

Observational and Modeling Study of Mesospheric Bores

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In our studies of the dynamics of the upper atmosphere, some of the most intriguing mesospheric phenomena we observe high over the Hawaiian night skies are internal bores. These events affecting chemiluminescence are documented in monochromatic airglow images taken by high performance all-sky CCD imaging systems operating at the Maui Space Surveillance Site on top of Haleakala Crater. Data is collected as part of the ongoing, collaborative Maui - Mesosphere and Lower Thermosphere (MALT) campaign, jointly sponsored by the National Science Foundation and the Air Force Office of Scientific Research. Bolstered by the Maui-MALT dataset, several theories now exist for mesospheric bores, agreeing in principle that they are likely nonlinear structures spawned by gravity waves and propagating within ducted waveguide regions, such as thermal inversion layers. A new investigation will model optical emissions using a robust, time-dependent, chemical dynamics model to explore the airglow response to ducted gravity waves and, in turn, the geographical and vertical coupling relationships which may exist.