EXPLORER 12 MAGNETOMETER RECORDS

16 AUGUST, 1961-6 DECEMBER, 1961

by

Robert S. Hyde and
Laurence J. Cahill, Jr.

Supported by the National Aeronautics and Space Administration under Grants NsG-33-60 and NsG-624 and Contract NASw-155 and by the Air Force under Contract AF29(601)-4618.

Explorer 12 Magnetometer Records

16 August, 1961 - 6 December, 1961

Robert S. Hyde and Laurence J. Cahill, Jr.

This set of records was prepared in the Physics Department of the University of New Hampshire between August 1962 and August 1966. The data from which these records were made were provided by the NASA Goddard Space Flight Center, in digital form, on magnetic tapes. The data tapes contained magnetic field measurements from a three-component Schonstedt Instrument Company fluxgate magnetometer, the time of the measurements, and several other useful related measurements. Each sensor had a nominal range of $\pm$ 1000 gammas in measurement of the magnetic field component along its sensitive axis. One sensor, the Z sensor, was aligned approximately (within 2^{o}) with the spin axis of the satellite throughout the flight. The spin rate was approximately 30 rpm. The other two sensors, X and Y, were orthogonal to the first sensor and to each other. Each sensor was sampled in sequence X, Y, Z during a 50-millisecond interval, and the sample rate was three times each second. During ground processing the analog magnetometer signals were digitized with an effective digitization channel width of 24 gammas. Each component measurement had an uncertainty due to digitization of $\pm$ 12 gammas, as well as other errors due to possible changes in preflight calibration. The other errors have been

discussed in several papers on the Explorer 12 magnetometer data. These papers are listed in the bibliography.

The X, Y, Z measurements were used to compute $B = \sqrt{x^2+y^2+z^2}$, $\alpha = \tan^{-1} \sqrt{x^2+y^2}/Z$ and $\psi = \psi_o + \omega\Delta t + \tan^{-1} Y/X$ (where ω is spin angular velocity, Δt is time between measurement and "see-sun" time and ψ_o angle between sun sensor and x sensor, Figure 1). In an average of several individual measurements, the digitization error, if random, may be reduced. The data points shown in these records are averages of 32 individual computed values (occasionally 16 values) of B, α and ψ. One data point was computed every 500 km in radial distance. The time interval between points varies from a few minutes near 5 R_e to an hour near apogee. The records have served as an initial survey of the Explorer 12 data, have aided in selection of periods for more intensive study, and have provided material for several papers listed in the bibliography. The records have been useful in determining the location of the magnetosphere boundary; the distortion of the field inside the magnetosphere and the general level of low frequency (<0.001 cps) magnetic fluctuations in the magnetosphere. They have not been adequate for detailed studies of the magnetopause, for studies of low amplitude fluctuations in the magnetosphere or for any studies of the transition region.

The measured values B, α, ψ shown here were plotted by hand at the appropriate geocentric radial distances specified on a "Master Orbit" magnetic tape also provided by GSFC.

Data below 5 R_e were not plotted because the magnitude increases rapidly and the field distortion becomes imperceptible on the scale of these records. The vertical scale for B is in gammas and the scales for α and ψ in degrees. The approximate time and magnetic latitude of a measurement may be obtained from the auxiliary Universal Time and latitude scales at the top of each record.

The predicted field B, α, and ψ, according to the Jensen and Cain, 1962, reference field, was computed from information provided on the Master Orbit tape on the assumption that the spin axis direction was 47^{o} Right Ascension and -27.5^{o} Declination in celestial coordinates.

Since the processing and plotting of these data several errors have been noted in the original plots. In late 1965 facilities became available at UNH for computer processing (IBM 1620) and automatic plotting (Cal Comp) of magnetic tape data. We have reprocessed the Explorer 12 data and have prepared automatic plots of B, α, ψ once every five minutes. The original records have been compared to these more recently plotted records and corrections have been made where necessary. In addition, a careful check of time, magnetic latitude and predicted field has been made. A number of errors may still remain in these records, but they are useful in showing the general characteristics of the outer magnetosphere and its boundary in the fall of 1961.

Acknowledgments

The laboratory in which this experiment was planned and tested was equipped with support under NASA Grant NSG-33-60 and Air Force Contract AF29(601)-4618. The work on the flight instruments was supported by NASA Contract NASw-155 and the data analysis proceeded under support of NASA Contract NASw-155 and Grant NSG-624.

We acknowledge the guidance of Dr. Frank MacDonald, S-3 project scientist at Goddard Space Flight Center in the planning and development of the experiment. The S-3 project office at GSFC assisted in many ways during the construction and testing of the experiment. We are particularly grateful to Mr. Paul Butler, Project Manager.

Many students and associates at UNH contributed to the success of the experiment and to the analysis of data. Paul Amazeen and Wendell Sawyer were major contributors to the experimental effort, while V. L. Patel and Marilyn Wingersky shared responsibility in data processing.

The interested and responsible assistance of Erick Schonstedt, who built the fluxgate instruments, and his associates was essential to our project. Availability of the Fredericksburg Magnetic Observatory, under the direction of Mr. Robert Gebhardt, aided testing of the experiment.

The enthusiastic assistance of many technical and administrative employees at UNH was essential. Among these employees were Anne Anderson, Carl Flanders, Herbert Scheibel and Phyllis Warnock.

References

A. Papers Based Principally on Explorer 12

Magnetic Results

Cahill, L. J., Jr., A study of the geomagnetic field, Space Research III, 324-330, (ed. W. Priester), North Holland Pub. Co., Amsterdam, 1962.

Cahill, L. J., Jr., and P. G. Amazeen, The boundary of the geomagnetic field, J. Geophys. Res., 68, 1835-1844, 1963.

Cahill, L. J., Jr. and D. H. Bailey, Distortion of the magnetosphere during a magnetic storm on September 30, 1961, J. Geophys. Res., 72, 159-169, 1967.

Cahill, L. J., Jr., and V. L. Patel, Further obserations of the geomagnetic boundary: Explorer 12 UNH Research Report 64-4, 1964, to be published in Planetary and Space Sci., 1967.

Fairfield, D. H. and L. J. Cahill, Jr., Transition region magnetic field and polar magnetic disturbances, J. Geophys. Res., 71, 155-169, 1966.

Mead, G. D. and L. J. Cahill, Jr., Explorer 12 measurements of the distortion of the geomagnetic field by the solar wind, GSFC X-640-66-527, November, 1966, to be published in J. Geophys. Res., 1967.

Nishida, A. L. J. Cahill, Jr., Sudden impulses observed by Explorer 12, J. Geophys. Res., 69, 2243-2255, 1964.

Nishida, A. and J. H. Young, Explorer 12 observations of magnetic sudden impulses in the earth's magnetosphere, Nature, 201, 1113-1114, 1964.

Patel, V. L., Structure of the equations of cosmic electrodynamics and photon rest mass, Phys. Letters, 14, 105-106, 1965.

Patel, V. L., Low frequency hydromagnetic waves in the magnetosphere: Explorer 12, Planetary and Space Sci., 13, 485-506, 1965.

Patel, V. L. and L. J. Cahill, Jr., Evidence of hydromagnetic waves in the earth's magnetosphere and of their propagation to the earth's surface, Phys. Rev. Letters, 12, 213-215, 1964.

Patel, V. L., L. J. Cahill, Jr., and A. J. Dessler, Magnetosheath field geomagnetic index a_p and stability of magnetopause, J. Geophys. Res., 72, 426-430, 1967.

Sonnerup, B. U. O. and L. J. Cahill, Jr., Magnetopause structure and attitude from Explorer 12 observations, J. Geophys. Res., 72, 171-182, 1967.

B. Papers Based Partially on Explorer 12

Magnetic Results

Freeman, J. W., J. A. Van Allen and L. J. Cahill, Jr., Explorer 12 observations of the magnetosphere boundary and the associated solar plasma on September 13, 1961, J. Geophys. Res., 68, 2121-2130, 1963.

Hoffman, R. A., L. R. Davis and J. M. Williamson, Protons of 0.1 to 5 Mev and electrons of 20 kev at 12 earth radii during sudden commencement on September 30, 1961, J. Geophys. Res., 67, 5001-50005, 1962.

Konradi, A. and R. L. Kaufmann, Evidence for rapid motion of the outer boundary of the magnetosphere, J. Geophys. Res., 70, 1627-1637, 1965.

Rosser, W. G. U., Changes in the structure of the outer radiation zone associated with the magnetic storm of September 30, 1961, J. Geophys. Res., 68, 3131-3148,,1963.

Rosser, W. G. U., B. J. O'Brien, J. A. Van Allen, L. A. Frank and C. D. Laughlin, Electrons in the earth's outer radiation zone, J. Geophys. Res., 67, 4533-4542, 1962.

Spreiter, J. R. and W. Jones, On the effect of a weak interplanetary magnetic field on the interaction between the solar wind and the geomagnetic field, J. Geophys. Res., 68, 3555-3564, 1963.

C. Review Articles

Cahill, L. J., Jr., The geomagnetic field, Chap. 9, 301-349, Space Physics, ed. D. P. LeGalley and A. Rosen, John Wiley and Sons, Inc., New York, 1964.

Cahill, L. J., Jr., Magnetic field measurements in space, Space Science Rev., 1, 399-414, (ed. C. de Jager) 1962.

Hines, C. O., The magnetopause: a new frontier in space, Science, 141, 130-136, 1963.

D. Abstracts

Cahill, L. J., Jr., Distortions of the geomagnetic field within the inner magnetosphere, Trans. A.G.U., 46, 116, 1965.

Cahill, L. J., Jr., Study of the outer geomagnetic field, Trans. A.G.U., 43, 217, 1962.

Cahill, L. J., Jr., and S. A. Knowles, Transition region magnetic fields, Trans. A.G.U., 46, 531, 1965.

Cahill, L. J., Jr., and P. G. Amazeen, Termination of the earth's magnetic field during the period September 11-14, 1961, Trans. A.G.U., 43, 218, 1962.

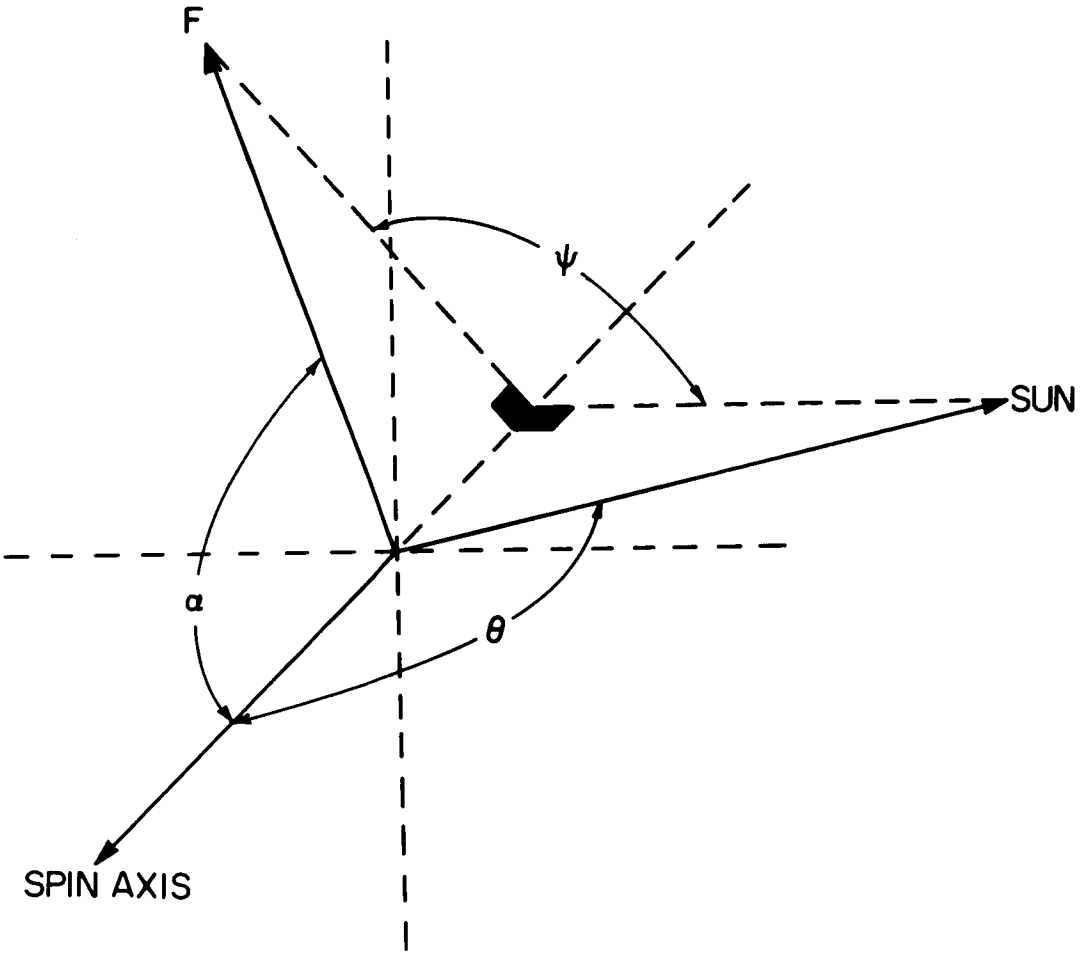
Cahill, L. J., Jr., and V. L. Patel, The SC and the main phase of a magnetic storm in the outer space, Trans. A.G.U., 43, 459, 1962.

Patel, V. L., and L. J. Cahill, Jr., On the stability of the magnetospheric boundary, Trans. A.G.U., 46, 530, 1965.

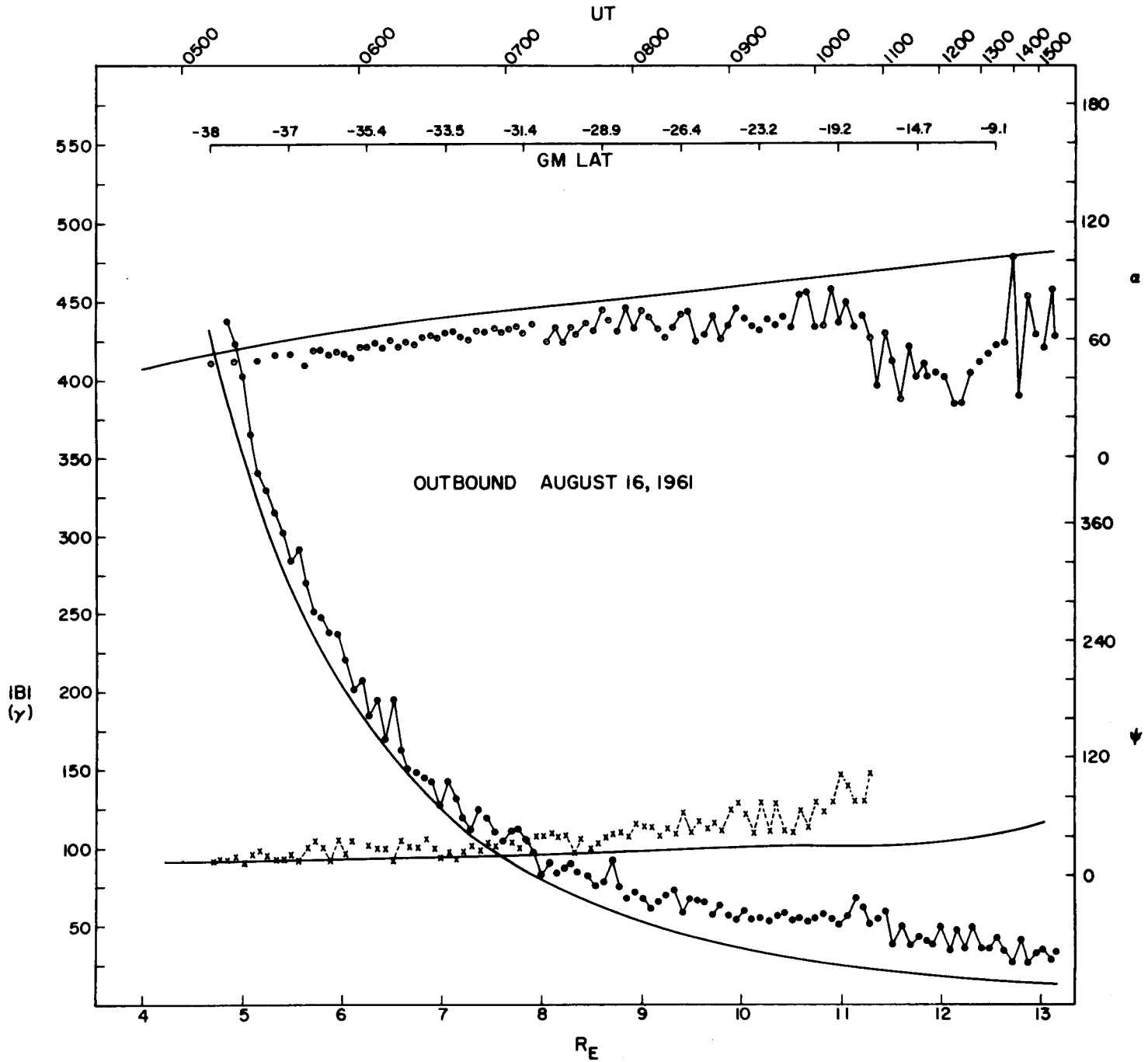
Patel, V. L., and L. J. Cahill, Jr., Polarization of low-frequency hydromagnetic waves in the magnetosphere, Trans. A.G.U., 45, 78, 1964.

