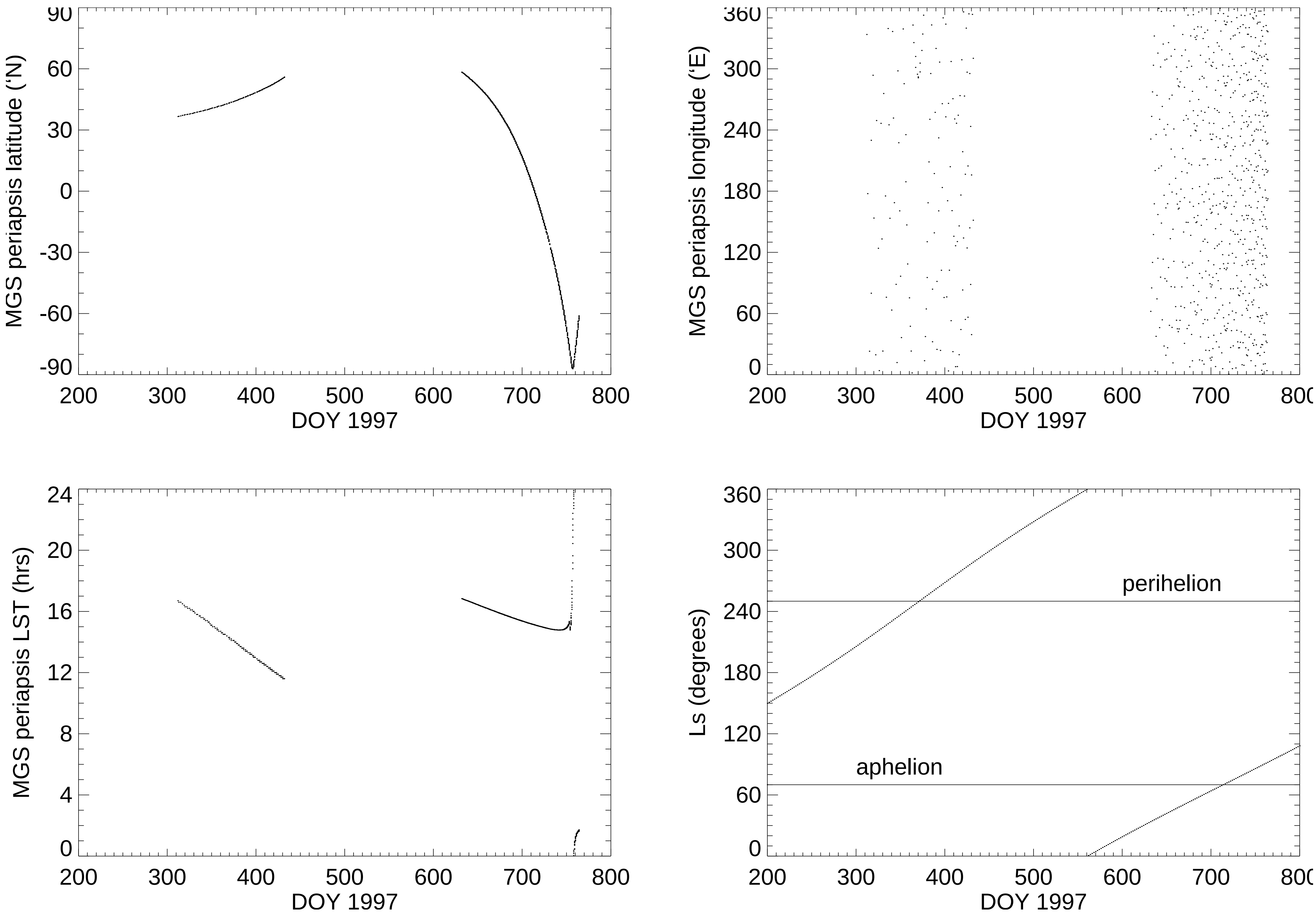
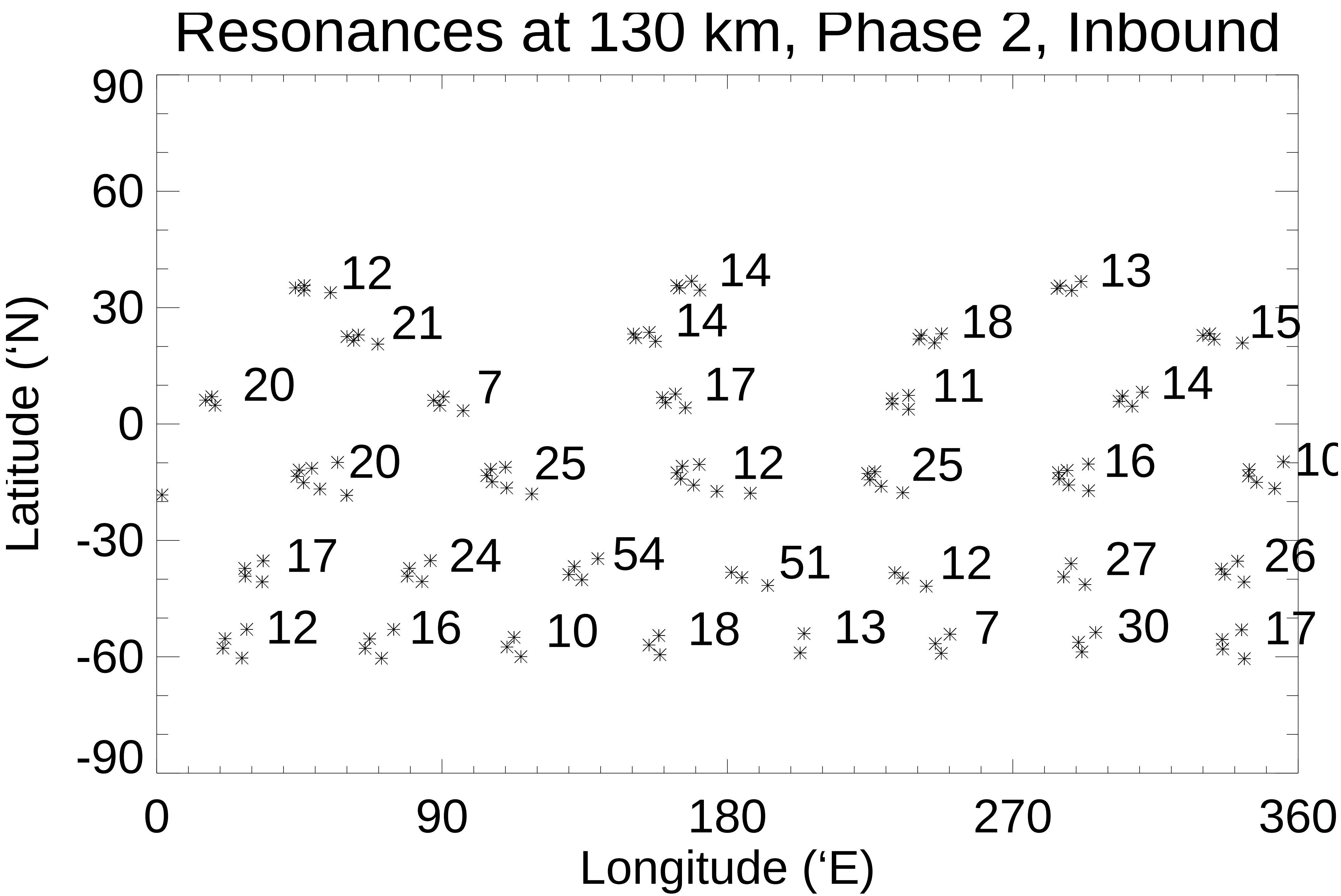
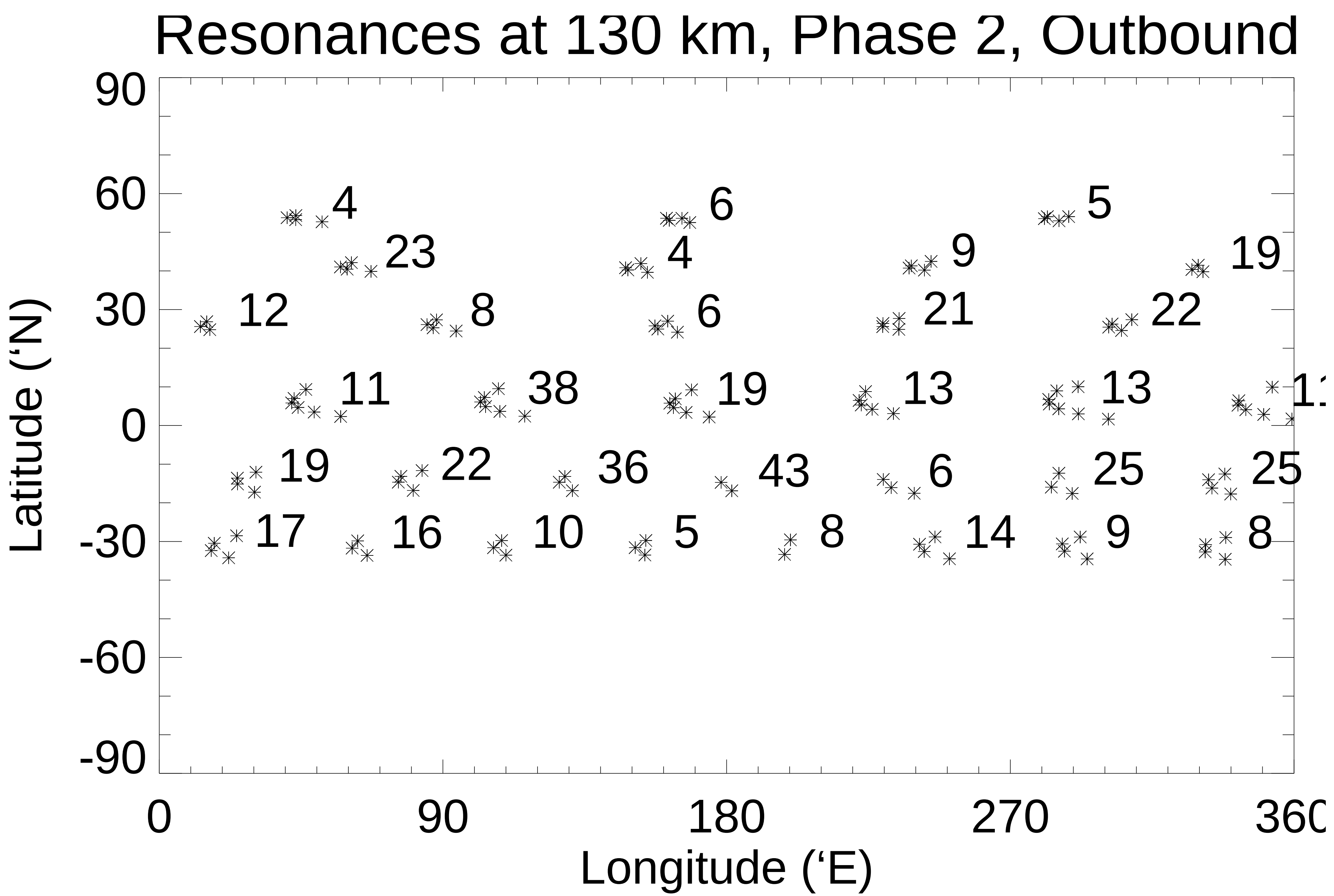


