

# *The RAP Seminar Series*



## NCAR

### **The Estimation of Snowfall Rate Using Visibility**

by

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**Research Applications Program**

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*Foothills Lab, Building 2,*

*Auditorium, 3:30 p.m.*

The relationship between liquid equivalent snowfall rate and visibility is investigated using data collected at the National Center for Atmospheric Research Marshall Snowfall Test Site during two winter field seasons and using theoretical relationships. The observational data include simultaneous liquid equivalent snowfall rate, crystal types, and both automated and manual visibility measurements. Theoretical relationships between liquid equivalent snowfall rate and visibility are derived for 27 crystal types, and for “dry” and “wet” aggregated snowflakes. Both the observations and theory show that the relationship between liquid equivalent snowfall rate and visibility depends on the crystal type, the degree of riming, the degree of aggregation, and the degree of wetness of the crystals, leading to a large variation in the relationship between visibility and snowfall rate. Typical variations in visibility for a given liquid equivalent snowfall rate ranged from a factor of 3 to a factor of 10, depending on the storm. This relationship is shown to have a wide degree of scatter from storm to storm and also during a given storm. The main cause for this scatter is the large variation in cross-sectional area to mass ratio and terminal velocity for natural snow particles.