Preface

Coherent vortex structures are common features of quasi-geostrophic or two-dimensional turbulence. In the oceans and in the planetary atmospheres, vortices are abundant: the high and low-pressure areas on weather maps are in fact huge vortices embedded in the global zonal atmospheric currents, and satellite observations have revealed the occurrence of large- and mesoscale vortices in virtually all parts of the world's oceans. Because of their relative longevity it is obvious that these vortex structures play an important role in the transport of physical properties such as mass, momentum and heat (and in the ocean also salt and biochemical components). For this reason the dynamics of geophysical vortices have attracted the attention of an increasing number of meteorologists and physical oceanographers during the last two decades or so.

Under typical atmospheric and oceanic conditions the quasi two-dimensionality of the motion on the larger scales is governed by the planetary rotation and/or the density stratification and, in addition, by dynamical constraints imposed by the 'flatness' of the domain itself. Two-dimensionality of motion can also be established in other ways, for example by external magnetic forces or by simply enclosing the fluid in an essentially two-dimensional domain. Such situations are encountered in magneto-hydrodynamic flows, in certain plasma configurations (tokamaks), in accretion disks of neutron stars, and also in soap films. Therefore, studying the dynamics of coherent vortex structures is not only relevant to geophysical fluid dynamics, but also to other fields of physics, such as plasma physics and astrophysics.

In 1983 Prof. Benoit Cushman-Roisin took the initiative to organize a colloquium on 'Modelling of Oceanic Vortices' at the Florida State University, Tallahassee (USA). The purpose of this meeting was to bring together the various scientists involved in modelling and observational studies of oceanic vortices in order to discuss and summarize recent developments and to exchange ideas for future work. The meeting appeared to fill a gap, and was followed by similar colloquia in 1985, 1987, 1988 and 1990, the latter two at the University of Liège (Belgium) and at Dartmouth College, Hannover (USA), respectively. Through the years the number of participants from outside the USA, in particular from Europe, steadily increased and it seemed appropriate to organize the next colloquium in the series again somewhere on the 'other' side of the Atlantic Ocean. On 11-13 May 1993, under the auspices of the Royal Netherlands Academy of

Arts and Sciences, the sixth colloquium on 'Modelling of Oceanic Vortices' was held in Amsterdam, in the Academy building. This time the meeting was organized by a committee consisting of Benoit Cushman-Roisin (Dartmouth College, USA), David G. Dritschel (University of Cambridge, UK), GertJan F. van Heijst (Eindhoven University of Technology, The Netherlands) and Gordon E. Swaters (University of Alberta, Canada), and gathered over 50 mainly North-American and European participants with backgrounds in physical oceanography, dynamical meteorology, plasma physics and theoretical physics.

This book contains a collection of extended abstracts of most of the presentations at the Amsterdam colloquium. At the present stage of research on oceanic vortices, efforts seem equally divided between the general study of the behaviour of vortices *per se* (*e.g.*, stability, interaction, merger), on one hand, and the investigation of their role in the overall chain of oceanic processes (*e.g.*, geostrophic turbulence, oceanic circulation), on the other. These two lines of research are reflected in the oral and poster presentations at the colloquium. It is hoped that this collection of contributions may serve as a useful description of the state-of-the-art, not only for physical oceanographers, but for anybody interested in coherent vortex structures.

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