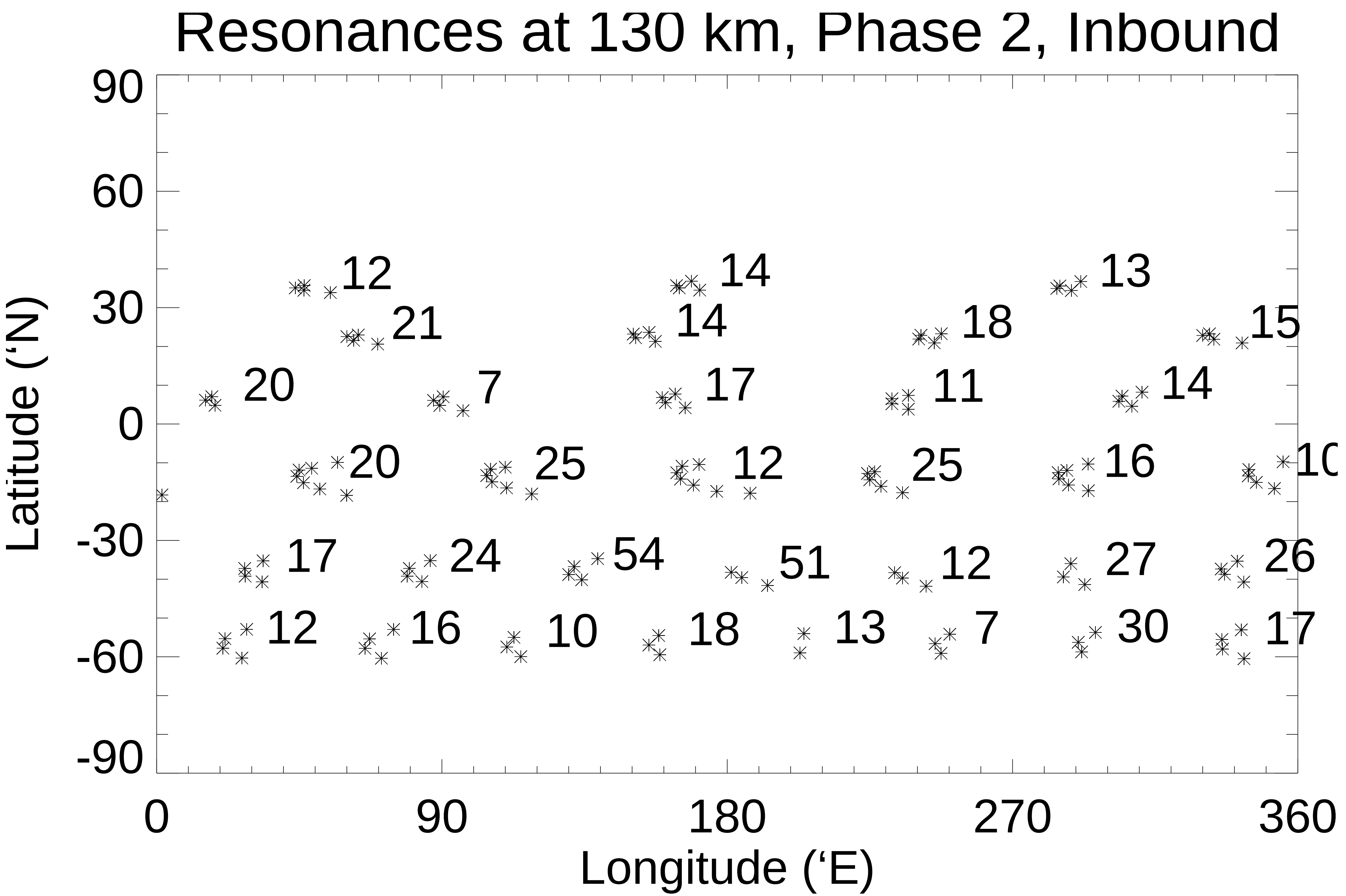
MGS periapsis latitude (‘N)
DOY 1997
MGS periapsis longitude (‘E)
DOY 1997
MGS periapsis LST (hrs)
DOY 1997
Ls (degrees)
perihelion
aphelion
DOY 1997



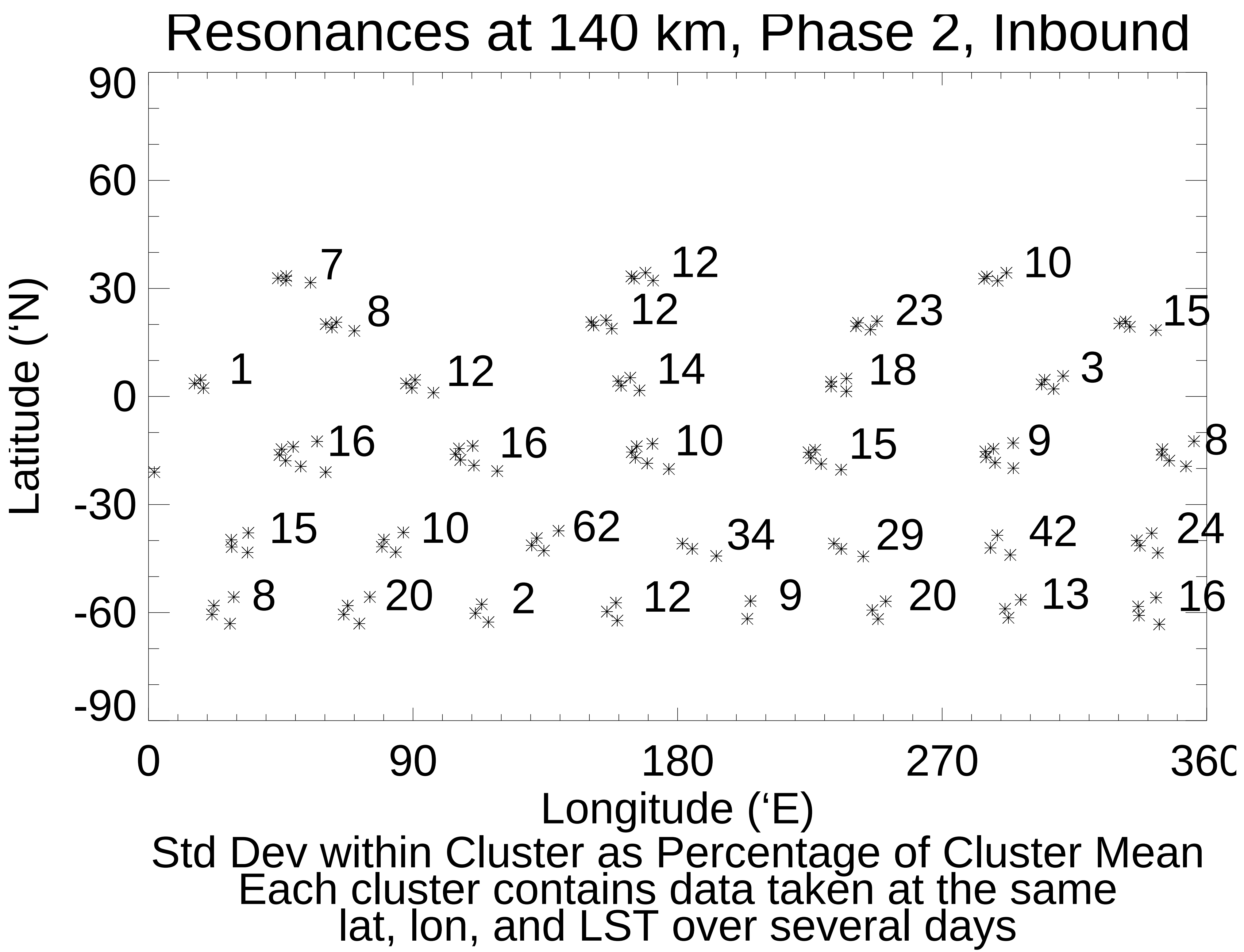
Std Dev within Cluster as Percentage of Cluster Mean
Each cluster contains data taken at the same
lat, lon, and LST over several days

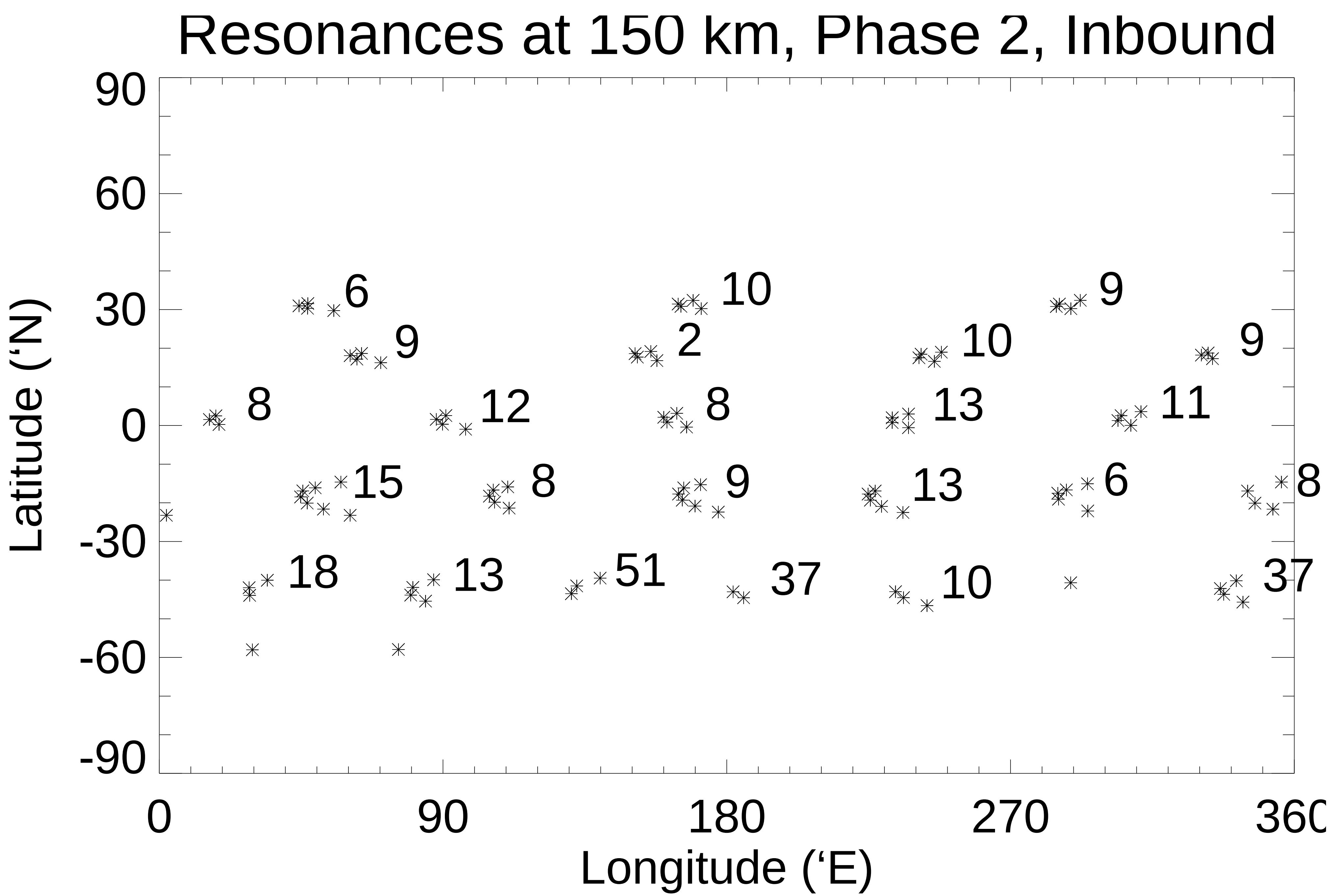


Std Dev within Cluster as Percentage of Cluster Mean
Each cluster contains data taken at the same
lat, lon, and LST over several days



