

层结稳定性“豁口”与北太平洋副热带中部模态水形成机制

潘爱军^{1,2}, 刘秦玉¹, 刘征宇^{3,1}

1 中国海洋大学物理海洋教育部重点实验室, 青岛 266003; 2 国家海洋局第三海洋研究所环境动力室, 厦门 361005; 3 Center for Climate Research, University of Wisconsin Madison, WI 537061695 USA

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摘要 本文首先指出北太平洋副热带中部模态水(简称中部模态水)的形成具有显著的“局地”特征, 其形成海区在(165°E~160°W, 38°N~42°N)区间. 海气通量分析表明单纯的外部大气强迫场(太阳短波辐射、净热通量和风应力旋度)不能解释中部模态水形成海区的“局地”性; 进一步对上层海洋层结季节变化特征的分析发现秋季(9~10月)在北太平洋中部上层海洋(<75 m)(165°E~160°W, 38°N~42°N)区间存在特殊的浮力频率低值区——层结稳定性“豁口”. 该层结稳定性“豁口”作为“预条件(Precondition Mechanism)”机制对中部模态水形成的“局地”特征给出了合理的解释. 在上述研究的基础上, 基于一个上层海洋混合层热平衡方程, 通过诊断分析揭示该层结稳定性“豁口”是由海表热力强迫、垂向挟卷、Ekman平流和地转平流效应共同导致的, “豁口”东、西边界的确定直接或间接地取决于海表热力强迫、Ekman冷平流和地转暖平流的纬向分布差异.

关键词 [北太平洋](#), [模态水](#), [海洋层结](#), [海洋平流](#), [层结稳定性](#) “[豁口](#)”

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Formation mechanism of the “Stability Gap” and the North Pacific Central Mode Water

PAN Ai-Jun^{1, 2}, LIU Qin-Yu¹, LIU Zheng-Yu^{3,1}

1 Physical Oceanography Lab., Ocean University of China, Qingdao 266003, China; 2 Environment and Dynamics Lab., Third Institute of Oceanography, Xiamen 361005, China; 3 Center for Climate Research, University of Wisconsin Madison, WI 537061695, USA

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Abstract Local feature of the formation region (165°E~160°W, 38°N~42°N) of the North Pacific Central Mode Water (NPCMW) is first put forward from data analysis, and for which, the external atmospheric forcing (solar shortwave radiation, net heat flux and wind stress curl) could not give acceptable explanation. Further analysis on the seasonal variability of the upper ocean

stratification shows that a special weak zone of the ocean stratification in the upper ocean (<75 m) the “stability gap” is detected in (165°E~160°W, 38°N~42°N) in autumn (September–October). As “Precondition Mechanism”, the “stability gap” provides a reliable answer for the “local feature” of the formation of the NPCMW. Based on a heat balance equation of the upper ocean mixed layer, diagnostic analysis suggests that the formation of the “stability gap” is the cooperative product of the surface heat flux forcing, vertical entrainment, Ekman advection and geostrophic advection. Among which, the latitudinal differences of the surface heat flux forcing, the cold Ekman advection and the warm geostrophic advection play the crucial roles on determining the critical eastern and western bound of the “stability gap”.

Key words [North Pacific](#) [Mode water](#) [Ocean stratification](#) [Ocean advection](#) [Stability gap](#)

通讯作者:

潘爱军 aijunpan@tiosoa.cn

作者个人主页: 潘爱军^{1,2}; 刘秦玉¹; 刘征宇^{3,1}

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