

9.5 EISCAT OBSERVATIONS DURING MAC/SINE AND MAC/EPSILON

J. Röttger

EISCAT Scientific Association
Box 705, S981 27 Kiruna, Sweden

U.-P. Hoppe
Norwegian defence Research Establishment
P. O. Box 25, N-2007 Kjeller, Norway

C. Hall

The Auroral Observatory
N-9001 Tromso, Norway

The EISCAT incoherent scatter radar facility in Tromso, Norway was operated during the MAC/SINE campaign for 78 hours in the period 10 June - 17 July 1987, and during the MAC/Epsilon campaign for 90 hours in the period 15 October - 5 November 1987. The VHF (224 MHz) radar operations during MAC/SINE yielded most interesting observations of strong coherent echoes from the mesopause region. We will present characteristic data of these polar mesospheric summer echoes. The UHF (933 MHz) radar operations during MAC/Epsilon were done with 18° off zenith beam and allow us to deduce meridional and horizontal wind components as well as radial velocity spectra in addition to the usual electron density profiles in the D and lower E regions. Some results from the VHF and UHF radars indicating the presence of gravity waves will be examined.

Table 1. EISCAT Observations During MAC/SINE

Campaign duration:	7 June - 19 July 1987
ESICAT operation:	10 June - 17 July 1987
Total observation time:	78 hrs on 16 days, mostly 9 - 13 UT
Location:	69.6°N, 19.2°E
Transmitted frequency:	224 MHz
Peak transmitter power:	2 MW
Duty cycle:	8%
Beam position	vertical
Height range	74 - 113 km
Height resolution:	105 km
Scattering volume:	~ 1 km ³
Time resolution:	10 s

Results:

- Very strong backscatter from 85 ± 4 km, nearly continuous
- Theory of radio scattering in the lower ionosphere must be modified
- High resolution observation of vertical motions:
 $\Delta w < 1$ - cm/s; $\Delta t = 10$ s; $\Delta z = 1.05$ km

Table 2. EISCAT Observations During MAC/Epsilon

Campaign duration:	12 October - 15 November 1987
EISCAT operation	15 October - 5 November 1987
Total observation time:	90 hr on 15 days
Location:	69.6°N, 19.2°E
Transmitted frequency:	933 MHz
Beam position:	18° zenith angle, alternately 180° and 270° azimuth
Cycle time:	20 minutes
Height range:	75 - 106 km
Height resolution:	1 km
Scattering volume:	~ 1 km ³
Time resolution:	5 minutes

Results:

- Raw electron density as a function of time and height
- Zonal and meridional winds as a function of time and height

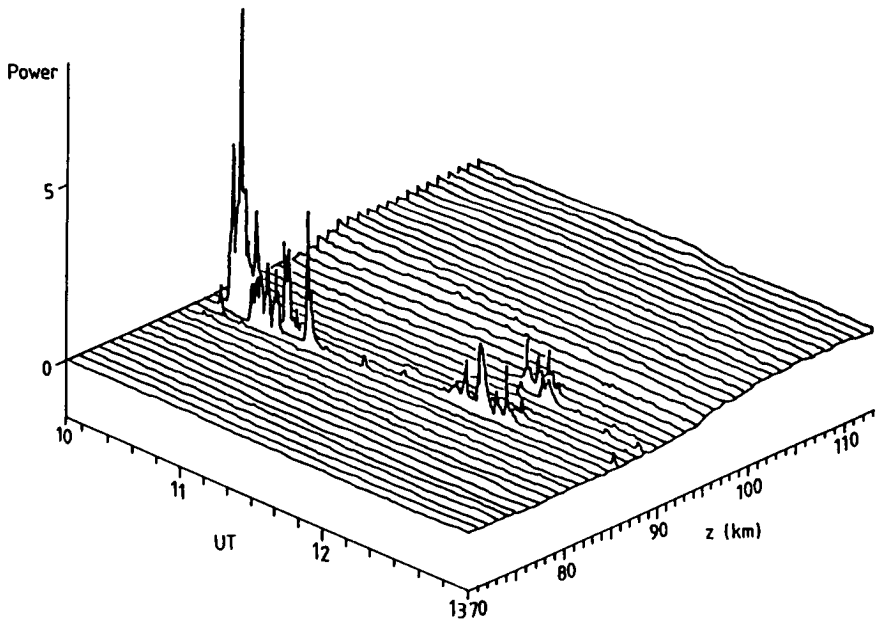


Figure 1. The backscattered power profile as a function of height and time on 10 June 1987. The height resolution is 1.05 km, the time resolution is 10 s. The power scale is arbitrary, but linear.

