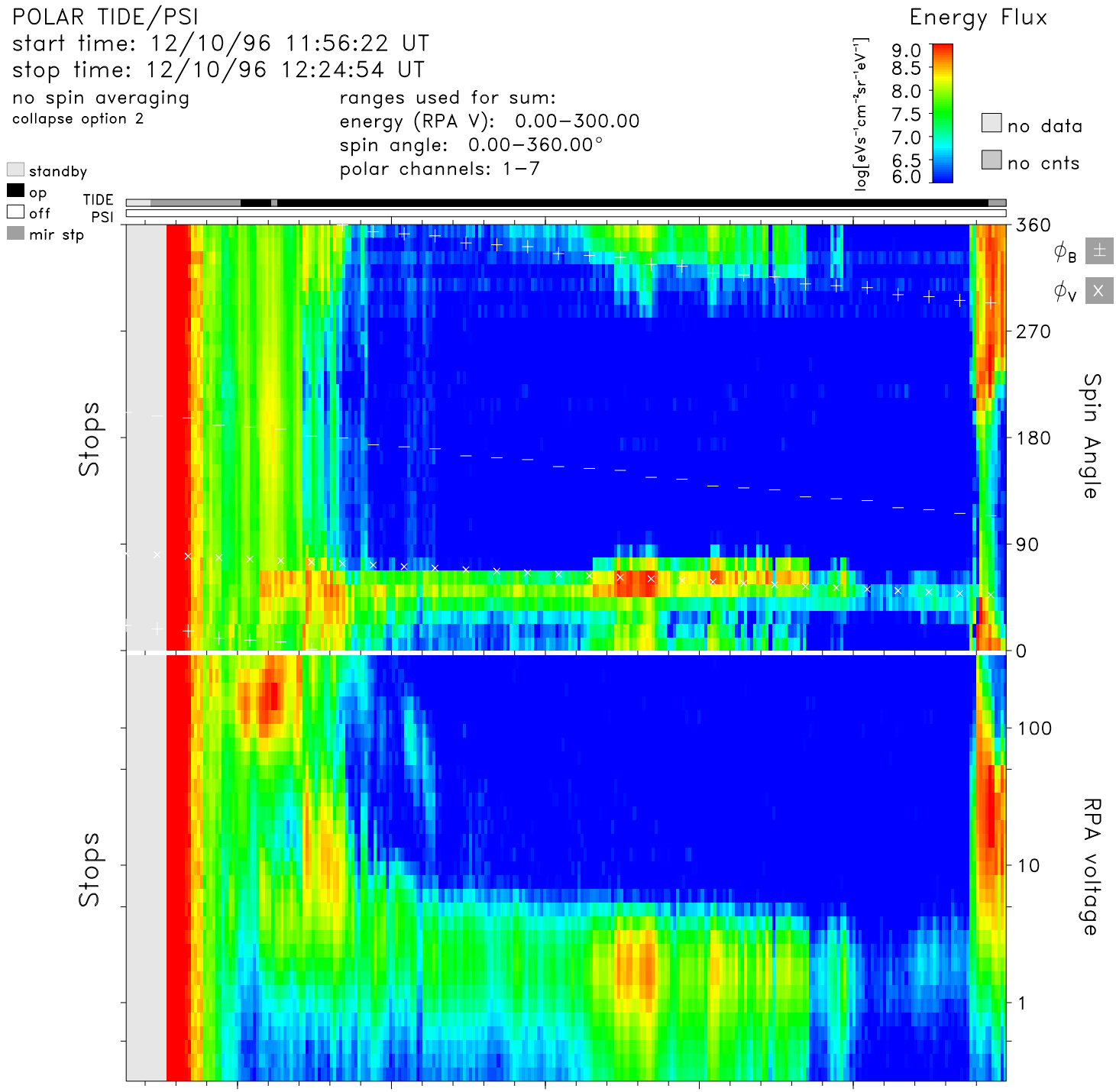
TIDE Sensitivity Variations

I have attempted to make a quick estimate of the sensitivity variation using perigee observations of rammed O+. The comparisons are made under the assumption that if properly calibrated densities from different days are plotted vs. spacecraft potential the curves should fall on top of one another. Conversely, if the calibration is held constant and the sensitivity varies with time the curves should be offset. Assuming this is correct you can draw your own conclusion from the following datasets.

I have chosen one pass from December of each year by picking a clean polar cap pass without evidence of higher energy ions (presumably without any charging due to energetic electrons). The figures show the summary plots for each pass and then a comparison of the density vs. potential curves - comparing each successive year to 1996.

POLAR TIDE/PSI
start time: 12/10/96 11:56:22 UT
stop time: 12/10/96 12:24:54 UT
no spin averaging
collapse option 2

ranges used for sum:
energy (RPA V): 0.00–300.00
spin angle: 0.00–360.00°
polar channels: 1–7



time	12:00	12:05	12:10	12:15	12:20	hr:mn
Re	1.9	1.9	1.9	1.9	1.9	Re
Lshell	12.7	37.9	100.0	89.5	19.2	
mlt	8.9	9.2	11.3	19.7	20.2	hrs
mlat	−66.9	−77.0	−86.9	−81.6	−71.5	degs
invlat	73.7	80.6	87.7	83.9	76.8	degs

