

Preface

Listening in the ocean is not as novel as many scientists and the general public may believe. The US Navy began installing listening stations with limited objectives in the ocean in the early 1950s. The then highly secret Navy's Sound Surveillance System (SOSUS) consisting of arrays of bottom-mounted hydrophones was created to detect, localize, and track Soviet submarines during the cold war. In 1993 the Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO) was created and a plan was developed to have 11 hydroacoustic stations with bottom-mounted sensors to detect seismic and acoustic waves from nuclear detonation any place in the world. These hydrophones cabled to shore stations have been located in remote locations around the world since 1997. Many current passive acoustic monitoring tools evolved from the work of geophysicists who used long-term monitoring system of bottom-mounted low-frequency seismic sensors. They were able to detect blue and fin whales that emitted very low-frequency sounds between 10 and 20 Hz. The work of these geophysicists led directly to the creation of a variety of passive acoustic monitoring systems that can detect underwater acoustic signals from the infrasonic to ultrasonic range.

Today we know that the ocean is far from a silent world. Thanks to the ever-increasing technological tools available to marine scientists, we know that the ocean is filled with sounds produced by a wide array of biotic, abiotic, and anthropogenic sources. Marine mammals are of course well-known contributors to oceanic soundscapes, but so are many species of fish and invertebrates, as are wind, waves, rain, ice, eruptions, and earthquakes. It is increasingly clear that sound is fundamental to many biological processes in the sea, including communication, sensing, navigation, and orientation. So it is against this backdrop of realization that we have begun to consider the role of another source of sound: the rapidly increasing levels of human generated noise in the ocean.

We are still only at the beginning of our efforts to understand how all the contributors to marine soundscapes interact and ultimately affect life in the ocean, but we have made considerable progress worth noting and discussing. The convergence of new knowledge, new technology, and an increasing concern for marine habitats led to an unprecedented rise in interest in listening to the sea over the past decade.

As it became clear how important sounds are in the marine environment, scientists and engineers began intensive efforts to develop new tools and to record marine habitats throughout the world. In this book we have collected the experiences of several of the researchers who pioneered this recent revolution in marine acoustic investigation. We are well aware that the number of contributions and contributors to this field of research is increasing almost daily, so this book will eventually only be a reference point of where the state of the art stood during the middle part of this decade. A similar volume will undoubtedly be necessary only a few years from now. However, for the time being, we believe that the findings and experiences described here represent the cutting edge of the science as it stands today and we hope that you will ultimately agree that sometimes the best way to learn is to listen.

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Listening in the Ocean

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2016, VIII, 416 p. 210 illus., 89 illus. in color., Hardcover

ISBN: 978-1-4939-3175-0