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Characterizing High Frequency Gravity Wave Propagation Through an Evolving Inertial Wave in the MLT

Tyler Mixa (1,2), Katrina Bossert (1), David Fritts (1), Brian Laughman (1), Thomas Lund (3), and Lakshmi Kantha (2)

(1) GATS-inc. Boulder, Boulder, USA, (2) University of Colorado Boulder, Boulder, USA, (3) NorthWest Research Associates, Boulder, USA

An anelastic numerical model is used to characterize a high frequency gravity wave (HFGW) packet propagating through an inertial gravity wave (IGW) in the Mesosphere and Lower Thermosphere (MLT). On 21 January 2015, a sodium resonance lidar and advanced mesospheric temperature mapper (AMTM) observed intermittent propagation of a HFGW through an IGW over Alomar, Norway. The evolving IGW creates a complex propagation environment, with the potential for critical layers, reflection, evanescence, and tunneling as the HFGW propagates through alternating IGW phases. Collocated observations from the sodium resonance lidar and AMTM provide a unique insight into this environment, capturing the dominant horizontal and vertical characteristics of wave interactions down to unprecedented spatial and temporal scales. Using a high resolution anelastic numerical model, the 21 January event is analyzed to characterize the HFGW propagating through the IGW and account for the temporal variability in the observational data.