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Supporting Information for

Ionospheric electron heating associated with pulsating auroras: Joint optical and PFISR observations

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Figure S1. Scatter plot of PFMSP intensities.

Figure S2. AMPERE and AMIR results of FACs.

Other Figures: PFISR summary plots of T_e and N_e.

Introduction

In this supplementary material we present plots from a few complementary datasets that will support our analyses in the main text.

Figure S1. (a) sampled PFMSP blue-line (427.8nm) and green-line (557.7nm) auroral

intensities during pulsating auroral intervals; (b) sampled PFMSP 427.8nm and red-line (630.0nm) intensities during pulsating auroral intervals. Note that to evaluate each intensity ratio we have applied two methods and labeled the results in the plot, one is via a linear regression, the others via direct statistics on the intensity ratio.

Figure S2. (a) Map showing the Iridium constellation at 1220-1230 UT. The magnetic perturbation vectors measured by satellites are labeled as arrows. The Poker Flat (PKR) location is marked. (b) THEMIS ASI keogram along PFISR meridian. (c) The FAC along the PKR meridian obtained from the AMPERE analysis. Negative value indicates upward FAC. The horizontal line in (b) and the vertical line in (c) mark the MLAT of Poker Flat. (d)-(i) six AMIE maps showing the FAC distribution during three pulsating auroral intervals, two frames for each. The magnetic perturbation at each ground station is rotated 90^0 clockwise to represent the equivalent current vector and superimposed in the plot. The Poker Flat (PKR) and For Yukon (FYKN) stations are marked.

We also present in the supplementary material PFISR summary plots of T_e and N_e on all beams during the interval of interest in two experimental modes, Freg732_v01 (before 13 UT) and WorldDay35 (after 13 UT).

Movie S1:

An auroral movie taken from THEMIS ASI at Fort Yukon during 1145-1350 UT on 19 March, 2015.

