Jets and Annular Structures in Geophysical Fluids (Jets)

Zonal jets emerge spontaneously, remarkably, and almost magically, from turbulence in the atmospheres and oceans on rotating planets. In January of 2006, several dozen atmospheric scientists, planetary and stellar scientists, oceanographers, and applied mathematicians gathered among the historic lanes of Savannah, Georgia, to share our wonder at the remarkable phenomena of jets and zonal structures. The event was the Chapman Conference on Jets and Annular Structures in Geophysical Fluids, sponsored by the American Geophysical Union, and generously cosponsored by the National Science Foundation and the Kyoto University Active Geosphere Investigations for the 21st Century (KAGI21) Program. We came to Savannah in the hope that by comparing and discussing seemingly similar fluid behaviors as they appear in very different contexts we would take a step towards a deeper understanding and better predictions of these phenomena. This special issue is a product of that effort. It is for the reader to decide if or how well we succeeded.

This special collection of the Journal of the Atmospheric Sciences is composed of twenty-seven papers developed from presentations at our conference. The papers are diverse: topics range from laboratory simulations relevant to jets on the gas giant planets, to detailed analyses of the observed variability of Earth’s polar vortex, and to numerical and theoretical models of widely varying structures and complexity. There are some very practical reasons for understanding jets and annular flows: such flows may provide a modest extension in the predictability of the atmosphere, and changes in annular flows
are prominent in how models of Earth’s atmosphere respond to global warming. Beyond such practical considerations, however, what comes across most in these papers is the fascination with these fluid phenomena and an aesthetic appreciation for the beauty and emergent order of these flows.

Prof. Shigeo Yoden of Kyoto University co-convened the Conference; he hosted the meeting website and served as lead advisor of this special issue. Neither the Conference nor this issue would have been possible without his hard work and superb judgment. The Conference organizing committee served as issue advisors: Dr. Michael Allison, Dr. Mark Baldwin, Prof. Yoshi-Yuki Hayashi, Prof. Peter Haynes, Dr. Huei-Ping Huang, Prof. Peter Rhines, Prof. David Thompson, and Prof. Geoffrey Vallis. Their valuable assistance is gratefully acknowledged. Thanks are due also to Ms. Marlie Brill, the meeting manager for the American Geophysical Union and especially to Ms. Karen Garrelts, the tireless editorial assistant for this special collection. Three more people merit acknowledgement: Mr. Michael Amburgey and Mr. Bobby Hanson, two fine bluesmen who entertained us on the final night of our meeting, and Prof. Michael McIntyre, ex officio member of the band and an indispensable participant in our Conference.

Walter Robinson,
JAS Editor
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Special Collection in the Journal of the Atmospheric Sciences

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