Arecibo

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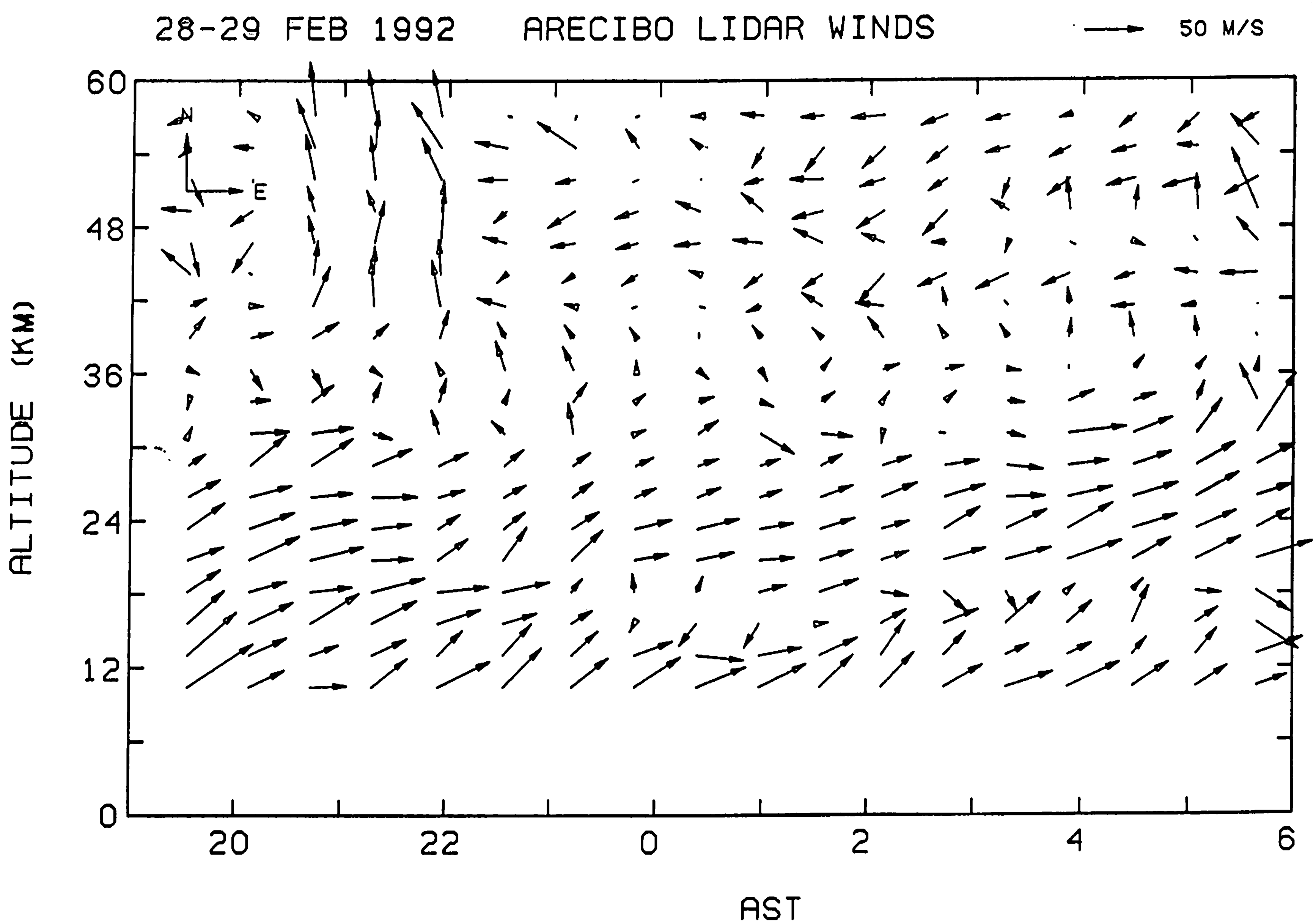


