



The mesospheric surf zone as observed by the CRISTA satellite instrument and modeled by the TIME-GCM

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Cryogenic Infrared Spectrometers and Telescopes for the Atmosphere (CRISTA) measurements of carbon monoxide, temperature, and potential vorticity show a distinct mesospheric surf zone pattern in the winter hemisphere. The observations indicate that the interaction of gravity waves and planetary waves is a likely formation mechanism. Gravity waves that propagate through the stratospheric polar jet break in the mesosphere and reverse the circulation above about 75 km altitude. Upward propagating planetary waves therefore encounter a critical wind layer, break, and a compact surf zone is formed between about 70-80 km altitude. The CRISTA observations and their interpretation are consistent with simulations of the thermosphere-ionosphere-mesosphere-electrodynamics general circulation model (TIME-GCM) that was run for the same time period (November 1994). The model/observation intercomparison also allows a discussion of the relationship between the surf zone and simultaneously observed temperature inversions with bottom altitudes well below the wave breaking region.