

MOUNTAIN WAVE EXCITATIONS IN AND AROUND THE KATHMANDU VALLEY

Sangeeta MAHARJAN* and Ram P. REGMI

*National Atmospheric Resource and Environmental Research Laboratory (NAREERL), Central
Department of Physics, Tribhuvan University, Kirtipur, Kathmandu, Nepal*

*Corresponding Author: sangeetamaharjan@gmail.com

ABSTRACT

The mountains waves are undulations developed in the atmosphere when stably stratified air is constrained to pass through a topographic barrier. Depending upon the scale of topographic complexities and the atmospheric conditions, mountain waves may either remain trapped within the shallow layer of lower troposphere or propagate vertically up to great heights. The trapped waves occasionally manifest in the form of wave clouds or rotor clouds in parallel bands. The energy associated with trapped mountain waves generally dissipate very slowly downwind and may continue downstream for many wavelengths spanning many tens of kilometers. Wave clouds are often seen over the Kathmandu valley initiated from the southern and western mountain ridges extending beyond the respective mountain gaps of the valley. The southern and western mountain gaps are the major gateways of Tribhuvan International Airport (TIA). As the flow beneath the wave crests is often turbulent that poses significant hazards to the low-level aviation activities, it is very important to understand, model and predict the mountain wave excitations over the area so that possible aircraft accident or flight discomfort can be avoided. In this paper, we will present the successful numerical reproduction of temporal evolution and spatial distribution mountain wave excitation over the southern gateways of TIA on 31 December 2014 using the Weather Research and Forecasting (WRF) modeling system. Present study over the Kathmandu valley along with other parts of the middle hills of Nepal Himalaya indicate that mountain wave excitations and possible impacts on low-level aviation activities can be successfully predicted.

KEYWORDS: Mountain wave, WRF model, stratified atmosphere