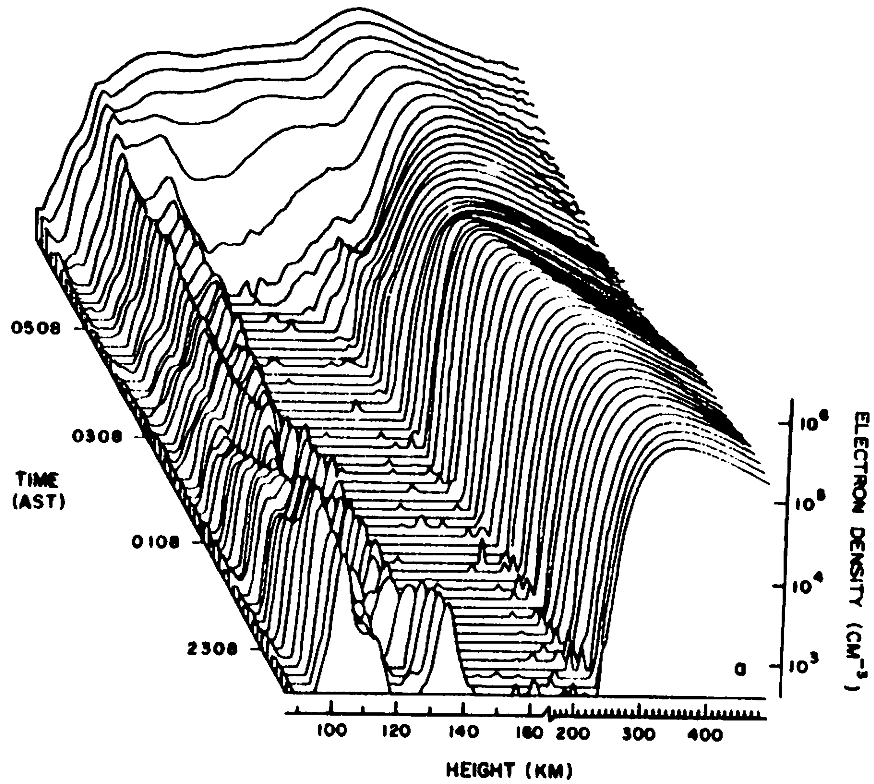


Fig. 5.19. (a) Electron density profiles for the night of April 16–17, 1974. This night was extremely quiet magnetically. (b) Electron density profiles for the night of April 17–18, 1974. This night was somewhat disturbed, and an intermediate layer can be seen. Note also the undulations of the F layer. (c) Profiles for the night of April 5–6, 1974. The intermediate layer on this night was particularly well defined and hence suitable for detailed study. The K_p index on this night ranged from 3 to 6. [Parts (a)–(c) after Shen *et al.* (1976). Reproduced with permission of the American Geophysical Union.] (d) Altitude variation of a number of layers detected during a 78-h period over Arecibo. (Courtesy of J. D. Mathews.)

tribute to the formation of irregularities. In this section we discuss a few of the more important sources of ionospheric structure.

5.3.1 Large-Scale Organization of the Mid-Latitude Nighttime Ionospheric Plasma

Three graphic examples of consecutive plasma density profiles detected in the nighttime Arecibo ionosphere were presented in Figs. 519a–c. The April 16–17, 1974 night shown in Fig. 5.19a was very quiet magnetically, while the other