Log average power 224 MHz
70°N ; June-July 1987
43 hrs averaged ; 10-14 LT

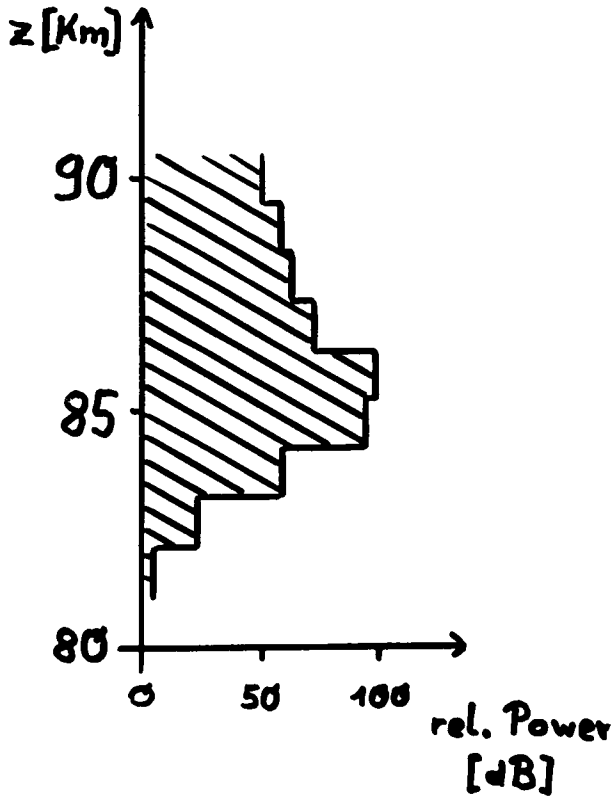


Figure 2. Log averaged power.

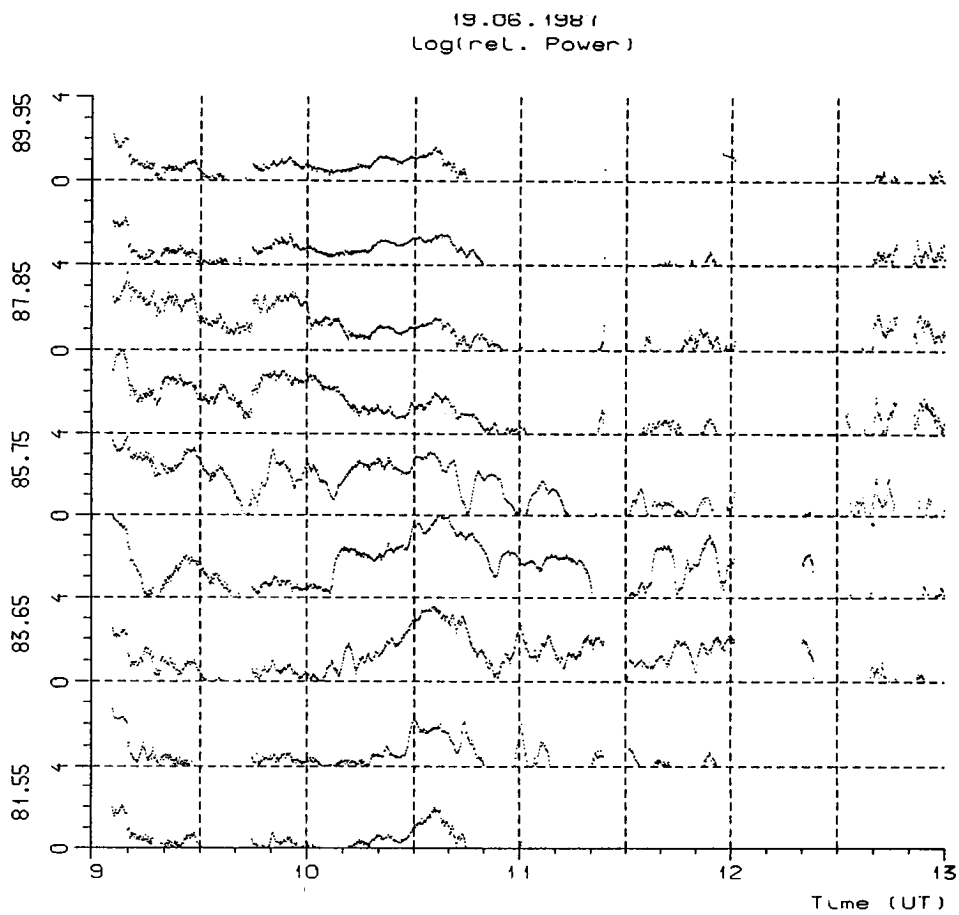


Figure 3. Log (rel. power) at nine heights.

