

# Preface

The science of sonar performance modeling is traditionally separated into a “wet end” comprising the disciplines of acoustics and oceanography and a “dry end” of signal processing and detection theory. This book is my attempt to bring both aspects together to serve as a modern reference for today’s sonar performance modeler, whether for research, design, or analysis, as Urlick’s *Principles of Underwater Sound* did for sonar engineers of his day. The similarity in the title is no accident.

During the process I made some valuable discoveries that I now share with the reader. The radar literature provides a deep mine of resources, with applicable results from the theories of wave propagation, signal processing, and (an especially rich vein, largely unexploited in the sonar literature) statistical detection. From oceanography we learn that each of the world’s oceans has its own unique physical, chemical, and biological signature, with sometimes profound consequences for sonar.

Marine mammals have evolved a sonar of their own, the remarkable properties of which we are only beginning to unravel, as reported in the increasingly sophisticated bioacoustics literature. Governments and industry around the world have begun to take seriously the environmental consequences of man’s use, whether deliberate or incidental, of sound in the sea. I have done my best to provide a representative snapshot of this rapidly developing field.

Some readers will treat this book as a repository of facts, figures, and formulas, while others will seek in it explanations and clarity. It has been my intention to satisfy the needs of both types of reader by including mathematical derivations and worked examples, supplemented with measurements or estimates of relevant input parameters. Of all readers I request the patience to overlook the flaws that undoubtedly remain, despite my best attempts to weed them out.

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