

Gravity waves in the airglow scan database of Dudley Observatory Report

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We have searched disturbances in the airglow scan database of Dudley observatory that may be related to gravity waves in the upper atmosphere. The airglow scan observations were made with narrow band filters of OI 5577 and OI 6300 for 166 nights at Haleakala, Maui in the period of April 1965 through October 1968. The OI 6300 emissions are produced mostly via recombination of O₂⁺ in the F-region, whereas the OI 5577 emissions are generated both in the E- and F-regions. We find disturbances in azimuthal scans of OI 6300 with wavelengths longer than 100 km. The disturbances are mostly found to be aligned along north-south direction and exclusively in the southern azimuth (near the equator), implying that they are one of the equatorial ionospheric irregularities, known as equatorial spread F (ESF) caused by gravity waves in the lower altitudes. The disturbances occurred 21 nights out of total 166 nights of observations with a maximum occurrence in September. The disturbances do not appear to be related to geomagnetic activities or solar activities, unlike gravity waves observed in high latitudes. The seasonal variation of the occurrence is consistent with the idea that the ESF is caused by gravity waves that were propagated from the troposphere after generated by strong convection in inter-tropical convergence zone.