Figure S1

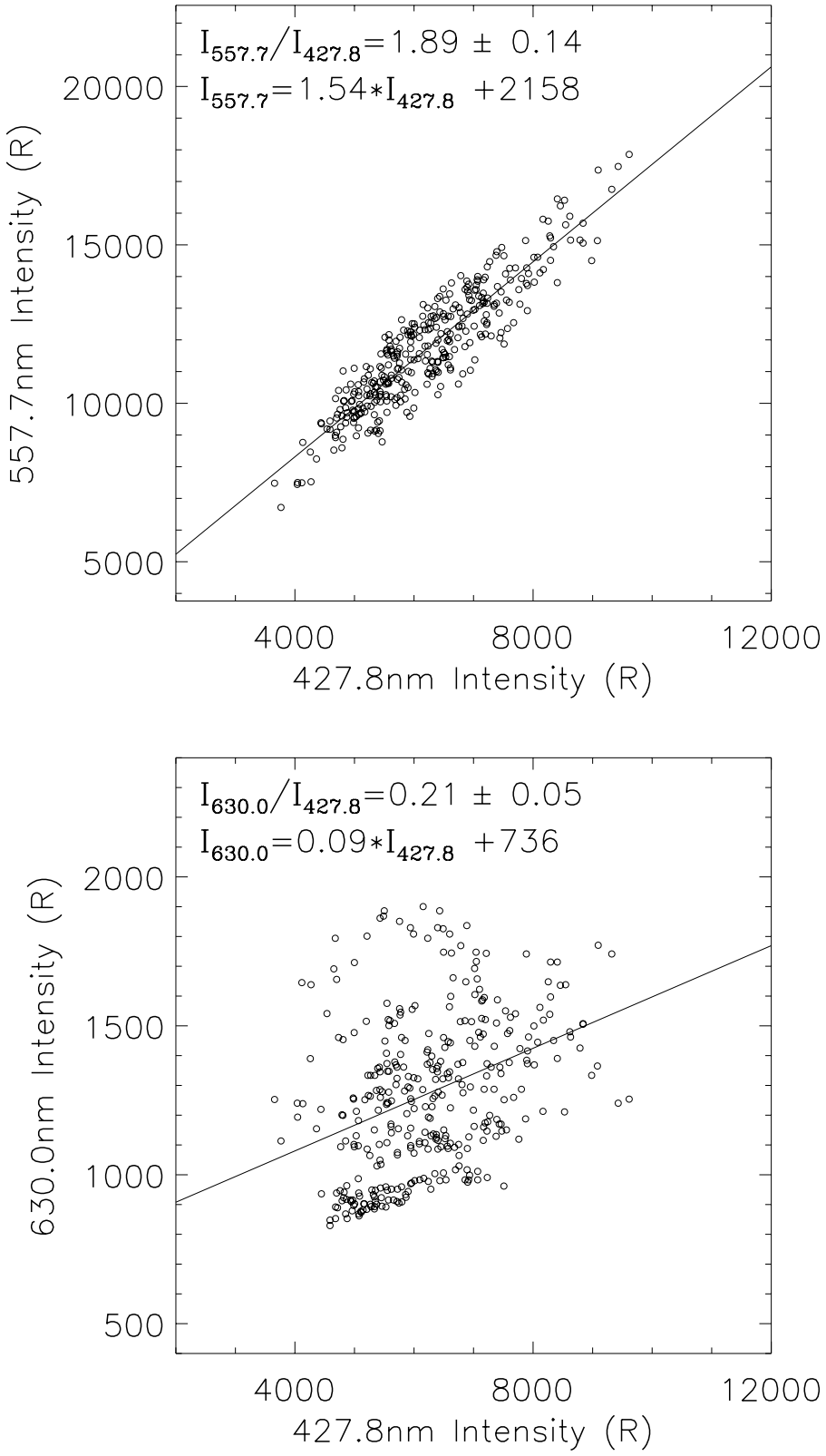