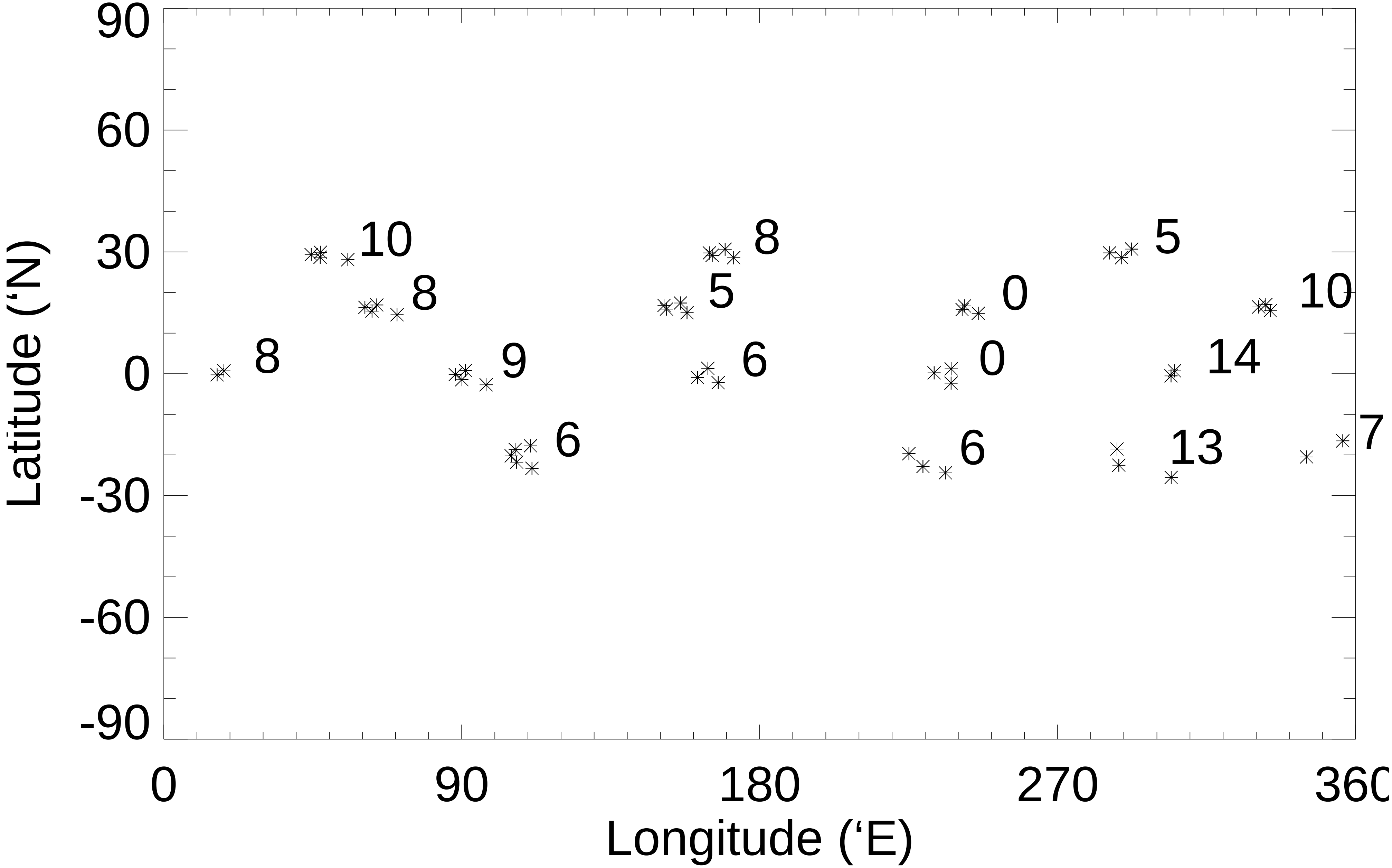
Std Dev within Cluster as Percentage of Cluster Mean
Each cluster contains data taken at the same
lat, lon, and LST over several days


Resonances at 140 km, Phase 2, Inbound
Latitude (‘N)
90
60
30
0
-30
-60
-90
Longitude (‘E)
0
90
180
270
360
7
8
1
12
16
15
8
10
20
16
2
62
12
12
14
10
34
12
9
23
18
15
29
20
10
3
9
42
13
15
8
24
16
Std Dev within Cluster as Percentage of Cluster Mean
Each cluster contains data taken at the same
lat, lon, and LST over several days



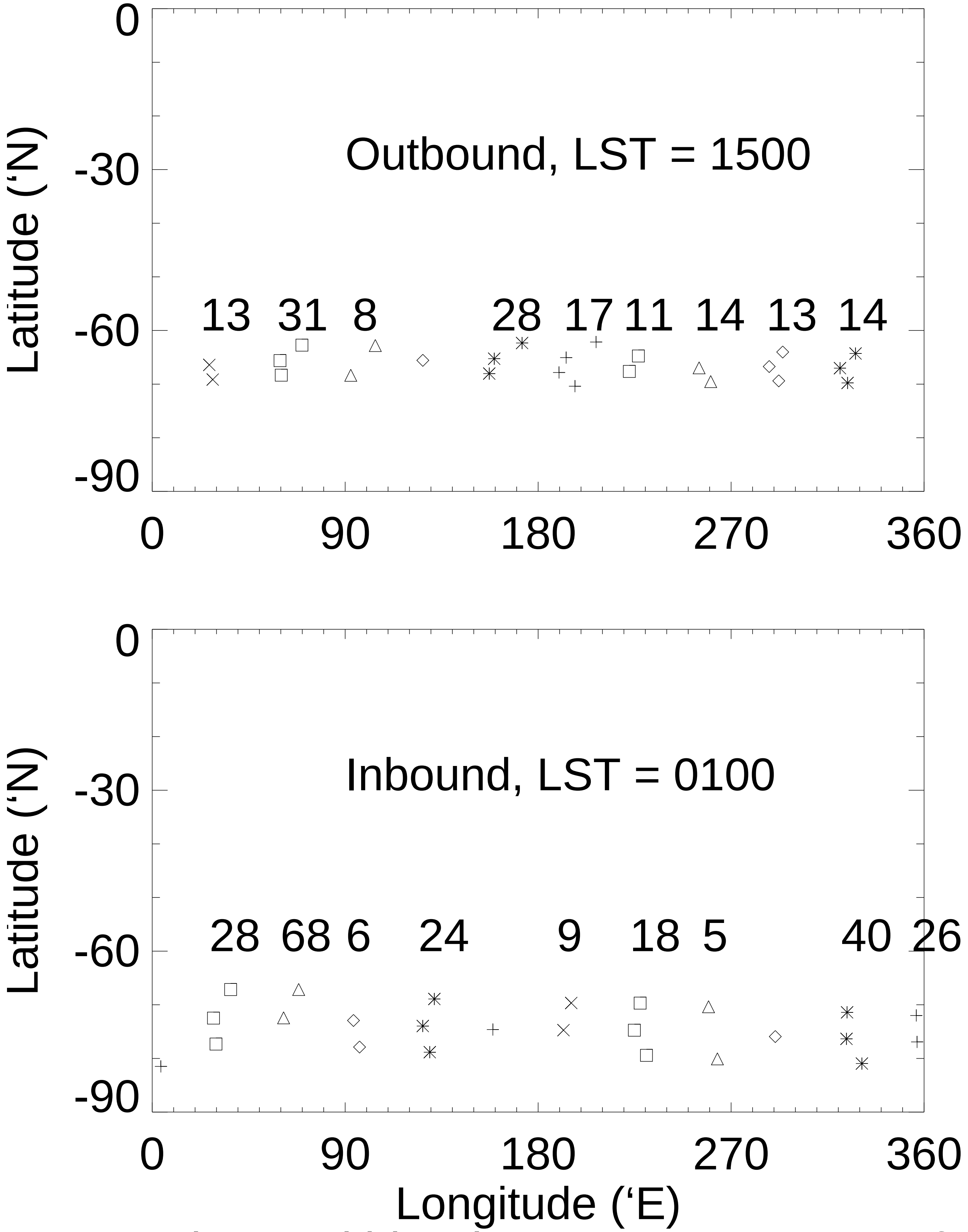
Std Dev within Cluster as Percentage of Cluster Mean
Each cluster contains data taken at the same
lat, lon, and LST over several days

Resonances at 160 km, Phase 2, Inbound



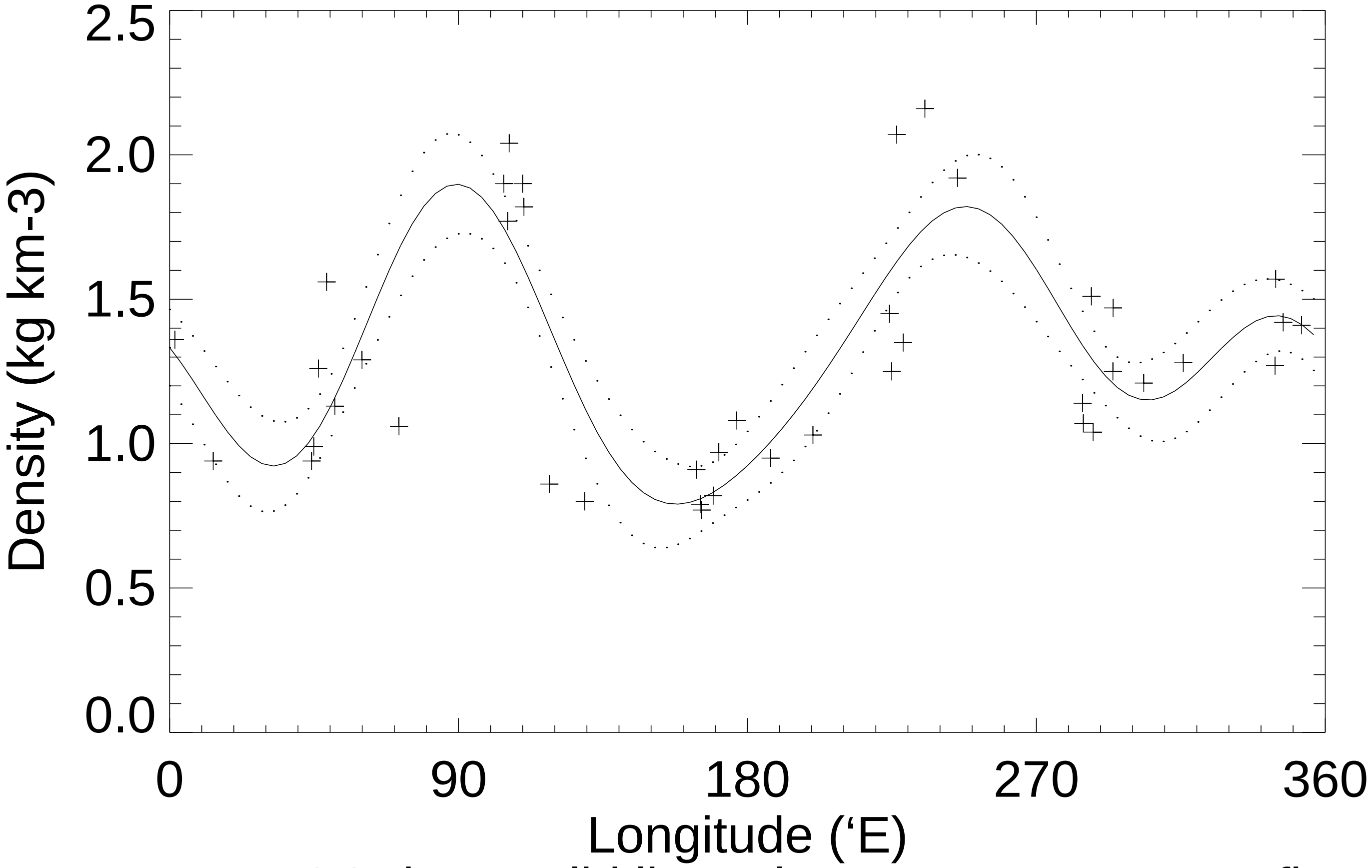
Std Dev within Cluster as Percentage of Cluster Mean
Each cluster contains data taken at the same
lat, lon, and LST over several days

11:1 Resonance at 130 km, Phase 2



Std Dev within Cluster as Percentage of Cluster Mean Each cluster contains data taken at the same lat, lon, and LST over several days