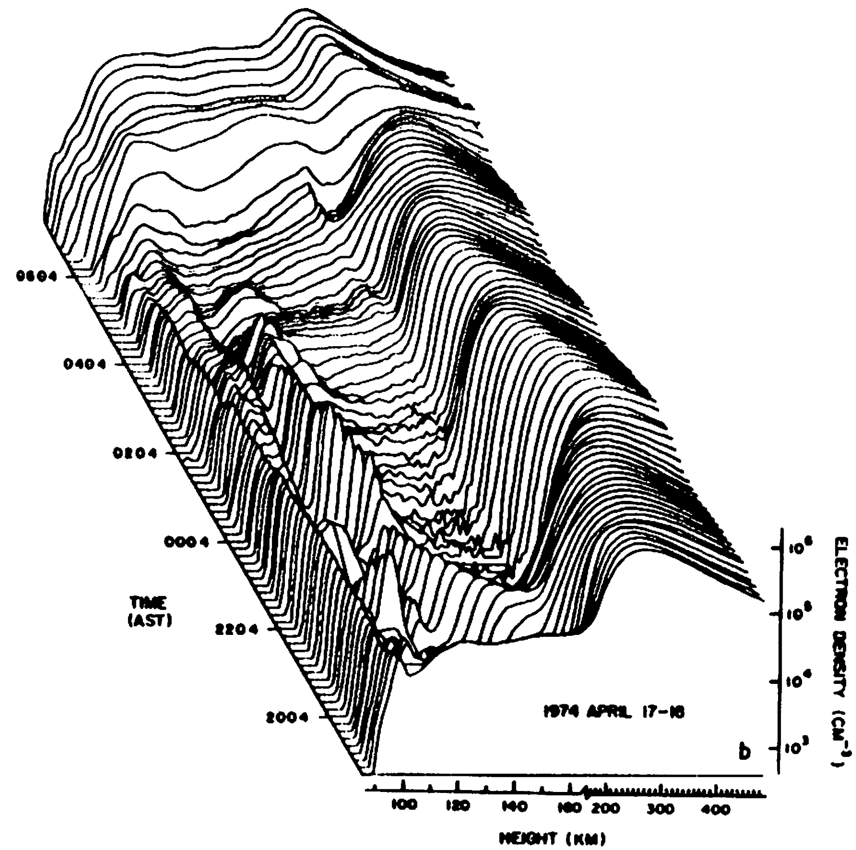
