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## PREFACE

Turbulent gas transfer across air–water interfaces usually occurs in geophysical flows such as oceans, lakes, rivers, and estuaries. An accurate estimation of the gas transfer rate has long attracted special interest due to its usefulness in quantifying/better understanding environmental problems (e. g., global climate change) related to the exchange gases, especially carbon dioxide ( $\text{CO}_2$ ), between the atmosphere and ocean. Gas (scalar or mass) transfer is also used as a separation technology in many industrial processes, including gas absorption, evaporation and condensation. The transfer mechanism is affected not only by interfacial turbulence above and below the surface but also by bubbles due to breaking waves, surfactants, rainfall and other surface processes. Therefore, it is of great interest to investigate gas transfer mechanisms across air–water interfaces for innovations, advancements, and improved understanding of geophysical and environmental problems. An understanding of air–water gas exchange is also necessary for studying eutrophication of lakes, rivers, and coastal waters and for designing and controlling industrial gas-liquid contact type equipment.

The International Symposium on Gas Transfer at Water Surfaces (GTWS), which was first held in 1983 and has met approximately every five years thereafter, has provided scientists and engineers with an opportunity to present recent advances, discuss current problems, and explore future prospects in research and technology in the area of gas transfer across air–water interfaces and interfacial turbulence. This symposium is held in high regard because it is the traditional forum for scientist all over the world to share their expertise on the subject of gas transfer including heat transfer and fluid mechanics at air–water interfaces.

In 1983, the first symposium (GTWS-1) was held at Cornell University in Ithaca, New York, USA and numerous papers dealing with the fundamental mechanisms of interfacial gas transfer were presented there. GTWS-1 attracted a wide range of researchers devoted to the study of the natural environment as well as engineers concerned mainly with the industrial problem of mass transfer between liquids and gases.

In 1990, GTWS-2 was held at the University of Minnesota in Minneapolis, Minnesota, USA. At the second symposium, fundamental mechanisms in liquid–gas exchange processes were highlighted. Various applications of gas transfer to



Section 7	Advanced Measuring Techniques
Section 8	Environmental Problems Related to Air–Water Scalar Transfer

A year after this volume's publication, the papers in this volume will be archived in the Kyoto University Research Information Repository: <http://repository.kulib.kyoto-u.ac.jp/dspace/?locale=en>.

We wish to acknowledge the considerable efforts of the Organizing, Executive and Scientific Advisory Committee members in coordinating the meeting and making the 6th International Symposium on Gas Transfer at Water Surfaces interesting, informative, and memorable. The Organizing Committee includes: S. Komori, Kyoto University, Japan (Chair); W. R. McGillis, University Columbia, USA (Co-Chair); T. Kunugi, Kyoto University, Japan (Local Co-Chair); W. E. Asher, University of Washington, USA; S. Banerjee, City College of New York, USA; J. S. Gulliver, University of Minnesota, USA; B. Jähne, University of Heidelberg, Germany; P. S. Liss, University of East Anglia, UK; and R. Wanninkhof, AOML/NOAA, USA.

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We are enthusiastic about the 7th International Symposium on Gas Transfer at Water Surfaces (GTWS-7) planned to be held in Seattle, Washington USA in 2015. GTWS-7 will be chaired by Dr. Andrew Jessup from the Applied Physics Laboratory (APL) at the University of Washington. We look forward to the progress that will be made and the innovations and results that will be presented there.

See you in Seattle in 2015.

March 2011, Satoru Komori  
Wade McGillis  
Ryoichi Kurose