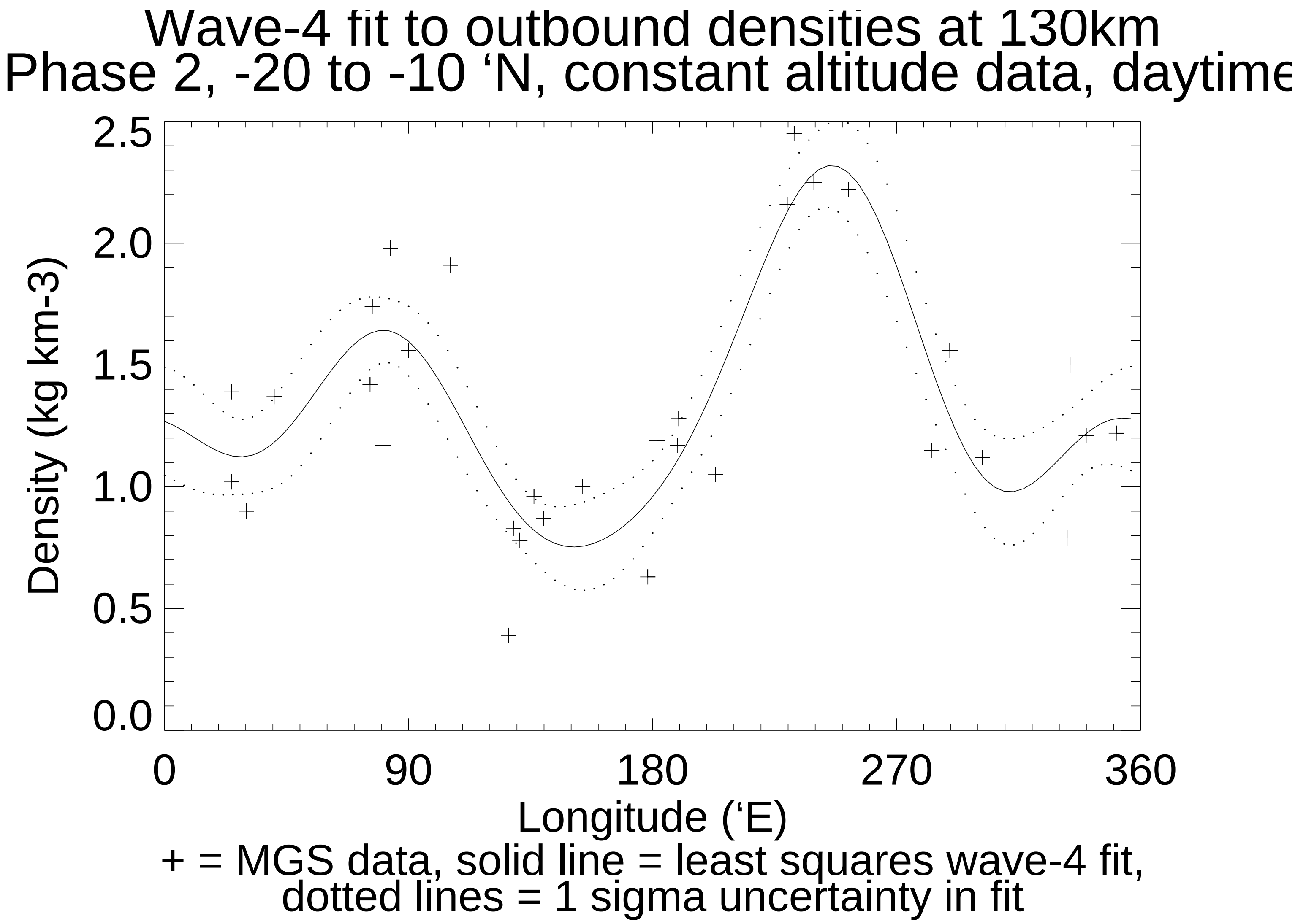
Wave-4 fit to inbound densities at 130km
Phase 2, -20 to -10 ‘N, constant altitude data, daytime



+ = MGS data, solid line = least squares wave-4 fit,
dotted lines = 1 sigma uncertainty in fit

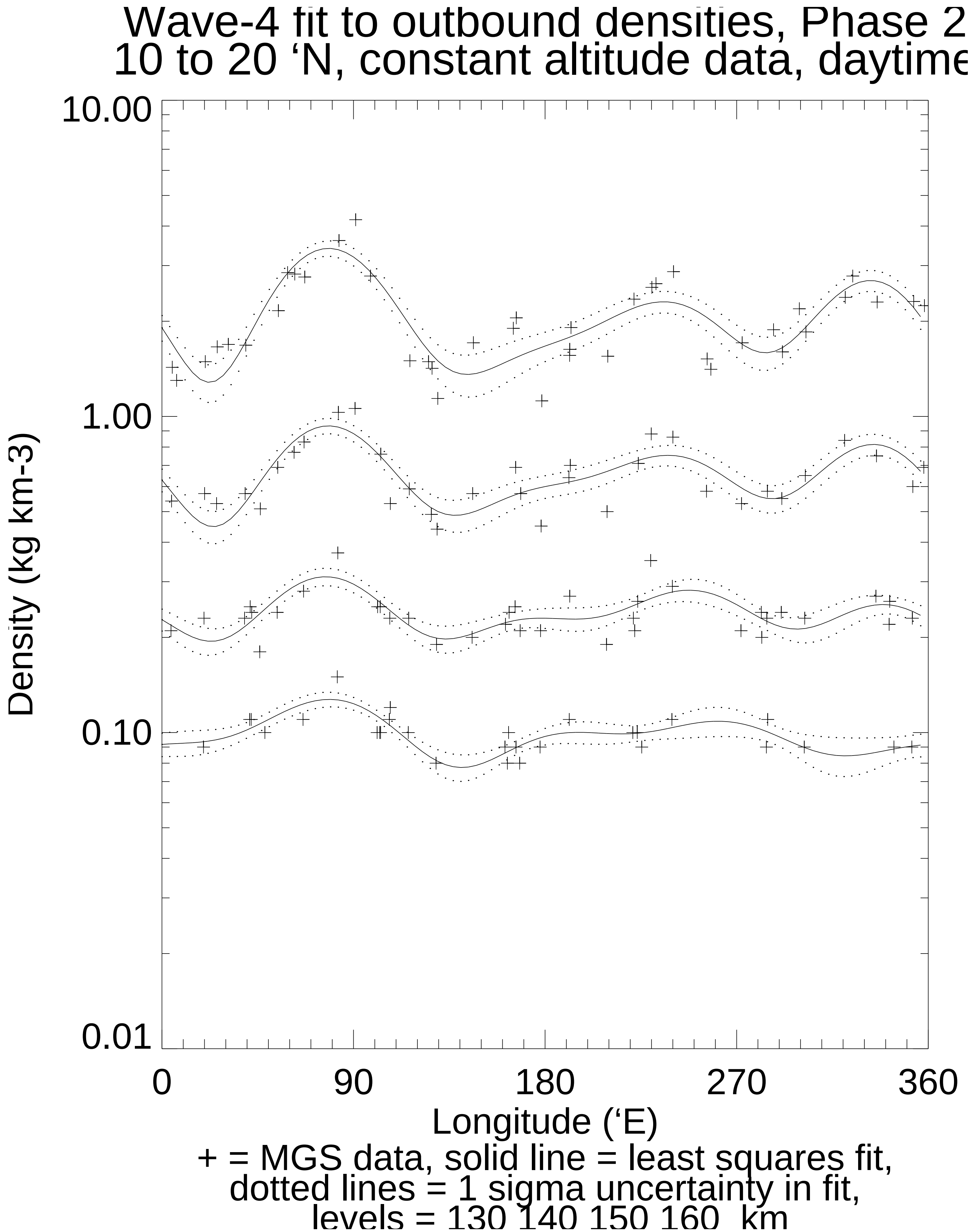
Background density	=	1.324 * (1 +/- 0.032)
Normalized Wave 1 amplitude	=	0.054 * (1 +/- 0.833)
Wave 1 phase	=	298.720 +/- 47.719
Normalized Wave 2 amplitude	=	0.249 * (1 +/- 0.235)
Wave 2 phase	=	80.359 +/- 6.408
Normalized Wave 3 amplitude	=	0.204 * (1 +/- 0.289)
Wave 3 phase	=	103.013 +/- 5.112
Normalized Wave 4 amplitude	=	0.105 * (1 +/- 0.549)
Wave 4 phase	=	81.474 +/- 7.669

Statistics neglect uncertainties in the data
Ratio of Mean Sq. Err. in wavefit to constant fit = 0.394
Wave phases are first maximum east of 0‘E



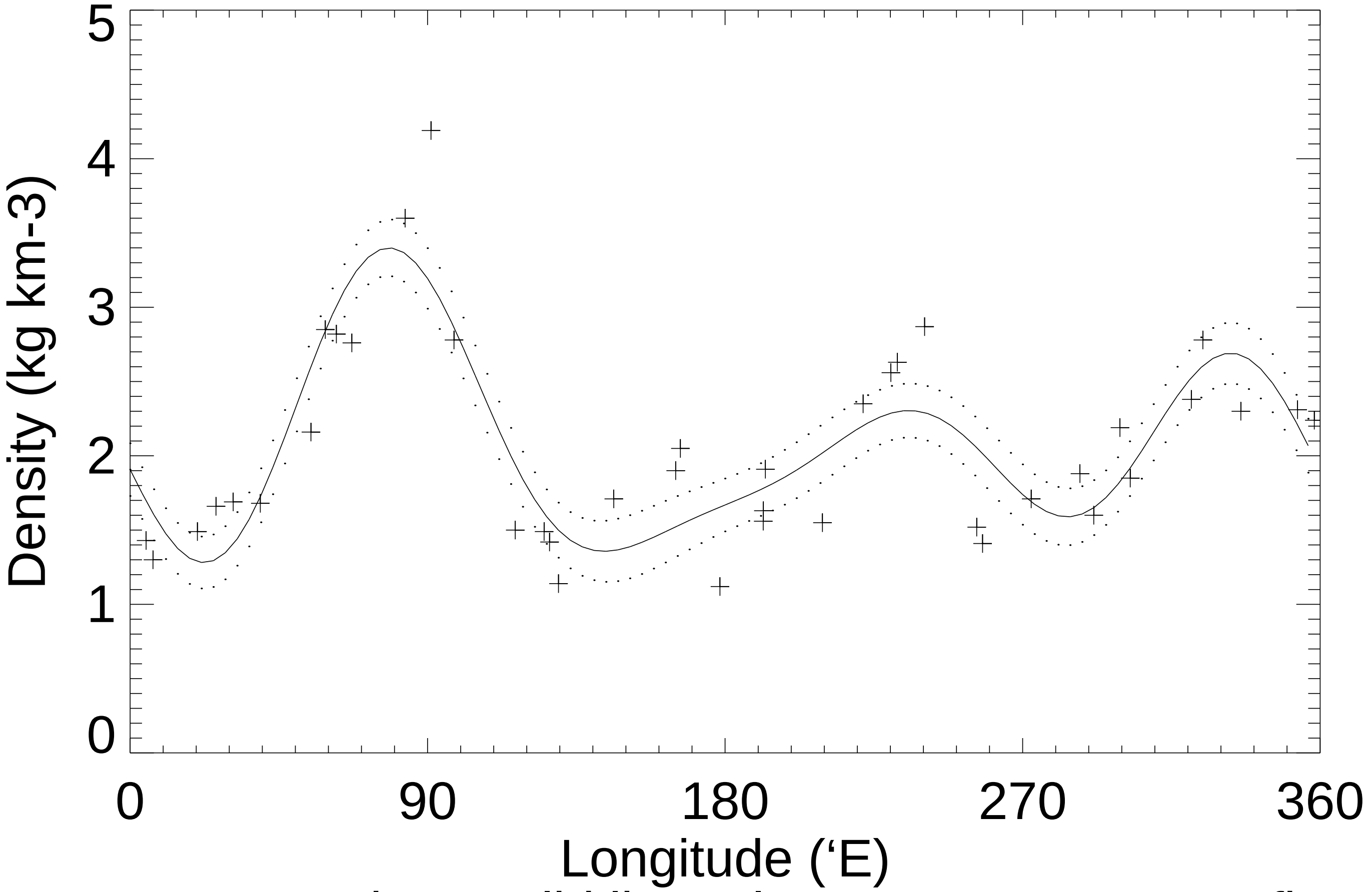
Background density = 1.350 * (1 +/- 0.041)
Normalized Wave 1 amplitude = 0.182 * (1 +/- 0.324)
Wave 1 phase = 261.755 +/- 17.738
Normalized Wave 2 amplitude = 0.355 * (1 +/- 0.166)
Wave 2 phase = 65.830 +/- 4.631
Normalized Wave 3 amplitude = 0.156 * (1 +/- 0.465)
Wave 3 phase = 111.628 +/- 8.411
Normalized Wave 4 amplitude = 0.101 * (1 +/- 0.680)
Wave 4 phase = 76.779 +/- 10.270

Statistics neglect uncertainties in the data
Ratio of Mean Sq. Err. in wavefit to constant fit = 0.267
Wave phases are first maximum east of 0‘E



Wave-4 fit to outbound densities, Phase 2
10 to 20 ‘N, constant altitude data, daytime
10.00
1.00
0.10
0.01
Density (kg km-3)
0
90
180
270
360
Longitude (‘E)
+ = MGS data, solid line = least squares fit,
dotted lines = 1 sigma uncertainty in fit,
levels = 130 140 150 160 km

Wave-4 fit to outbound densities at 130km
Phase 2, 10 to 20 'N, constant altitude data, daytime