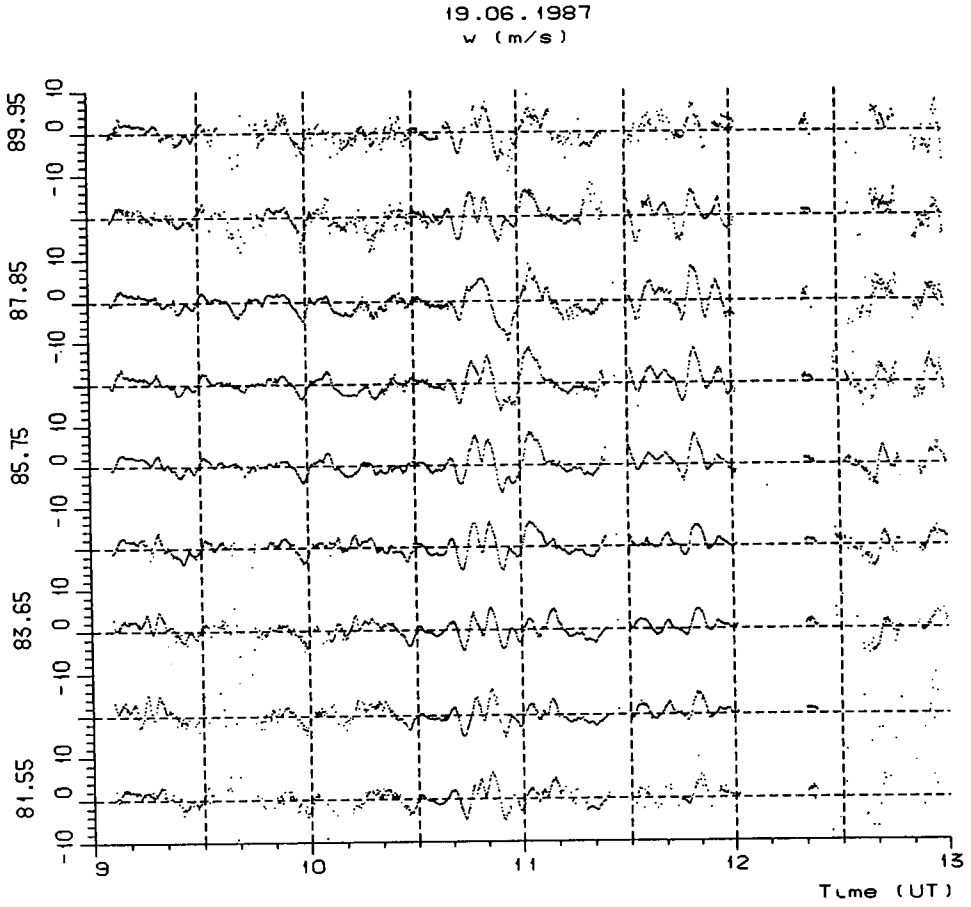


Figure 4. Vertical velocities at nine heights.

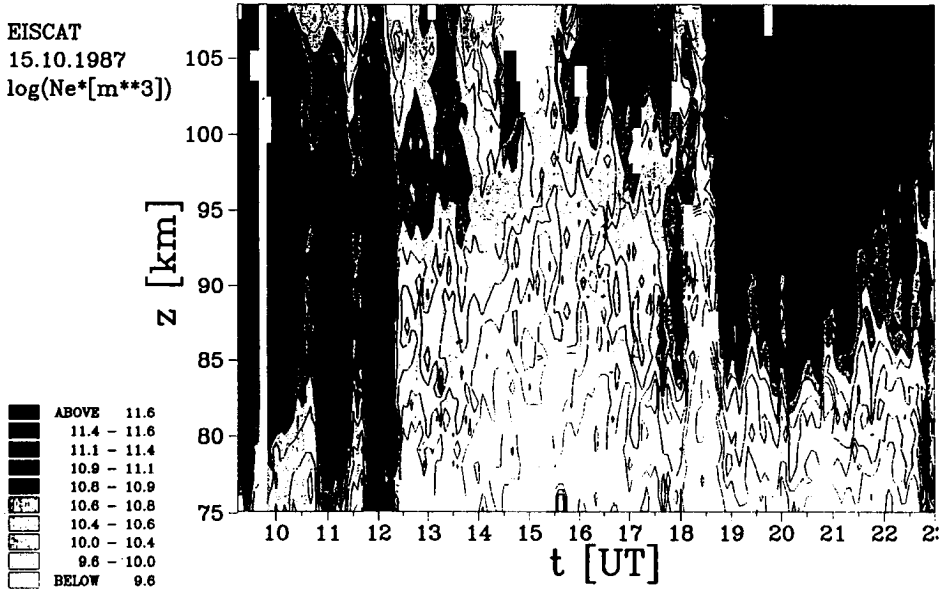


Figure 5. Raw electron density.