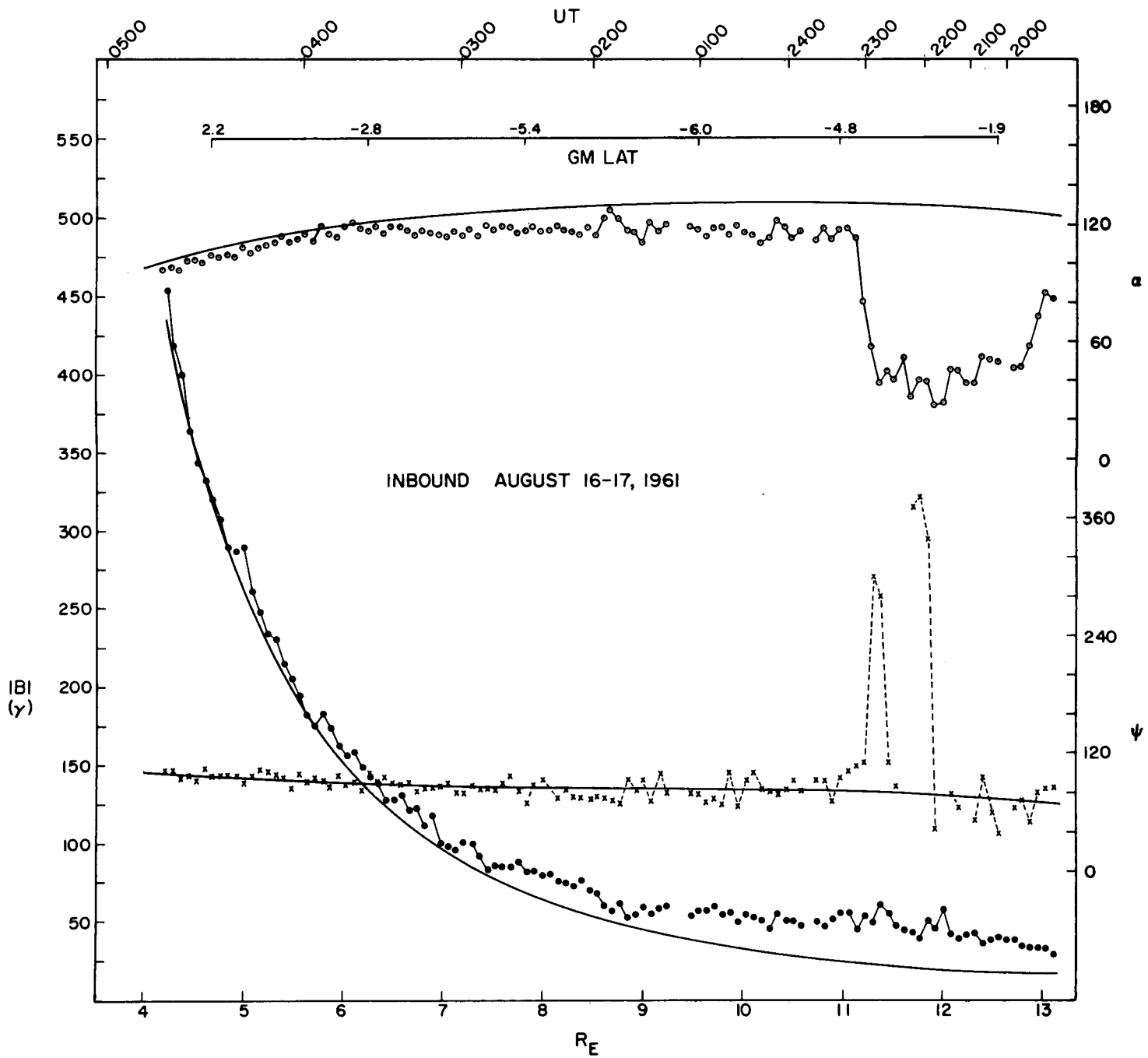
Patel, V. L., and L. J. Cahill, Jr., The geomagnetic field boundary and associated solar wind, Trans, A.G.U., 43, 459, 1962.

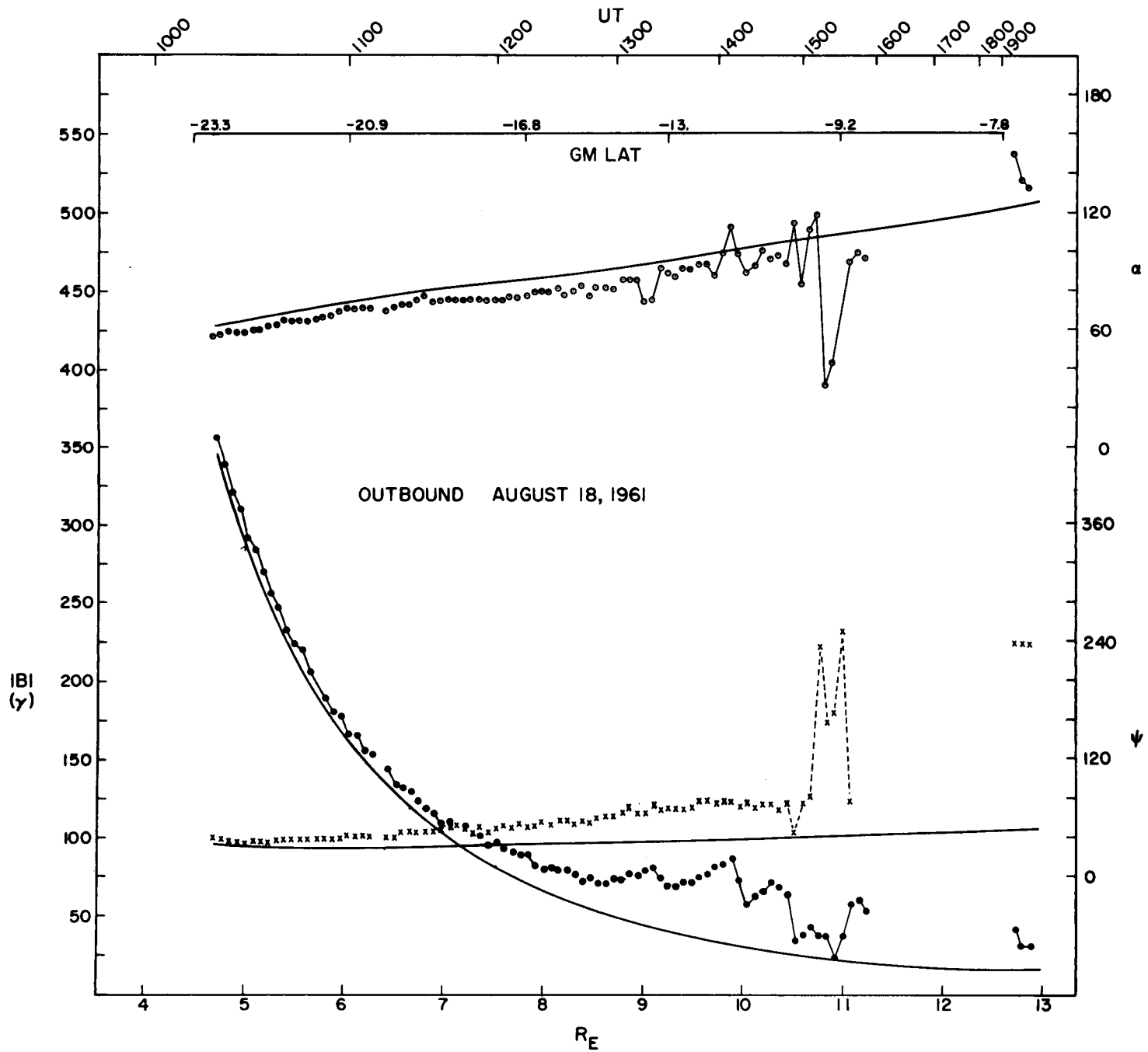
Patel, V. L., and L. J. Cahill, Jr., The magnetic storm of September 30, 1961: Explorer 12 measurements, Trans. A.G.U., 43, 218, 1962.

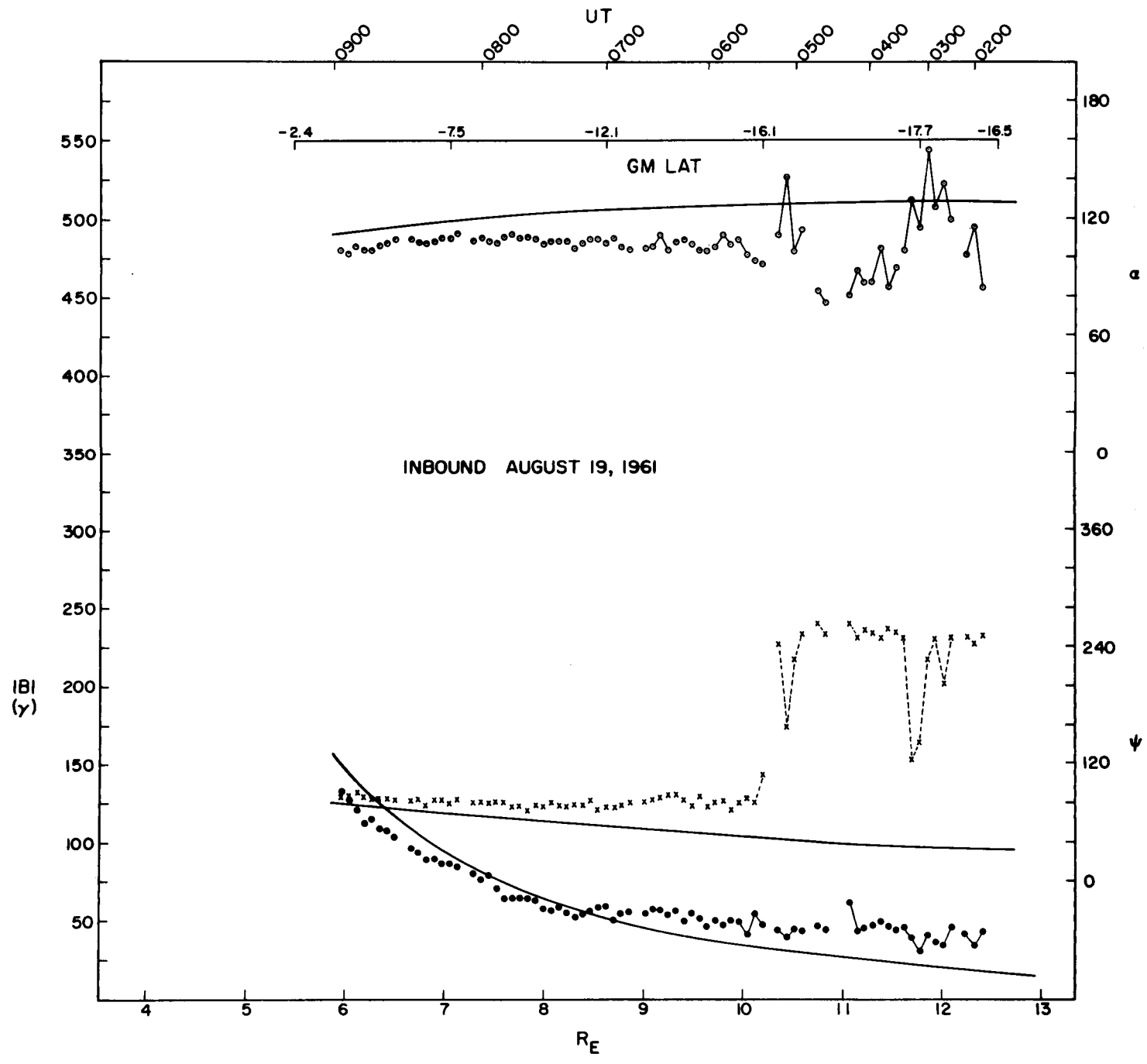


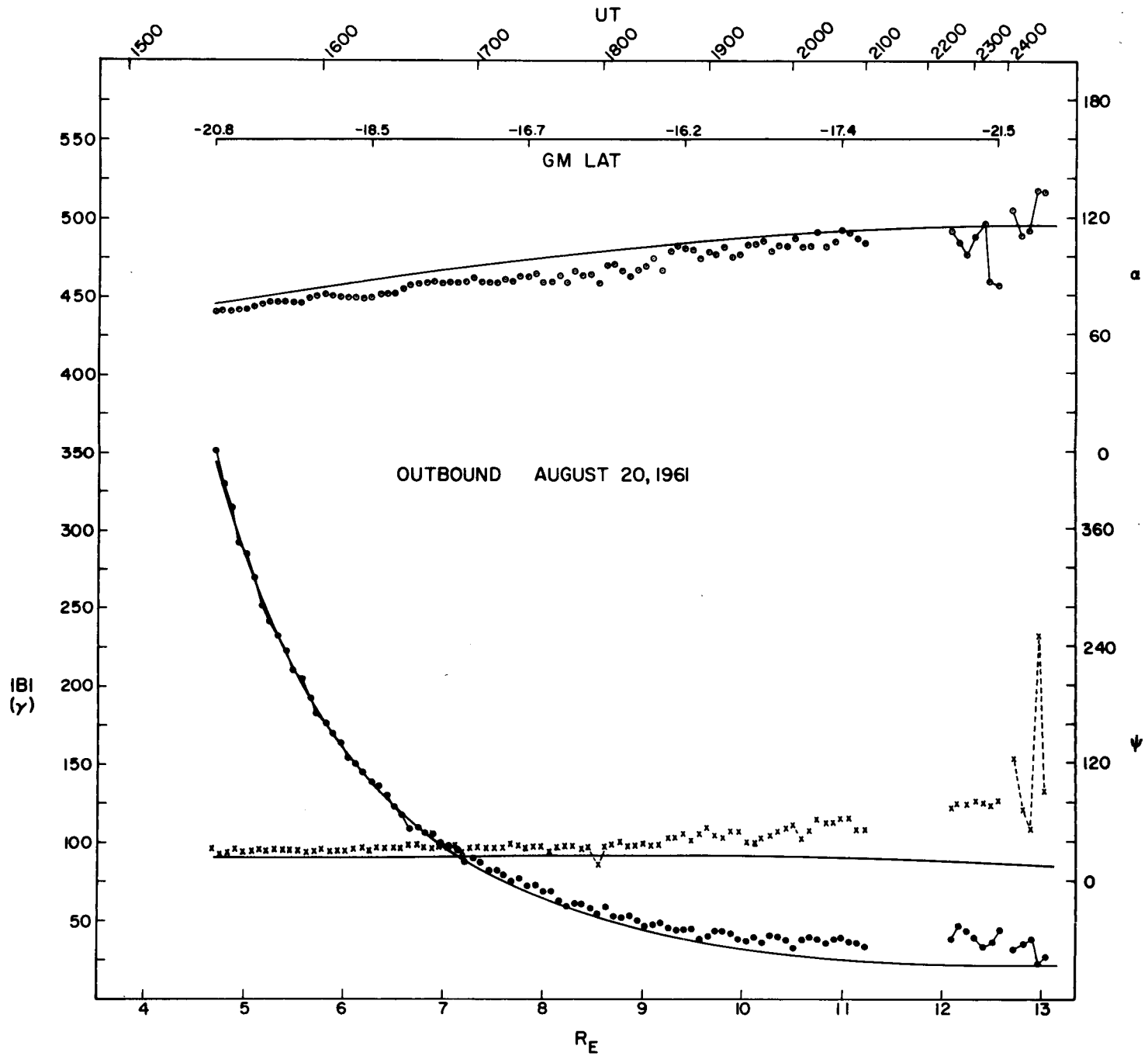
DIRECTION OF THE MAGNETIC FIELD IN RELATION TO THE SUN–SPIN PLANE.