tide_lz_v4.1.0
Fri Feb 27 11:43:59 1998
plot: t9612101156_1224_sp.eshtr.ps

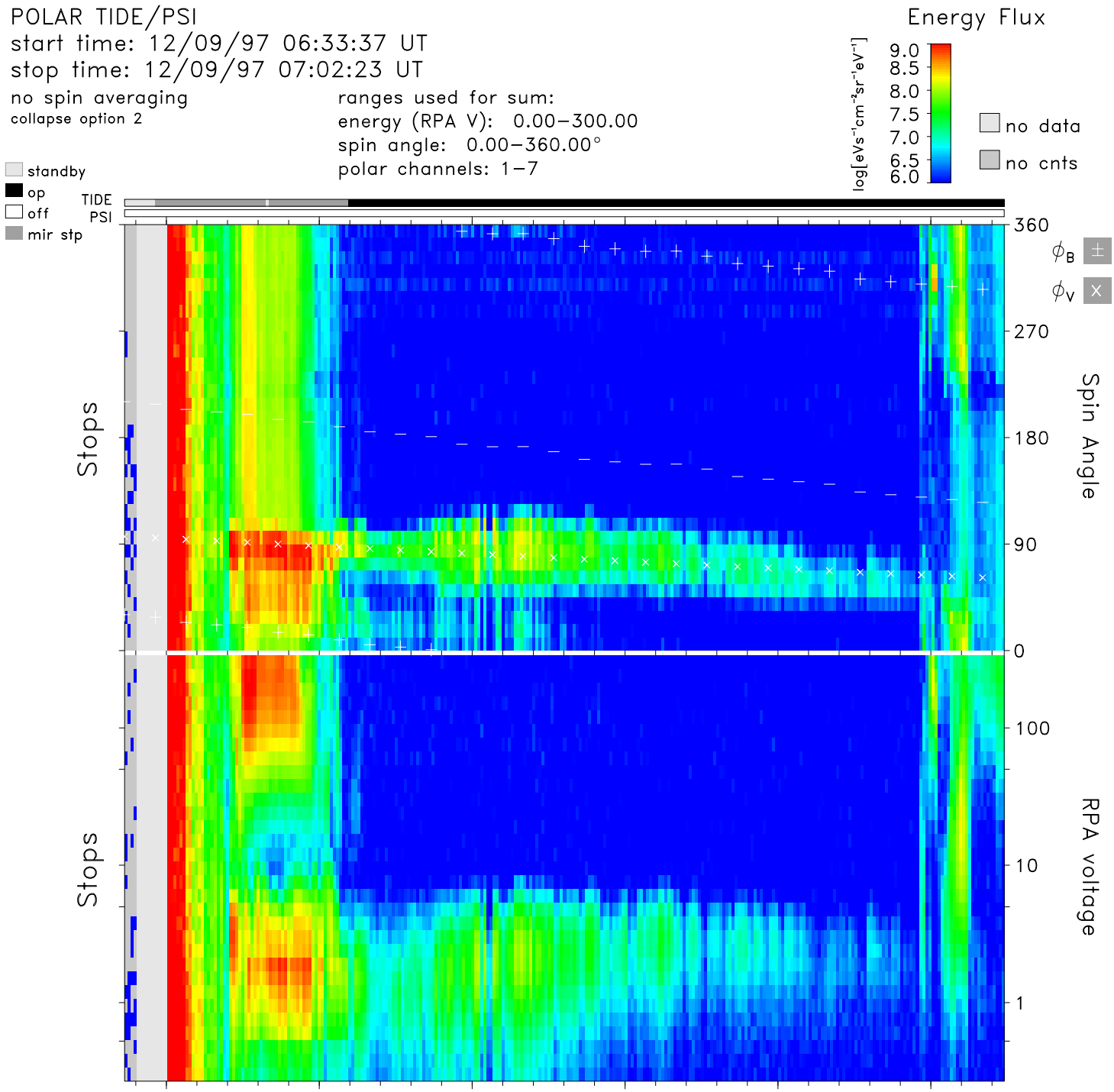
sector_sens: no correction
calibration: tide_calib.v5
mass_calibration: mass_calib.v7
ion_mask: t961211_v2.mask

attitude: 96121001.cdf
orbit: 96121001.cdf
level–zero: 96121001.dat

POLAR TIDE/PSI
start time: 12/09/97 06:33:37 UT
stop time: 12/09/97 07:02:23 UT

no spin averaging
collapse option 2

ranges used for sum:
energy (RPA V): 0.00–300.00
spin angle: 0.00–360.00°
polar channels: 1–7

