

### 3 On the Mid-Depth Circulation of the World Ocean *Joseph L .Reid* 70

3.1	Introduction	70
3.2	The Circulation of the Upper Waters and Their Contribution to the Mid-Depths	70
3.3	The Use of Geostrophy	72
3.4	The Mid-Depth Circulation of the Atlantic Ocean from Core Analysis and Vertical Geostrophic Shear	74
3.5	Studies of Total Transport and Layers	79
3.6	Mid-Depth Studies Using Isopycnal Analysis	81
3.7	Comparison of Relative Geostrophic Flow at Mid-Depth with Numerical Models of Transport	85
3.8	Mid-Depth Patterns in the World Ocean	91
3.9	Comparison of the Maps of Shear Field and Characteristics	109
3.10	Conclusion	110

### 4 The Gulf Stream System *N. P. Fofonoff* 112

4.1	Introduction	112
4.2	The Gulf Stream System	113
4.3	The Florida Current	113
4.4	The Gulf Stream	123
4.5	The North Atlantic Current	133
4.6	Summary and Conclusions	137

### 5 Dynamics of Large-Scale Ocean Circulation *George Veronis* 140

5.1	Introduction and Summary	140
5.2	The Equations for Large-Scale Dynamics	142
5.3	The Quasi-Geostrophic Equations and the $\beta$ -Plane	144
5.4	Ekman Layers	147
5.5	Steady Linear Models of the Wind-Driven Circulation	149
5.6	Preliminary Nonlinear Considerations	153
5.7	Why Does the Gulf Stream Leave the Coast?	157
5.8	Thermohaline Circulation	158