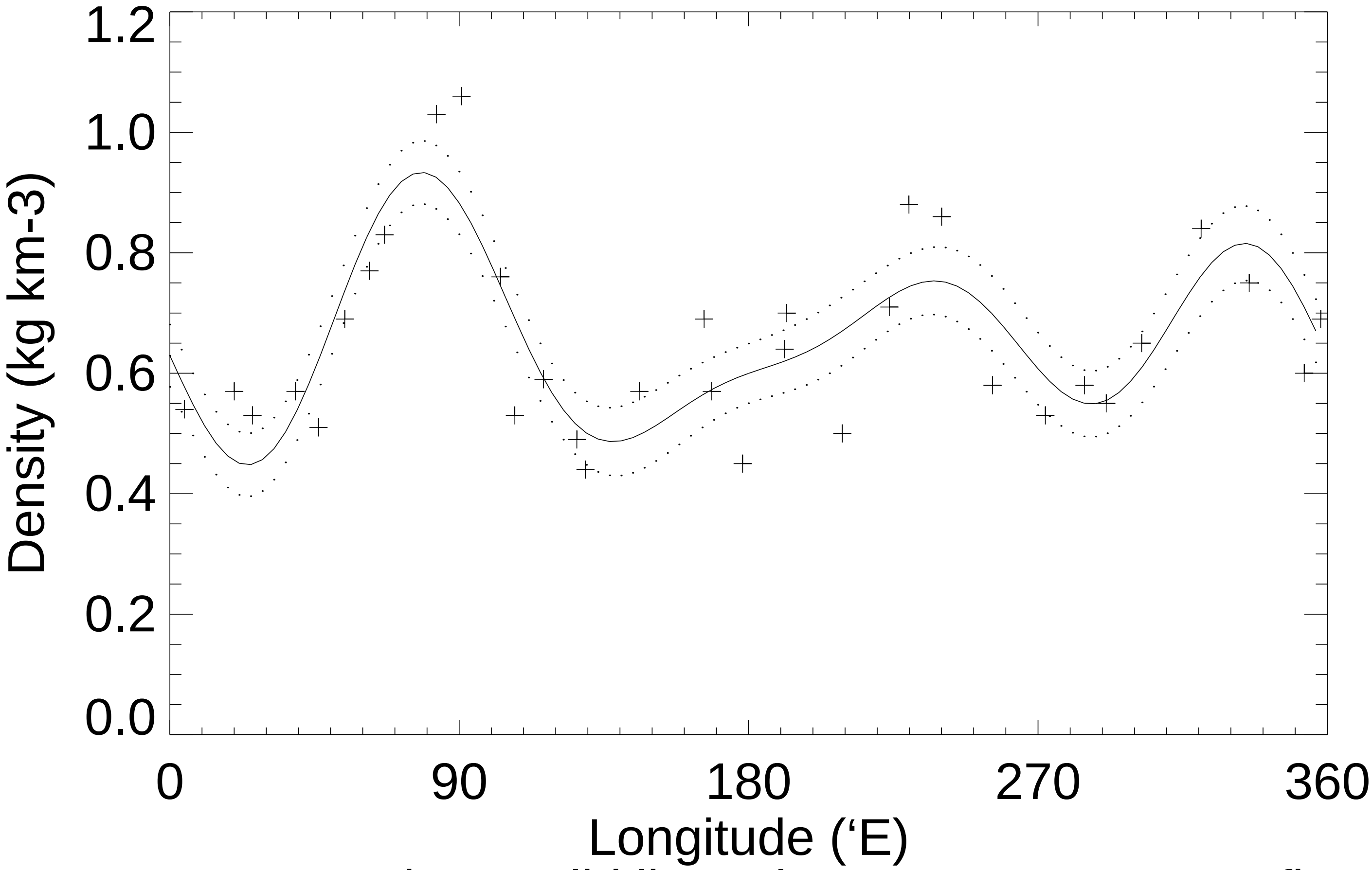


+ = MGS data, solid line = least squares wave-4 fit,
dotted lines = 1 sigma uncertainty in fit

Background density	=	2.066 * (1 +/- 0.030)
Normalized Wave 1 amplitude	=	0.119 * (1 +/- 0.363)
Wave 1 phase	=	40.455 +/- 20.787
Normalized Wave 2 amplitude	=	0.176 * (1 +/- 0.251)
Wave 2 phase	=	79.623 +/- 7.061
Normalized Wave 3 amplitude	=	0.277 * (1 +/- 0.171)
Wave 3 phase	=	87.733 +/- 2.776
Normalized Wave 4 amplitude	=	0.157 * (1 +/- 0.283)
Wave 4 phase	=	70.233 +/- 3.925

Statistics neglect uncertainties in the data
Ratio of Mean Sq. Err. in wavefit to constant fit = 0.289
Wave phases are first maximum east of 0'E

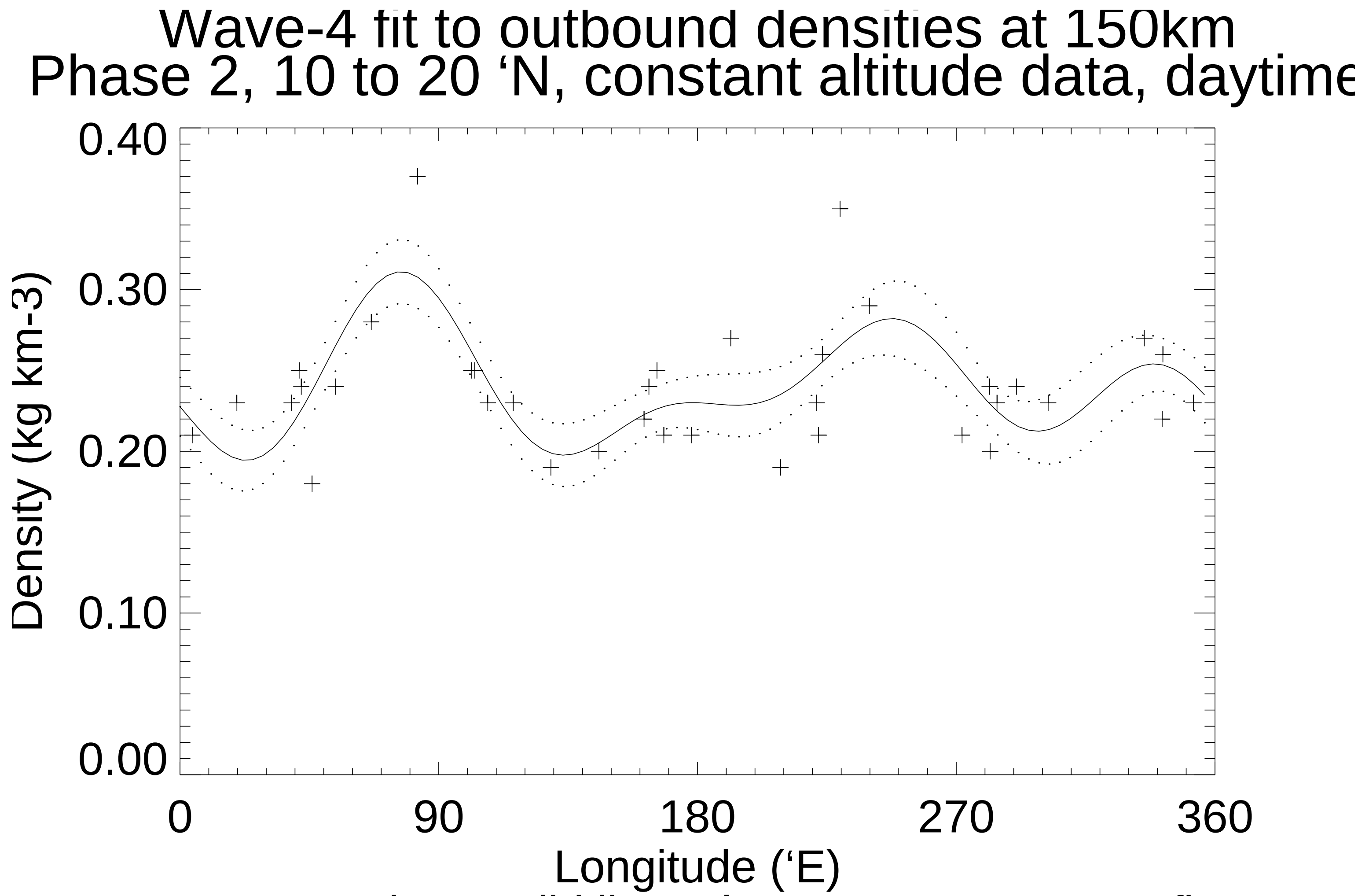
Wave-4 fit to outbound densities at 140km
Phase 2, 10 to 20 'N, constant altitude data, daytime



+ = MGS data, solid line = least squares wave-4 fit,
dotted lines = 1 sigma uncertainty in fit

Background density	=	0.657 * (1 +/- 0.028)
Normalized Wave 1 amplitude	=	0.040 * (1 +/- 0.973)
Wave 1 phase	=	13.956 +/- 55.725
Normalized Wave 2 amplitude	=	0.111 * (1 +/- 0.352)
Wave 2 phase	=	76.657 +/- 10.323
Normalized Wave 3 amplitude	=	0.200 * (1 +/- 0.212)
Wave 3 phase	=	88.413 +/- 3.513
Normalized Wave 4 amplitude	=	0.135 * (1 +/- 0.297)
Wave 4 phase	=	71.155 +/- 4.114

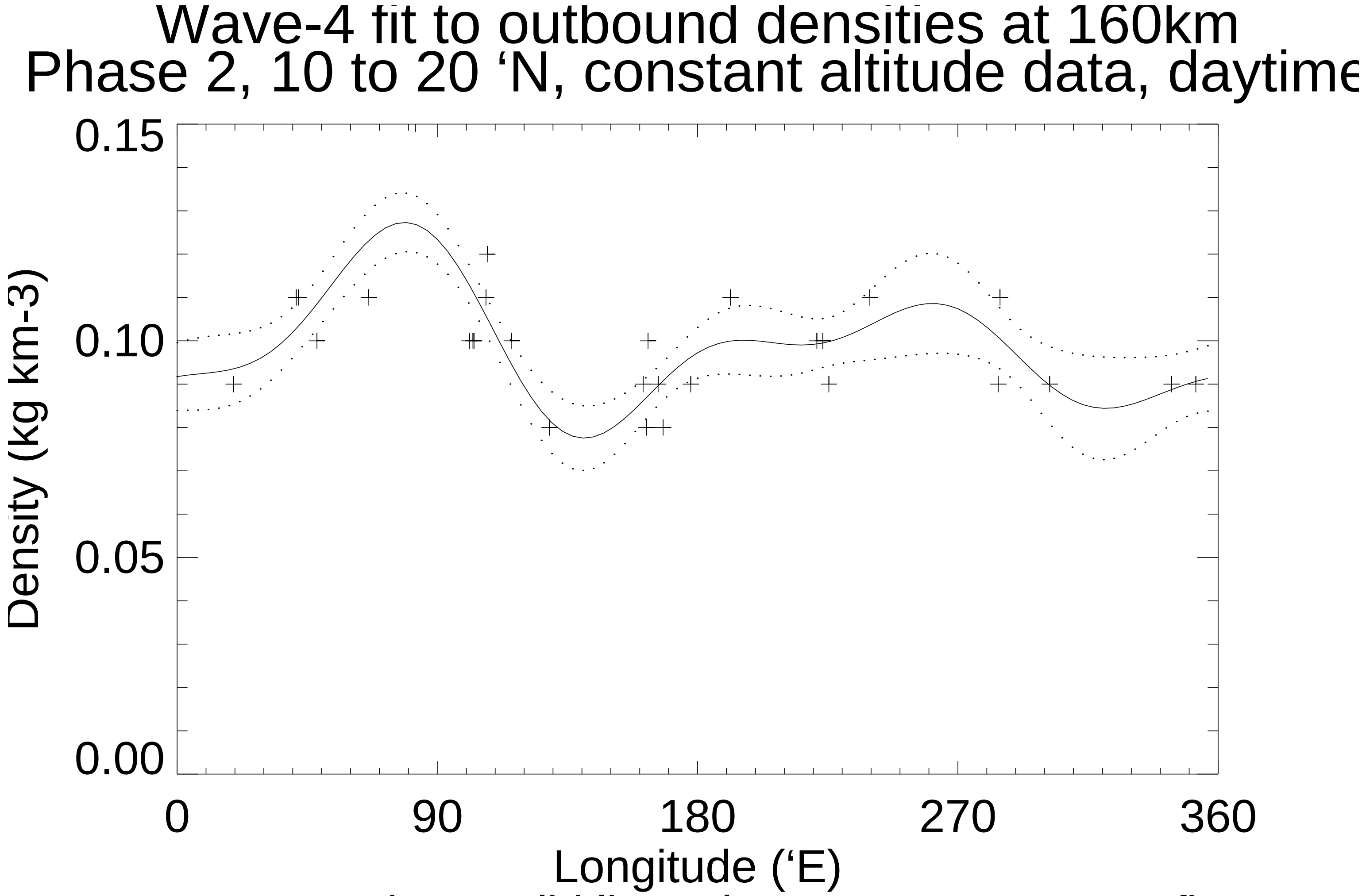
Statistics neglect uncertainties in the data
Ratio of Mean Sq. Err. in wavefit to constant fit = 0.347
Wave phases are first maximum east of 0'E