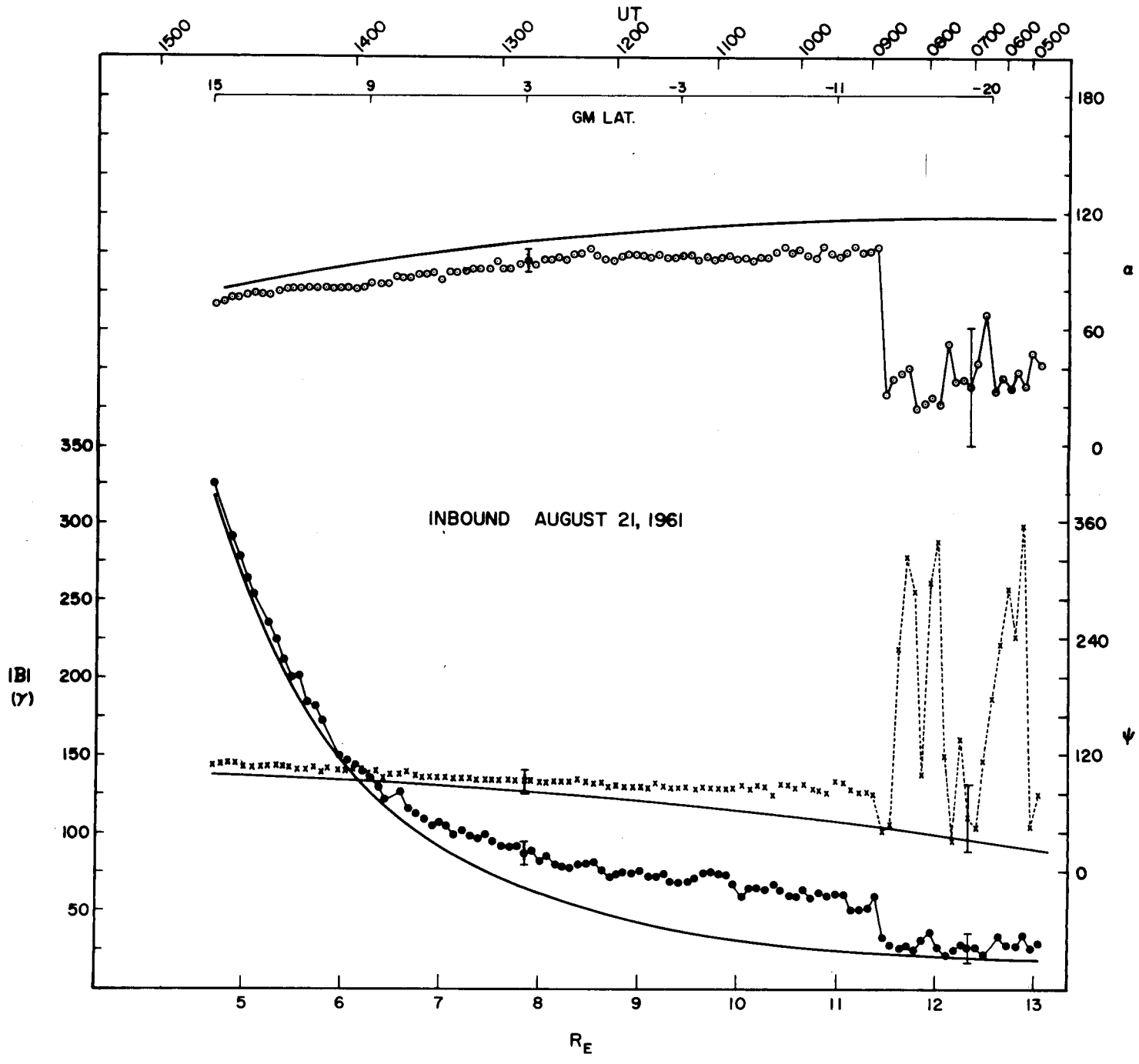

UT
0500
0600
0700
0800
0900
1000
1100
1200
1300
1400
1500
-38
-37
-35.4
-33.5
-31.4
-28.9
-26.4
-23.2
-19.2
-14.7
-9.1
GM LAT
OUTBOUND AUGUST 16, 1961
|B|
(γ)
550
500
450
400
350
300
250
200
150
100
50
180
120
60
0
360
240
120
0
α
ψ
4
5
6
7
8
9
10
11
12
13
R_E

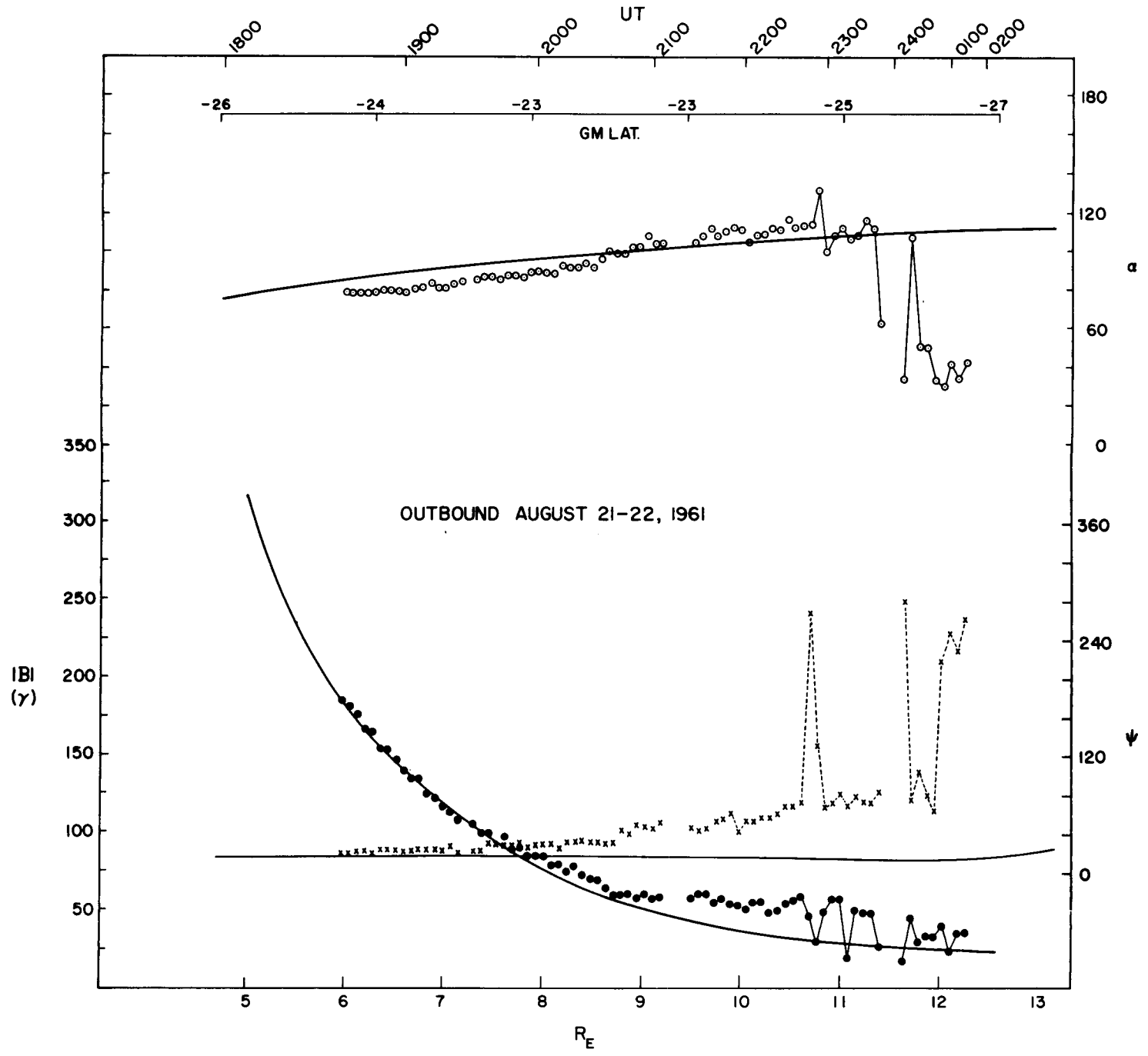

UT
0500
0400
0300
0200
0100
2400
2300
2200
2100
2000
2.2
-2.8
-5.4
-6.0
-4.8
-1.9
GM LAT
INBOUND AUGUST 16-17, 1961
IBI (γ)
α
ψ
R_E

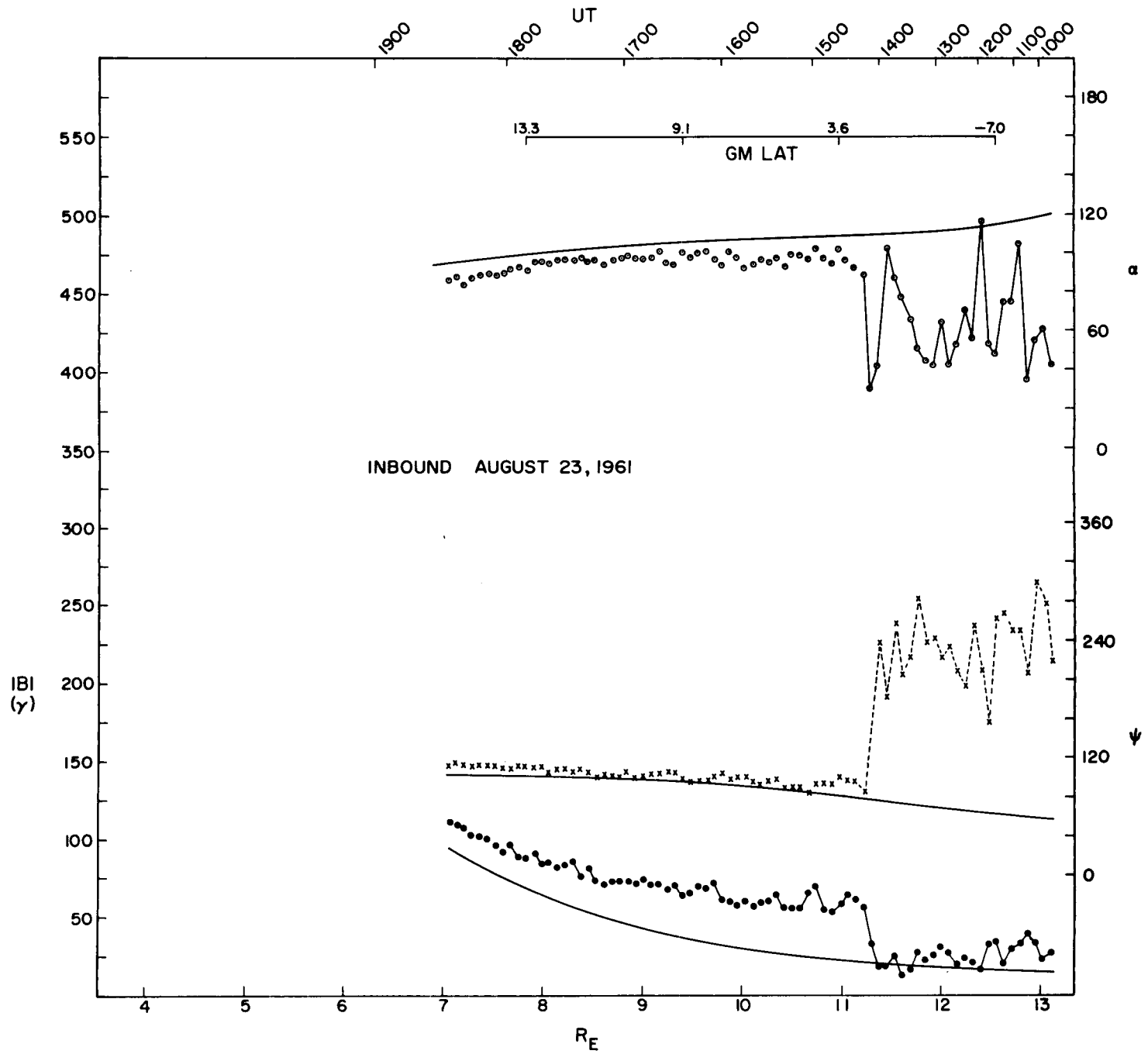

UT
1000
1100
1200
1300
1400
1500
1600
1700
1800
1900
-23.3
-20.9
-16.8
-13.
-9.2
-7.8
GM LAT
OUTBOUND AUGUST 18, 1961
|B|
(γ)
550
500
450
400
350
300
250
200
150
100
50
180
120
60
0
360
240
120
0
α
ψ
4
5
6
7
8
9
10
11
12
13
R_E

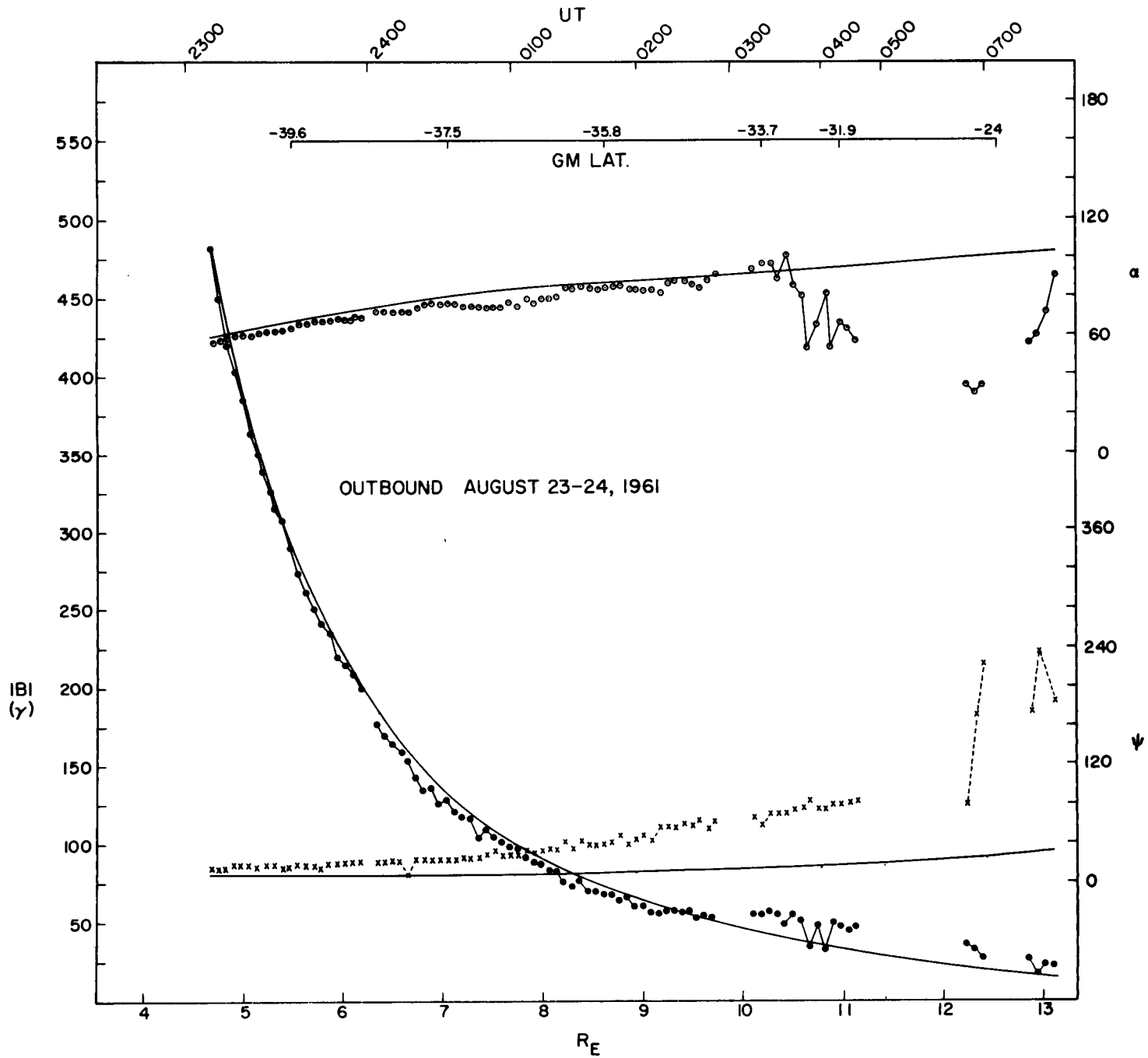

UT
0900
0800
0700
0600
0500
0400
0300
0200
-2.4
-7.5
-12.1
-16.1
-17.7
-16.5
GM LAT
INBOUND AUGUST 19, 1961
|B|
(γ)
550
500
450
400
350
300
250
200
150
100
50
180
120
60
0
360
240
120
0
α
ψ
4
5
6
7
8
9
10
11
12
13
R_E