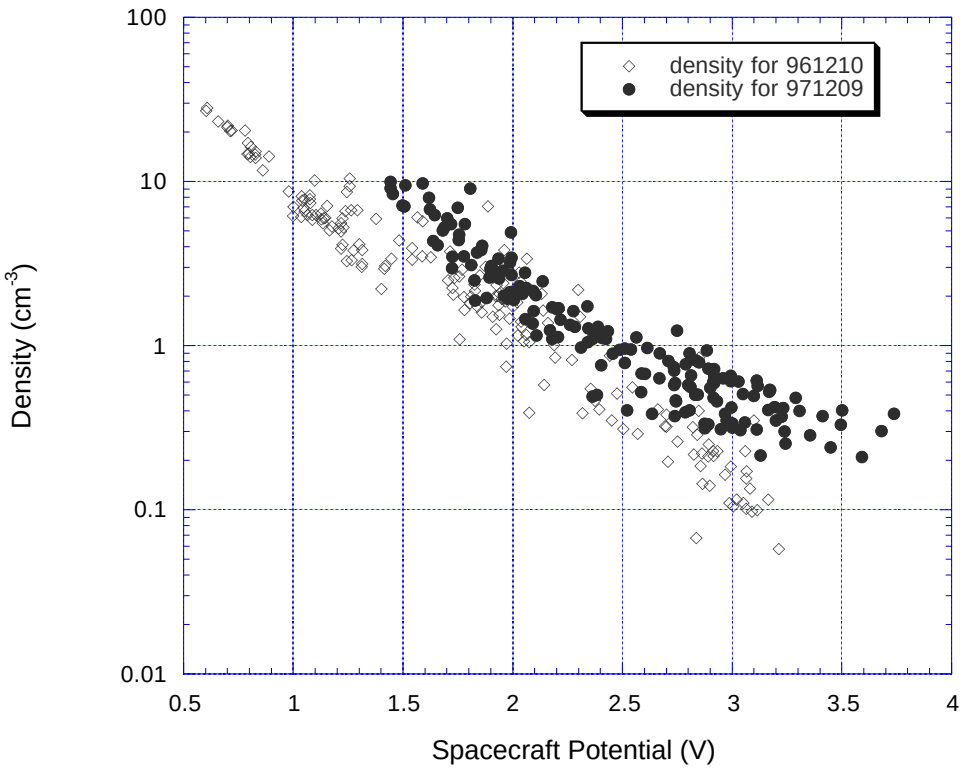


time	06:35	06:40	06:45	06:50	06:55	07:00	hr:mn
Re	1.9	1.9	1.9	1.9	2.0	2.0	Re
Lshell	9.3	20.0	57.6	63.4	23.4	11.2	
mlt	7.2	6.5	4.6	0.6	22.6	21.8	hrs
mlat	−62.8	−72.0	−79.5	−80.0	−73.1	−64.8	degs
invlat	70.9	77.1	82.4	82.8	78.1	72.6	degs

tide_lz_v4.1.0
Fri Jan 9 11:02:40 1998
plot: t9712090633_0702_sp.eshtr.ps

sector_sens: no correction
calibration: tide_calib.v5
mass_calibration: mass_calib.v7
ion_mask: t971210_v2.mask

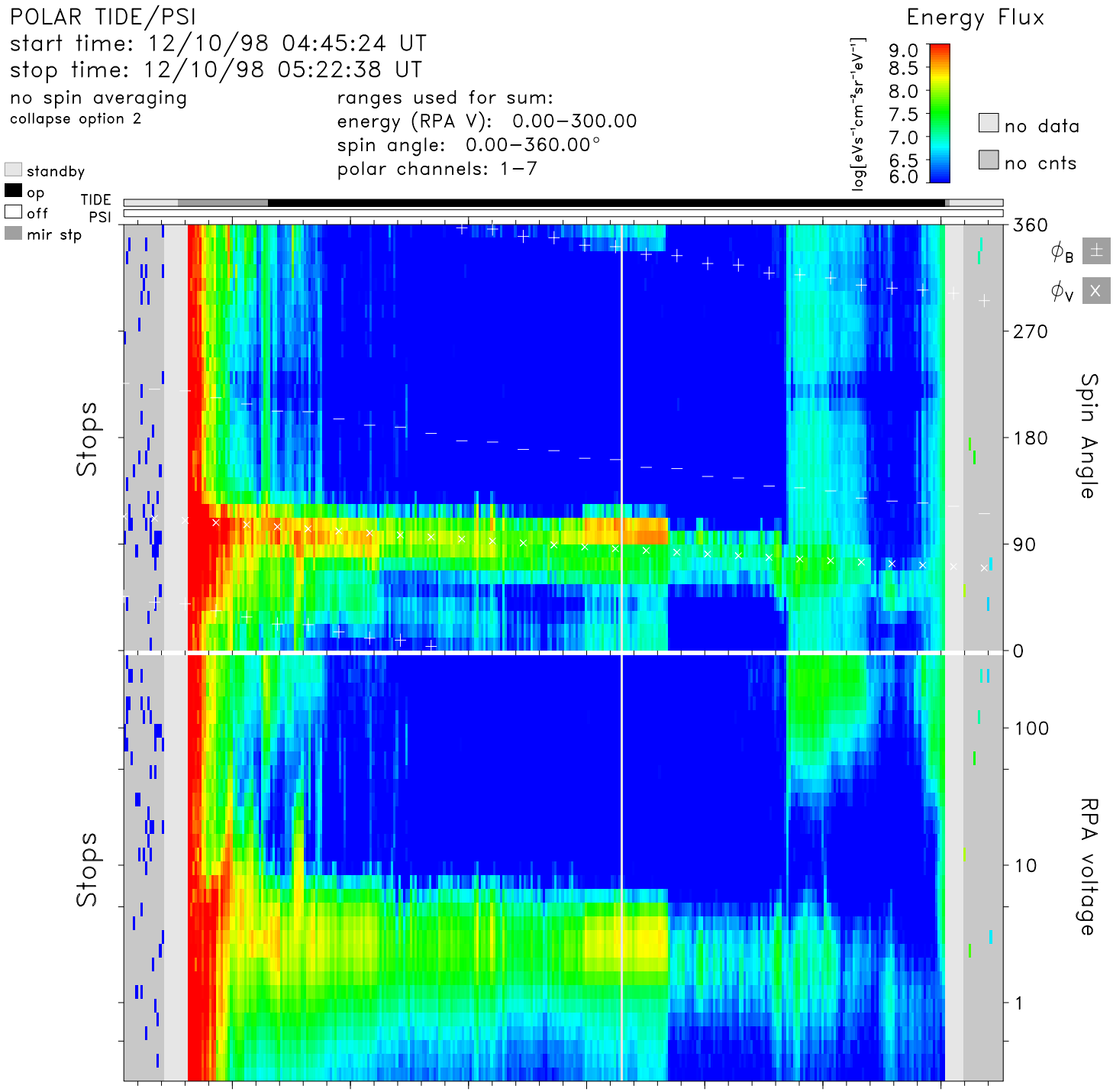
attitude: 97120900.cdf
orbit: 97120900.cdf
level−zero: 97120900.dat


density for 961210
density for 971209
100
10
1
0.1
0.01
Density (cm-3)
0.5
1
1.5
2
2.5
3
3.5
4
Spacecraft Potential (V)