+ = MGS data, solid line = least squares wave-4 fit,
dotted lines = 1 sigma uncertainty in fit

Background density	=	0.241 * (1 +/- 0.023)
Normalized Wave 1 amplitude	=	0.004 * (1 +/- 8.400)
Wave 1 phase	=	56.851 +/- ******
Normalized Wave 2 amplitude	=	0.117 * (1 +/- 0.317)
Wave 2 phase	=	71.867 +/- 9.174
Normalized Wave 3 amplitude	=	0.082 * (1 +/- 0.460)
Wave 3 phase	=	88.287 +/- 8.745
Normalized Wave 4 amplitude	=	0.109 * (1 +/- 0.339)
Wave 4 phase	=	73.748 +/- 4.951

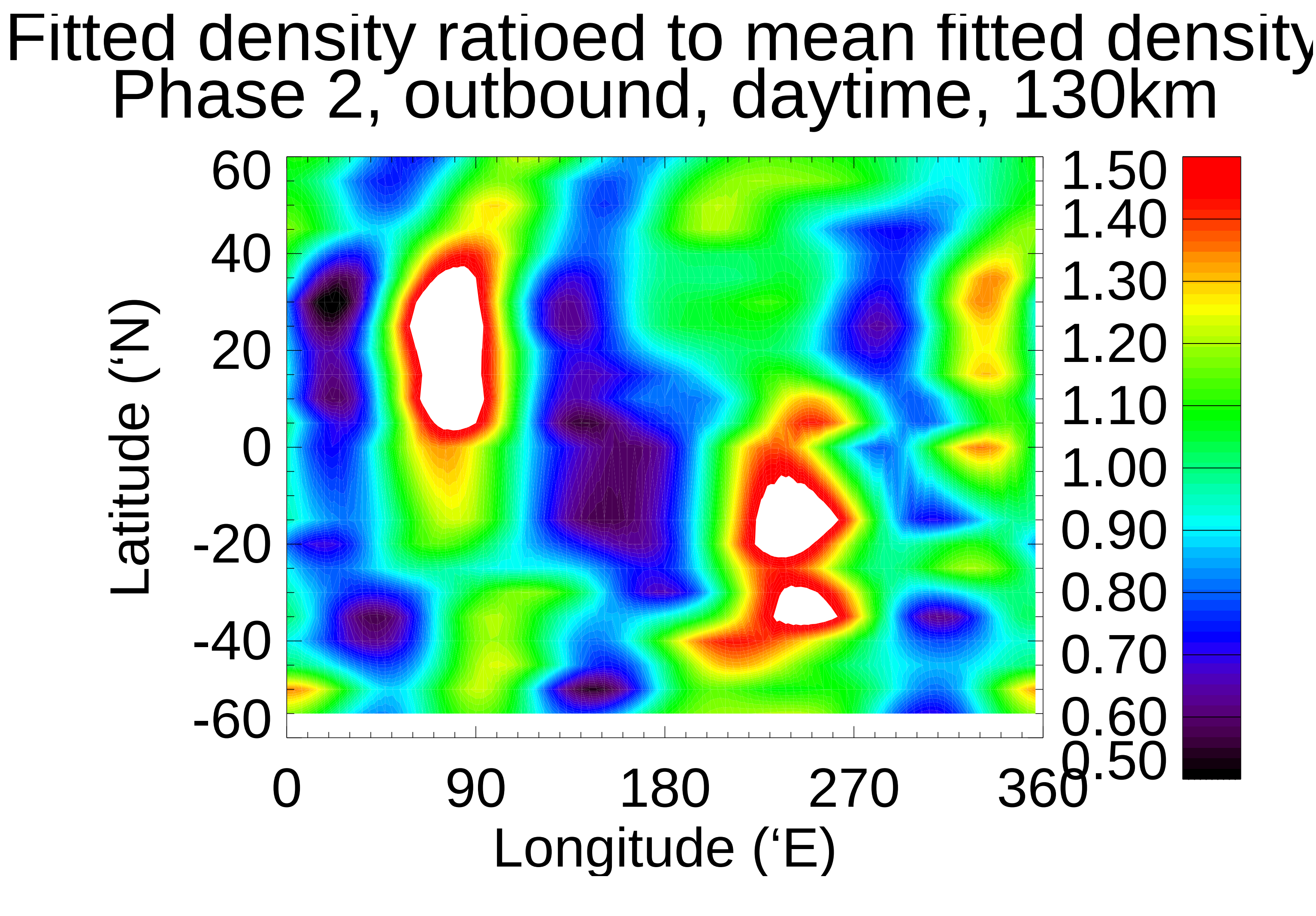
Statistics neglect uncertainties in the data
Ratio of Mean Sq. Err. in wavefit to constant fit = 0.578
Wave phases are first maximum east of 0‘E



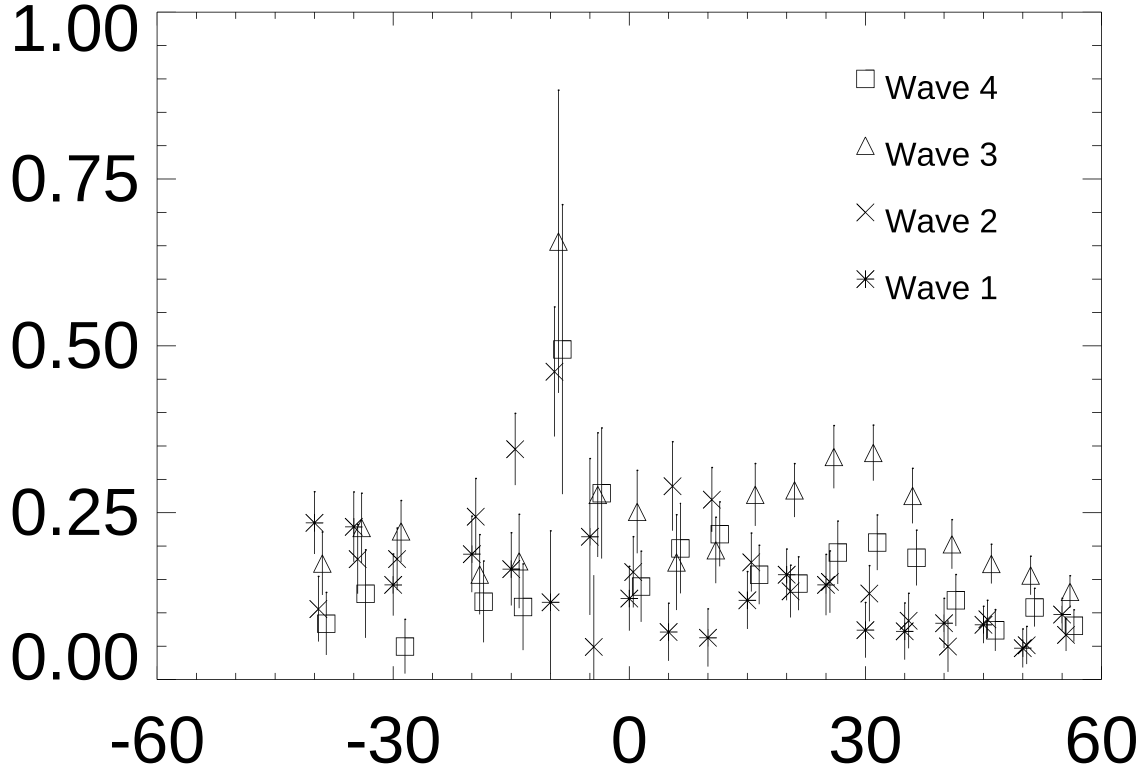
+ = MGS data, solid line = least squares wave-4 fit,
dotted lines = 1 sigma uncertainty in fit

Background density	=	0.099 * (1 +/- 0.023)
Normalized Wave 1 amplitude	=	0.041 * (1 +/- 0.784)
Wave 1 phase	=	78.126 +/- 46.081
Normalized Wave 2 amplitude	=	0.150 * (1 +/- 0.261)
Wave 2 phase	=	67.429 +/- 7.440
Normalized Wave 3 amplitude	=	0.055 * (1 +/- 0.733)
Wave 3 phase	=	76.285 +/- 13.659
Normalized Wave 4 amplitude	=	0.067 * (1 +/- 0.607)
Wave 4 phase	=	86.381 +/- 7.565

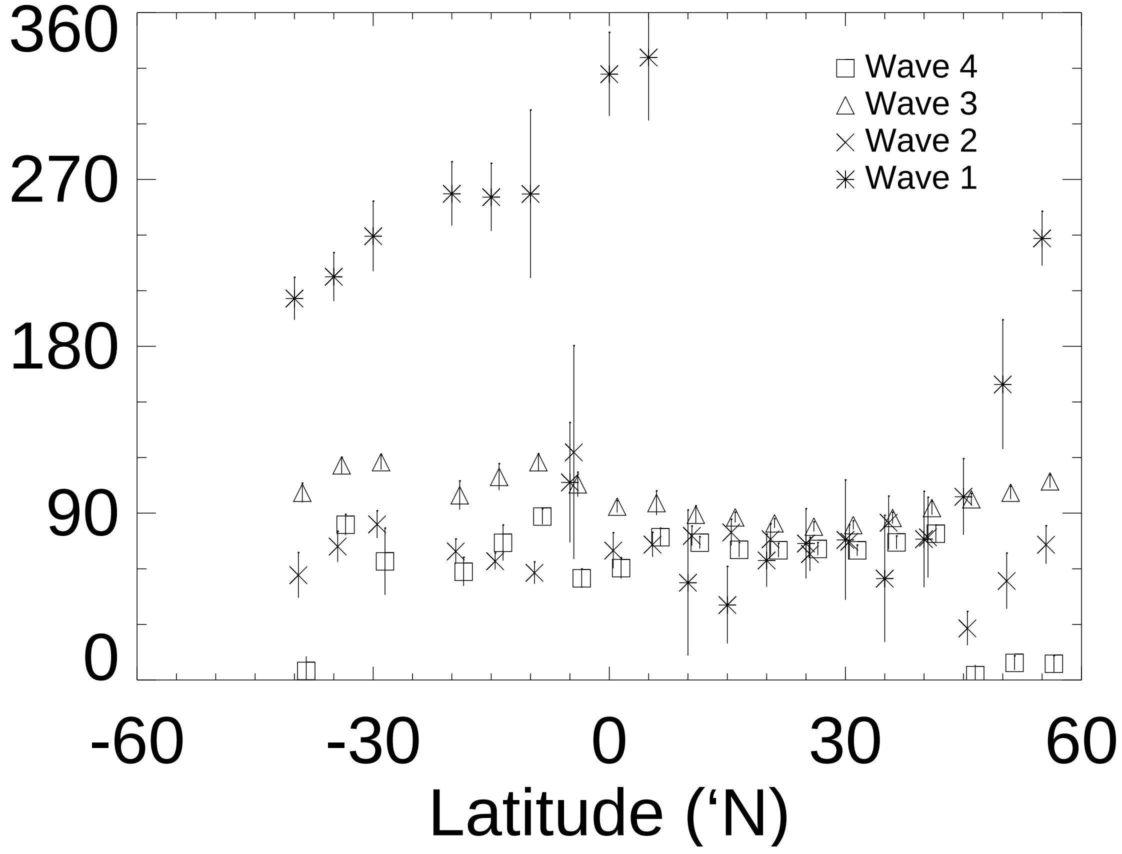
Statistics neglect uncertainties in the data
Ratio of Mean Sq. Err. in wavefit to constant fit = 0.421
Wave phases are first maximum east of 0‘E

