9.12 CASE STUDY OF MODELED AND MEASURED D-REGION PLASMA DENSITIES

M. Friedrich

Department of Communications and Wave Propagation
Technical University Graz
Inffeldgasse 12, A-8010 Graz, Austria

Two of the many sounding rockets launched as part of the MAC/Epsilon campaign are particularly suited to test the validity or quality of D-region models. The measurements covered atomic oxygen, neutral temperatures and fluxes of charged particles. With these parameters as inputs, one is thus in the position to assess their relevance for the measured parameters, i.e., ion composition, transition heights of clusters and negative ions and total plasma density. The two IOMAS payloads are believed to be the only night flights with associated measurements of atomic oxygen extending below the ledge at about 80 km.

Table 1. List of Rocket Salvos During the Campaign MAC/Epsilon.

date y,m,d	time UTC	zenith angle deg	payload codes	available data
1987-10-15	10:52	78°	T1	q,N^+
1987-10-21	21:33	120°	T2, T3	q,N^+,N_e,O
1987-11-12	00:21	127°	T4, T5	q,N^+,N_e,O,NO

N^+ density of positive ions, N_e electron density, q ion pair production rate by energetic electrons (> 40 keV), O atomic oxygen density, NO nitric oxide density.

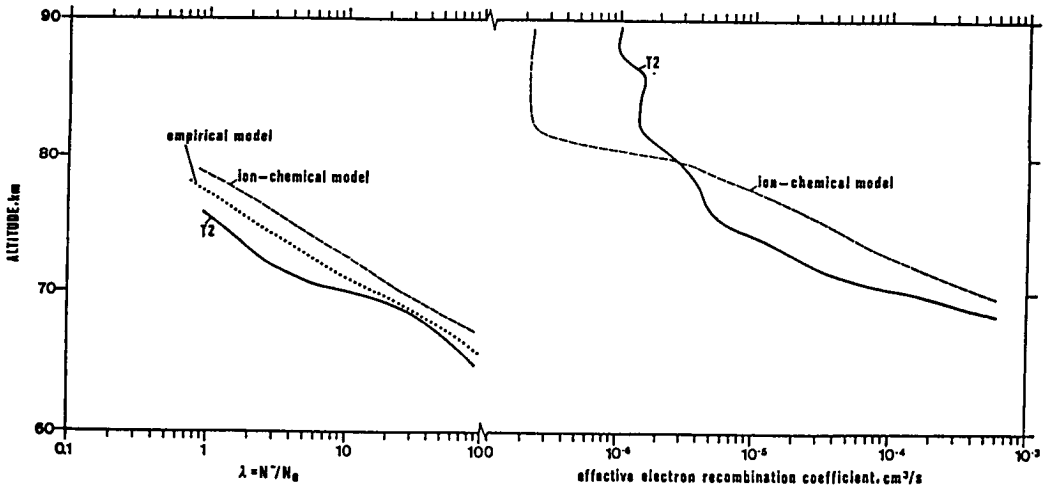

Figure 1. Ratio $\lambda = N^-/N_e$ derived from the rocket flight T2 and the corresponding results from a statistical analysis [Torkar and Friedrich, *J. Atmos. Terr. Phys.*, in press] and an ion-chemical model [Torkar and Friedrich, *J. Atmos. Terr. Phys., 45*, 369, 1983] (left panel). Right panel: effective electron recombination coefficient derived from payload T2 together with the result of the theoretical model [Torkar and Friedrich, *J. Atmos. Terr. Phys., 45*, 369, 1983].

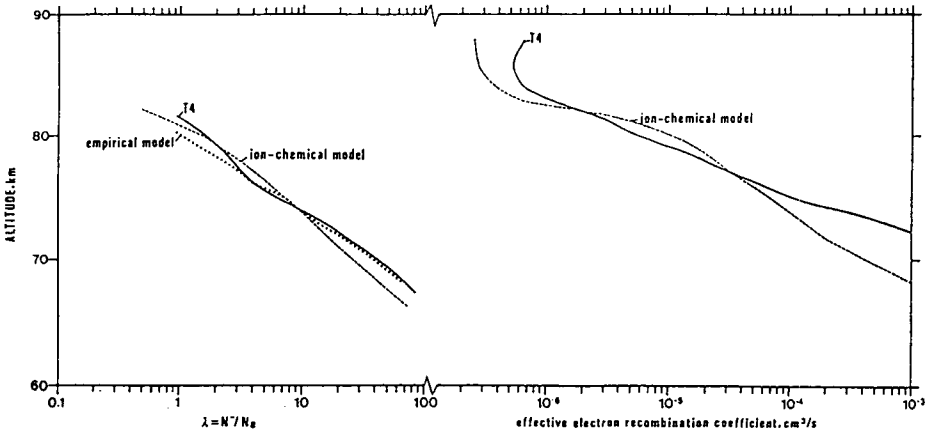

Figure 2. Same as for Figure 1 but for rocket flight T4.

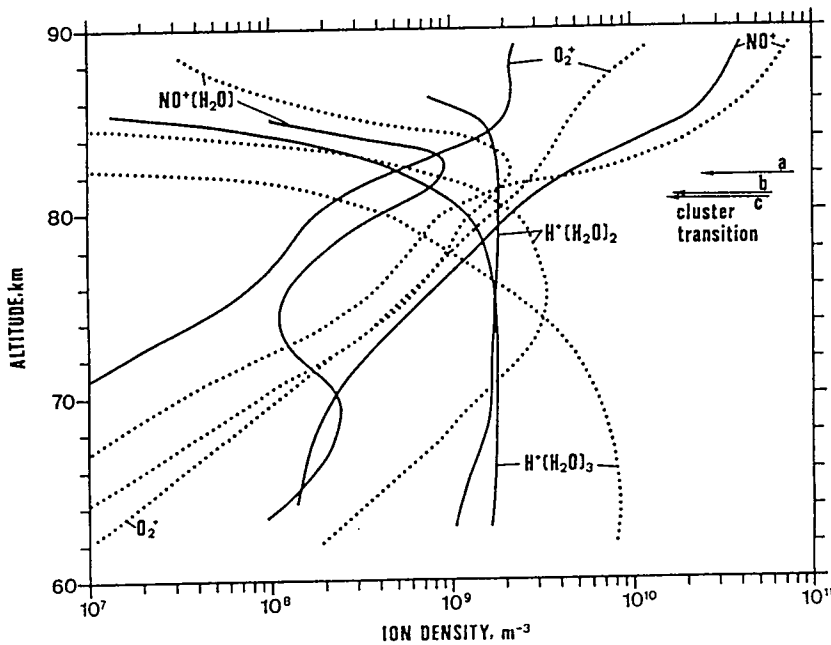

Figure 3. Measured and modeled partial densities of the five most abundant positive ions of the rocket flight T4. Full lines = measurement, dotted lines = ion-chemical modeling. Transition height from cluster to molecular ions: a = statistical model, b = measured, c = ion chemical model.