 The Indian Continental Margin 12
1.5 Growing Energy Requirement 16
1.6 Petroleum Exploration Scenario in India 17
1.7 Challenges and Technological Advances 19
1.8 Scope of the Present Book 20

2. Reconstruction of Eastern Gondwanaland Breakup and Evolution of the Passive Continental Margin of India 23

2.1 Introduction 23
2.2 Present day Plate Geometry and Morphology of the Indian Ocean 25
2.3 Evolution of the Indian Ocean: Geological and Geophysical Constraints 28
2.4 Tectonic Reconstruction and Development of Indian Continental Margins 43

3. Regional Tectonic Framework and Crustal Structure 57

3.1 Introduction 57
3.2 Regional Geological Setting 58
3.3 Bathymetry and Gravity Anomalies in the Indian Offshore and Contiguous Areas 58
3.4 Structure and Tectonics of the Western Offshore 63
3.5 Structure and Tectonics of the Eastern Offshore 88

4. Sedimentation History and Development of Fan System Along the Continental Margins of India 127

4.1 Introduction 127
4.2 Himalayan Orogeny and Submarine Fan System in the Indian Ocean 128
4.3 Indus Fan 131
4.4 Bengal Fan 142

5.1 Introduction 161
5.2 Regional Geological Setting of the East Coast Basins 161
5.3 Basin-Wise Analysis of Hydrocarbon Potential 164

6. Subsurface Geology, Depositional History, and Petroleum Systems Along the Western Offshore Basins of India

6.1 Introduction 269
6.2 Regional Geological Setting of the West Coast Basins 270
6.3 Basin-Wise Analysis of Hydrocarbon Potential 277

7. Exploration in the Indian Offshore Basins—Some Challenging Issues Related to Imaging and Drilling

7.1 Summary of Structural and Petroleum Setup of Indian Offshore Basins 319
7.2 Offshore Exploration in India—Challenges and Technological Advancements 322
7.3 Drilling Hazards in the Indian Offshore—Challenges and Mitigation 339

8. Summary

8.1 Petroleum Systems in the Indian Offshore Basins 362

References 369
Subject Index 409