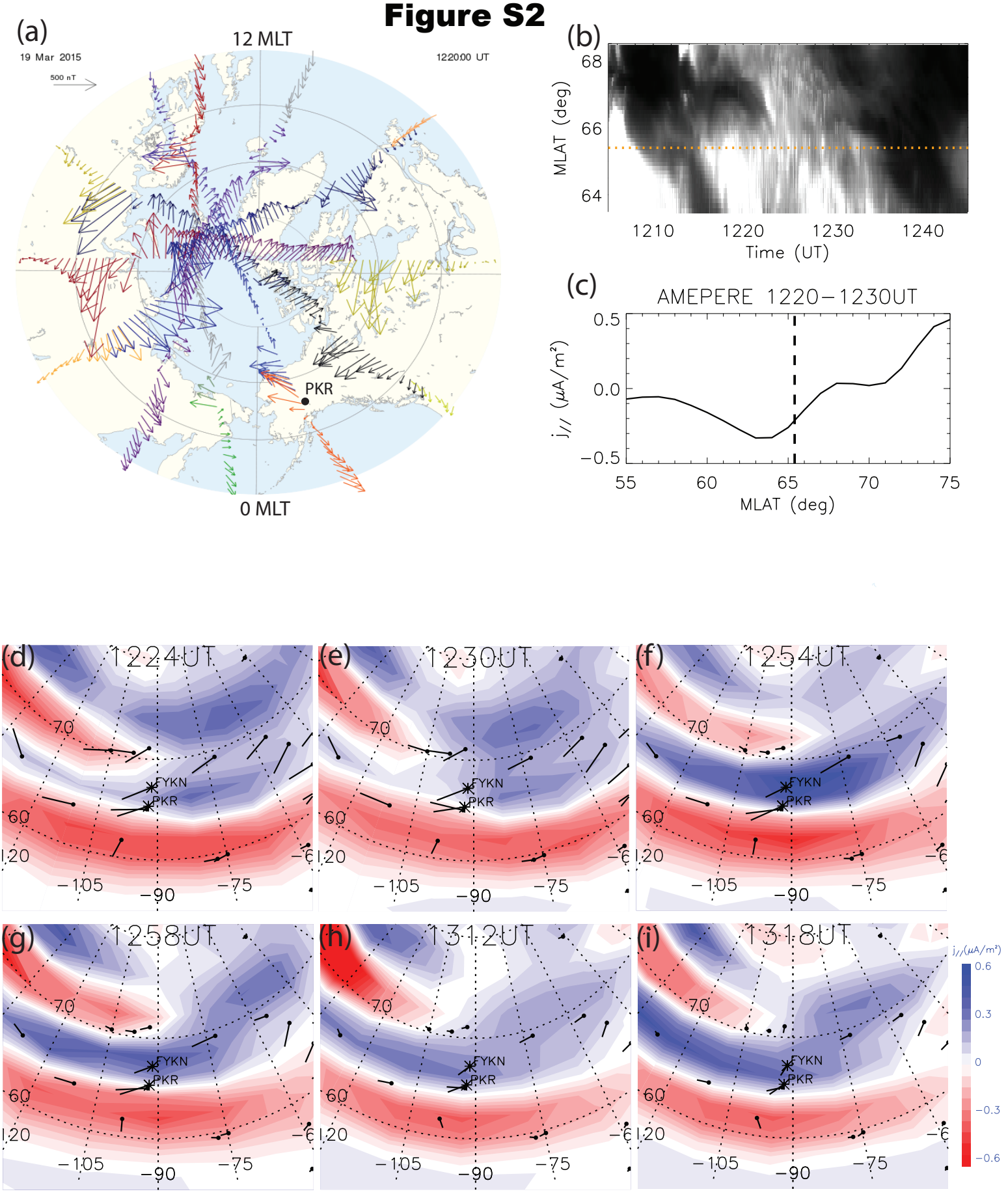
