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海洋的比熵和等熵分析

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摘要 基于海水热力学局域平衡的假定及Feistel(2003, 2005)给出的海水Gibbs热力学势函数表达式，利用全球海洋观测数据，计算了全球海洋网格域的比熵、位温、位密等热力学参数，分析了海水比熵的时-空分布格局及其与位温、位密以及中性面之间的关系。分析结果表明，海洋中的比熵与位温之间具有确定的解析关系，而海洋中的比熵与位密、中性面之间的分布则无明显的一致性；这一结论为文章进一步导出海洋内部近似稳态大尺度地转流涡在等熵面上的流函数，证明等熵面与等密面的交线即物理海洋学上经典的"动力计算方法"中的Montgomery流函数，进而为海洋内部的准地转运动的等熵-等密分析提供了新的热力-动力学依据。

关键词： 海水 比熵 地转流 等熵分析

Abstract： Several improvements have been made recently to deal with the thermodynamic properties of seawater and a self-consistent expression for Gibbs potential functions was proposed by Feistel (2003, 2005). Based on this expression and hydrographic datasets, specific entropy, potential density, and potential temperature are calculated and analyzed. It is shown that there exists a significantly high correlation between specific entropy and potential temperature, while the distribution of entropy is not identical to that of potential density or neutral density in the ocean. In addition, a geostrophic streamfunction on isentropic surface is deducted, and the result shows that there exists Montgomery streamfunction on the isentropic surface and the geostrophic flow moves isentropically and isopycnally in order to keep its motion occur without change in the density and entropy of the water mass.

Keywords： seawater, specific entropy;geostrophic flow;isentropic analysis

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