7.7 PLASMA PHENOMENA OBSERVED IN THE MAP/WINE CAMPAIGN

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The wealth of plasma data gathered in the MAP/WINE campaign allows insight into the generation of electron densities on a large, and the nature of the ions on a small scale. The associated measurements of winds and charged particles help to understand the morphology of the midlatitude ionization which turns out to correlate poorly with geomagnetic activity, but at least slightly with the prevailing winds. A somewhat clearer connection seems to exist between stratospheric warmings and radio wave absorption minima. On the local scale the interpretation of the rocket measurements of positive ions was helped by simultaneous observations of temperatures and atomic oxygen. The relevance of the description "winter anomaly" for high latitude electron density profiles will be examined.

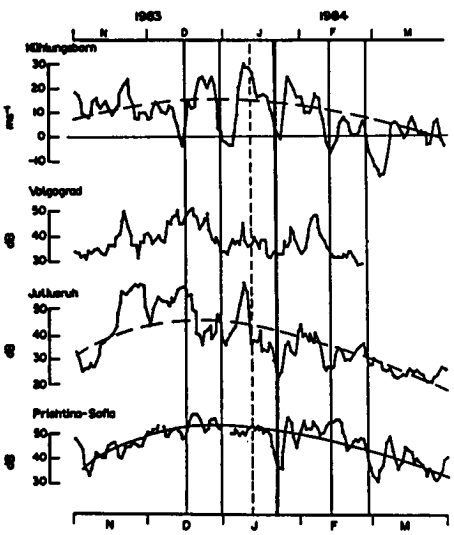

Figure 1. Zonal wind component measured by a meteor radar installation (Kühlungsborn) together with absorption data a three European locations [after Williams et al., *J. Atmos. Terr. Phys. 49*, 777, 1987].

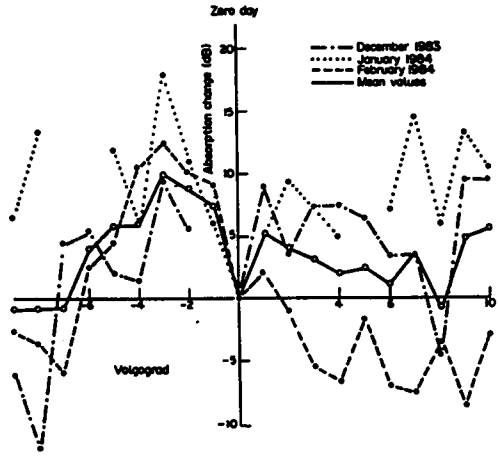

Figure 2. Elapsed time plot of midlatitude absorption(Volgograd) relative to the time of the onset of stratospheric warmings of the MAP/WINE period [after Williams et al., *J. Atmos. Terr. Phys. 49*, 777, 1987].