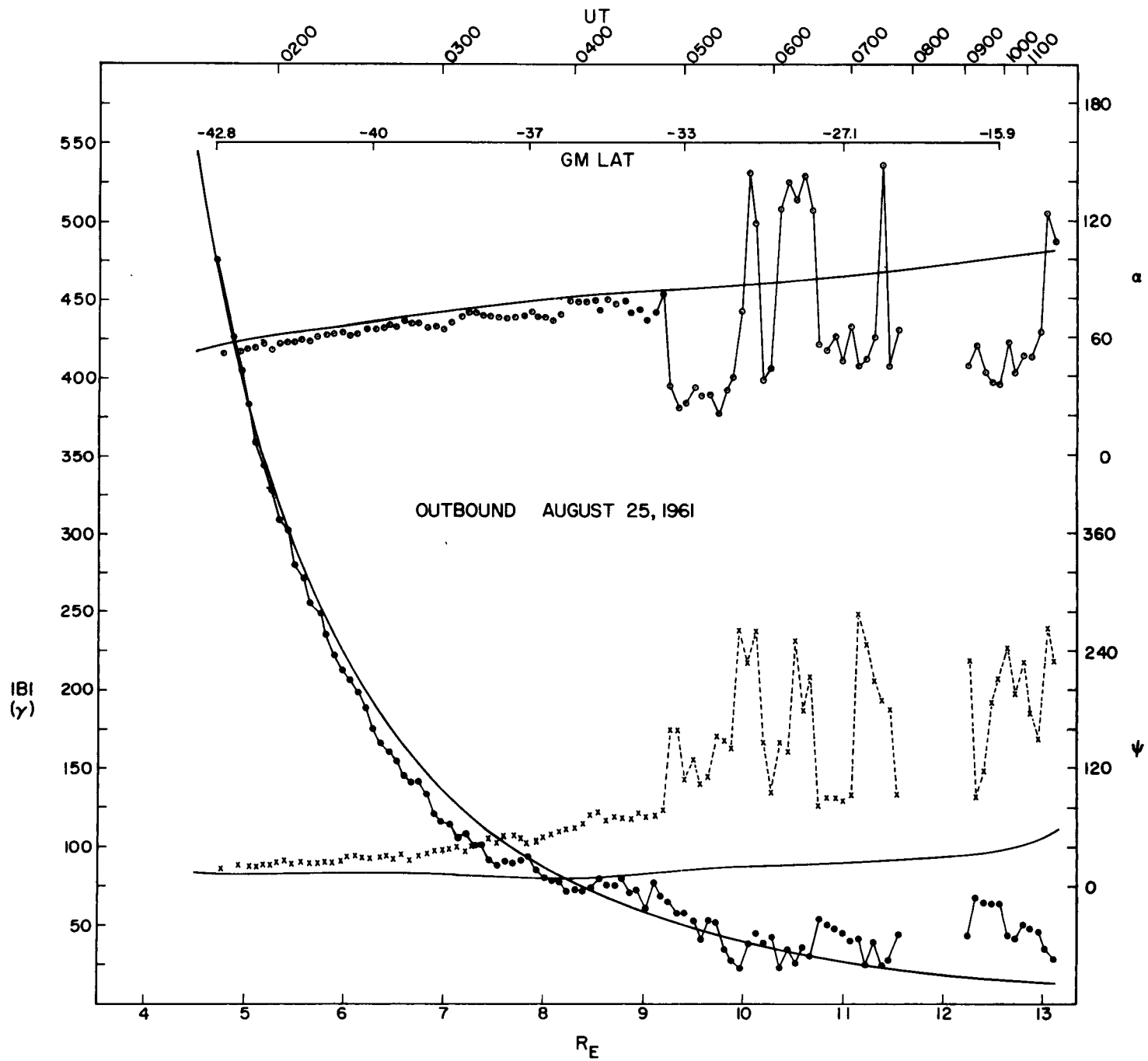

UT
1500
1600
1700
1800
1900
2000
2100
2200
2300
2400
-20.8
-18.5
-16.7
-16.2
-17.4
-21.5
GM LAT
OUTBOUND AUGUST 20, 1961
|B|
(γ)
550
500
450
400
350
300
250
200
150
100
50
180
120
60
0
360
240
120
0
α
ψ
4
5
6
7
8
9
10
11
12
13
R_E

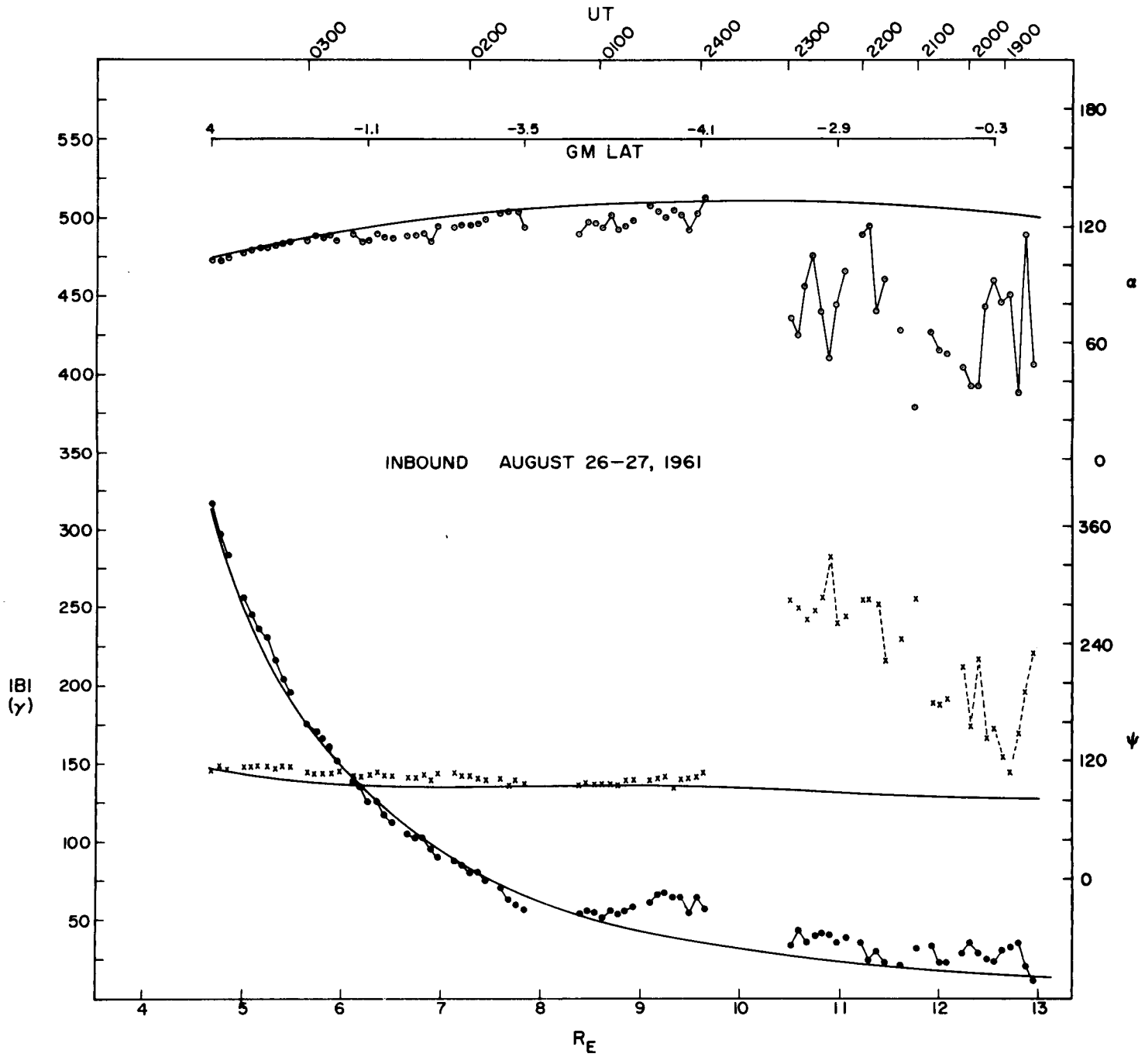

UT
1500
1400
1300
1200
1100
1000
0900
0800
0700
0600
0500
15
9
3
-3
-11
-20
GM LAT.
180
120
60
0
α
INBOUND AUGUST 21, 1961
350
300
250
200
150
100
50
|B|
(γ)
360
240
120
0
ψ
5
6
7
8
9
10
11
12
13
R_E

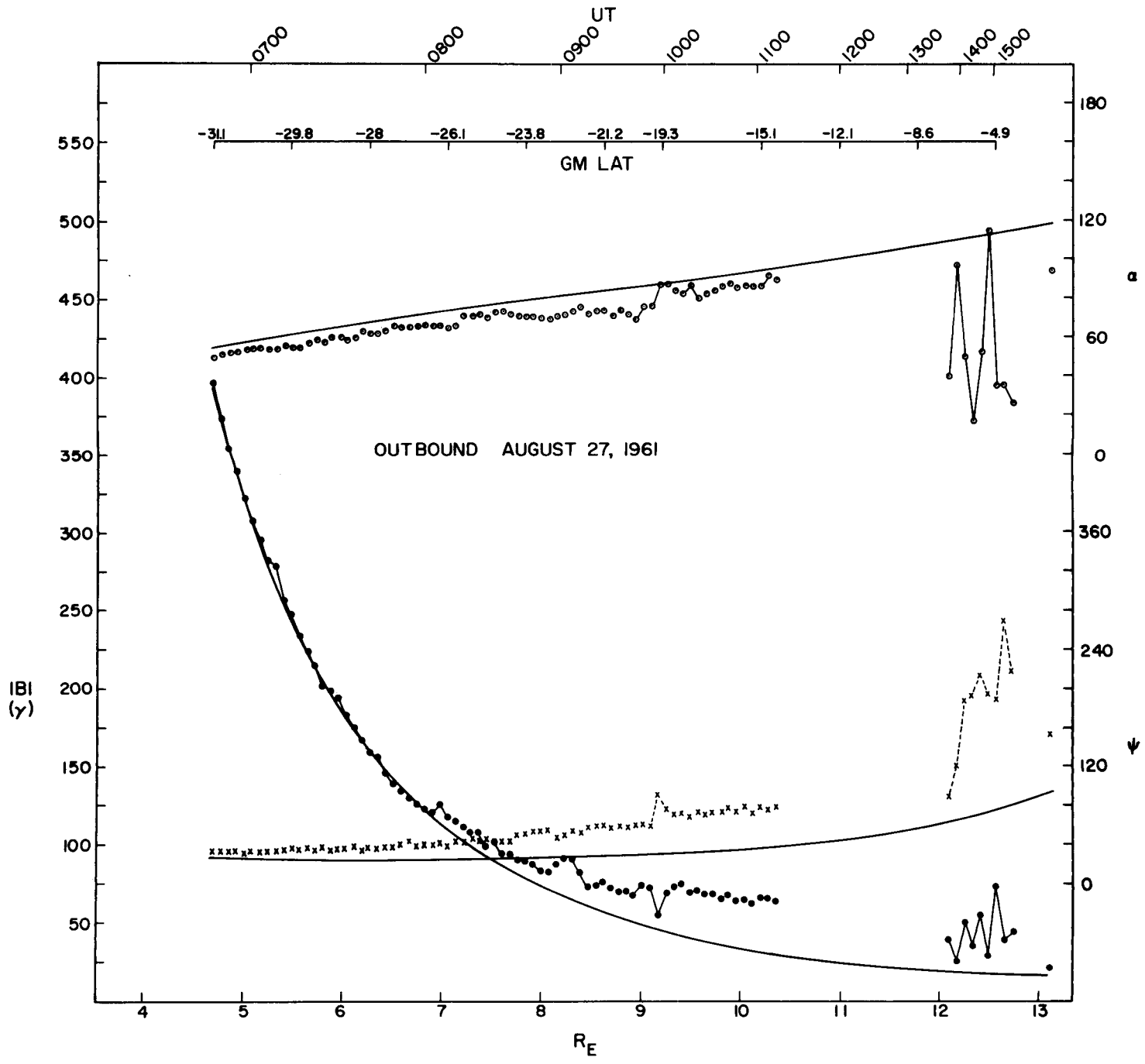

UT
1800
1900
2000
2100
2200
2300
2400
0100
0200
-26
-24
-23
-23
-25
-27
GM LAT.
180
120
60
0
α
OUTBOUND AUGUST 21-22, 1961
350
300
250
200
150
100
50
|B|
(γ)
360
240
120
0
ψ
5
6
7
8
9
10
11
12
13
R_E

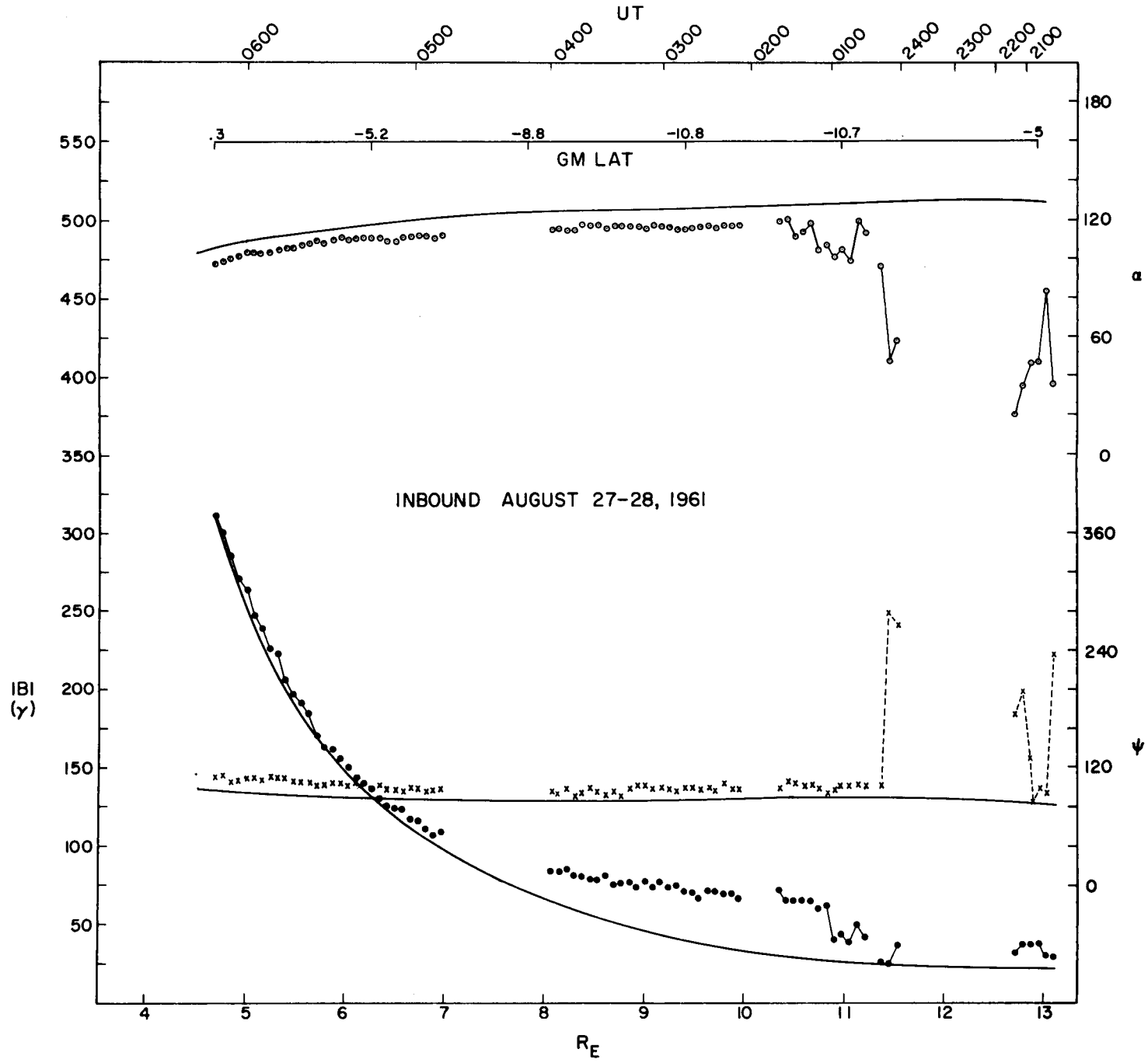

UT
1900
1800
1700
1600
1500
1400
1300
1200
1100
1000
13.3
9.1
3.6
-7.0
GM LAT
INBOUND AUGUST 23, 1961
|B|
(γ)
550
500
450
400
350
300
250
200
150
100
50
180
120
60
0
α
360
240
120
0
ψ
4
5
6
7
8
9
10
11
12
13
R_E

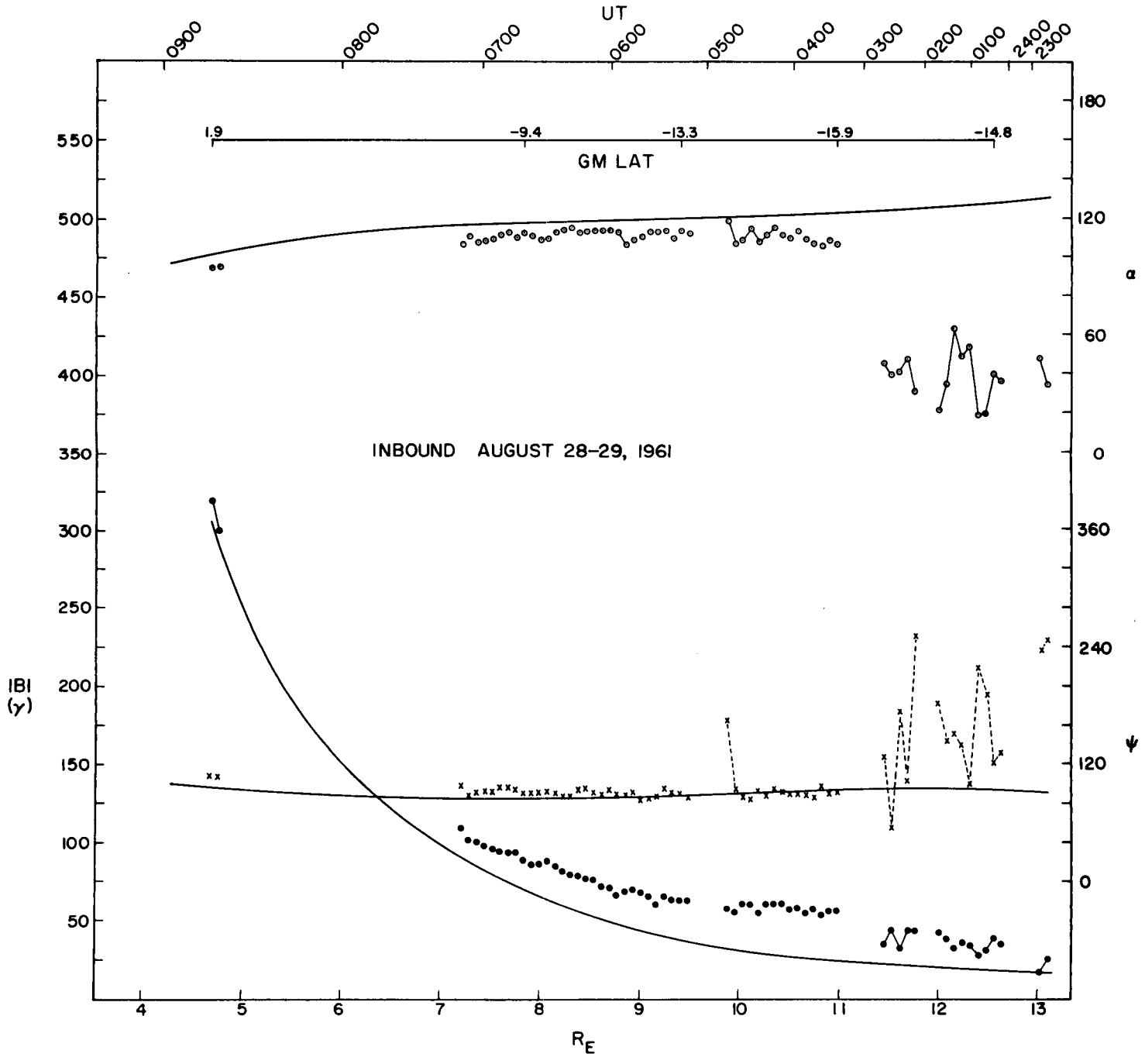

UT
2300
2400
0100
0200
0300
0400
0500
0700
-39.6
-37.5
-35.8
-33.7
-31.9
-24
GM LAT.
OUTBOUND AUGUST 23-24, 1961
|B|
(γ)
α
ψ
R_E