POLAR TIDE/PSI
start time: 12/10/98 04:45:24 UT
stop time: 12/10/98 05:22:38 UT

no spin averaging
collapse option 2

ranges used for sum:
energy (RPA V): 0.00–300.00
spin angle: 0.00–360.00°
polar channels: 1–7

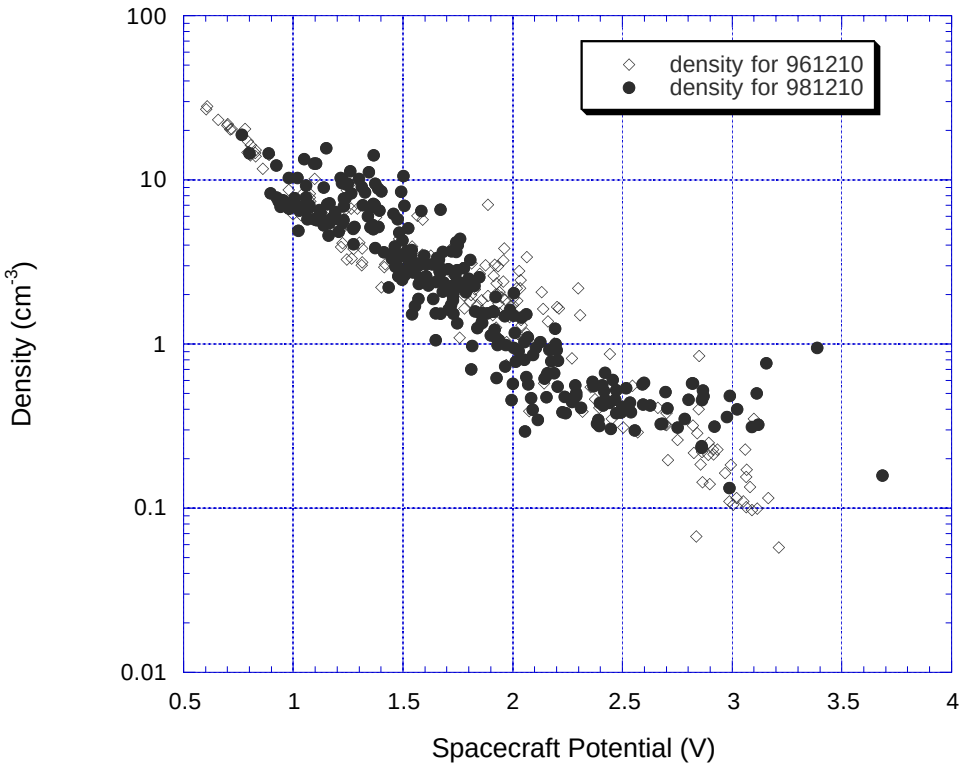


time	04:50	04:55	05:00	05:05	05:10	05:15	05:20	hr:mn
Re	1.8	1.8	1.9	1.9	2.0	2.1	2.2	Re
Lshell	10.9	29.8	96.6	48.0	18.3	10.1	6.9	
mlt	6.8	5.8	2.7	22.8	21.6	21.1	20.8	hrs
mlat	−65.7	−75.6	−82.0	−78.4	−70.6	−62.7	−55.3	degs
invlat	72.3	79.5	84.2	81.7	76.5	71.7	67.7	degs

tide_lz_v5.1.0
Mon Jan 25 13:38:41 1999
plot: t9812100445_0522_sp.eshtr.ps
no minimum subtracted

sector_sens: no correction
calibration: tide_calib.v5
mass_calibration: mass_calib.v7
ion_mask: t981210_v2.mask