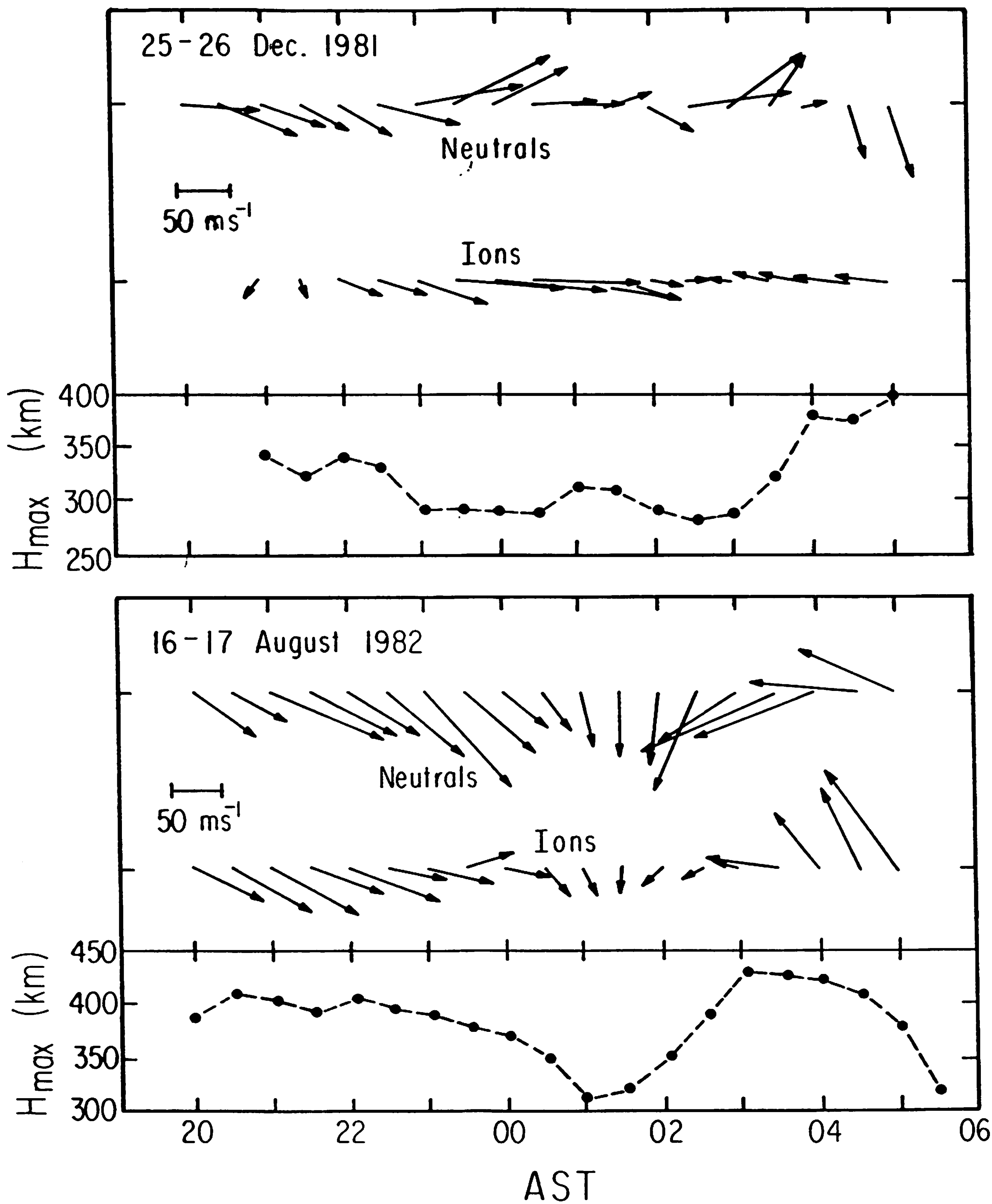