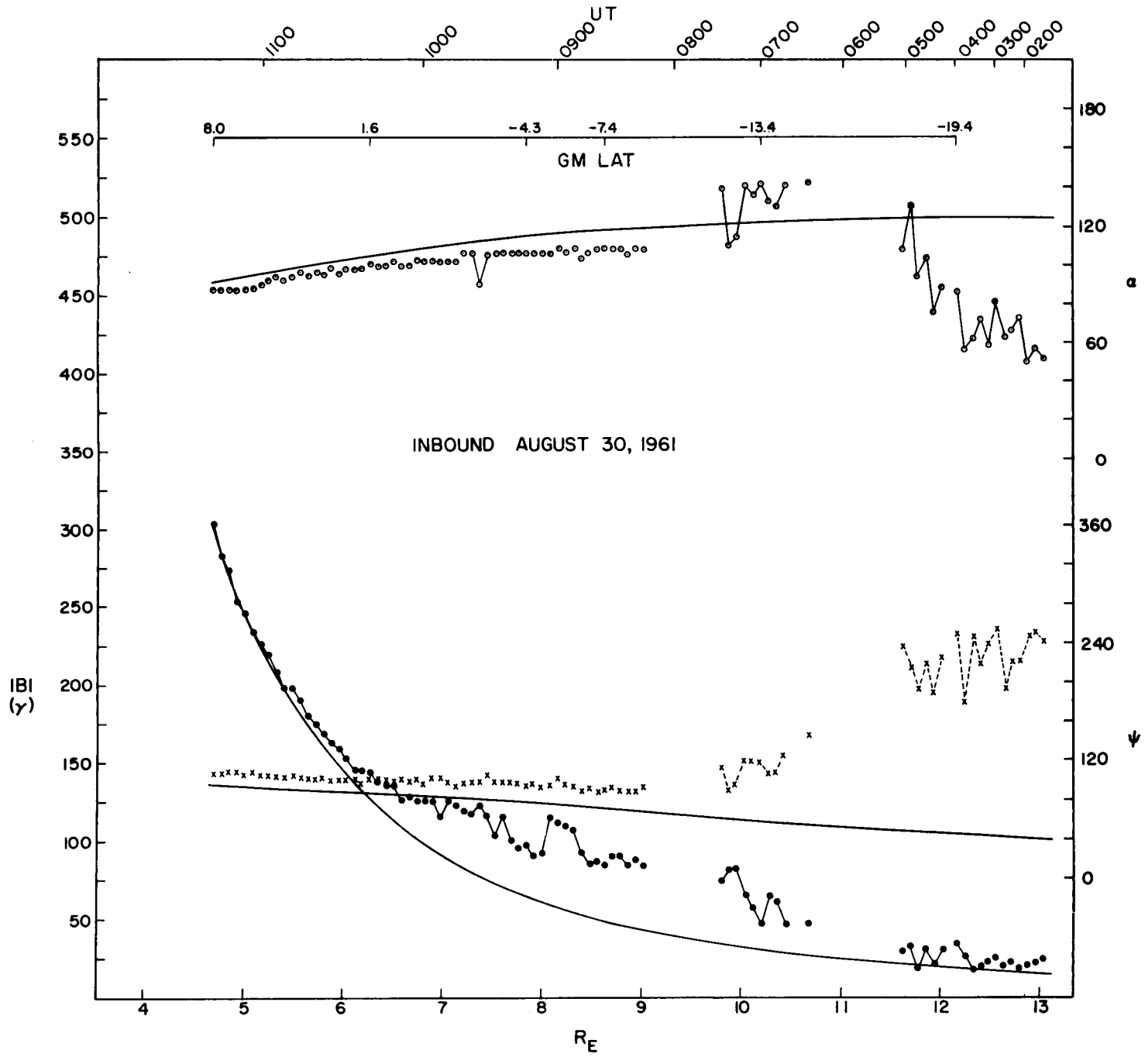

UT
0200
0300
0400
0500
0600
0700
0800
0900
1000
1100
-42.8
-40
-37
-33
-27.1
-15.9
GM LAT
OUTBOUND AUGUST 25, 1961
|B|
(γ)
α
ψ
R_E

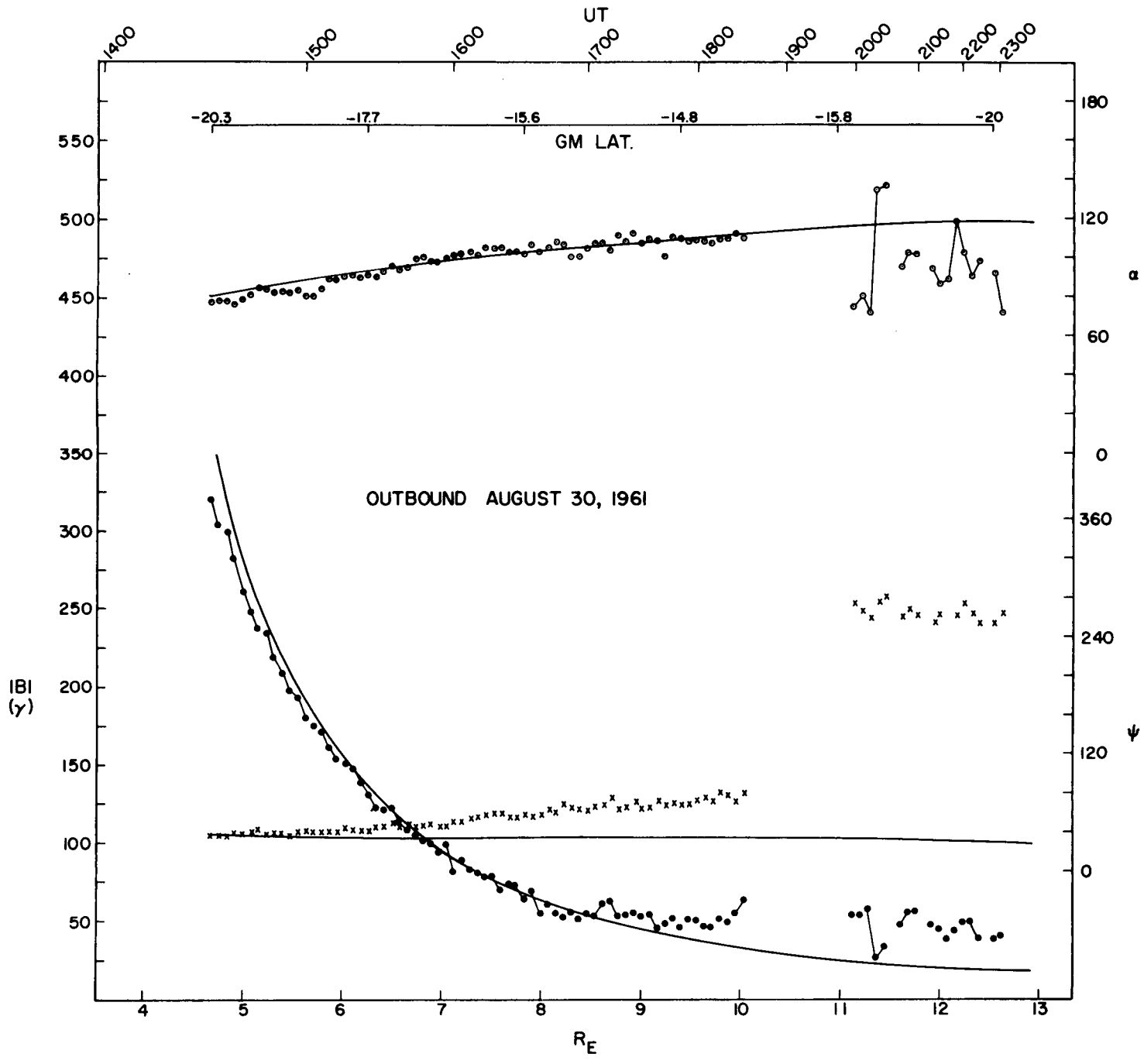

UT
0300
0200
0100
2400
2300
2200
2100
2000
1900
4
-1.1
-3.5
-4.1
-2.9
-0.3
GM LAT
INBOUND AUGUST 26-27, 1961
|B| (γ)
α
ψ
R_E

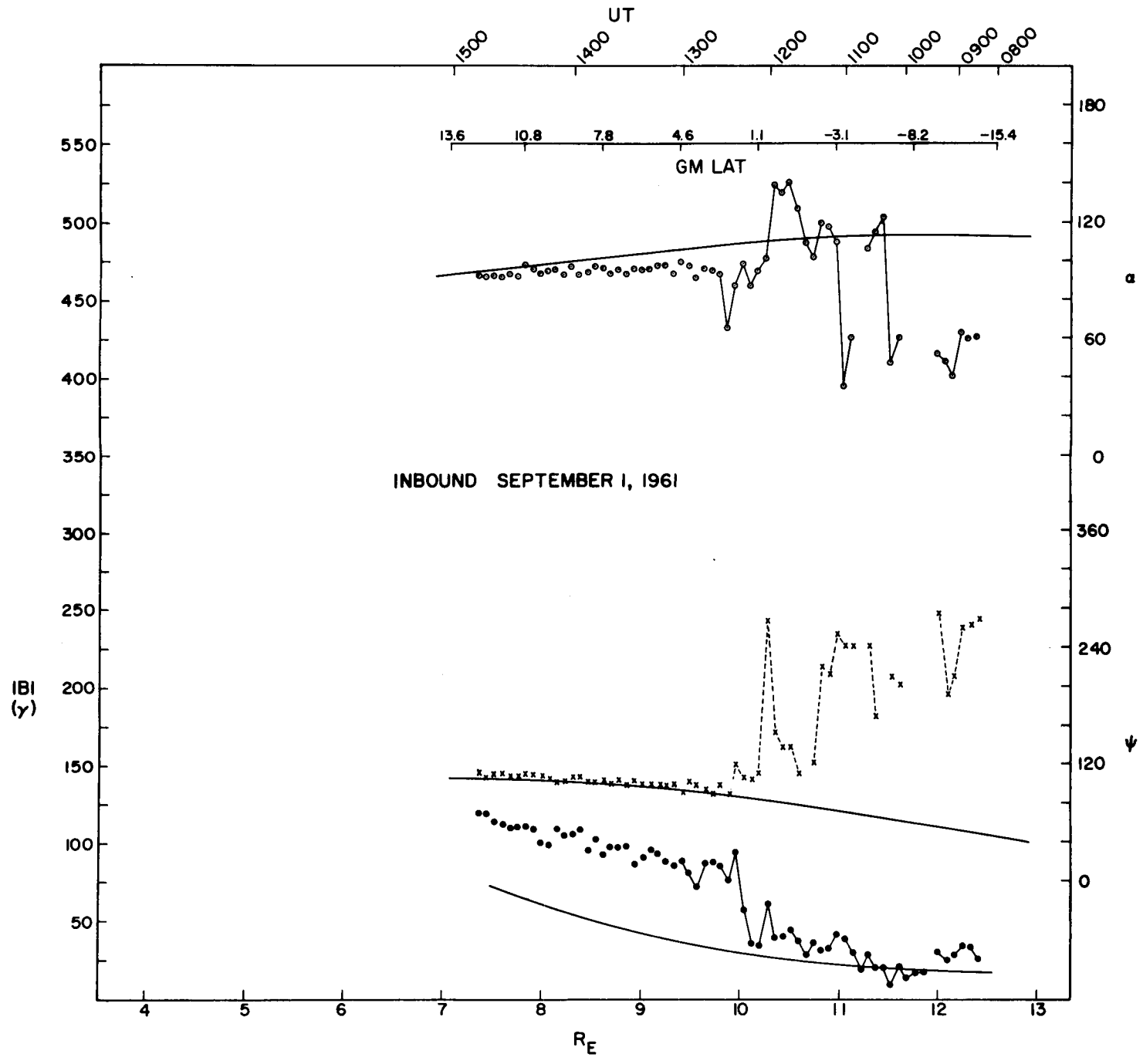

UT
0700
0800
0900
1000
1100
1200
1300
1400
1500
-31.1
-29.8
-28
-26.1
-23.8
-21.2
-19.3
-15.1
-12.1
-8.6
-4.9
GM LAT
OUTBOUND AUGUST 27, 1961
|B|
(γ)
550
500
450
400
350
300
250
200
150
100
50
180
120
60
0
360
240
120
0
α
ψ
4
5
6
7
8
9
10
11
12
13
R_E

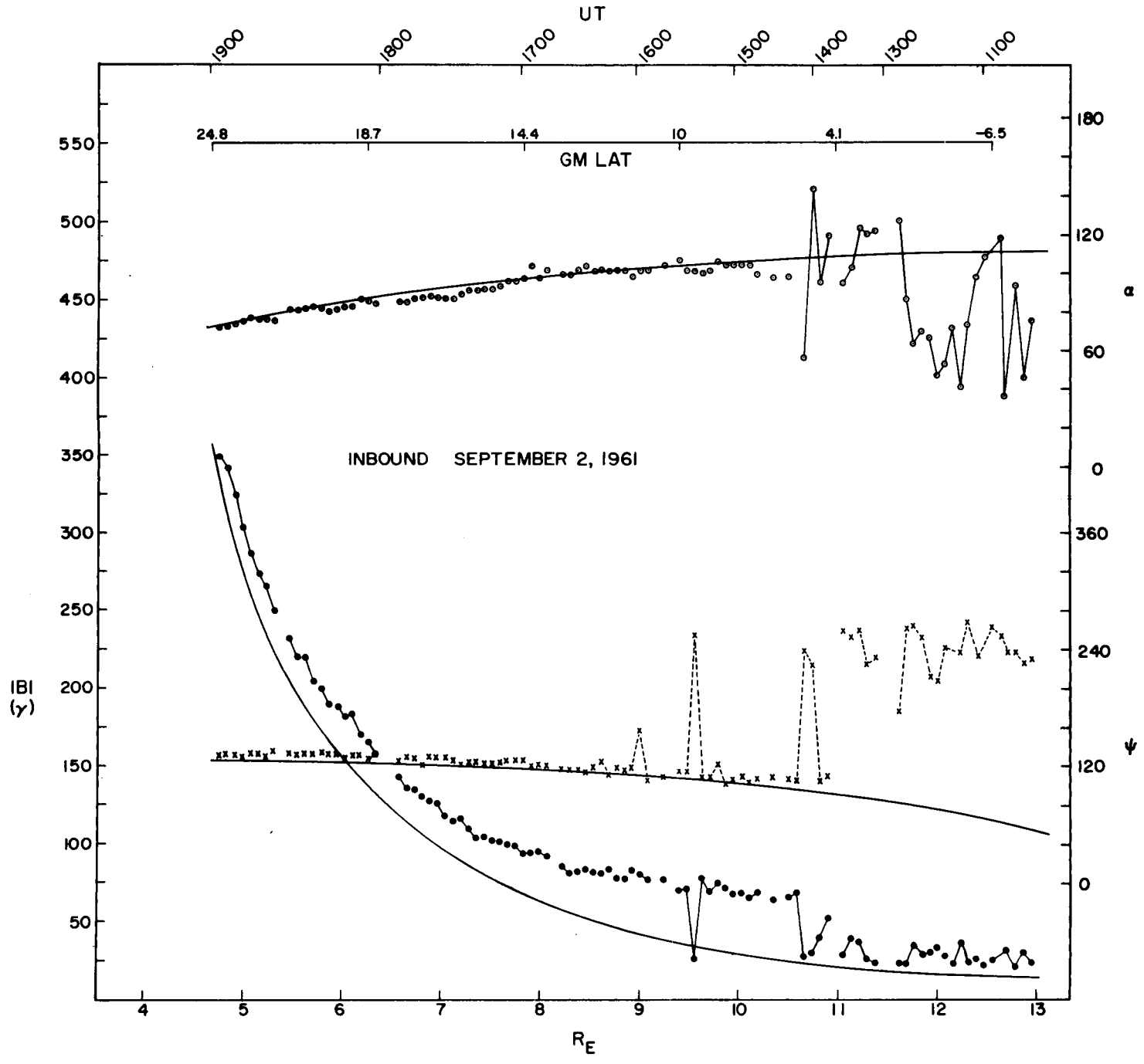

UT
0600
0500
0400
0300
0200
0100
2400
2300
2200
2100
-3
-5.2
-8.8
-10.8
-10.7
-5
GM LAT
INBOUND AUGUST 27-28, 1961
IBI
(γ)
α
ψ
R_E

