

**ATMO 489/689
Radar Meteorology**

Laboratory #5
10/17/05 (Monday section) and 10/18/05 (Tuesday section)

**Radar Reflectivity (Factor)
A radar measurement and a physical property of rainfall**

Due: By beginning of lecture on Wednesday, 10/26/2005

Reading: Rinehart (2004) Chapter 5

Questions (100 points):

1. (40 points) The Distromet Joss-Waldvogel (J-W) disdrometer (<http://www.distromet.com/default.htm> and pictured below in Fig. 1) for raindrops is an instrument for measuring raindrop size distributions continuously and automatically.



Figure 1. Joss- Waldvogel (J-W) disdrometer signal processor/storage (left) and measuring unit (right).

It was developed because statistically meaningful samples of raindrops could not be measured previously without a prohibitive amount of work. The J-W instrument transforms the vertical momentum of an impacting drop into an electric pulse whose amplitude is a function of the drop diameter. A conventional pulse height analysis yields the size distribution of raindrops in 20 discrete bins. Drop size distribution (DSD) data is typically averaged over a 1 minute period.

The Texas A&M University Department of Atmospheric Sciences currently owns and operates three J-W disdrometers over southeastern Texas for the study of physical and radar meteorology. One of the instruments was installed by Dr. Courtney Schumacher and her research group at the old TI building in College Station, as shown in Fig. 2. The

other two units are currently being installed in the downtown Houston area and along the Texas coast near Galveston.

The signal processor and PC, which process, store and displays the data, are housed in the custom designed enclosure shown in Fig. 2a. The J-W measuring unit sits on top of the enclosure (Fig. 2b). The unit runs continuously, recording the DSD of any rain events that pass overhead.

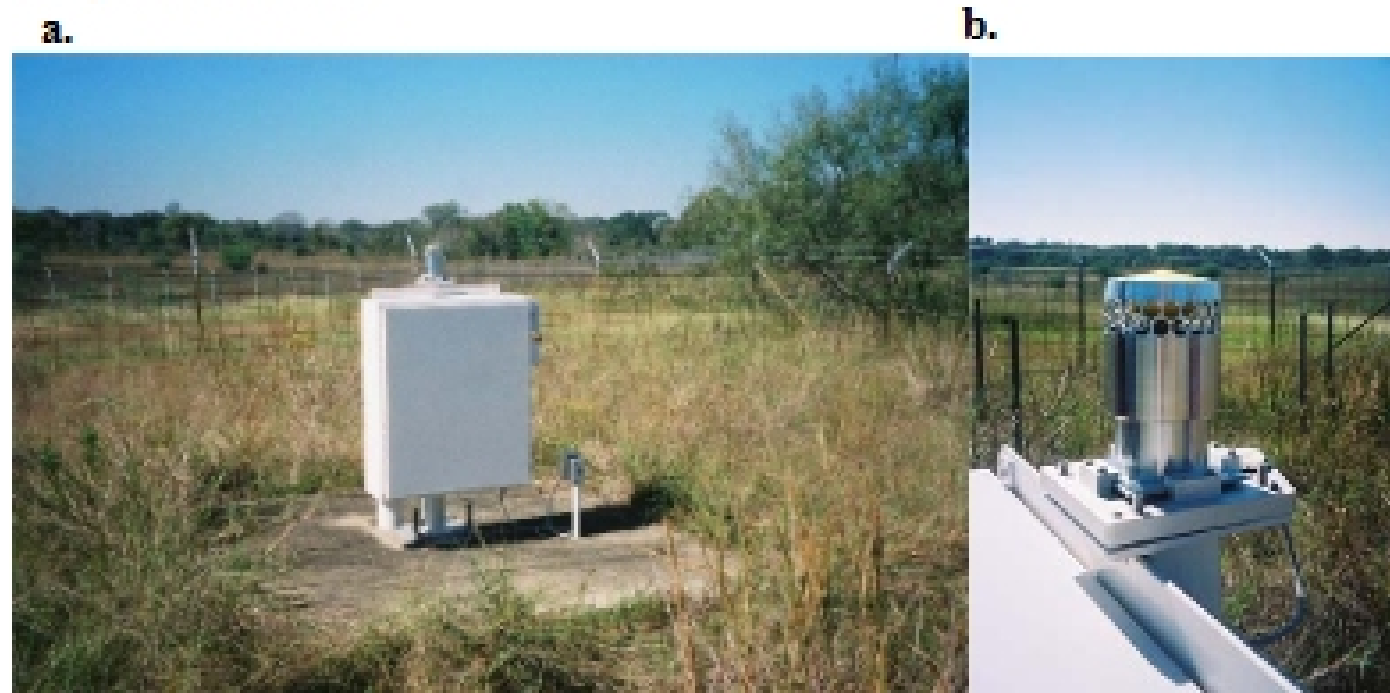


Figure 2. Texas A&M University Joss-Waldvogel (J-W) disdrometer operated by Dr. Courtney Schumacher and her research group at the old TI building in College Station, TX. (Pictures courtesy of Dr. Schumacher)

