About Don L. Boyer

Don Lamar Boyer, a pioneer of physical modeling of rotating and stratified topographic flows, passed away in Las Vegas, Nevada on June 19, 2020. A visionary in and champion for geophysical and environmental fluid dynamics research, a dedicated mentor and a skilled administrator, he played an influential leadership role in the evolution of laboratory-based research in environmental flows.

Endowed Annual Lecture

In his honor, the Don L. Boyer Memorial Endowment for Excellence in Environmental Fluid Dynamics has been created to support groundbreaking, crucial lectures in the important fields of environmental prediction, risks, and sustainability. These lectures, emphasizing the fundamental dynamics of environmental flows in the spirit of the research of Don L. Boyer, will enliven the conversation around these topics in the college and beyond. This lecture will be supported annually in perpetuity by the fund.

The endowment was established by an initial gift from Dr. Dustin Boyer, Don's son. Donations to the fund can be made at giveto.nd.edu.

https://efmlab.nd.edu/don-l-boyer-memorial-endowment/

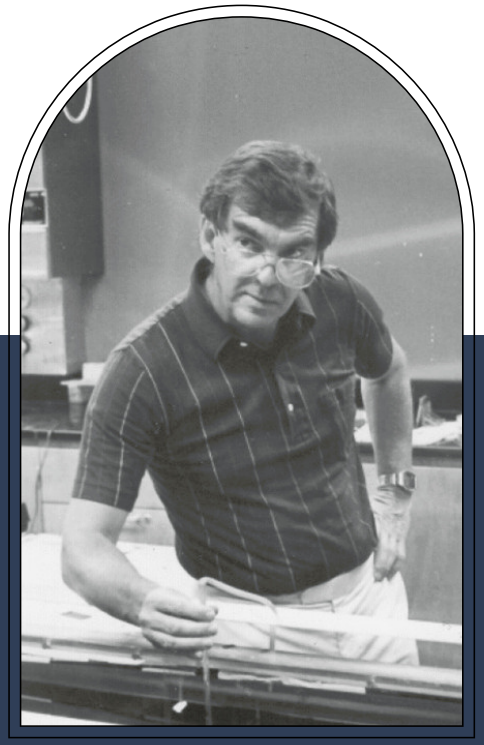
ENGINEERING AT NOTRE DAME

Engineering at Notre Dame combines technical inquiry with a creative bent to develop innovations that can improve the health, well-being, and quality of life for all persons. Consistent with the University's Catholic mission and heritage, the College of Engineering's mission is founded on the principle that the creation and transfer of fundamental knowledge should reflect a profound and complete respect for the dignity of all persons and for the greater common good of humanity. The Don L. Boyer Memorial Endowment supports faculty, students, and the scientific community at large in the pursuit of achieving the educational mission and outreach of the University.

UNIVERSITY OF NOTRE DAME

DON L. BOYER DISTINGUISHED LECTURE

in Environmental Fluid Mechanics



Tuesday, March 29, 2022

Lecture 11:00 am - 12:00 pm

Lunch Reception 12:00 pm - 1:00 pm

Eck Visitors Center Auditorium

Dr. Joël Sommeria

Research Director,
Laboratoire des Écoulements Géophysiques et Industriels,
Centre National de la Recherche Scientifique,
Université Grenoble Alpes

BIOGRAPHY

Dr. Sommeria, a physicist by training, is a research director at the Centre National de la Recherche Scientifique (CNRS), where he has spent his entire career. He obtained a PhD from the University of Grenoble in 1985 on magneto-hydrodynamic turbulence and its links with two-dimensional turbulence. He then turned his attention to the process of self-organization of turbulence. He explained the formation of large atmospheric vortices such as the Great Red Spot of Jupiter by the statistical mechanics of vorticity, and reproduced this phenomenon in the laboratory at the University of Texas at Austin. He proposed that similar vortices initiate the formation of planets in the proto-planetary nebula. Since 2000, he has been in charge of the large "Coriolis" rotating platform in Grenoble, which reproduces the dynamics of atmospheric or oceanic flows. This instrument belongs to the LEGI (Laboratoire des Écoulements Géophysiques et Industriels). Since 2019, Joël Sommeria is the director of this laboratory. He is also the editorial head of two online publications, Encyclopedia of the Environment and Encyclopedia of Energy.

Orographic Wakes in Experiments of Rotating and Stratified Flows

ABSTRACT

Orographic wakes have important effects in the atmosphere and oceans as a source of waves and vortices. The induced drag forces influence the atmospheric winds and oceanic currents, Some of the largest and most persistent circulation errors in global numerical weather prediction and climate models are still attributable to the inadequate representation of this topographic drag. In oceanic canyons, wake effects lead to vertical mixing and upwelling. Orographic effects are also expected to play an important role at the outer boundary of planetary liquid cores, with influence on the magnetic field generation. Following a review paper by Boyer and Davies (Annu. Rev. Fluid Mechanics 2000), we here illustrate key processes involved using laboratory experiments performed in the large ‘Coriolis’ rotating platform of Grenoble. While small scale topography can be viewed as ‘roughness’ in a turbulent Ekman boundary layer, a wide variety of flow phenomena is obtained for larger topographies. Those depend on the internal Froude number (characterising density stratification) and Rossby number (characterising Coriolis effects). The influence of the topographic shape will be also discussed.