

CERTAIN INVESTIGATIONS ON GRAVITY WAVES IN THE MESOSPHERIC REGION

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ABSTRACT

This paper is concerned in mesosphere, with the effect of diabatic processes due to photochemical heating on long-period gravity waves. A linear diabatic gravity wave model is prepared to compare the model of pure dynamical adiabatic gravity waves. The detailed influences of (i) The adiabatic condition (ii) Cooling process (iii) Cooling and photochemical heating on the gravity waves are studied in mesosphere region.

KEYWORDS- Instability, Gravity wave, photochemical reaction, adiabatic condition.

I. INTRODUCTION

In present circumstances, the rigorous study of the coupling between the mesosphere and thermosphere is very important. The nature of mesopause region is investigated by help of MST radar and laser radar. In mesosphere region, the heating process is composed of solar heating, exothermic chemical reaction, infrared cooling, turbulent heating and other possible effect of heat. Gravity waves are very common phenomenon in atmosphere, Lindzen [1], Fritts [2], Garcia and Solomon [3] and Lubken [4] have recognized the essential role of gravity wave in large scale circulation and chemical composition in the mesospheric region. The role of wave amplitude is an important factor in wave saturation. In recent years, several researchers like McDade and Llewellyn [5], Mlynczak and Solomon [6], Riese et al. [7], Meriwether and Mlynczak [8] Jiyao [9], Offermann [14] and Wang Yongmei et al. [10] have studied photochemical heating in mesopause region. In real situation non-adiabatic process of photochemical heating is of great importance in investigation of propagation in this region. The purpose of this paper is to make a unitary gravity wave model in stratosphere, mesosphere and lower thermosphere considering the coupling between the photochemistry and the dynamics and to investigate the influence of photochemical processes on gravity waves in stratosphere, mesosphere and lower thermosphere. The accuracy of the results of this paper is obtained by the help of MATLAB Simulation setup.

(The paper has been divided into sections: photochemical gravity wave model, investigations, results and discussions, conclusion and future work).

II. PHOTOCHEMICAL GRAVITY WAVE MODEL

Here the effect of photochemistry on gravity wave propagation, the diabatic process of the photochemical heating and cooling and atmospheric constituents is considered in our model. The gravity wave fluctuations of wind, temperature and mixing ratios of atmospheric. The following linear inertia internal gravity wave model is used for influence of photochemistry on gravity waves in mesospheric region: