

ESCI 343 – Atmospheric Dynamics II
Answers to Selected Exercises for Lesson 10

2. Assume that the Allegheny Mountains can be approximated as a parallel series of ridges approximately 25 km apart. Also, assume an isothermal, compressible atmosphere with a scale height of 8100 m. Calculate the critical wind speed below which topographically forced waves will propagate vertically, and above which they will decay with height.

Answer: From Problem 1 we have $N^2 = \frac{g}{H}(1 - 1/\gamma)$. Therefore, $N = 0.0186 \text{ s}^{-1}$. $k = 2\pi/\lambda = 0.000251 \text{ m}^{-1}$, so the critical value of \bar{u} is N/k which is 74 m/s.