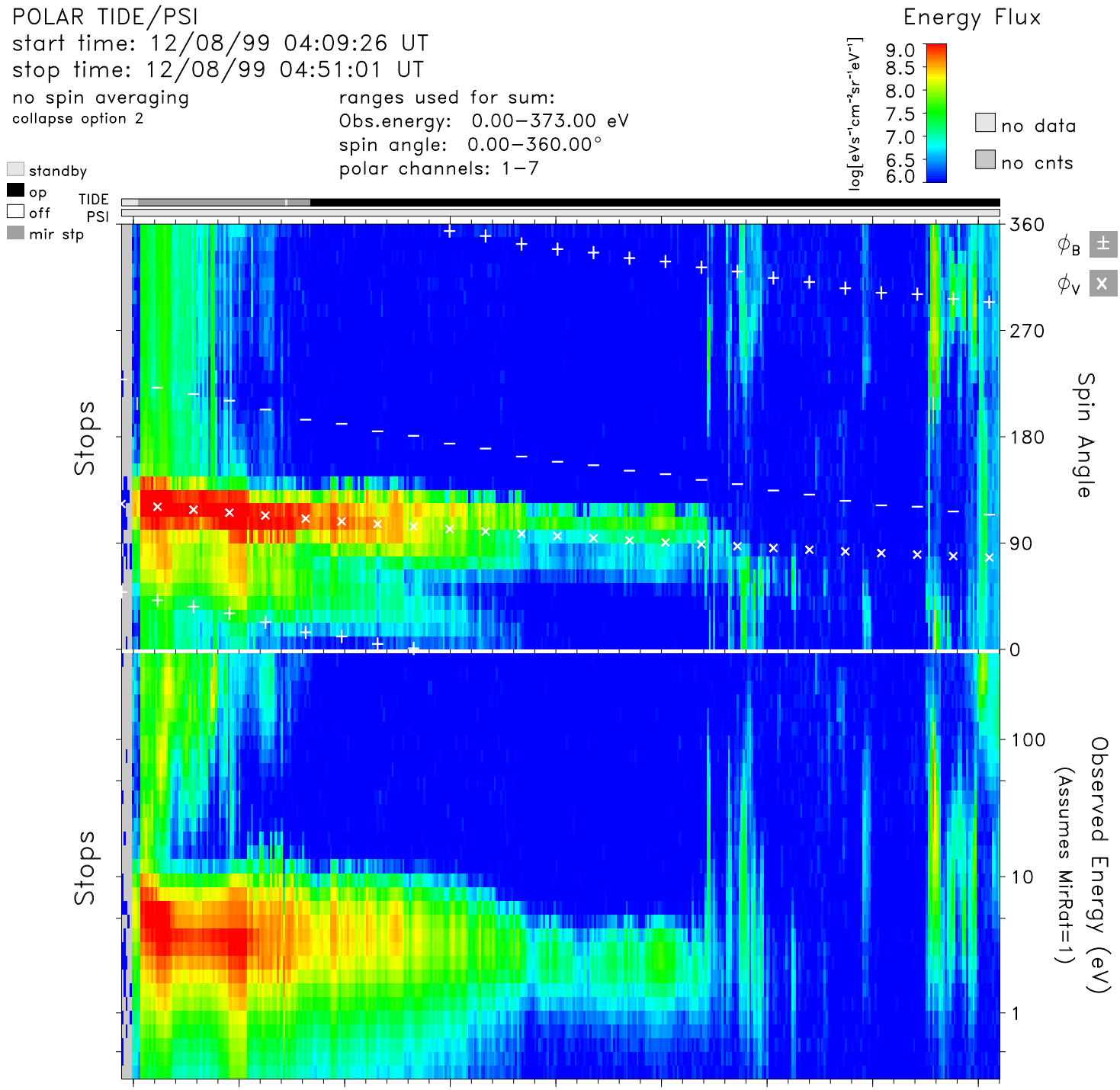
s/c potential = 0.0000
attitude: 98121000.cdf
orbit: 98121000.cdf
level-zero: 98121000.dat


density for 961210
density for 981210
100
10
1
0.1
0.01
Density (cm-3)
0.5
1
1.5
2
2.5
3
3.5
4
Spacecraft Potential (V)

POLAR TIDE/PSI
start time: 12/08/99 04:09:26 UT
stop time: 12/08/99 04:51:01 UT

no spin averaging
collapse option 2

ranges used for sum:
Obs.energy: 0.00–373.00 eV
spin angle: 0.00–360.00°
polar channels: 1–7

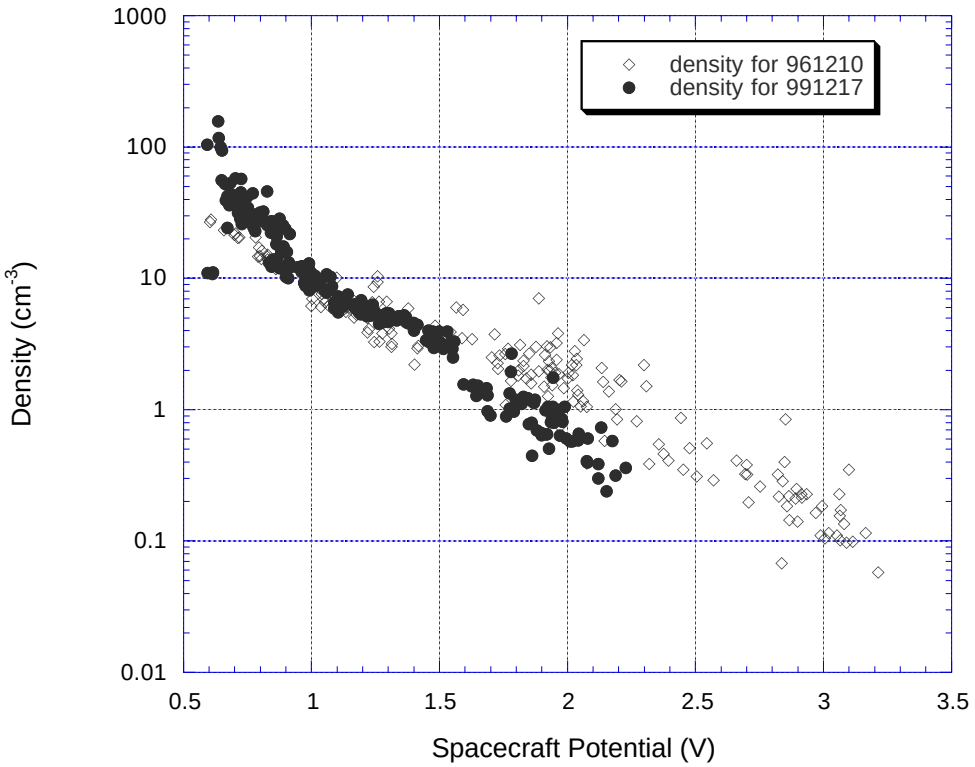


time	04:10	04:15	04:20	04:25	04:30	04:35	04:40	04:45	04:50	hr:mn
Re	1.7	1.7	1.8	1.9	2.0	2.1	2.3	2.4	2.6	Re
Lshell	6.4	15.6	64.5	100.0	35.8	16.2	10.1	7.5	6.2	
mlt	7.0	6.5	5.0	0.1	21.6	20.9	20.6	20.5	20.4	hrs
mlat	−58.9	−70.4	−80.3	−83.0	−76.2	−68.7	−61.7	−55.5	−49.9	degs
invlat	66.8	75.3	82.8	84.9	80.4	75.6	71.7	68.6	66.3	degs

tide_lz_v5.3.0
Fri Dec 10 04:22:25 1999
plot: t9912080409_0451_sp.eshtr.ps
no minimum subtracted

sector_sens: no correction
calibration: tide_calib.v6
mass_calibration: mass_calib.v7
ion_mask: t991208_v2.mask