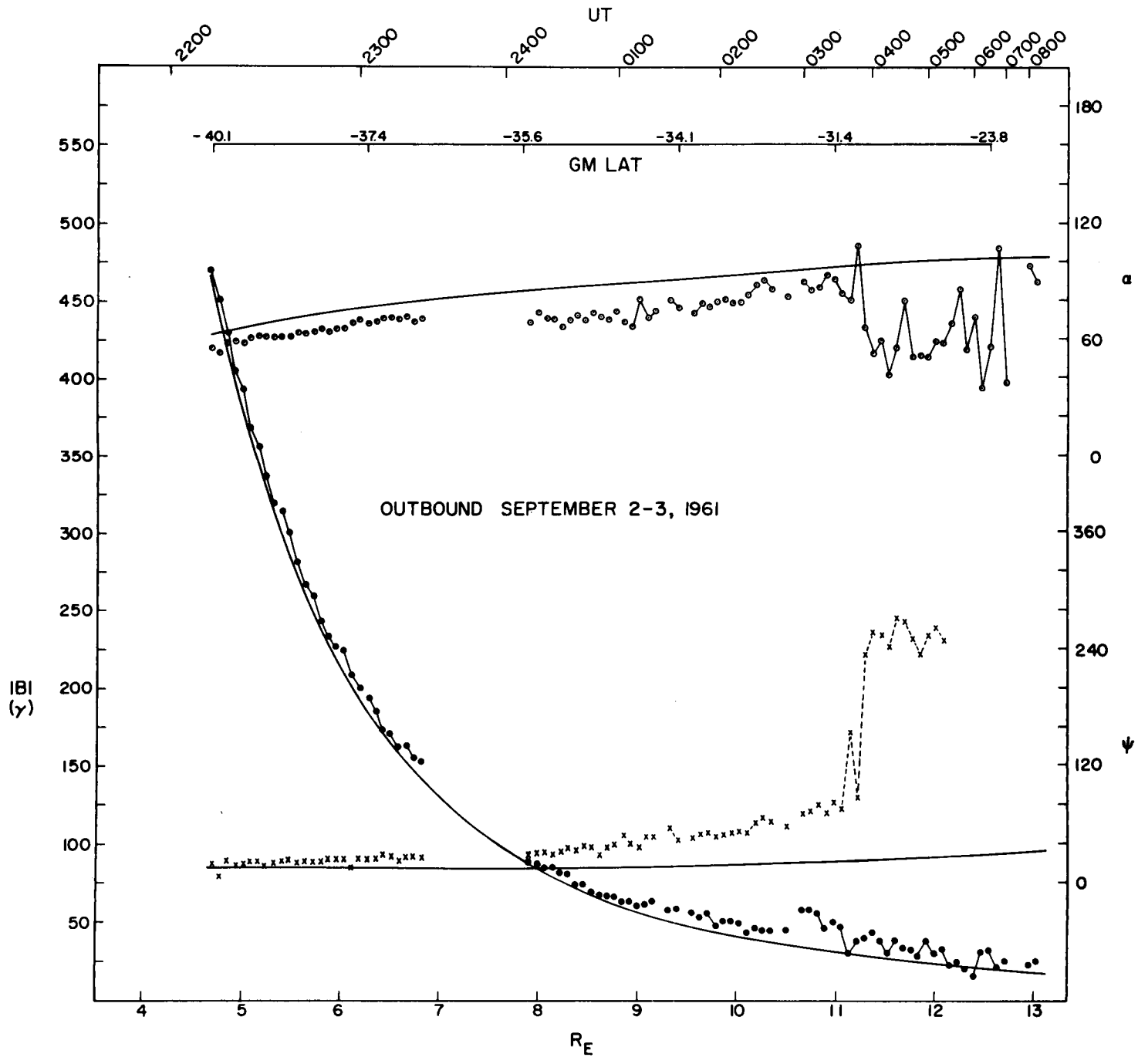

UT
0900
0800
0700
0600
0500
0400
0300
0200
0100
2400
2300
1.9
-9.4
-13.3
-15.9
-14.8
GM LAT
INBOUND AUGUST 28-29, 1961
|B|
(γ)
550
500
450
400
350
300
250
200
150
100
50
180
120
60
0
360
240
120
0
α
ψ
4
5
6
7
8
9
10
11
12
13
R_E

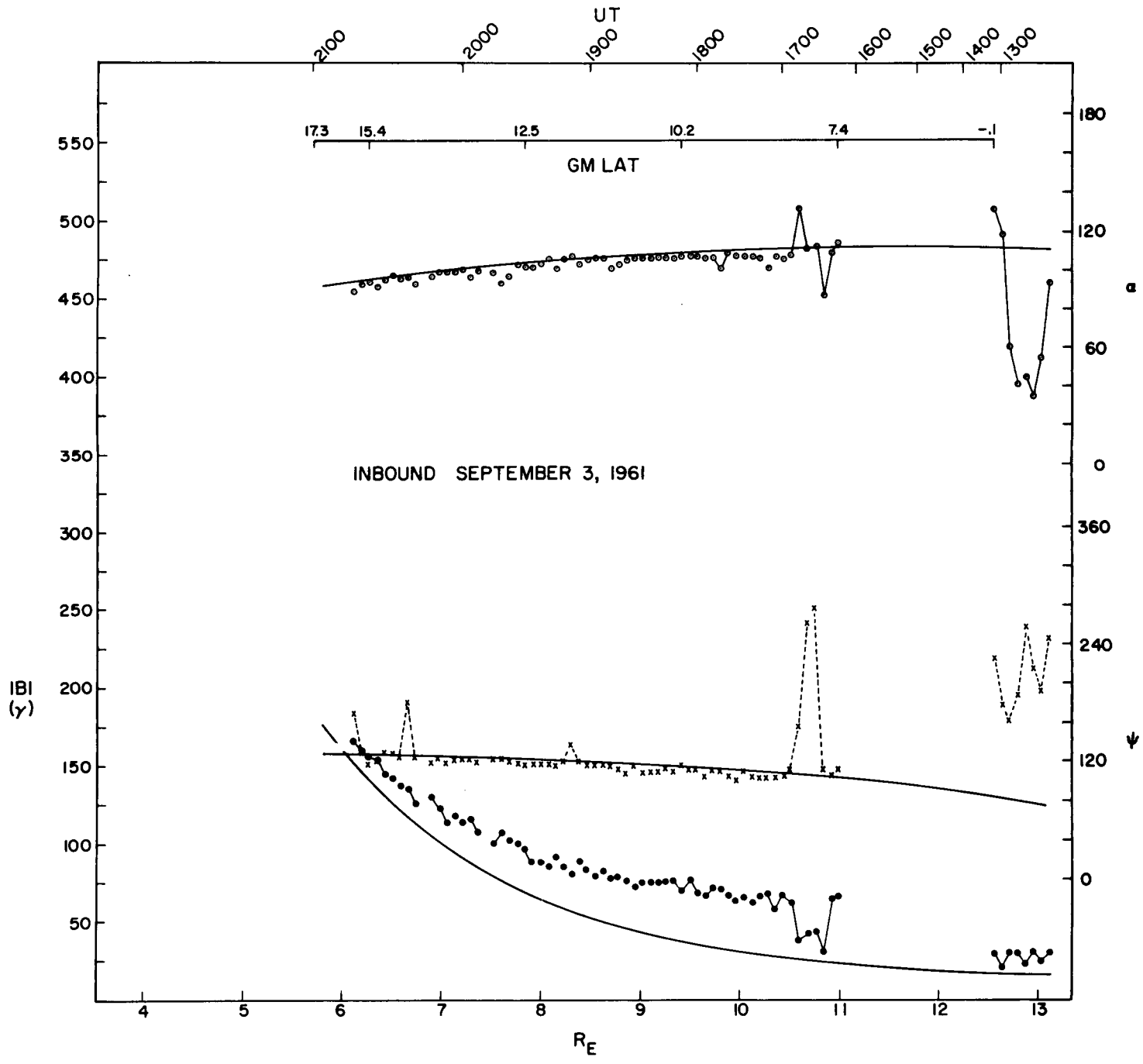

UT
1100
1000
0900
0800
0700
0600
0500
0400
0300
0200
8.0
1.6
-4.3
-7.4
-13.4
-19.4
GM LAT
INBOUND AUGUST 30, 1961
|B|
(γ)
550
500
450
400
350
300
250
200
150
100
50
180
120
60
0
α
360
240
120
0
ψ
4
5
6
7
8
9
10
11
12
13
R_E

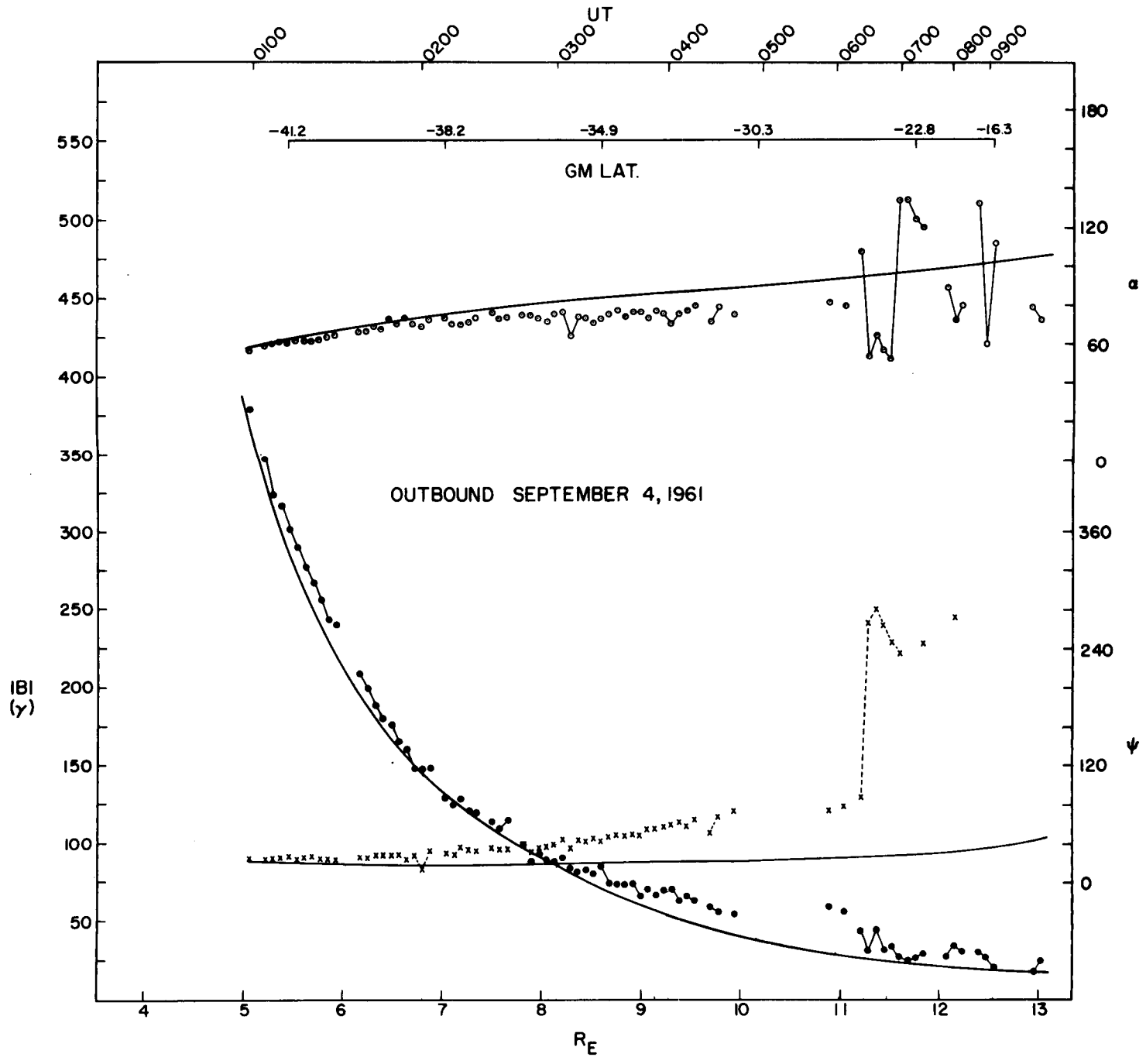

UT
1400
1500
1600
1700
1800
1900
2000
2100
2200
2300
-20.3
-17.7
-15.6
-14.8
-15.8
-20
GM LAT.
OUTBOUND AUGUST 30, 1961
|B|
(γ)
550
500
450
400
350
300
250
200
150
100
50
180
120
60
0
360
240
120
0
α
ψ
4
5
6
7
8
9
10
11
12
13
R_E

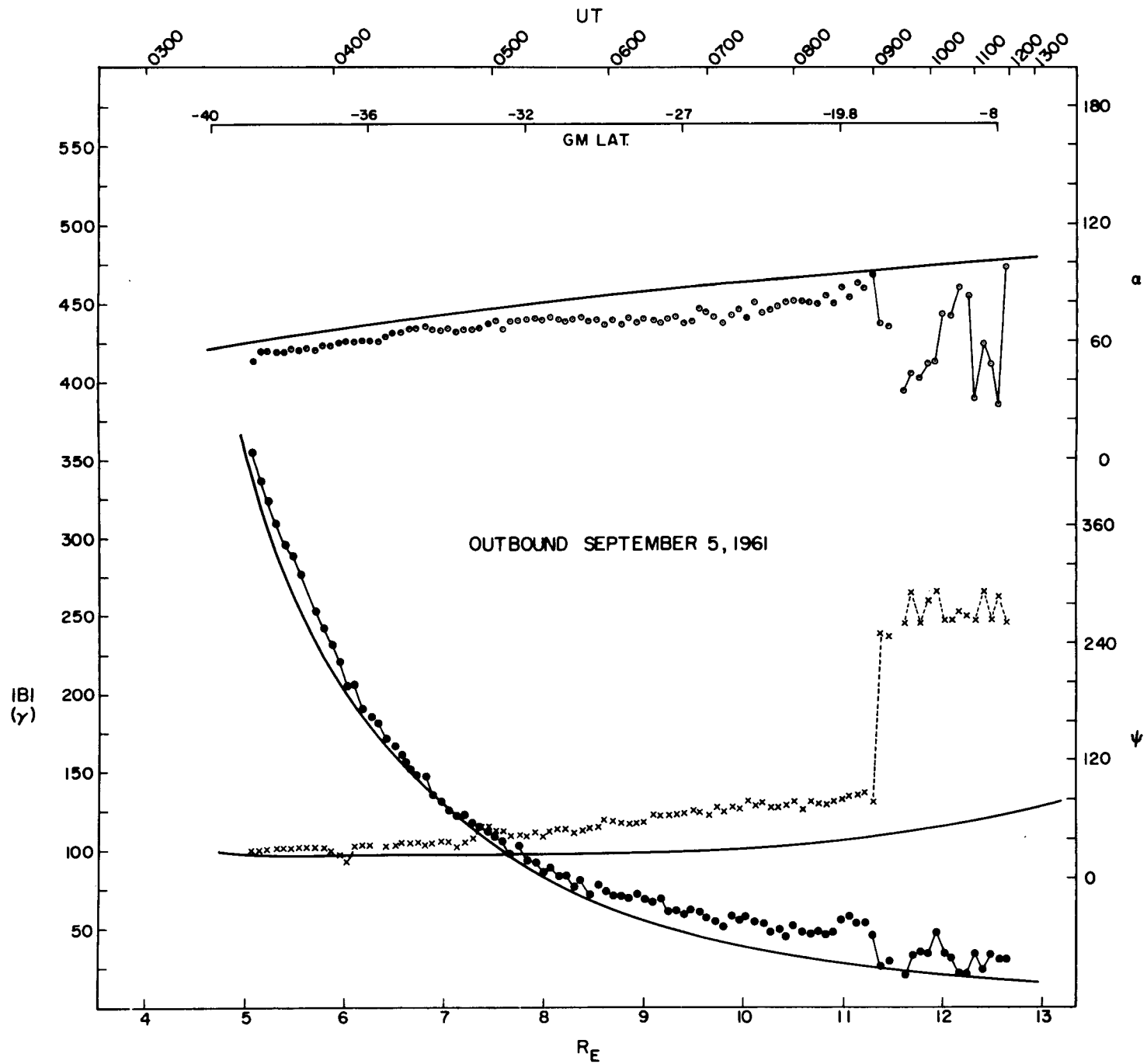

UT
1500
1400
1300
1200
1100
1000
0900
0800
13.6
10.8
7.8
4.6
1.1
-3.1
-8.2
-15.4
GM LAT
INBOUND SEPTEMBER 1, 1961
|B|
(γ)
550
500
450
400
350
300
250
200
150
100
50
180
120
60
0
360
240
120
0
α
ψ
4
5
6
7
8
9
10
11
12
13
R_E