Fig. 5.19 (*Continued*)

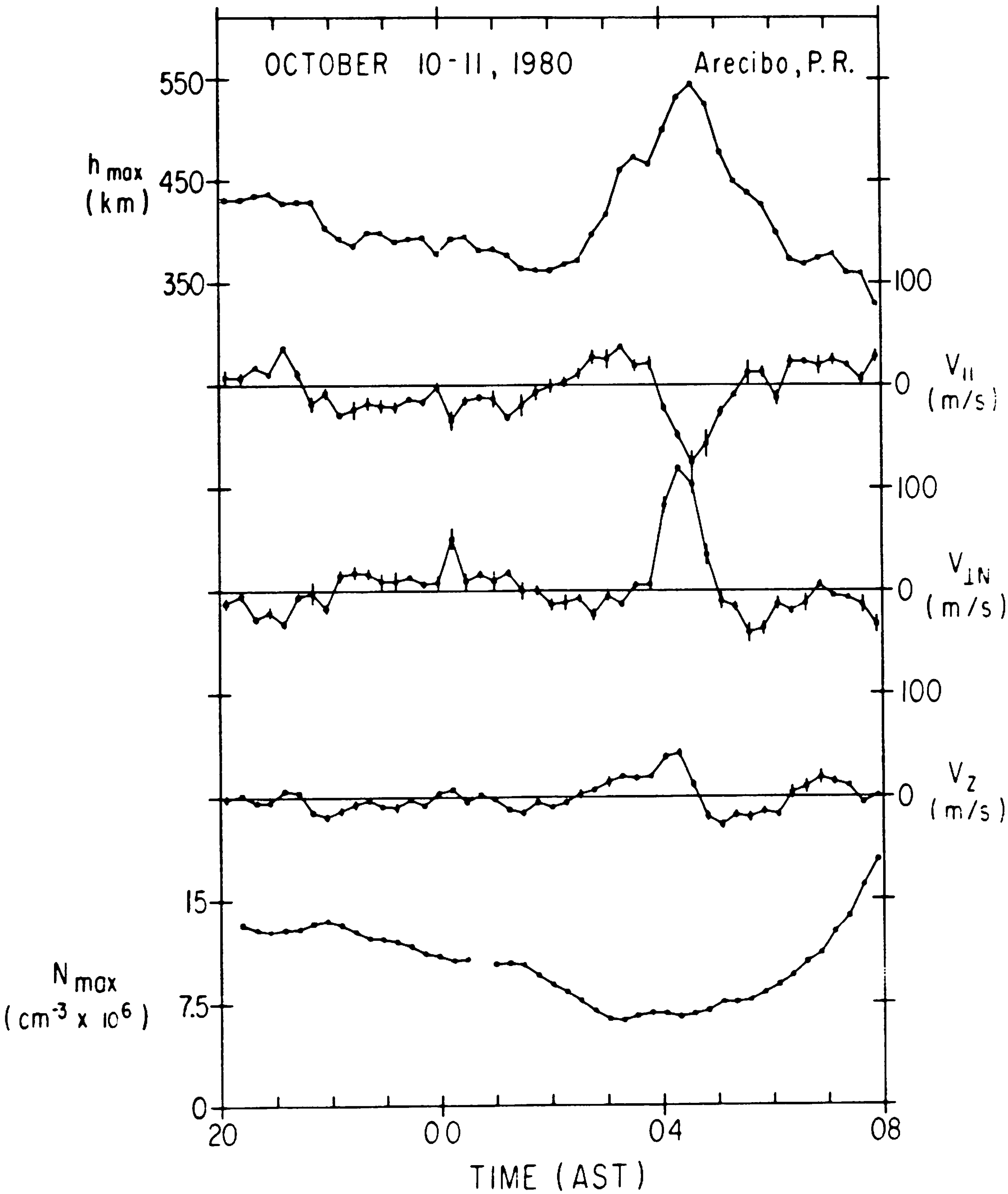
nights were moderately disturbed. The solar influence can be clearly seen at sunrise, when the deeply depressed plasma in the F-layer "valley" between 160- and 240-km altitude fills in and causes even the E-region structure to merge into the fairly featureless daytime ionospheric profiles at the top of each figure.

Some features are common to all nights. The high-density F layer itself displays undulations with a typical period of 2 h. The F layer rose and fell by many tens of kilometers during these long-period oscillations. In the E region between 90 and 120 km very intense layers developed on each night and lasted from sunset to sunrise.

On the more magnetically active nights the plasma density in the valley region is very much elevated over the quiet night. Whenever there are electrons to scatter from, the radar can detect motion and organization of the plasma. For example, on the nights when plasma is present in the valley a piece of the E regi-