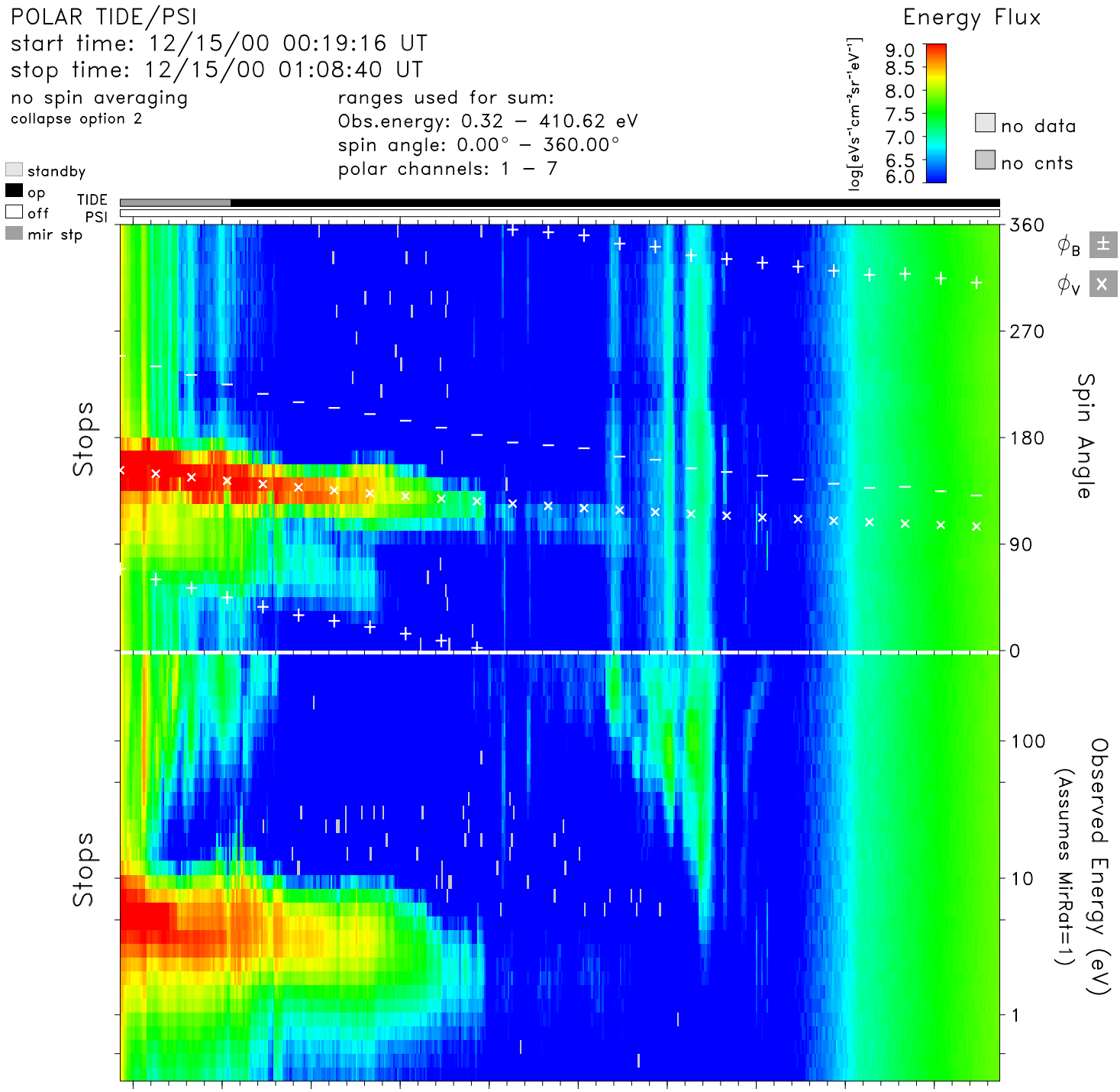
s/c potential = 0.0000
attitude: 99120800.cdf
orbit: 99120800.cdf
level−zero: 99120800.dat


density for 961210
density for 991217
1000
100
10
1
0.1
0.01
Density (cm-3)
0.5
1
1.5
2
2.5
3
3.5
Spacecraft Potential (V)

POLAR TIDE/PSI
start time: 12/15/00 00:19:16 UT
stop time: 12/15/00 01:08:40 UT

no spin averaging
collapse option 2

ranges used for sum:
Obs.energy: 0.32 – 410.62 eV
spin angle: 0.00° – 360.00°
polar channels: 1 – 7

