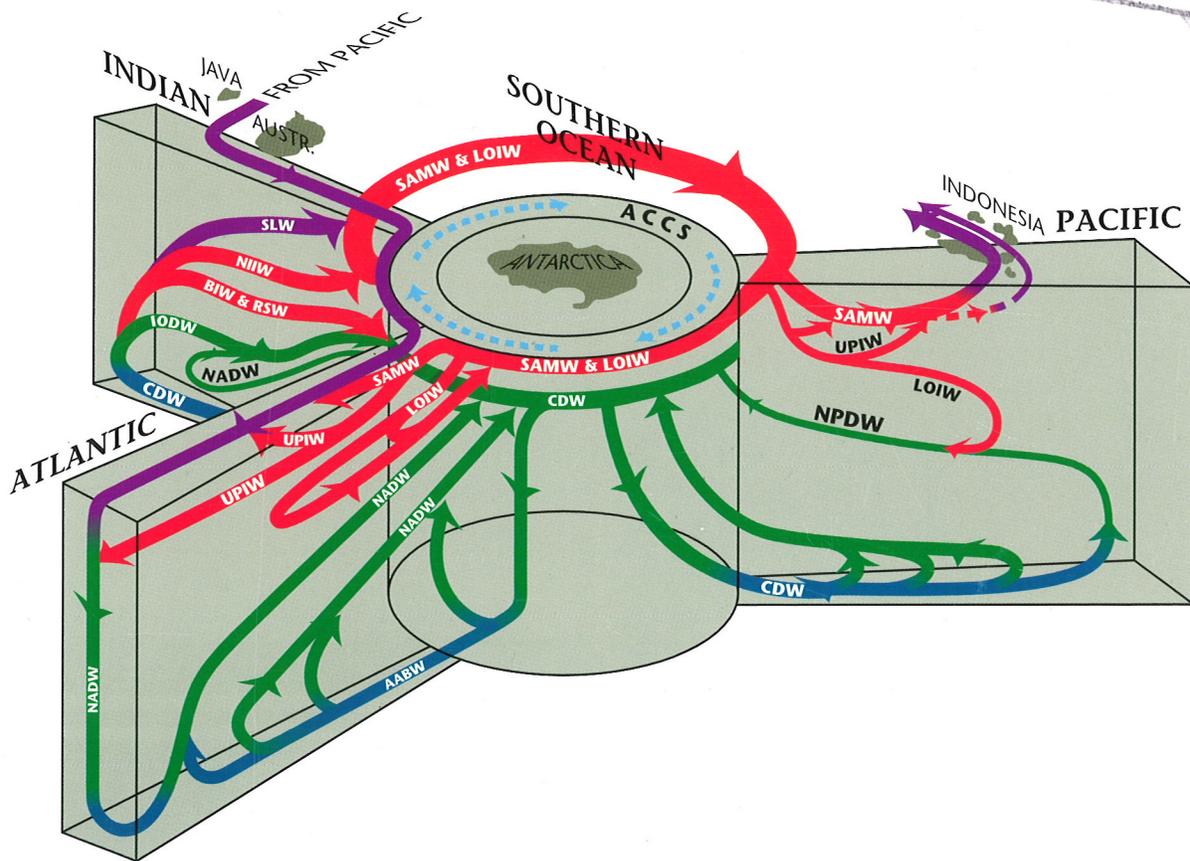
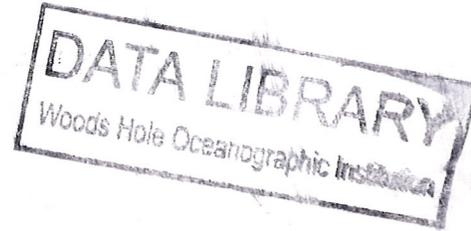


# On the World Ocean Circulation: Volume II

## The Pacific and Indian Oceans / A Global Update

by

William J. Schmitz, Jr.



December 1996

Woods Hole Oceanographic Institution

Technical Report

WHOI-96-08

Funding was provided by the Office of Naval Research, Grant Nos. N00014-89-J-1039 and N00014-95-1-0356, and the Clark Foundation.

