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## MEASUREMENT AND DATA ANALYSIS OF THE SOUTH KOREA'S NARO-1 ROCKET NOISE

**Abstract**

South Korea successfully launched a two-stage rocket in third attempt to place a science satellite into space in January 2013. Naro-1, originally named the Korea Space Launch Vehicle, or KSLV, is the South Korea's first rocket to achieve Earth orbit. Previous launch attempts in 2009 and 2010 failed: the first Naro-1 failed to reach orbit due to a fairing problem, and the second vehicle was exploded in midair. The authors participated in measuring Naro-1's rocket noise in 2010 and 2013, and obtained time-domain data recordings of near- and far-field sound pressures during the rocket launch. The acoustic measurement was carried out at five spots of various distance from the launch pad: 120 m, 200 m, 270 m, 1400 m, and 1740 m. From the launch pad, the spots are located at different direction and altitude due to geographical difficulty in securing the proper observation place. However, the each spot location was kept to the same as that of 2010 in 2013. Bruel Kjaer and G. R. A. S. microphones were used for data acquisition. The time series data at various spatial locations is analyzed by plotting pressure, time rate of change of pressure, and overall sound pressure level versus time. Time rate of increase versus pressure rise magnitude is also plotted and examined to understand characteristics of the rocket noise. Power spectral density of the noise during the period of maximum sound pressure levels are calculated, and its increasing and decreasing trend will be analyzed in relation with frequency. The authors consider that this measurement and analysis could be also used to investigate the environmental effect of the launch noise on demographics of endangered species in the vicinity of launch sites. Also, another rocket engine's power performance in the next launch can be assessed by comparing its noise with Naro-1's noise data.