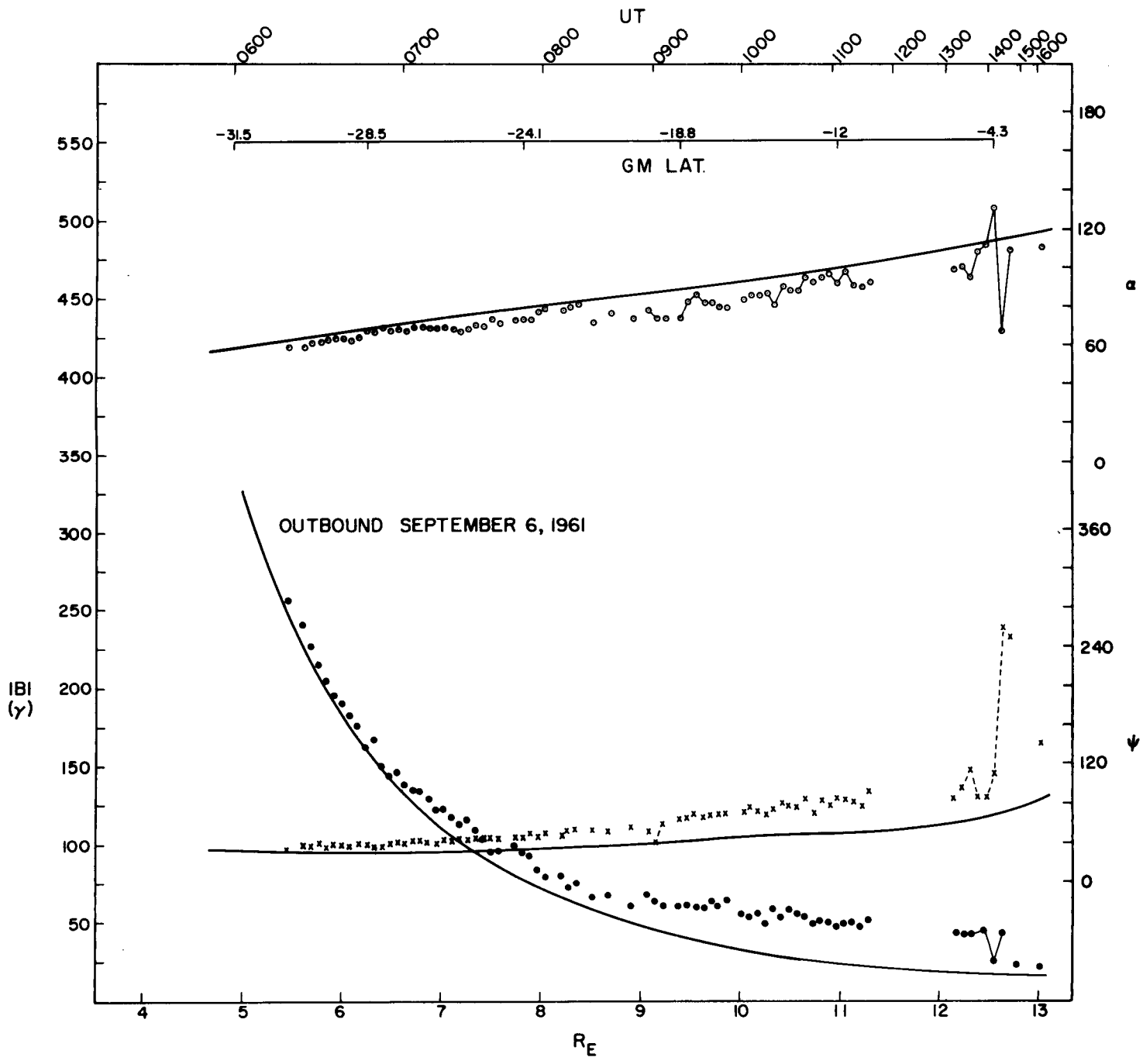

UT
1900
1800
1700
1600
1500
1400
1300
1100
24.8
18.7
14.4
10
4.1
-6.5
GM LAT
INBOUND SEPTEMBER 2, 1961
|B|
(γ)
550
500
450
400
350
300
250
200
150
100
50
180
120
60
0
360
240
120
0
α
ψ
4
5
6
7
8
9
10
11
12
13
R_E

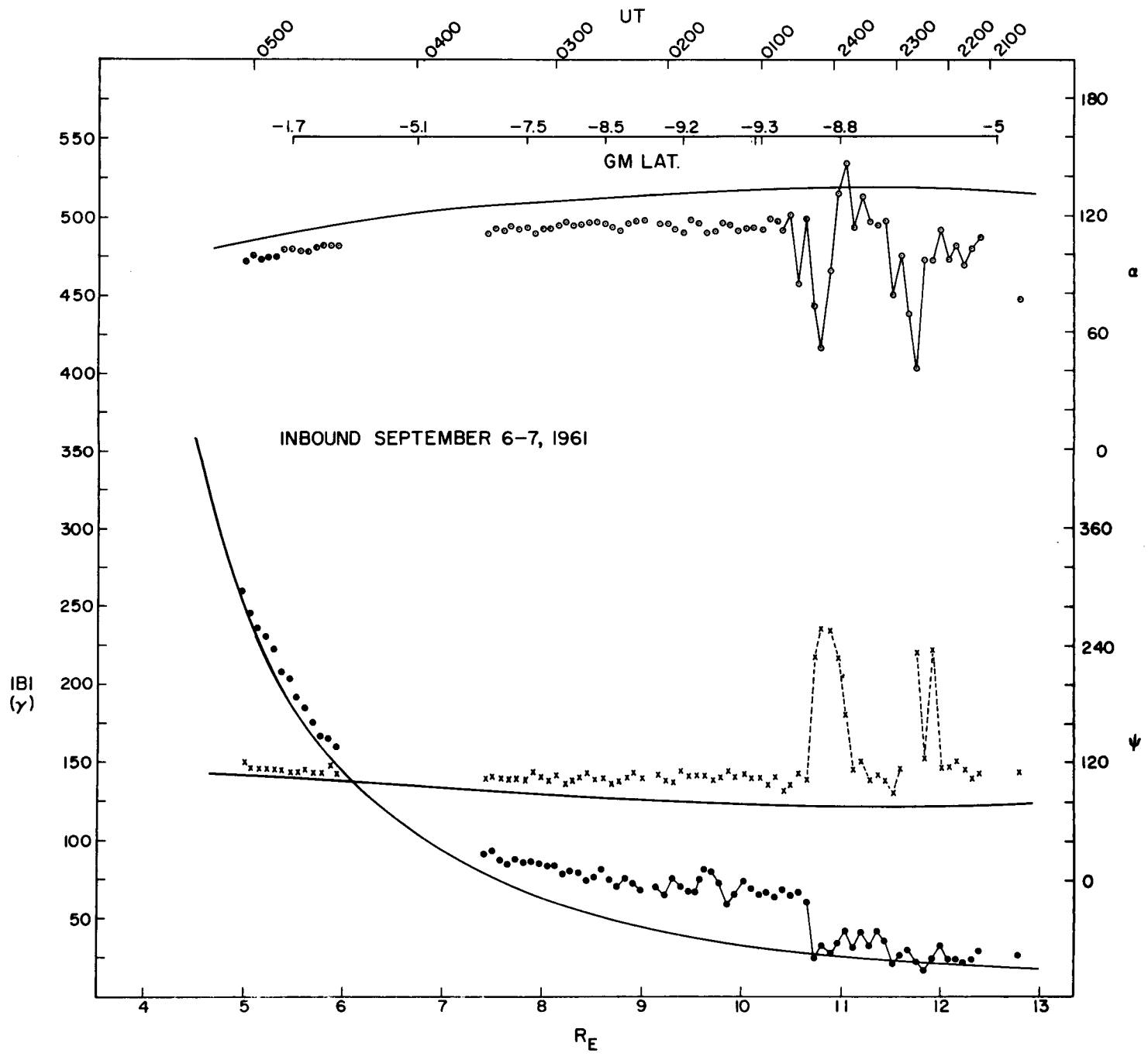

UT
2200
2300
2400
0100
0200
0300
0400
0500
0600
0700
0800
-40.1
-37.4
-35.6
-34.1
-31.4
-23.8
GM LAT
OUTBOUND SEPTEMBER 2-3, 1961
|B|
(γ)
α
ψ
R_E

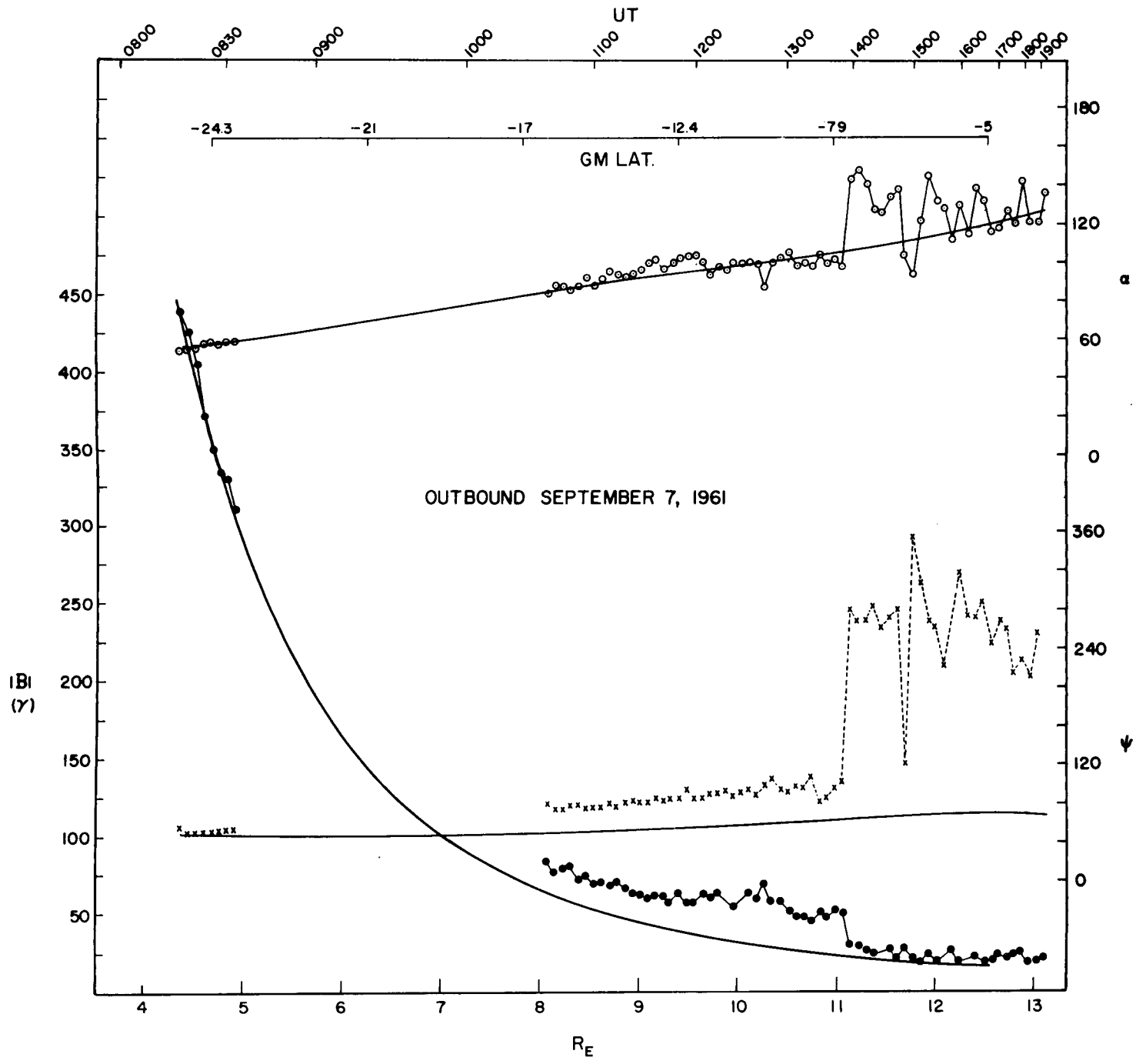

UT
2100
2000
1900
1800
1700
1600
1500
1400
1300
17.3
15.4
12.5
10.2
7.4
-.1
GM LAT
INBOUND SEPTEMBER 3, 1961
|B|
(γ)
550
500
450
400
350
300
250
200
150
100
50
180
120
60
0
α
360
240
120
0
ψ
4
5
6
7
8
9
10
11
12
13
R_E

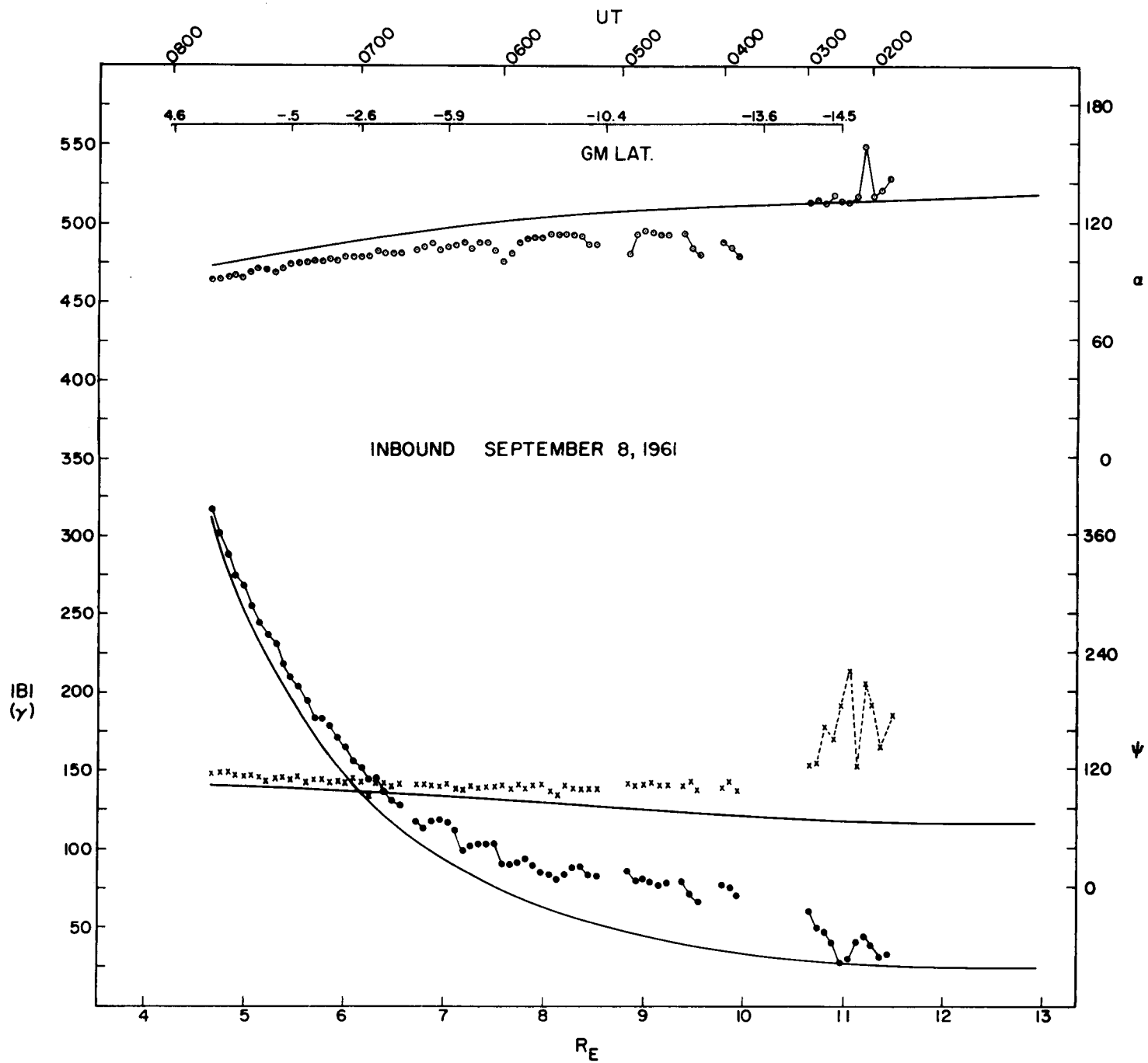

UT
0100
0200
0300
0400
0500
0600
0700
0800
0900
-41.2
-38.2
-34.9
-30.3
-22.8
-16.3
GM LAT.
OUTBOUND SEPTEMBER 4, 1961
|B| (γ)
550
500
450
400
350
300
250
200
150
100
50
180
120
60
0
360
240
120
0
α
ψ
4
5
6
7
8
9
10
11
12
13
R_E

