

# EGS Abstract for The Hague, 1999

## THE TRAPPING OF LEE WAVES

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Lee waves are that particular kind of internal gravity waves that are produced by stratified flow over an obstacle. In many situations of geophysical interest, the scales over which lee waves propagate are such that the vertical variations of the stratification come into play, causing vertical trapping. This communication addresses the question of the effect of trapping on lee waves, using the Green's function formalism of Voisin (1994). For each given internal wave mode, at each point of reception, the waves are expressed in terms of the retarded time of their emission. The retarded time follows from the resolution of a system of implicit equations expressing propagation at the group velocity and Doppler shift; it depends only on the vertical variations of the stratification and on the temporal variations of the wind in speed and direction. For constant wind and non-anomalous stratification, in each horizontal plane, the waves are contained within a wedge and composed of divergent and (possibly) transverse waves, in a manner reminiscent of the Kelvin wave wake of surface ships. General conclusions about the geometry and structure of the wave field are obtained, and applied to two particular stratifications: a fluid layer of finite depth and linear density profile, and a thermocline corresponding to a hyperbolic tangent density profile. Comparison with original experiments is also performed.

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