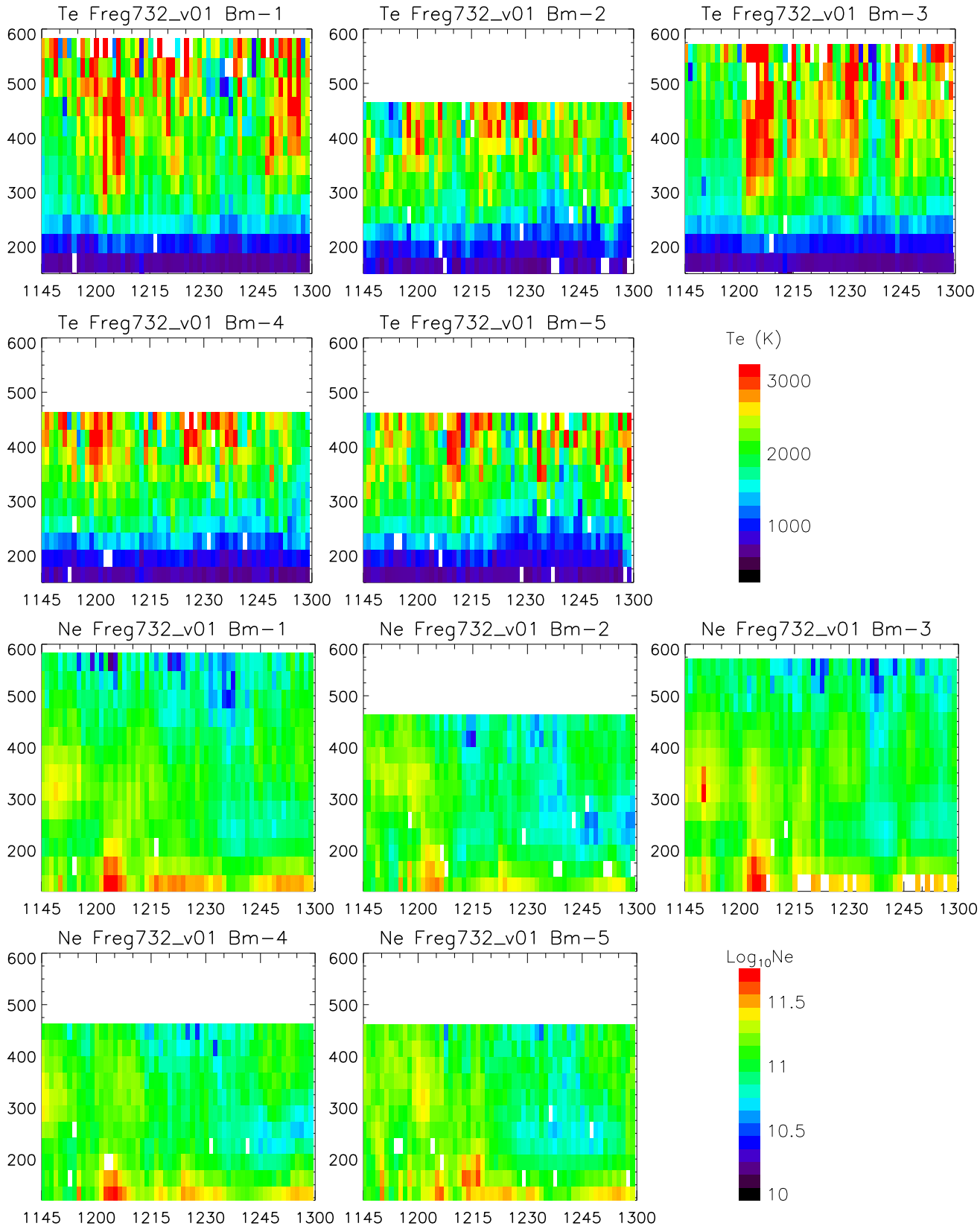
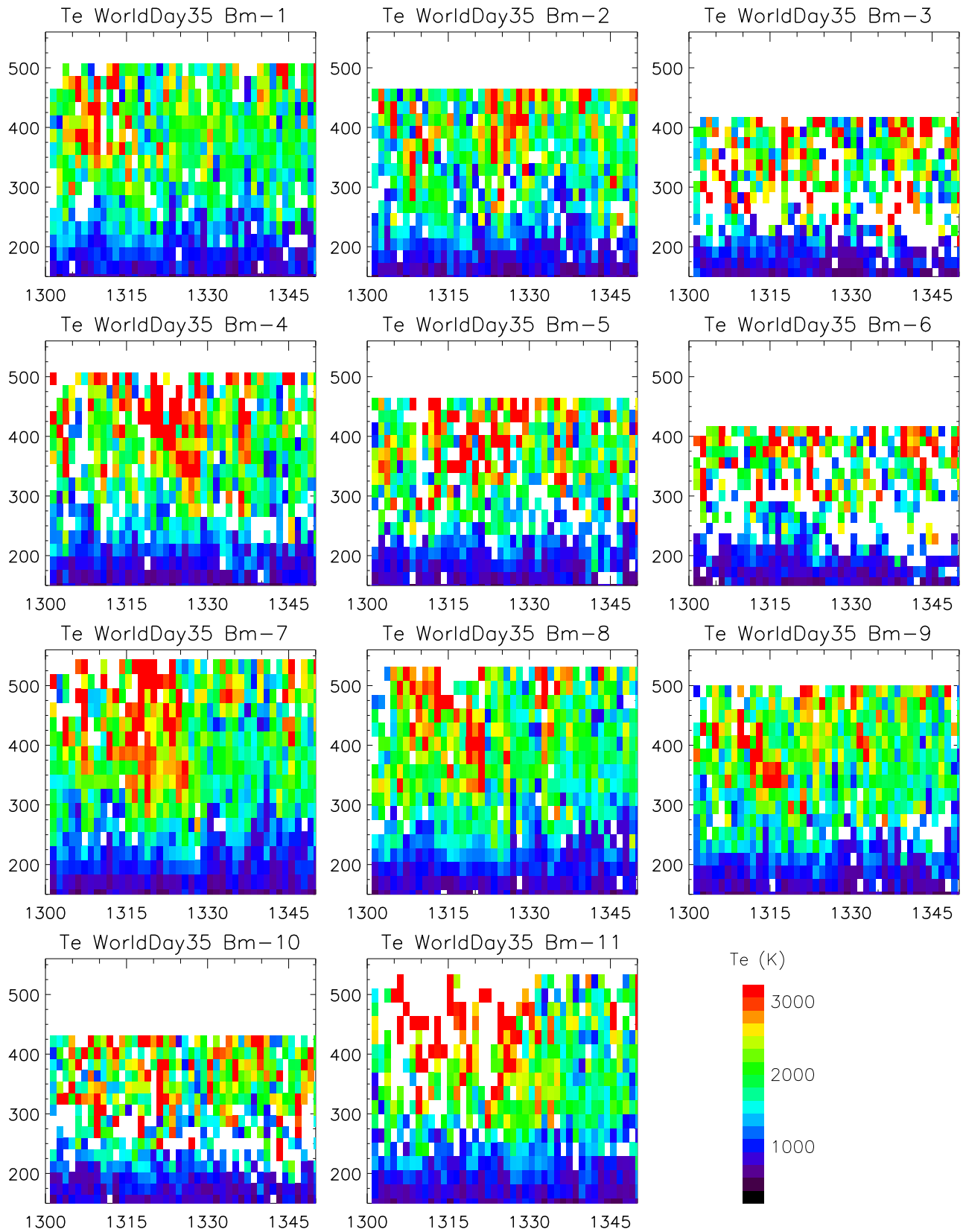
