5.1A FREQUENCY AND SITE SELECTION CRITERIA FOR MST RADARS

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The majority, if not all, MST and ST radars for which data are currently available are located in or near mountainous terrain. When measuring horizontal velocities, the terrain is a small factor, but when measuring vertical velocities. the meteorological noise induced by rough terrain can severely limit the usefulness of the observations. For example, the synoptic-scale vertical velocity is of prime importance for many meteorological purposes. but it is usually small, less than 10 cm s^{-1} or so. (Synoptic scale includes motion systems with time scales roughly from three to 24 hours). When the variance of the vertical velocity is too large. it is not possible to suitably filter the data to detect the small synoptic-scale signal with reasonable statistical confidence. It is well established that the variance of vertical velocity at all tropospheric levels is directly related to the low level wind speed during flow over rough terrain (e.g., ECKLUND et al., 1982; NASTROM et al., 1984). Also, the vertical velocity may be biased by standing lee waves during flow over rough terrain. On the other hand, our studies suggest that the synoptic-scale vertical velocity can be measured by ST radars where the terrain is smooth.

The important point is that the large-scale (synoptic-scale) vertical velocity cannot always be reliably determined from MST radar data when the underlying terrain is rough. As the vertical velocity is potentially one of the future radar site selections, taking into account the desired meteorological applications of the data as well as engineering design factors. Especially. if the synoptic-scale vertical velocity is a desired variable, the radar should not be located near mountains.

REFERENCES

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