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Results from a student built balloon-borne infrasound sensing instrument

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Balloon-borne infrasound sensors should have two advantages over ground based counterparts: lack of wind noise, and the potential for infrasound concentration in stratospheric ducts. In this paper we present the design and results from a student-built payload for sensing infrasound waves (between 0.1Hz to 20Hz) from a NASA stratospheric balloon that reached altitudes of 37km on September 28th of 2016. The SISE (Student Infrasound Experiment) uses a unique arrangement of COTS differential pressure sensors and student designed signal conditioning to eliminate noise and sense infrasound waves below 20Hz. To calibrate the sensitivity of ground based and balloon-borne sensors, we contracted EMRTC to set off three large explosions from Socorro NM during flight, roughly 200-400 km west of the balloon position at the time of the explosions. The goal of this experiment was to detect the artificially generated infrasound waves at altitude despite the lower expected amplitudes. This presentation contains discussions of the overall design for the instrument, laboratory and in flight performance characteristics, as well as in flight observations of infrasound generated from the artificial sources. The instrument successfully detected infrasound waves of about 0.03 Pa at an altitude of 37 kilometers and a distance of 350km from the source.