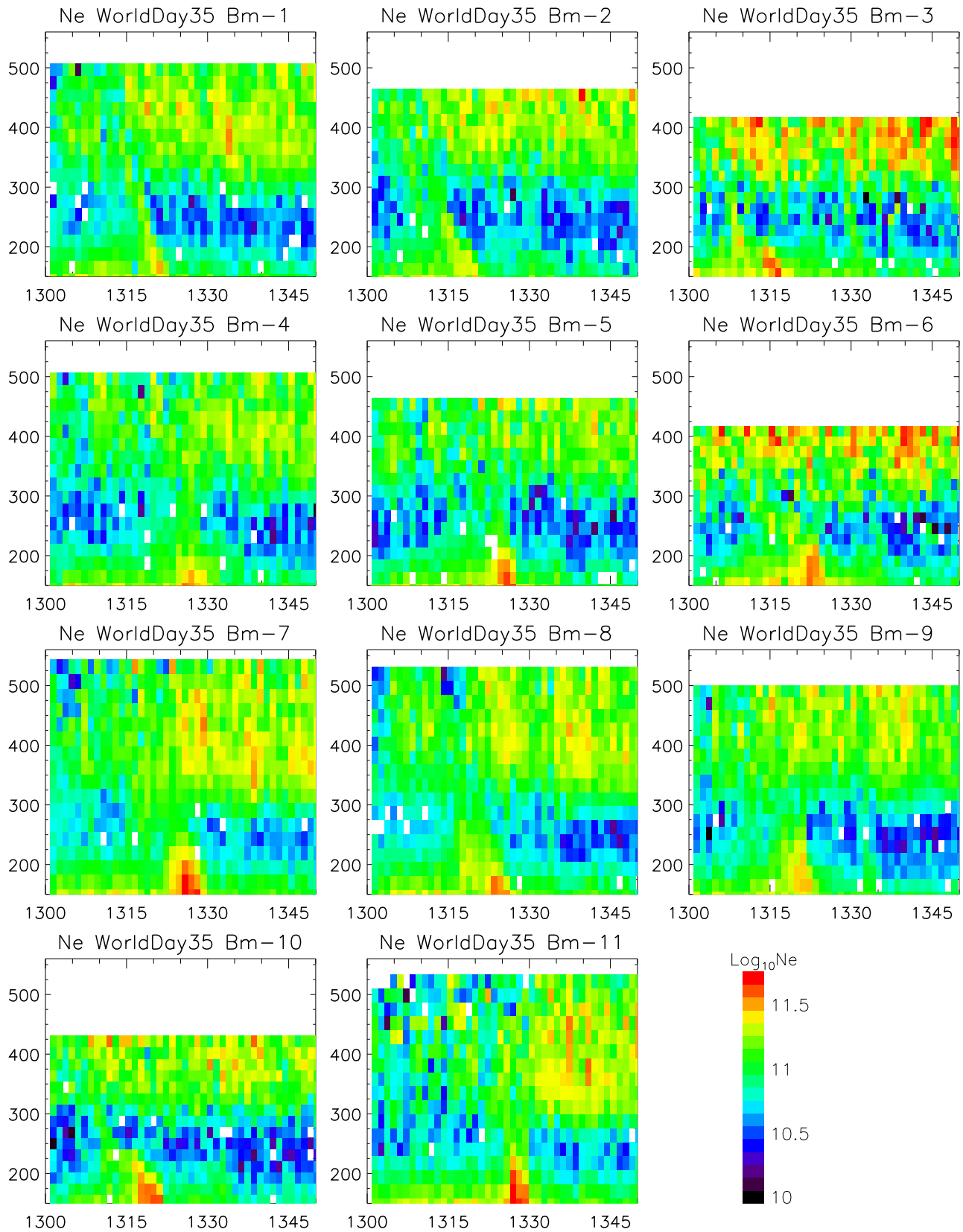