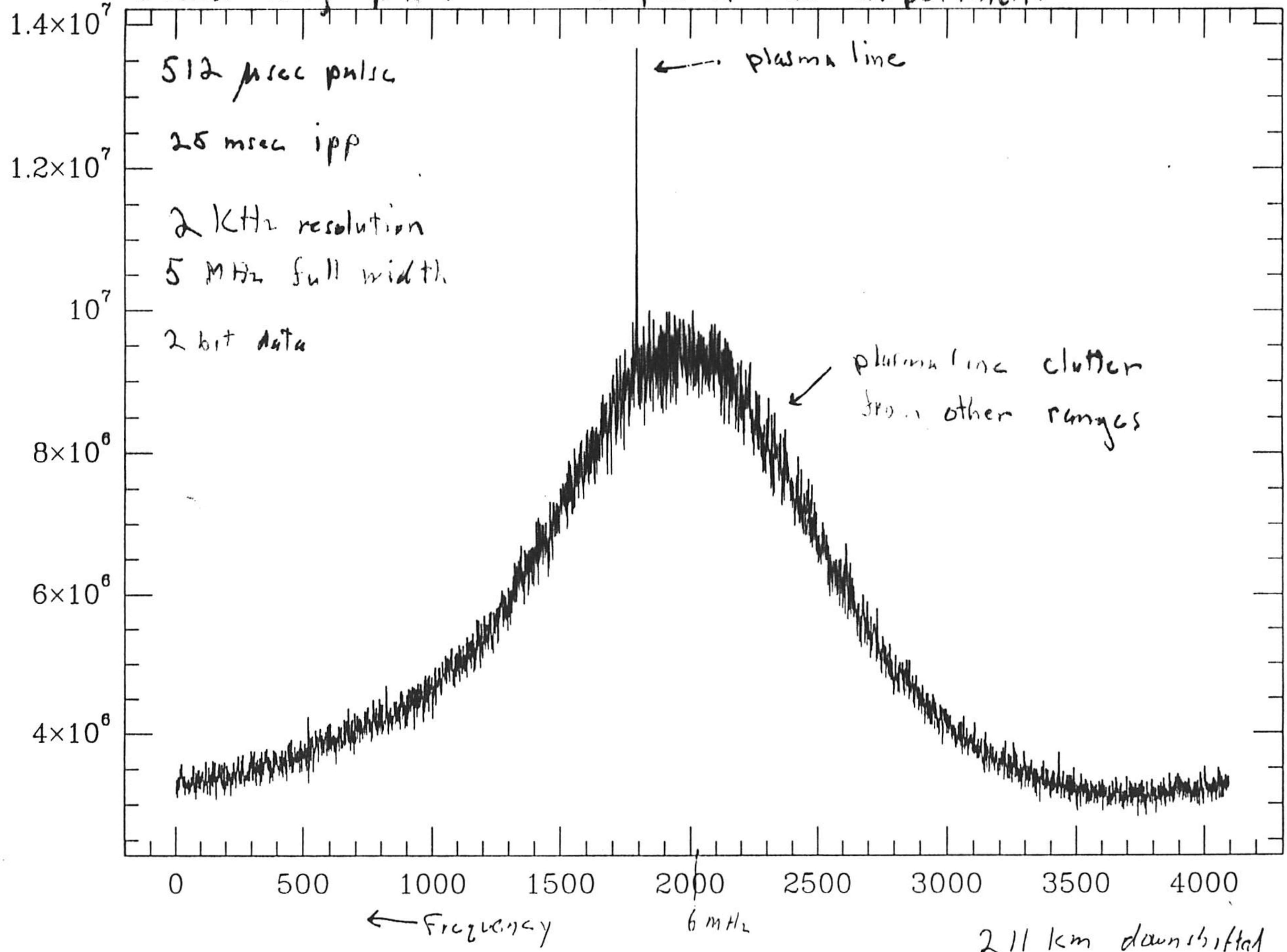


25-26 Dec. 1981
Neutrals
50 ms⁻¹
Ions
Hmax (km)
400
350
300
250
16-17 August 1982
Neutrals
50 ms⁻¹
Ions
Hmax (km)
450
400
350
300
20
22
00
02
04
06
AST



OCTOBER 10-11, 1980
Arecibo, P.R.
h_{max} (km)
550
450
350
100
$V_{\parallel}$ (m/s)
0
100
$V_{\perp N}$ (m/s)
0
100
V_Z (m/s)
0
N_{max} ($cm^{-3} \times 10^6$)
15
7.5
0
20
00
04
08
TIME (AST)