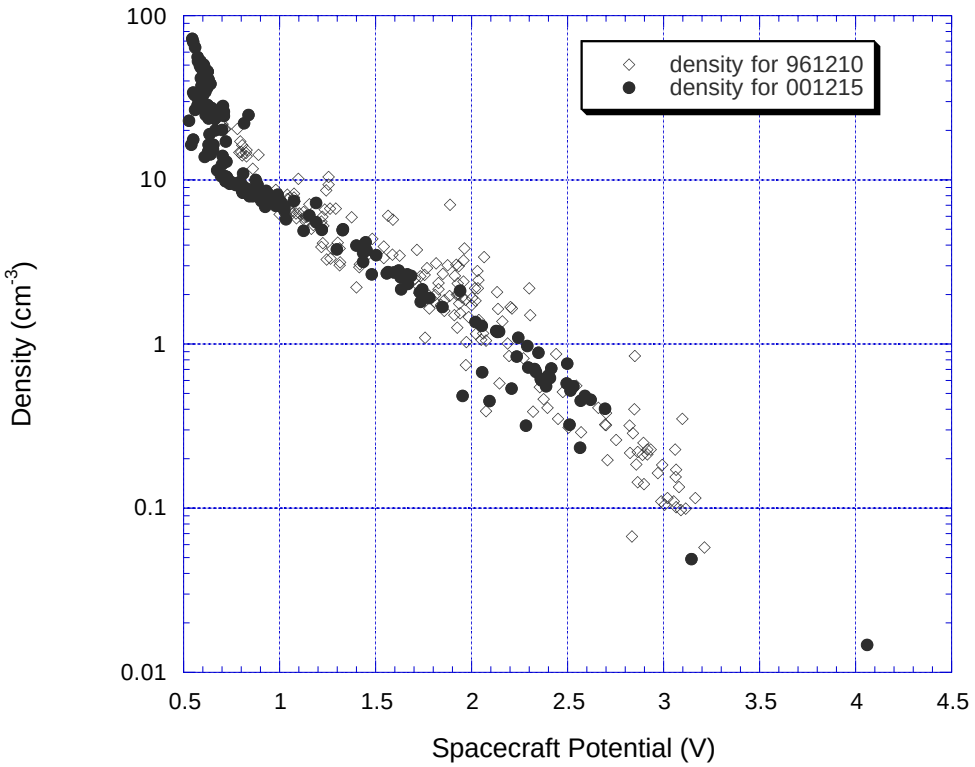


time	00:20	00:25	00:30	00:35	00:40	00:45	00:50	00:55	01:00	01:05	hr:mn
Re	1.6	1.7	1.8	1.9	2.1	2.2	2.4	2.5	2.7	2.8	Re
Lshell	6.7	20.7	100.0	100.0	38.3	17.7	11.4	8.7	7.3	6.4	
mlt	6.8	7.0	7.9	17.1	18.1	18.3	18.4	18.4	18.5	18.5	hrs
mlat	−60.7	−73.4	−84.5	−84.9	−76.5	−69.1	−62.7	−57.1	−52.2	−47.8	degs
invlat	67.2	77.3	85.9	86.3	80.7	76.2	72.8	70.2	68.2	66.7	degs

tide_lz_v5.4.0
Sun Dec 17 04:34:48 2000
plot: t0012150019_0108_sp.eshtr.ps
no minimum subtracted

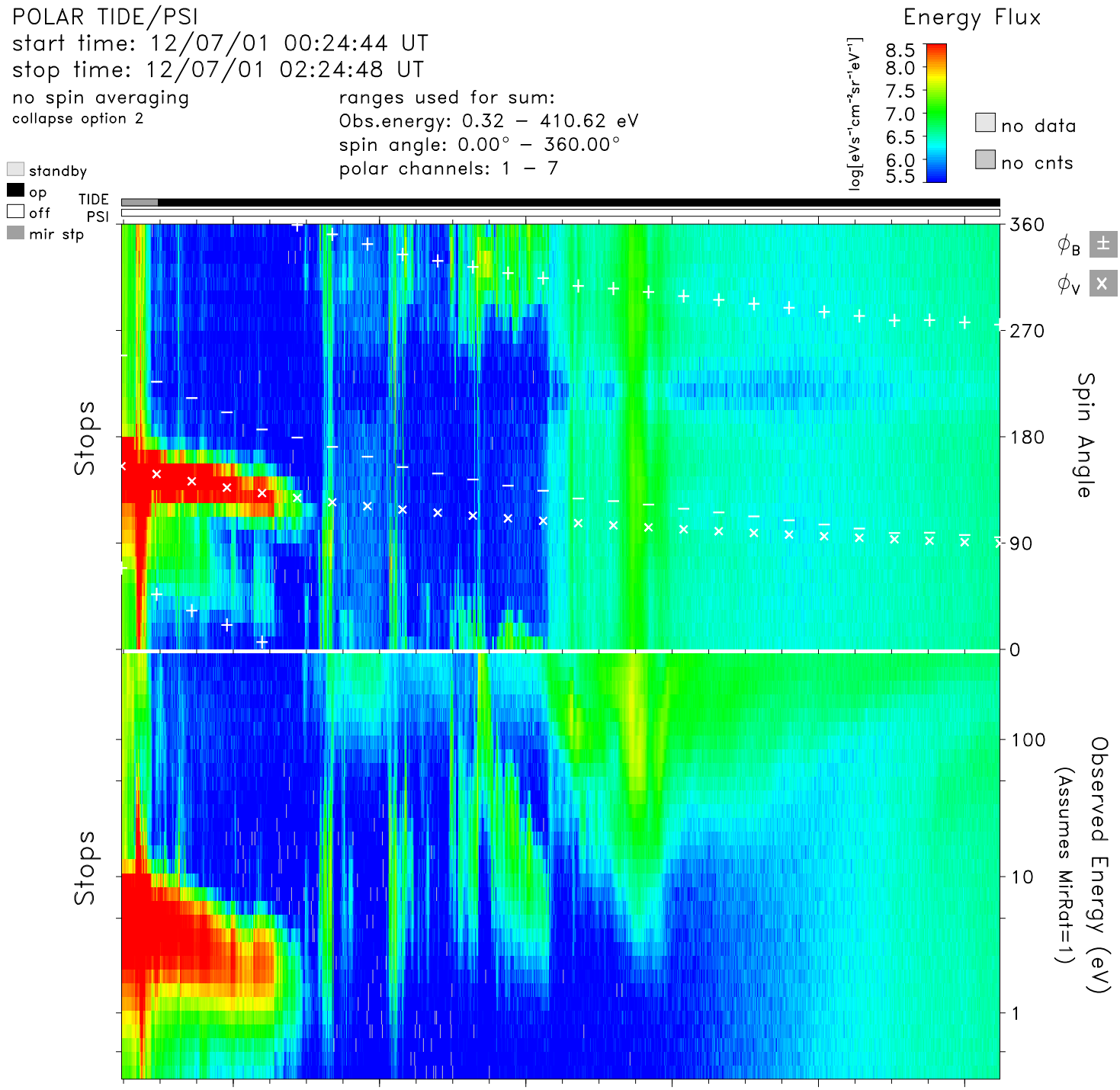
sector_sens: no correction
calibration: tide_calib.v6
mass_calibration: mass_calib.v7
ion_mask: t001215_v2.mask

