Application of Parametric Speakers to RASS

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In this study, a wind profiler with radio acoustic sounding system (RASS) and radiosonde measurements were used to investigate the technical practicability and reliability of using parametric speakers to measure the vertical profile of virtual temperature. Characteristics of parametric speakers include high directivity and very low sidelobes, which are preferable for RASS, especially those operating at urban areas, if this type of speaker exhibits reliability comparable with acoustic speakers for RASS measurements. The experiments were conducted on fine days with light winds to mitigate the effects of the horizontal and vertical components of wind on acoustic waves used for RASS. The results of this study indicated that, although parametric speaker RASS is susceptible to horizontal winds due to the narrower acoustic beam, bias and standard deviation of parametric speaker RASS/radiosonde virtual temperature difference were close to that from acoustic speakers. In addition, when compared with acoustic speaker RASS, the values for the parametric speaker RASS were even smaller. Based on these results, it is concluded that the parametric speaker RASS has accuracy and precision comparable with acoustic speaker RASS despite its high directivity of sound.

Keywords: radio acoustic sounding system (RASS), parametric speaker