大氣潮汐之激發

ON THE THERMAL EXCITATION OF ATMOSPHERIC TIDES

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ABSTRACT

Ozone heating on a global scale is calculated based on the recent O_3 observations. Lindzen and Will's method is used for this purpose. The sphericity of the atmosphere is taken into account. When compared with Lindzen's and Butler and Small's results, the calculated vertical distributions of the O_3 heating function exhibit much greater maxima and, also, much narrower widths for diurnal, and especially for semidiurnal, components. The computed heating functions result in improved dynamic response for the diurnal tide, but not for the semidiurnal case. These heating functions have been found in no better agreement between the observed phase of the semidiurnal surface pressure oscillation and that obtained with existing theories. To resolve these discrepancies for the semidiurnal tide, we propose that the thermal forcing due to latent heat release from H_2O on a global scale may play a role as significant as that of H_2O absorption. Based on available data, the amount of latent heat release is found to be comparable to what is required, in combination with the effect of O_3 and H_2O absorptions, to generate a dynamic response in agreement with the observations. In particular, with the incorporation of this proposed forcing, the spurious node phenomena in the neighborhood of 28 km and the phase discrepancy at the ground which are present in the existing theories can be removed.

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摘要

本文對臭氧及水汽吸收日光能之情形作詳細之計算，所得結果作符式分析後即得各分量潮之激發函数。本文中並以所得的激發函数与他人已發表之激發函数相比較，發現有相當程度之不同我們認為其他激發函数不是已過時，就是不正確，應該揚棄。我們並且發現熱帶積雨雲中放出之潛热也是半日潮之一種重要之激發源。