s/c potential = 0.0000
attitude: 00121500.cdf
orbit: 00121500.cdf
level−zero: 00121500.dat


density for 961210
density for 001215
100
10
1
0.1
0.01
Density (cm-3)
0.5
1
1.5
2
2.5
3
3.5
4
4.5
Spacecraft Potential (V)

POLAR TIDE/PSI
start time: 12/07/01 00:24:44 UT
stop time: 12/07/01 02:24:48 UT
no spin averaging
collapse option 2

ranges used for sum:
Obs.energy: 0.32 – 410.62 eV
spin angle: 0.00° – 360.00°
polar channels: 1 – 7

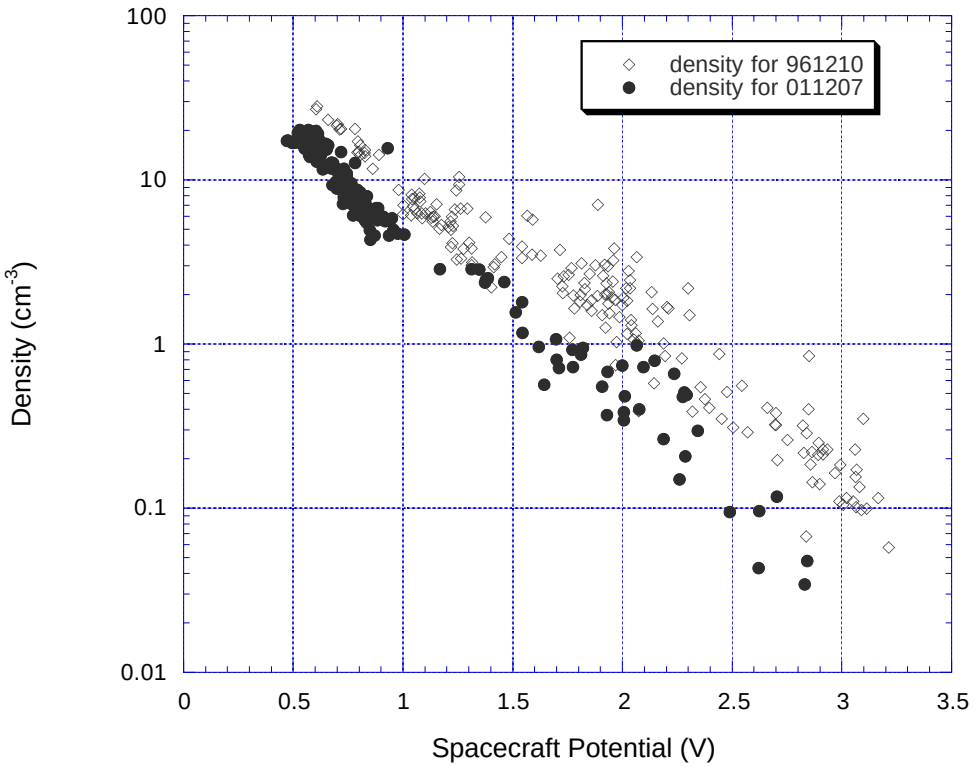


time	00:40	01:00	01:20	01:40	02:00	02:20	hr:mn
Re	2.0	2.7	3.4	4.0	4.5	5.1	Re
Lshell	100.0	16.0	8.7	7.2	6.8	6.7	
mlt	13.0	18.4	18.7	18.8	18.9	18.9	hrs
mlat	−86.8	−65.6	−51.2	−41.6	−34.6	−29.2	degs
invlat	87.8	75.5	70.1	68.1	67.4	67.3	degs

tide_lz_v5.5.0
Fri Jan 11 11:01:30 2002
plot: t0112070024_0224_sp.eshtr.ps
no minimum subtracted

sector_sens: no correction
calibration: tide_calib.v6
mass_calibration: mass_calib.v7
ion_mask: t011206_v2.mask

s/c potential = 0.0000
attitude: 01120700.cdf
orbit: 01120700.cdf
level−zero: 01120700.dat


density for 961210
density for 011207
100
10
1
0.1
0.01
Density (cm-3)
0
0.5
1
1.5
2
2.5
3
3.5
Spacecraft Potential (V)