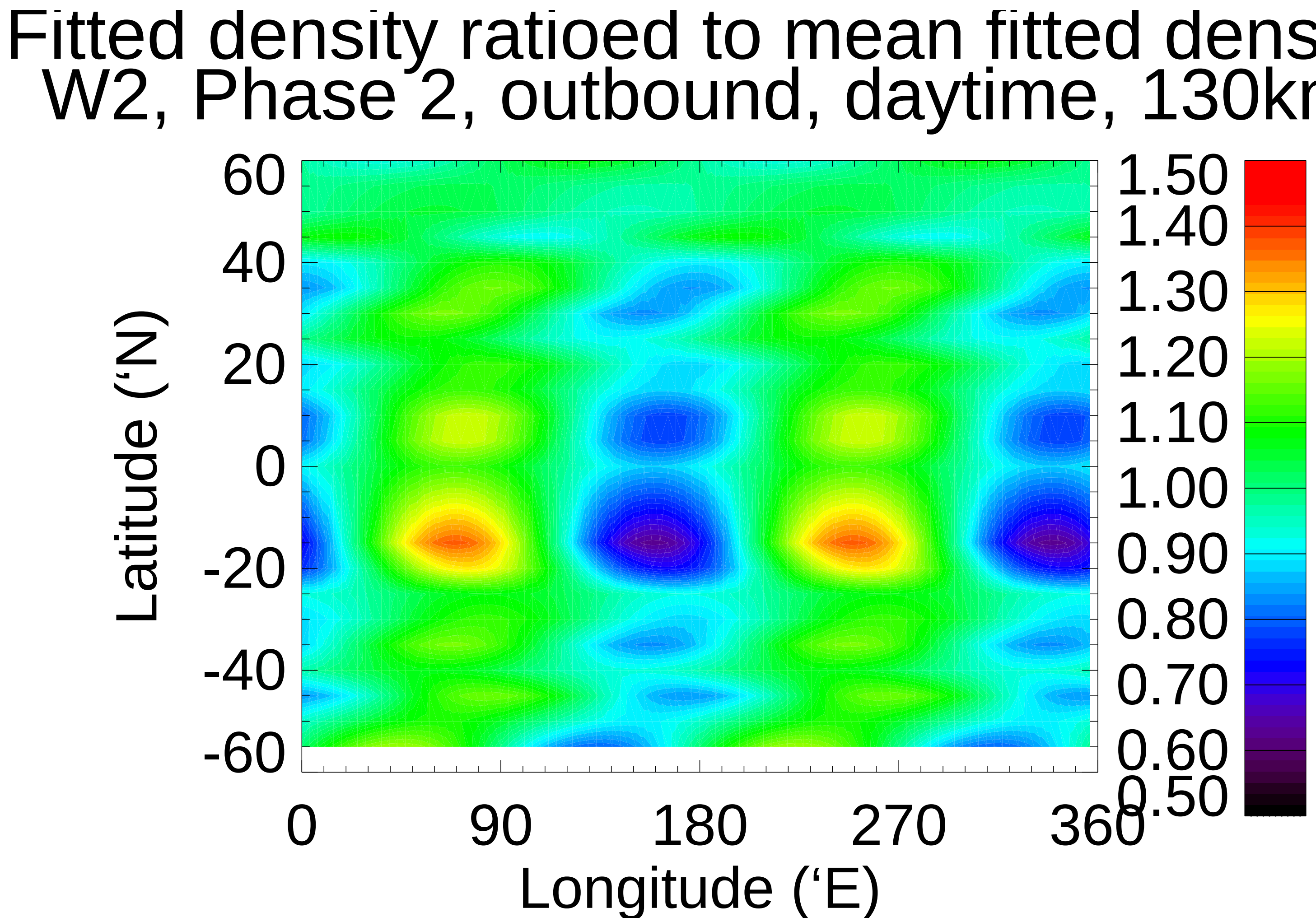

Fitted density ratioed to mean fitted density
Phase 2, outbound, daytime, 130km
60
40
20
0
-20
-40
-60
Latitude (‘N)
0
90
180
270
360
Longitude (‘E)
1.50
1.40
1.30
1.20
1.10
1.00
0.90
0.80
0.70
0.60
0.50

Normalized Wave Amplitudes
Outbound, 130 km, Phase 2, Daytime

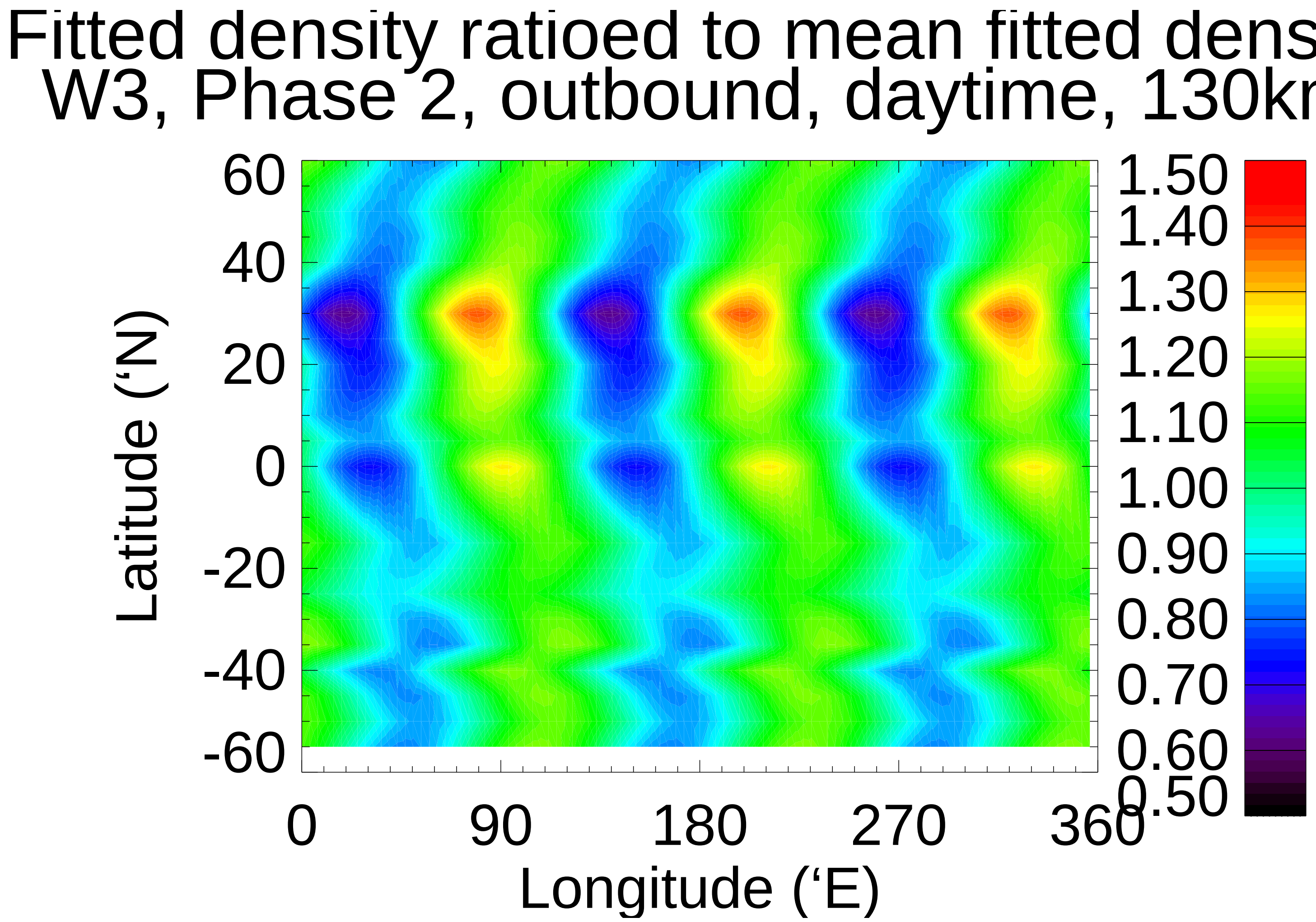


Wave Phases
Outbound, 130 km, Phase 2, Daytime

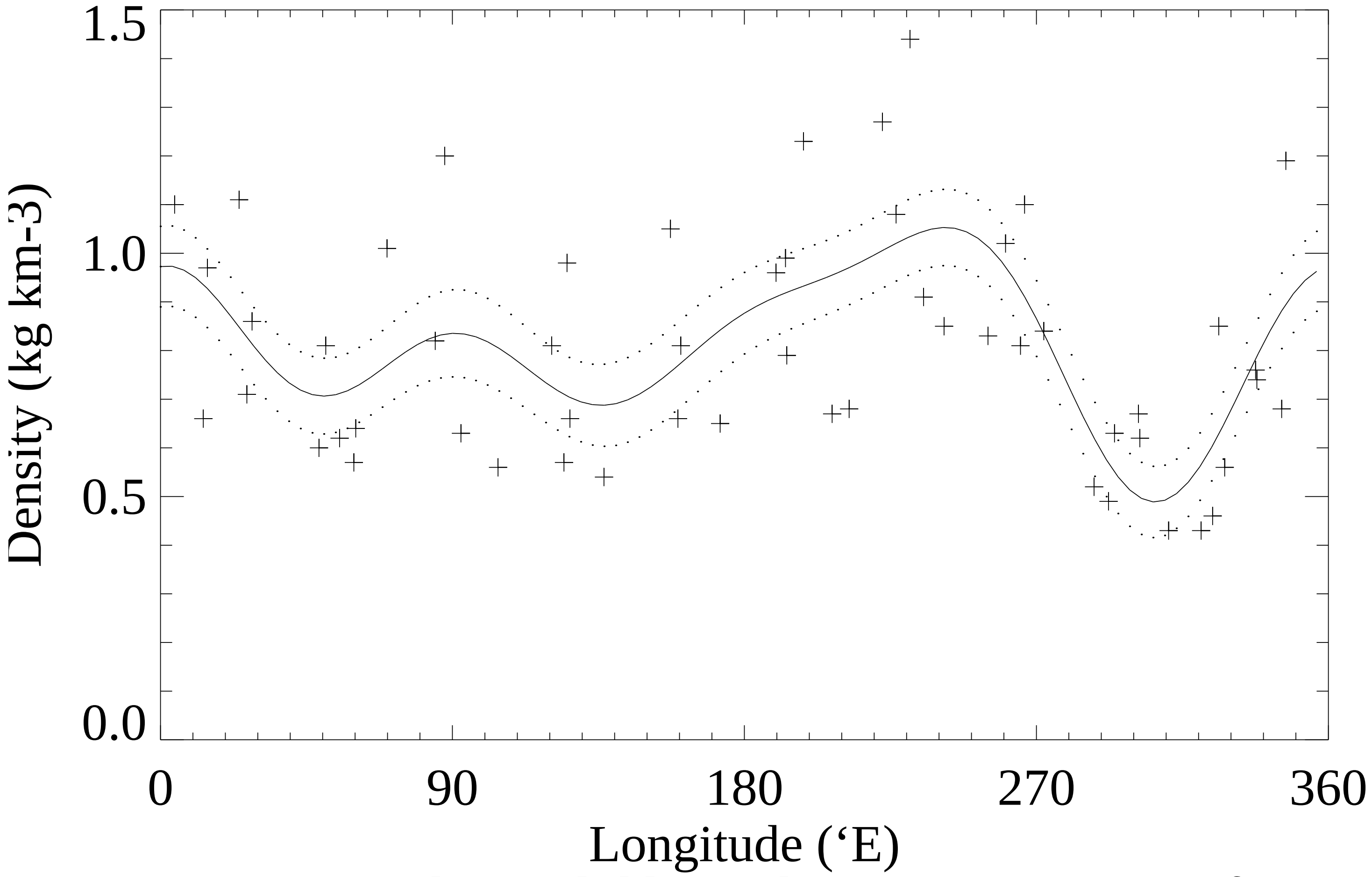




Fitted density ratioed to mean fitted density
W2, Phase 2, outbound, daytime, 130km
60
40
20
0
-20
-40
-60
0
90
180
270
360
Latitude ('N)
Longitude ('E)
1.50
1.40
1.30
1.20
1.10
1.00
0.90
0.80
0.70
0.60
0.50


Fitted density ratioed to mean fitted density
W3, Phase 2, outbound, daytime, 130km
60
40
20
0
-20
-40
-60
Latitude (‘N)
0
90
180
270
360
Longitude (‘E)
1.50
1.40
1.30
1.20
1.10
1.00
0.90
0.80
0.70
0.60
0.50

Wave-4 fit to outbound densities at 130km
Phase 2, -70 to -50 ‘N, constant altitude data, daytime

