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6.0 PROGRESS IN EXISTING AND PLANNED MST RADARS

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The papers presented in this session describe radar systems using two different wind-measuring techniques: the partial-reflection drift technique and the MST (or Doppler beam-swinging) radar technique.

The partial-reflection drift technique, first implemented by FRASER (1965), has been shown to work in the troposphere and lower stratosphere and in the mesosphere and lower thermosphere, at frequencies from about 2 to 50 MHz. In practice, however, it is regularly used only in the mesosphere and lower thermosphere at frequencies near 2 MHz. The advantages of this technique include relatively small operating costs and 24-hour operation above about 80 km.

The MST radar technique was independently invented at least three times, by Woodman in 1970 in Peru using a 6-m radar (WOODMAN and GUILLEN, 1974), by Dobson in 1969 in the U.S. using a 10.7-cm radar (DOBSON, 1970), and by Browning and coworkers in 1971 in the U.K. also using a 10.7-cm radar (BROWNING et al., 1972). As far as I know, all of the radars described in this session derive from the pioneering work of Woodman. The early S-band systems were not operated for long, perhaps because of high operating costs. Almost all recent S- and UHF-band systems have utilized radars developed for other purposes in order to avoid the high cost of S- and UHF-band antennas. The only exceptions are the Wave Propagation Laboratory 915-MHz radar at Denver and their 405-MHz system under development for operational use (see the paper by STRAUCH).

The advantages of the MST radar technique are: good spatial resolution, relatively large zenith angle, and consequent simple geometrical interpretation of the signal. The disadvantages are the converse of the advantages of the partial-reflection drift technique.

Since the last MST Radar Workshop in May 1984, several new radars have come into operation, at Penn State, Christmas Island, Chung-li, and Arecibo (VHF), other radars have been augmented, and the planning of several other systems has materially progressed. We look forward to hearing about these developments.

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6.1 RECENT RESULTS AT THE SUNSET RADAR

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The Sunset radar is a VHF, pulsed Doppler (ST) radar located in a narrow canyon near the Sunset townsite 15 km west of Boulder, CO. This facility is operated by the Aeronomy Laboratory, ERL, NOAA, exclusively for meteorological research and the development of the MST and ST radar technique. A description of this facility can be found in GREEN (1983) and GREEN et al. (1984).

In January-February, 1985, as in the previous year, the Sunset radar was used to measure winds as a part of a multisensor study of aircraft safety sponsored by the Federal Aviation Administration. The FAA will use this broad data set, in part, to evaluate the response of altimeters used on commercial aircraft to mountain lee waves.

A technical report, WARNOCK and VANZANDT (1985), has been prepared to facilitate the use of a statistical turbulence model (VANZANDT et al., 1978). This report contains complete FORTRAN listings of the model and instructions for calculating profiles of C_n^2 from routine National Weather Service rawindsonde data.

The Sunset radar is being used to test new equipment and operating concepts to be used in the proposed Flatland radar. Since both the existing system and the proposed system are similar and modular in design, a new subsystem under development can be substituted with a minimum of inconvenience. For example, a new Transmit/Receive switch was developed by imbedding it in the Sunset system, whose operating characteristics are well known. (GREEN and ECKLUND, 1986).

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