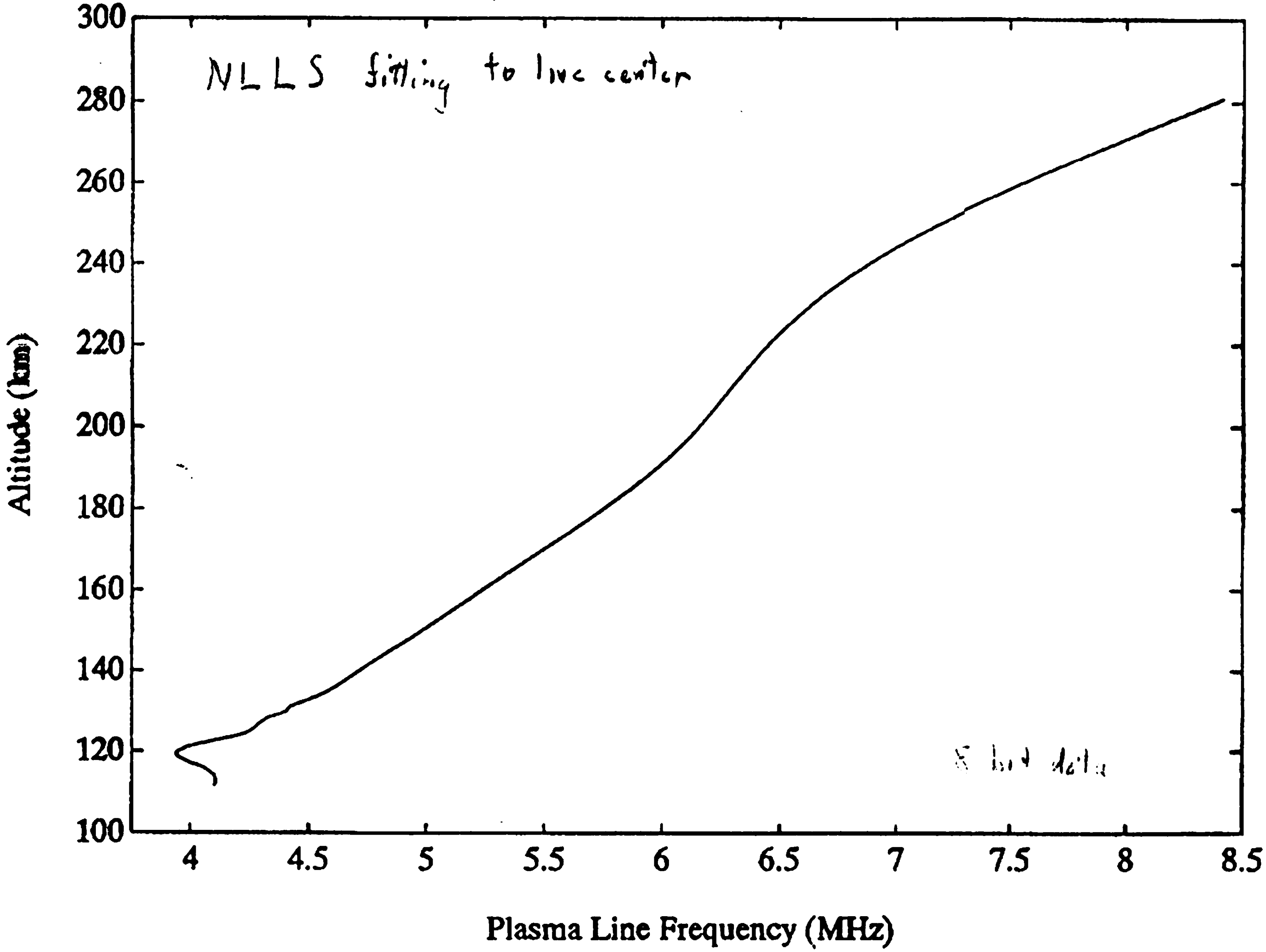
Coded long pulse natural plasma line experiment



211 km downshifted
50 sec int

max at 1792

15 May 1991, 11:20:00.0 - 11:20:12.5 AST



FUTURE ACTIVITIES

* IONOSPHERIC PHYSICS & CHEMISTRY

* THERMOSPHERIC DYNAMICS

  - COORDINATED MULTIPLE INSTRUMENTS

  - HIGH ACCURACY MEASUREMENTS

* MIDDLE ATMOSPHERE DYNAMICS

  - MESOSPHERE

  - STRATOSPHERE

* NATURAL IONOSPHERIC IRREGULARITIES

* IONOSPHERIC MODIFICATION

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