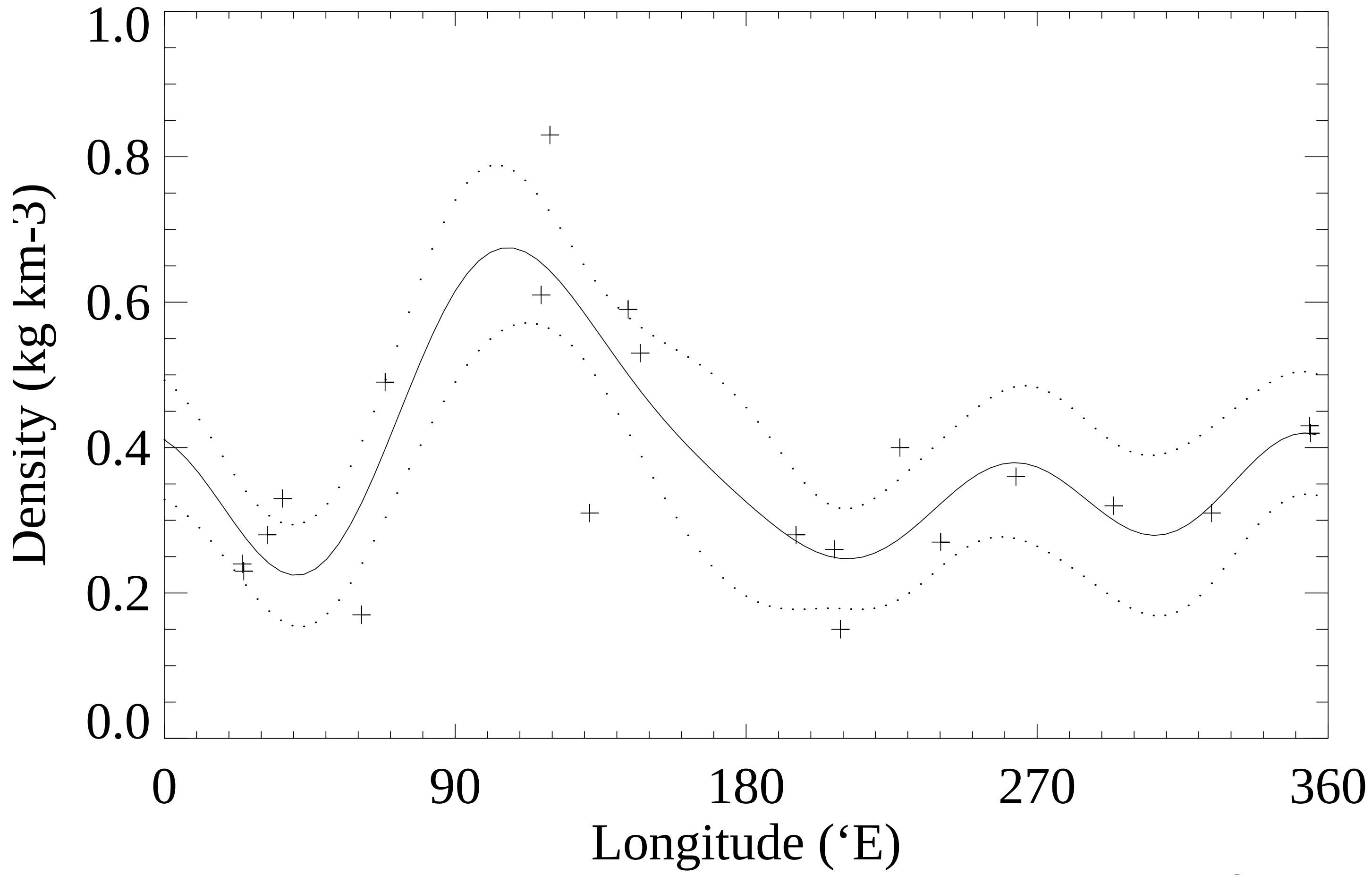


+ = MGS data, solid line = least squares wave-4 fit,
dotted lines = 1 sigma uncertainty in fit

Background density = 0.810 * (1 +/- 0.033)
Normalized Wave 1 amplitude = 0.083 * (1 +/- 0.565)
Wave 1 phase = 207.105 * (1 +/- 0.156)
Normalized Wave 2 amplitude = 0.168 * (1 +/- 0.271)
Wave 2 phase = 37.091 * (1 +/- 0.220)
Normalized Wave 3 amplitude = 0.134 * (1 +/- 0.347)
Wave 3 phase = 117.282 * (1 +/- 0.057)
Normalized Wave 4 amplitude = 0.101 * (1 +/- 0.478)
Wave 4 phase = 85.404 * (1 +/- 0.075)

Statistics neglect errors in the data
Ratio of Mean Sq. Err. in wavefit to constant fit = 0.589
Wave phases are first maximum east of 0‘E

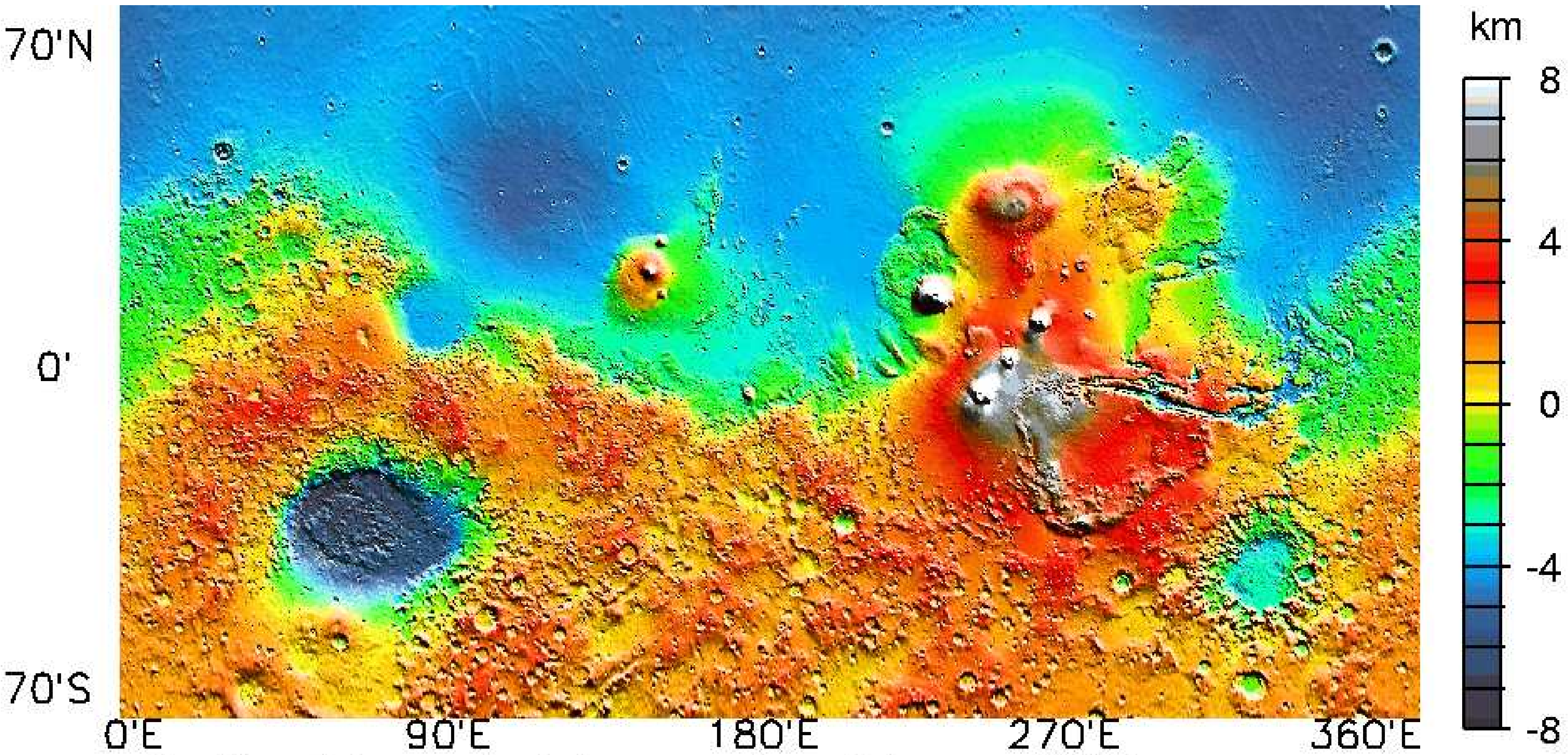
Wave-4 fit to inbound densities at 130km
Phase 2, -70 to -50 ‘N, constant altitude data, nighttime



+ = MGS data, solid line = least squares wave-4 fit,
dotted lines = 1 sigma uncertainty in fit

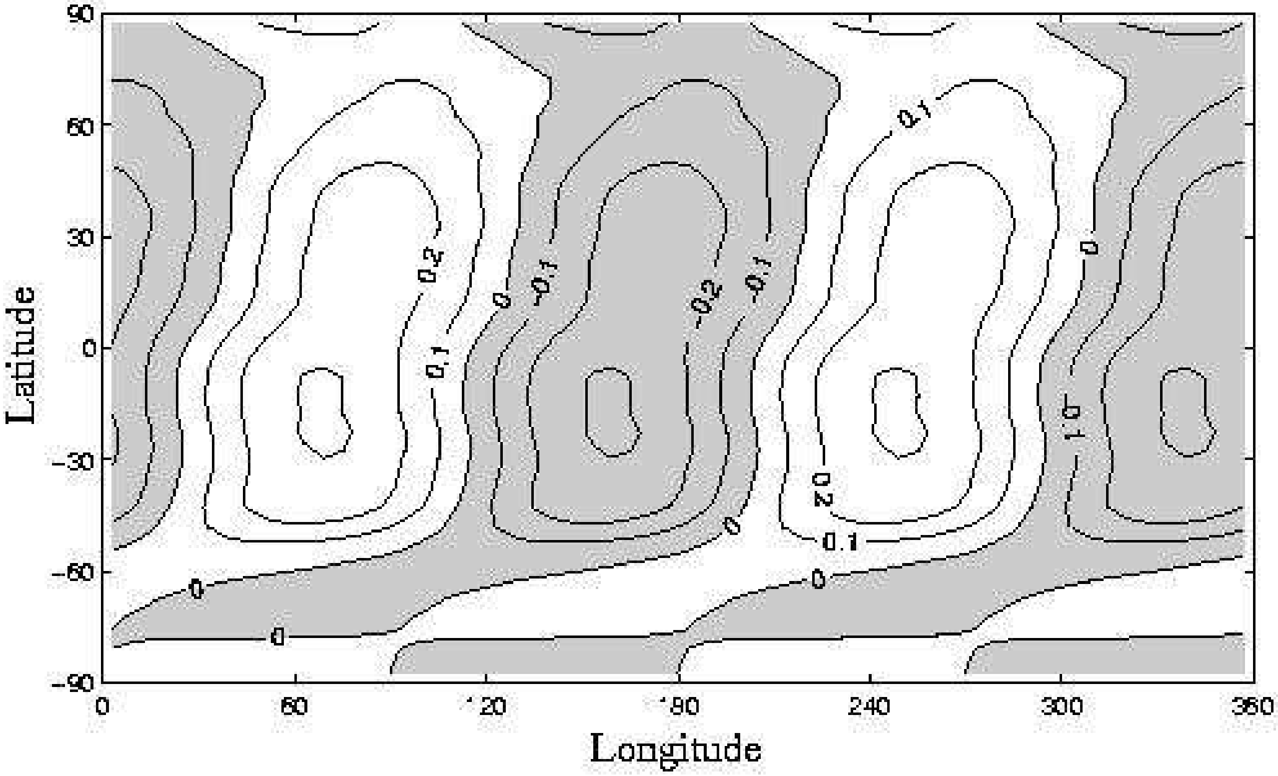
Background density = 0.383 * (1 +/- 0.086)
Normalized Wave 1 amplitude = 0.275 * (1 +/- 0.456)
Wave 1 phase = 107.722 * (1 +/- 0.225)
Normalized Wave 2 amplitude = 0.280 * (1 +/- 0.409)
Wave 2 phase = 116.976 * (1 +/- 0.106)
Normalized Wave 3 amplitude = 0.202 * (1 +/- 0.582)
Wave 3 phase = 114.827 * (1 +/- 0.094)
Normalized Wave 4 amplitude = 0.126 * (1 +/- 1.103)
Wave 4 phase = 88.931 * (1 +/- 0.128)

Statistics neglect errors in the data
Ratio of Mean Sq. Err. in wavefit to constant fit = 0.361
Wave phases are first maximum east of 0‘E



Smith, Zuber, et al topography, Science, 1999

MGCM S=2 Density Anomaly 1500 LT Z= 115 km



MGCM S=3 Density Anomaly 1500 LT Z= 115 km