One such rain event occurred on December 22, 2004 for about 5 hours with widespread light to heavy rain (Figure 3). This storm was associated with the passage of a cold front, which generated a strong temperature gradient. The widespread rain developed behind the front as the upper level low lagged the surface front.

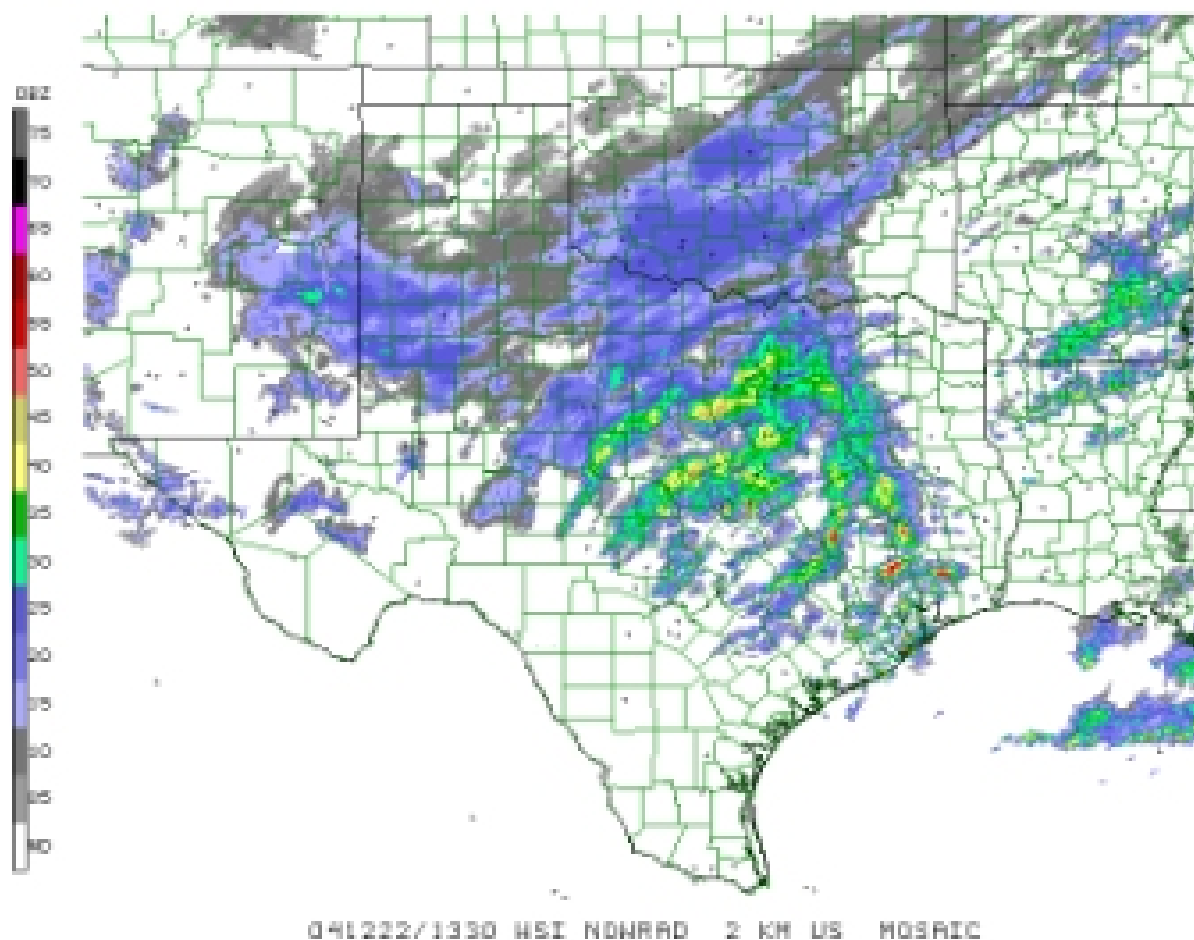


Figure 3. WSI NOWRAD mosaic of low level WSR-88D (Weather Surveillance Radar - 1988 Doppler) data over Texas and vicinity on December 22, 2004 at 1330 UTC.

