The Desert Research Institute (DRI) Mobile Microwave Radiometer (MMR) is a dual-channel instrument that operates at frequencies of 20.6 and 31.65 GHz. The basic antenna and receiver components have been thoroughly described in previous work, particularly Huggins (1995) and Hogg et al. (1983). The 20.6 GHz channel is sensitive mainly to emissions from water vapor, and the 31.65 GHz channel, in an atmospheric transmission window, is more sensitive to liquid water. The instrument measures brightness temperature at each frequency, from which absorption is computed. Statistical retrieval techniques are then used to compute path-integrated depths of water vapor and liquid water (Westwater and Strand 1972; Hogg et al. 1983). The atmospheric retrieval coefficients are computed using a radiative transfer model on a set of soundings relevant to the location of interest.

A picture of the mobile radiometer vehicle is shown in Fig. 1. The radiometer receiver, computer, and antenna control mechanism are housed in the cargo area of the vehicle. A 6.5 kW power generator installed into a sound- and heat-insulated compartment serves as the power source for the instrument in mobile mode. The generator can power the radiometer for up to 24 h of mobile or remote operation. Typically, two people are involved in operations: a driver and an instrument operator. Vehicle position is recorded from a GPS receiver. Surface temperature and humidity are also recorded.

The antenna for the system yields a 2.5º beam sampling width. A spinning reflector is used externally to direct microwave emission to this antenna and to repel precipitation particles from the reflector surface. Demoz et. al. (1993) have pointed out the usefulness of the spinning reflector in a comparison with a radiometer using the more typical flat stationary reflector. In stationary operation, the antenna housing can be pointed vertically or be rotated to collect data in scans at fixed elevation angles. For mobile operation, the antenna is locked to a zenith-pointing position. Data are typically averaged over a period of about 1-5 seconds. At a cruising speed of about 50 km/hr, this translates to a spatial resolution of 14-70 m.

Figure 1. DRI Mobile Microwave Radiometer

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