ORIGINAL FILE
BLACK AND WHITE PHOTOGRAPH

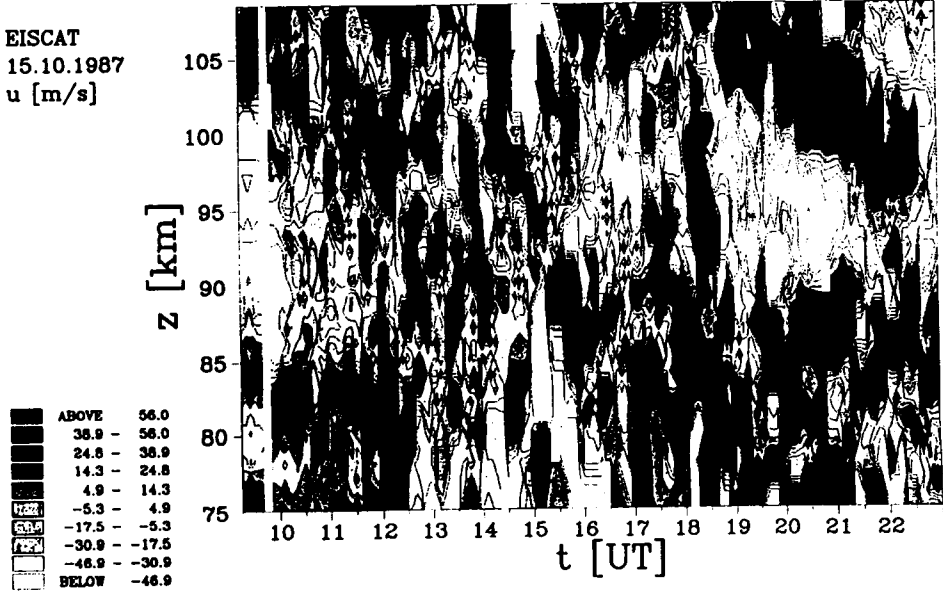


Figure 6. Zonal velocity.

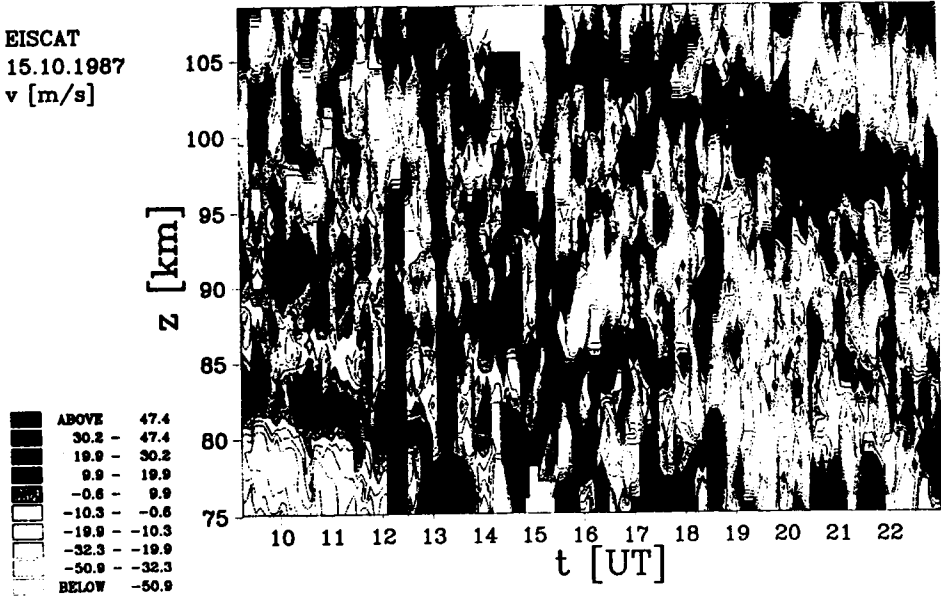


Figure 7. Meridional velocity.

ORIGINAL PAGE
BLACK AND WHITE PHOTOGRAPH