$I_{557.7}/I_{427.8}$=1.89 ± 0.14
$I_{557.7}$=1.54*$I_{427.8}$ +2158
557.7nm Intensity (R)
20000
15000
10000
5000
4000
8000
12000
427.8nm Intensity (R)
$I_{630.0}/I_{427.8}$=0.21 ± 0.05
$I_{630.0}$=0.09*$I_{427.8}$ +736
630.0nm Intensity (R)
2000
1500
1000
500
4000
8000
12000
427.8nm Intensity (R)

Figure S2


(a)
12 MLT
19 Mar 2015
1220:00 UT
500 nT
PKR
0 MLT
(b)
68
66
64
MLAT (deg)
1210
1220
1230
1240
Time (UT)
(c)
AMEPERE 1220–1230UT
0.5
0.0
−0.5
j// (μA/m²)
55
60
65
70
75
MLAT (deg)
(d)
1224UT
(e)
1230UT
(f)
1254UT
(g)
1258UT
(h)
1312UT
(i)
1318UT
70
60
FYKN
PKR
120
−105
−90
−75
j//(μA/m²)
0.6
0.3
0
−0.3
−0.6


Te Freg732_v01 Bm-1
Te Freg732_v01 Bm-2
Te Freg732_v01 Bm-3
Te Freg732_v01 Bm-4
Te Freg732_v01 Bm-5
Te (K)
3000
2000
1000
Ne Freg732_v01 Bm-1
Ne Freg732_v01 Bm-2
Ne Freg732_v01 Bm-3
Ne Freg732_v01 Bm-4
Ne Freg732_v01 Bm-5
Log10Ne
11.5
11
10.5
10
600
500
400
300
200
1145
1200
1215
1230
1245
1300


Te WorldDay35 Bm−1
Te WorldDay35 Bm−2
Te WorldDay35 Bm−3
Te WorldDay35 Bm−4
Te WorldDay35 Bm−5
Te WorldDay35 Bm−6
Te WorldDay35 Bm−7
Te WorldDay35 Bm−8
Te WorldDay35 Bm−9
Te WorldDay35 Bm−10
Te WorldDay35 Bm−11
500
400
300
200
1300
1315
1330
1345
Te (K)
3000
2000
1000


Ne WorldDay35 Bm−1
Ne WorldDay35 Bm−2
Ne WorldDay35 Bm−3
Ne WorldDay35 Bm−4
Ne WorldDay35 Bm−5
Ne WorldDay35 Bm−6
Ne WorldDay35 Bm−7
Ne WorldDay35 Bm−8
Ne WorldDay35 Bm−9
Ne WorldDay35 Bm−10
Ne WorldDay35 Bm−11
500
400
300
200
1300
1315
1330
1345
Log10Ne
11.5
11
10.5
10