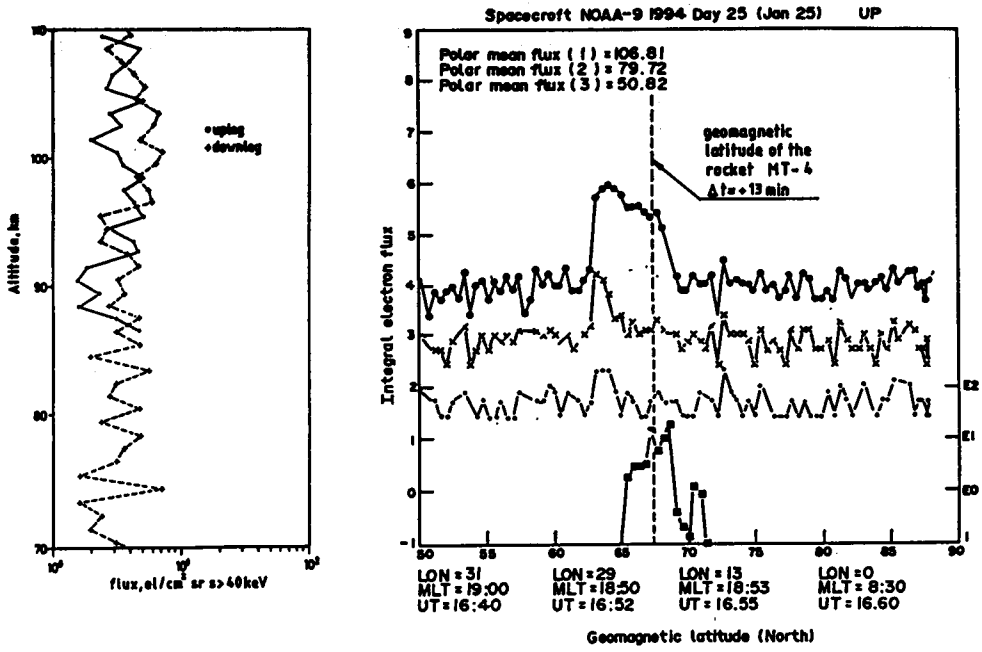

Figure 3. Flux of energetic electrons (> 40 keV) vs. altitude as measured by the rocket-borne Geiger-Müller counters aboard the rocket MT-4 and the corresponding measurements by a TIROS-N satellite. Note that the rocket-borne instrument measured no fluxes exceeding the background, despite the proximity of the satellite's geomagnetic footprint.

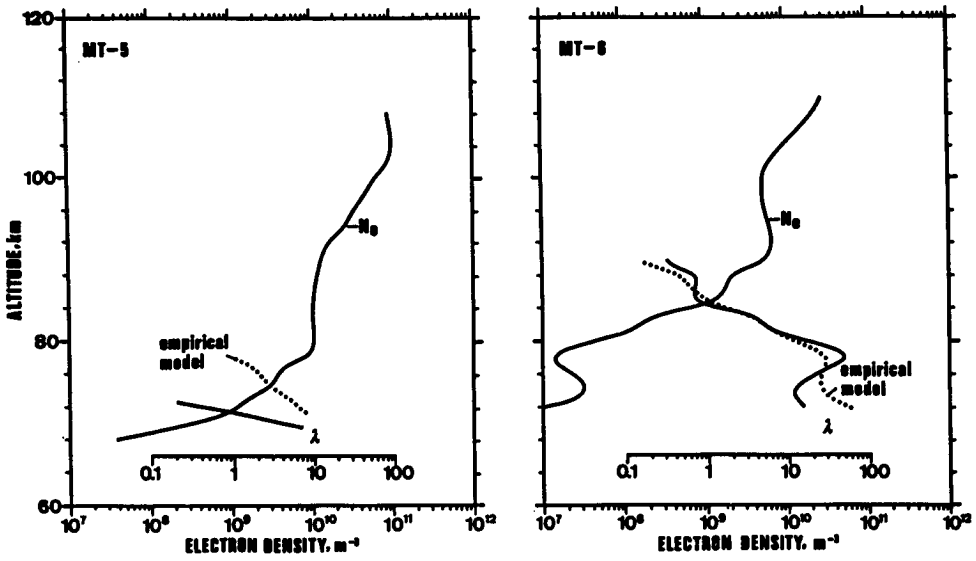

Figure 4. Electron densities and λ (density ratio of negative ions to electrons) for the rocket flights MT-5 and 6.

CONCLUSIONS

A meteorological influence upon the ionosphere has been assumed and is predicted by various models. The observations obtained in the MAP/WINE Campaign have strengthened the following statements:

1. A direct temperature control on radio wave absorption (D-region electron densities) is not evident in the available data, although it can be predicted based on the highly temperature-dependent clustering processes.

2. Daytime absorption tends to decrease after stratospheric warmings which is most probably due to an influence on the chemistry and distribution of minor neutral species (NO,O), rather than a direct temperature influence on the ion chemistry.

3. The only conceivable meteorological influence on the nighttime plasma densities at high latitudes is via the concentration of atomic oxygen, whereas the concentration of NO contributes only marginally to the ion production.

4. To seek a dependence of the electron densities outside the auroral zone on activity inside it was not part of the MAP/WINE Campaign; for completeness it may be added here that such a relation has been found to be, if at all detectable, very poor and only occurring with lags of a few days after the event in the auroral zone [e.g, Torkar et al., *J. Atmos. Terr. Phys.*, *42*, 183, 1980].