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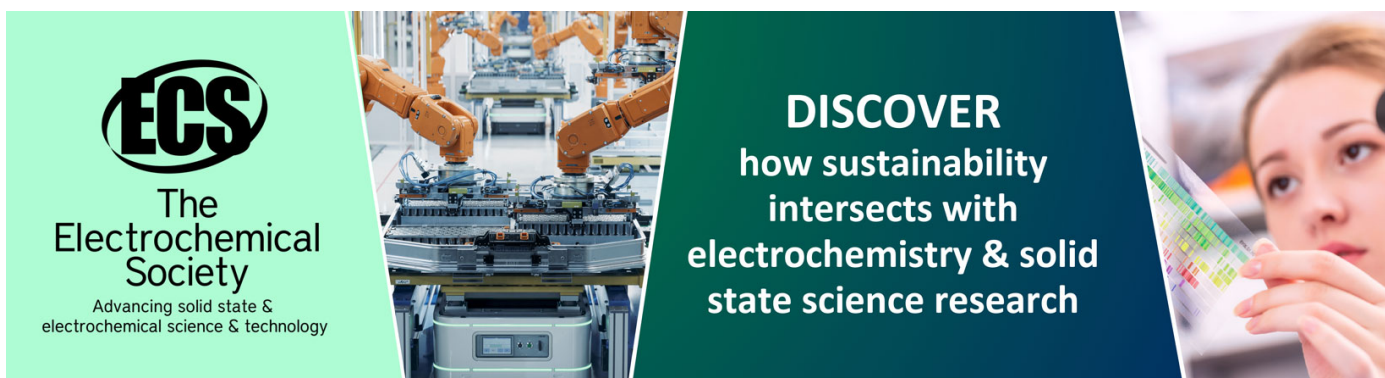
7th International Symposium on Gas Transfer at Water Surfaces

To cite this article: Andrew T. Jessup and William E. Asher 2016 *IOP Conf. Ser.: Earth Environ. Sci.*
35 011001

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PREFACE

The 7th International Symposium on Gas Transfer at Water Surfaces was held 18–21 May 2015 in Seattle, Washington. These symposia, which have occurred approximately every five years since 1983, bring together the international scientific and engineering community investigating the mechanisms, parameterizations, and applications of gas transfer at water surfaces. The focus in part is on the physical processes that govern the gas flux, which include air entrainment (by breaking waves, flow over hydraulic structures, or direct injection), turbulence (generated by mechanical agitation, wind, wave breaking, rainfall, or currents), and the effect of natural and synthetic surfactants. Of equal importance to the treatment of the forcing mechanisms are the discussions on how to model or parameterize air-water gas transfer relevant to biogeochemical cycling on global, regional, and local scales. Furthermore, because the mechanisms controlling the gas flux also govern the air-sea flux of heat and momentum, the conference is attended by many studying a wide range of air- and water-side mixing processes that occur at or near the ocean surface. This provides opportunities for cross-fertilization of ideas between the classical air-sea interaction community and those focused on biogeochemical cycling.

The first symposium was held at Cornell University, Ithaca, New York in 1983 [1]. The second symposium took place in Minneapolis in 1990 [2] and the third symposium was held at the University of Heidelberg in Heidelberg, Germany in 1995 [3]. The fourth symposium took place in Miami in 2000 [4] and the fifth symposium was held in Liège, Belgium in 2005 in conjunction with the 37th International Liège Colloquium on Ocean Dynamics [5]. The sixth symposium was held in Kyoto, Japan in 2010 [6].

Gas transfer at air-water interfaces encompasses a wide variety of research, including fundamental fluid dynamics, biogeochemistry, and oceanography across a range of spatial and temporal scales. For example, the exchange of greenhouse gases between the atmosphere and natural bodies of water is critical to characterize and quantify global climate change. The establishment of a regular series of international symposia with a periodicity of five years was motivated by the increasing societal interest in the consequences of gas transfer at air-water interfaces, the size and productivity of the research community, and the wide geographic distribution of active researchers. The symposium has established a reputation as an important and influential venue for presenting and disseminating research progress to the community. The five-year period between gatherings ensures that significant progress since the last occurrence will be reported.

The research problems involve extremely challenging and complex issues associated with turbulent flow over a wide range of spatial and temporal scales that include the effects of wind and currents, breaking waves, rainfall, and two-phase flow effects due to the presence of bubbles generated by breaking waves and raindrops. The complexity is increased by the occurrence of both natural and anthropogenic surface films, which can modify the chemical and physical characteristics of the interface. The challenge of understanding gas transfer and the effect of gas exchange on biogeochemistry has led to the need for multidisciplinary, collaborative efforts and the development of a wide variety of innovative observational and experimental techniques. As many dedicated past attendees can attest, the symposia have fostered productive and long-lasting collaborations that have made new and pivotal contributions over the past three decades.



The objectives of the meeting were:

- to provide a balanced view of state-of-the-art research to understand, quantify, and parameterize gas transfer at water surfaces by disseminating and evaluating progress since the 2010 meeting
- to determine how best to use these new results to better understand and parameterize biogeochemical cycling over global, regional, and local scales
- to foster multidisciplinary interaction and collaboration within the gas transfer community

The topics covered by previous symposia encompass field, laboratory, and modeling investigations of the physics governing air-water transfer, development and testing of parameterizations for use in global climate models, remote sensing techniques, and assessment of the global distribution of air-sea flux of CO₂ and other radiatively important trace gases. In addition to these core topics, the 2015 symposium included the topics of ocean acidification due to increased CO₂ uptake, the impact of reduced sea ice extent on gas transfer in high-latitude regions, and studies in coastal regions, rivers, and lakes. The Seattle meeting was attended by 108 participants from North America, Asia, and Europe, with over 100 oral and poster presentations. The papers in this volume provide a sampling of the wide variety of field, laboratory, and modeling research results presented at the meeting.

We gratefully acknowledge the contributions of the local organizing and scientific committees in coordinating the meeting, providing guidance, and assisting in the review process for the papers in this volume.

Local Organizing Committee: A. Jessup (Chair), W. Asher, (co-Chair), E. D'Asaro, A. Horner-Devine, C. McNeil, S. Mecking, and A. Schweiger, University of Washington, USA.

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The symposium would not have been possible without the generous contributions of our sponsors. We gratefully acknowledge support from the Applied Physics Laboratory and the Department of Civil and Environmental Engineering at the University of Washington, the National Aeronautics and Space Administration, the National Science Foundation, Ocean Carbon and Biogeochemistry, and US CLIVAR.

We are grateful for the assistance in organizing the meeting from Syd Fredrickson of the University of Washington Conference Management and in preparing this volume from Lisa Day-Mercer and Brian Rasmussen from the Applied Physics Laboratory, University of Washington.

This volume is dedicated to the memory of Sergei A. Kitaigorodskii and Edgar L. Andreas. Both of these dedicated scientists participated in several of the symposia and made unique and lasting contributions to the field of gas transfer, as noted in the tributes that follow.

We look forward to the 8th International Symposium on Gas Transfer at Water Surfaces, which will be hosted by Drs. Jamie Shutler of the University of Exeter and Phil Nightingale of the Plymouth Marine Laboratory.

Andrew T. Jessup
William E. Asher

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