ASSESSING GROUND-TRUTH INFRASOUND EVENTS FOR VALIDATING WIND MODELS

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One of the fundamental limitations in the use of infrasound to locate atmospheric events, such as explosions, is inaccuracy in our knowledge of the atmospheric properties that control infrasound propagation, hence our ability to predict propagation times and directions needed to locate sources. This is a particularly complex problem because the atmosphere varies significantly in space and time. Recent infrasound studies and large amounts of new atmospheric wind measurements reveal significant inaccuracy in the atmospheric Horizontal Wind Model (HWM-93) and Ground to Space (G2S) wind model between elevations of 55 and 150 km, which is based on HWM-93 as likely the single largest source of these infrasound prediction errors.

As part of a project to update HWM-93 and G2S using the wealth of new wind data acquired since HWM-93 was created, we will use infrasound data from ground-truth (GT) events for additional constraint and statistical assessment of the new and existing wind models. This places a renewed importance on accurate characterization of GT infrasound events: their locations and times, and our uncertainties in them. Here we present recent work on collection and assessment of ground truth locations and times for infrasound events. We describe the assignment of uncertainties to them and the amount those uncertainties are ultimately reflected in the residuals between predicted and observed travel times and back azimuths. Through our preliminary assignments of GT source location and time uncertainties, we estimate that more than half of the back-azimuth and travel-time data currently in our GT database have significant power for constraining and assessing the atmospheric models.