Approved for public release; distribution unlimited.

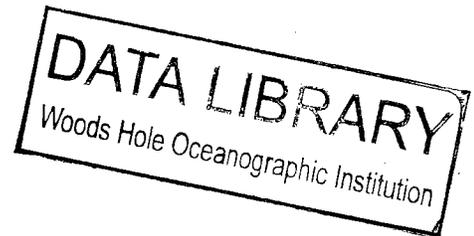
WHOI-96-08

**On the World Ocean Circulation: Volume II**  
**The Pacific and Indian Oceans / A Global Update**

by

**William J. Schmitz, Jr.**

Woods Hole Oceanographic Institution  
Woods Hole, Massachusetts 02543



December 1996

**Technical Report**

Funding was provided by the Office of Naval Research, Grant Nos. N00014-89-J-1039 and N00014-95-1-0356, and the Clark Foundation.

Reproduction in whole or in part is permitted for any purpose of the United States Government. This report should be cited as Wood Hole Oceanog. Inst. Tech. Rept., WHOI-96-08.

Approved for public release; distribution unlimited.

**Approved for Distribution:**

**Philip L. Richardson, Chair**  
Department of Physical Oceanography

**Front Cover Figure Caption:** A three-dimensional interbasin flow schematic with “typical” meridional–vertical sections for the indicated oceans, and their horizontal connections in the Southern Ocean and the Indonesian Passages. The surface layer circulations are in purple, intermediate and SAMW are in red, deep in green, and near bottom in blue. Also shown as Figure II-8 (page 22).

<b>SLW</b>	Surface Layer Water
<b>SAMW</b>	Subantarctic Mode Water
<b>RSW</b>	Red Sea Water
<b>AABW</b>	Antarctic Bottom Water
<b>NPDW</b>	North Pacific Deep Water
<b>ACCS</b>	Antarctic Circumpolar Current System
<b>CDW</b>	Circumpolar Deep Water
<b>NADW</b>	North Atlantic Deep Water
<b>UPIW</b>	Upper Intermediate Water, $26.8 \leq \sigma_{\theta} \leq 27.2$
<b>LOIW</b>	Lower Intermediate Water, $27.2 \leq \sigma_{\theta} \leq 27.5$
<b>IODW</b>	Indian Ocean Deep Water
<b>BIW</b>	Banda Intermediate Water
<b>NIIW</b>	Northwest Indian Intermediate Water

## Contents

Abstract .....	iv
1. Introduction .....	1
2. The Pacific Ocean.....	36
2a. The Upper Level Subtropical and Subpolar Gyres in the North Pacific .....	52
2b. The Upper Level Subtropical Gyre in the South Pacific .....	64
2c. The Low-Latitude Upper Layer Circulation.....	70
2d. Intermediate Water.....	75
2e. The Deep and Near-Bottom Circulation .....	81
2f. The Large-Scale Meridional Cell in the Pacific Ocean.....	87
2g. The Mesoscale Eddy Field.....	93
3. The Indian Ocean .....	101
3a. Short Notes on the Upper-Layer Subtropical Gyre in the South Indian Ocean .....	111
3b. The Indonesian Throughflow .....	113
3c. The Deep and Near-Bottom Circulation of the Indian Ocean .....	122
3d. Intermediate Water.....	129
3e. The Large-Scale Meridional Cell in the Indian Ocean .....	151
3f. Incredibly Brief Remarks on the Upper-Layer North and Low-Latitude Indian Ocean .....	154
3g. The Mesoscale Eddy Field in the Agulhas Retroflexion, and Globally .....	156
4. The Southern Ocean(s) .....	165
4a. A Few Comments on the South Atlantic Ocean .....	167
4b. Brief Remarks on the Antarctic Circumpolar Current System (ACCS).....	178
5. A Summary of the Global Interbasin Exchange Picture .....	186
6. Discussion, Conclusions and Gazing Ahead .....	201
Acknowledgements .....	203
References .....	204
Appendix A: Curriculum Vitae .....	229
Appendix B: Navy Medal Citations .....	230
Appendix C: Summary Cartoons .....	233
Appendix D: List of Abbreviations and Symbols .....	235

