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FINAL REPORT

UTAH STATE UNIVERSITY

AFOSR-86-0241

MESOSPHERIC WIND MEASUREMENTS

COVERING THE PERIOD 30 July 1986 - 29 September 1988

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UTAH STATE UNIVERSITY • LOGAN, UTAH 84322-4405

Center for Atmospheric and Space Sciences
Telephone (801) 750-2961
TELEX 3789426

January 26, 1989

PKZ
Attn. Paulette Bowman
Air Force Office of Scientific Research (AFSC)
Bolling Air Force Base, DC 20332-6448

Subject: Final Technical Report--Grant No AFOSR-86-0241

The subject grant involves the construction of MENTOR, an RF interferometer radar to study acoustic-gravity waves in the mesopause region of the earth's atmosphere, under the Department of Defense--University Research Instrumentation Program.

Tycho Technology, Inc., of Boulder, Colorado, the subcontractor for the construction of MENTOR, has completed the radar and put it in the field. All the electronics are fielded in an 8'x8'x20' shipboard container, with the antenna arrays deployed close by. The electronics consists of a 50-kW transmitter, 8 receivers, and 150 Mips of on-line computer. The radar antenna consists of a 32-Yagi antenna array configured as 16 Yagis for transmit and 16 Yagis for receive. The transmit array is deployed on one side of the shipboard container and operated as a single in-phase beam; the 16 separate Yagis for receive are sampled as 8 rows of 4 Yagis each.

The system has now been operated several times with time-domain-average data and on-line FFT'd data collected on tape. This lets us check on our downstream algorithms off-line before committing them to on-line operation, and simultaneously do an off-line check of the on-line FFT routine. This has revealed a hardware synchronization problem, which has been fixed, and several software problems, which have also been fixed.

A presentation was made of this system and some of the first data at the COSPAR meeting in Helsinki [Brosnahan, J. W., G. W. Adams, J. W. Neuschaefer, D. M. Woodard, and R. G. Roper, "The MAPSTAR and MENTOR Imaging Doppler Interferometer Radars", presented at the XXVII COSPAR Meeting, Helsinki, Finland, 18-29 July, 1988]. The system and its results were well-received.

The imaging Doppler interferometer (IDI) radar concept is being well-received in general. It is becoming obvious that the MENTOR IDI radar will be a productive scientific tool. We have already obtained funding from the Air Force Office of Scientific Research to investigate mesospheric wave dynamics, from the Meteorology Program at NSF to explore the use of MENTOR as a tropospheric wind-measuring system, and from the U.S. Army to use MENTOR as a platform for the development of algorithms for their planned IDI portable wind-measurement systems.

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