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T2.2-P08. Discriminating Traveling Ionospheric Disturbances (TIDs) from Underground Nuclear and Large Chemical Explosions Using Combined GPS and Low-Frequency Radio Interferometry Observations

Recent studies have demonstrated the utility of GPS data collected by the Global Navigation Satellite System (GNSS) for detecting underground nuclear explosions (UNE), earthquakes, tsunamis, and other large explosive events. In addition, low-frequency radio interferometry data observed by the Very Large Array (VLA) have been shown to capture the signature of the Hunters Trophy UNE conducted at the Nevada Test Site (NTS) in 1992. Both GPS and VLA datasets detected the ionospheric effects of these explosive events as total electron density disturbances. In this study, we investigated the utility of integrated GPS-VLA observations for discriminating the ionospheric signatures of UNEs and large chemical explosions. Specifically, we found that the signatures may be differentiated in both their spectral and anisotropic propagation attributes, which possibly characterize event depths and yields. Additionally discrimination may result the ionospheric phase correction for radio interferometry in the presence of explosion-induced TIDs. These results from complement efforts of the IMS network of ground-based infrasound arrays that seek to characterize explosions based on established correlations between peak acoustic wave frequency and yield.

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