L-BAND SCINTILLATIONS ON THE WAAS SIGNAL MEASURED FROM HALEAKALA VOLCANO: INSIGHTS GAINED FROM COLLOCATED RADIO AND OPTICAL MEASUREMENTS

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Utilizing the signals transmitted by the Global Positioning System (GPS) satellite network provides a simple method to estimate irregularity structuring in the F-region ionosphere. Measurements of the power received from each GPS satellite by a single-frequency receiver located atop the Haleakala Volcano on Maui, HI have been recorded since the beginning of 2002. Beginning in August of 2004, measurements of the received signal power from a Space Based Augmentation System (SBAS) geostationary satellite called a Wide Area Augmentation System (WAAS) satellite have also been recorded. From these signal power measurements it is possible to study the scintillations and irregularity structures due to the overhead passage of ionospheric irregularities. These irregularities are typically associated with the equatorial spread-F phenomenon, although evidence exists for the passage of irregularities not associated with this phenomenon. The difference between the GPS satellites and the SBAS satellite is that the former move with respect to the Earth, while the latter are fixed. The lack of motion in the Earths reference frame simplifies the interpretation of the scintillations on the SBAS signals. Several case studies of scintillations are presented. On several occasions, these scintillations occurred during times when both the moon and sun were below the horizon and the skies were clear. This allows us to compare the scintillation measurements to airglow depletions observed using a collocated imaging system. The data collected by the imaging system places the one-dimensional scintillation data into a broader two-dimensional spatial context and allows conclusions to be drawn as to the spatial structure of the irregularities with respect to the larger-scale airglow depletions.

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