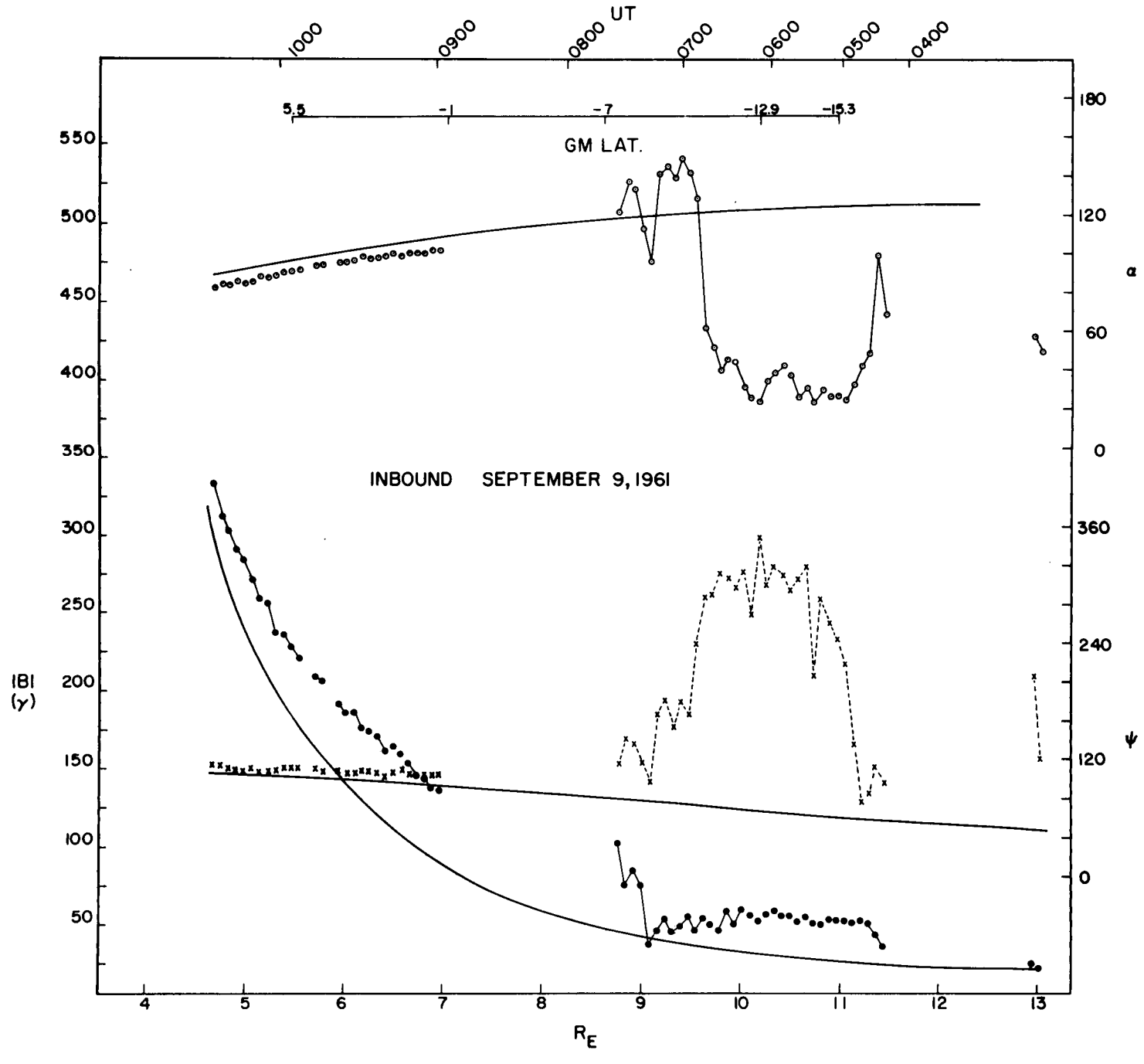

UT
0300
0400
0500
0600
0700
0800
0900
1000
1100
1200
1300
-40
-36
-32
-27
-19.8
-8
GM LAT.
OUTBOUND SEPTEMBER 5, 1961
|B|
(γ)
α
ψ
R_E

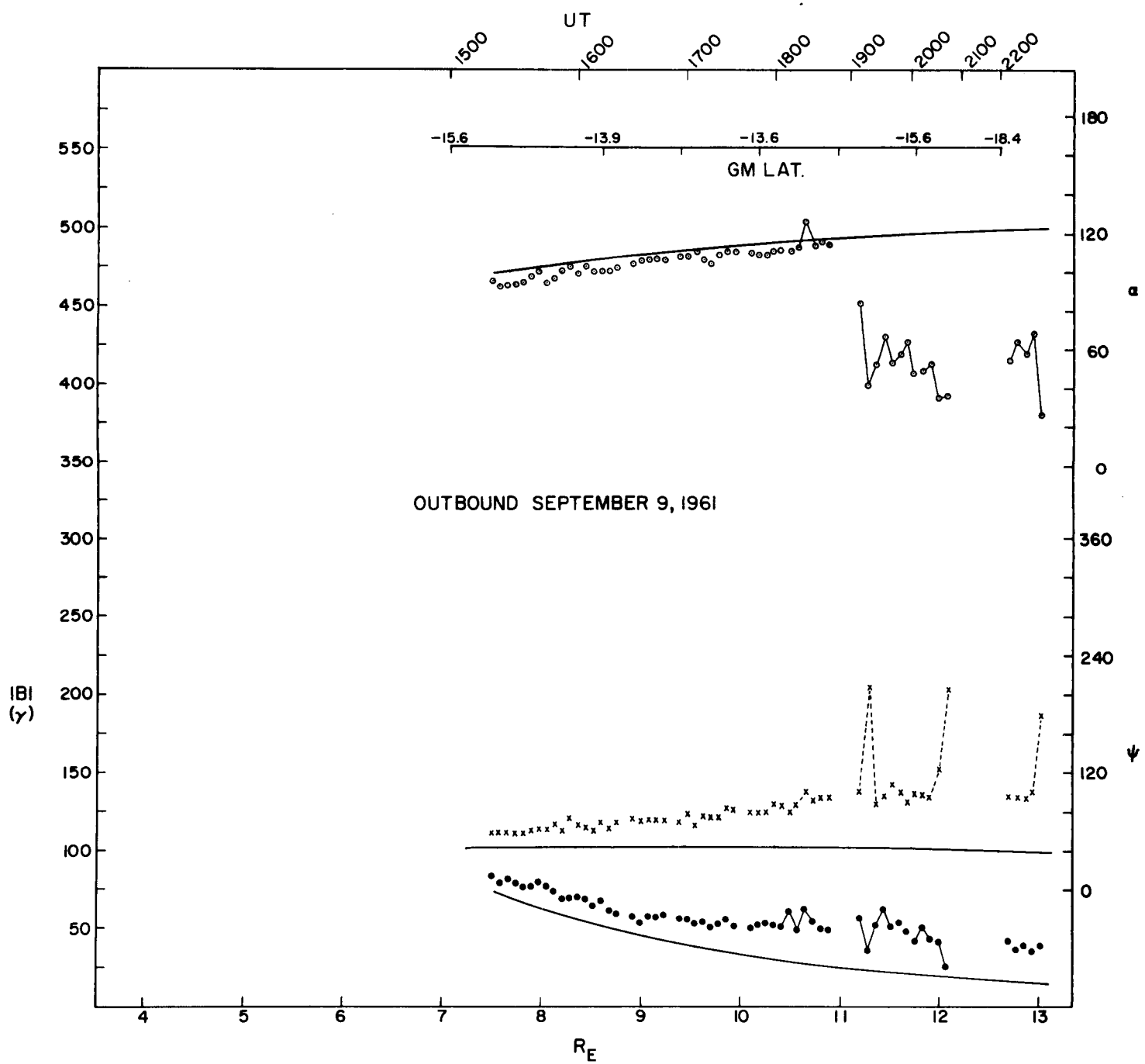

UT
0600
0700
0800
0900
1000
1100
1200
1300
1400
1500
1600
-31.5
-28.5
-24.1
-18.8
-12
-4.3
GM LAT.
OUTBOUND SEPTEMBER 6, 1961
|B|
(γ)
α
ψ
180
120
60
0
360
240
120
0
550
500
450
400
350
300
250
200
150
100
50
4
5
6
7
8
9
10
11
12
13
R_E

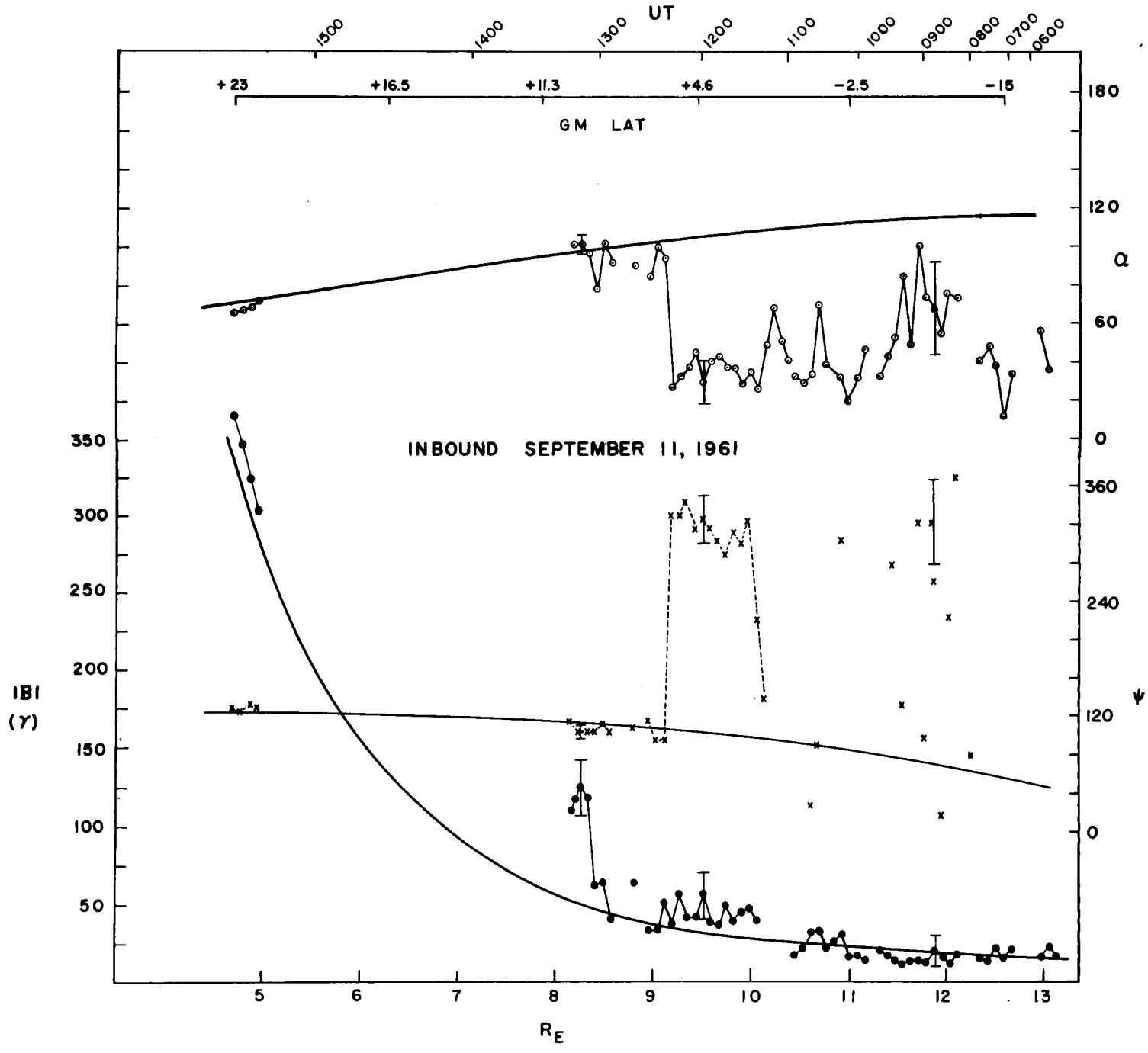

UT
0500
0400
0300
0200
0100
2400
2300
2200
2100
-1.7
-5.1
-7.5
-8.5
-9.2
-9.3
-8.8
-5
GM LAT.
INBOUND SEPTEMBER 6-7, 1961
|B|
(γ)
550
500
450
400
350
300
250
200
150
100
50
180
120
60
0
360
240
120
0
α
ψ
4
5
6
7
8
9
10
11
12
13
R_E

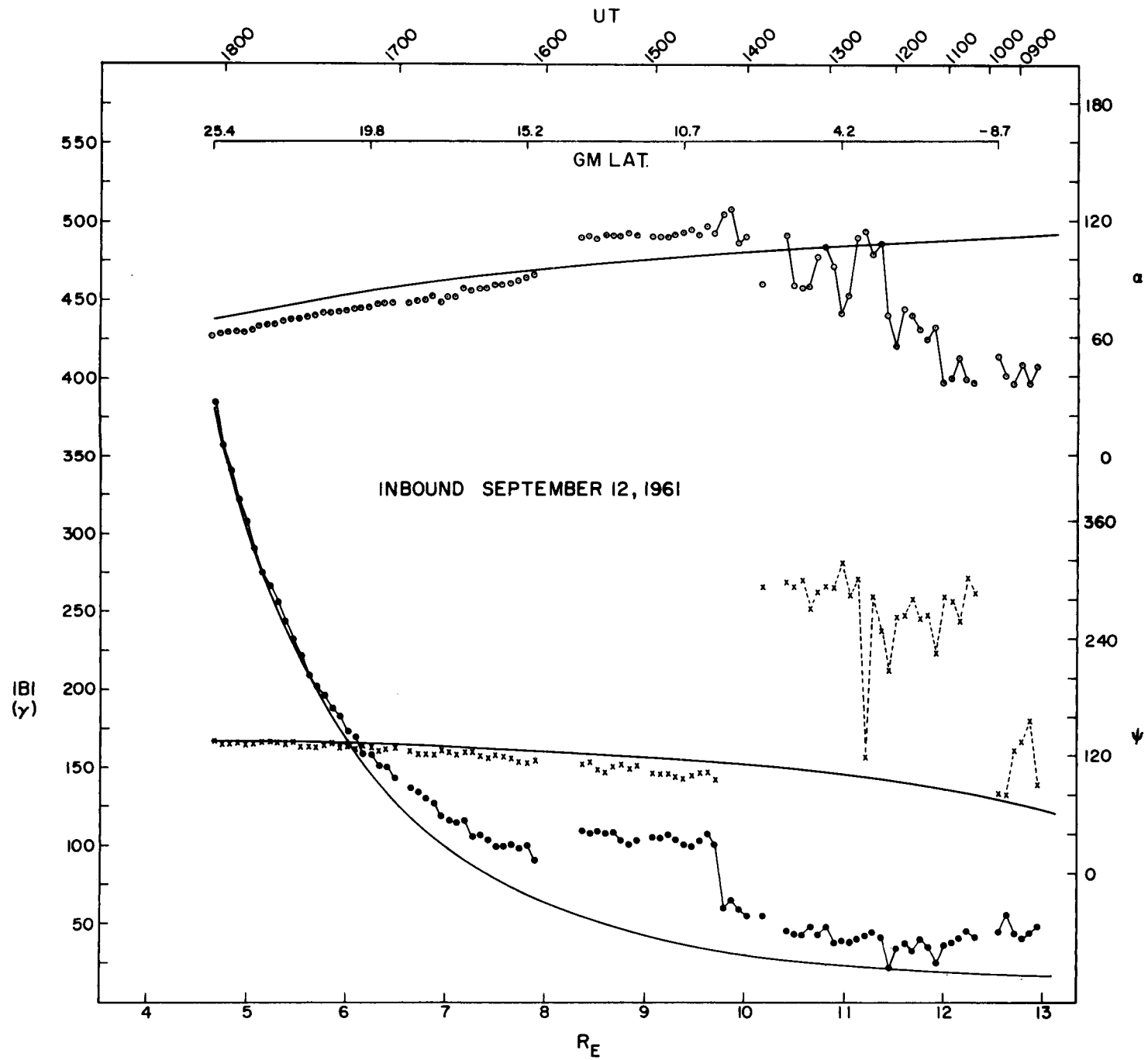

UT
0800
0830
0900
1000
1100
1200
1300
1400
1500
1600
1700
1800
1900
-24.3
-21
-17
-12.4
-7.9
-5
GM LAT.
OUTBOUND SEPTEMBER 7, 1961
|B|
(γ)
450
400
350
300
250
200
150
100
50
180
120
60
0
360
240
120
0
α
ψ
4
5
6
7
8
9
10
11
12
13
R_E

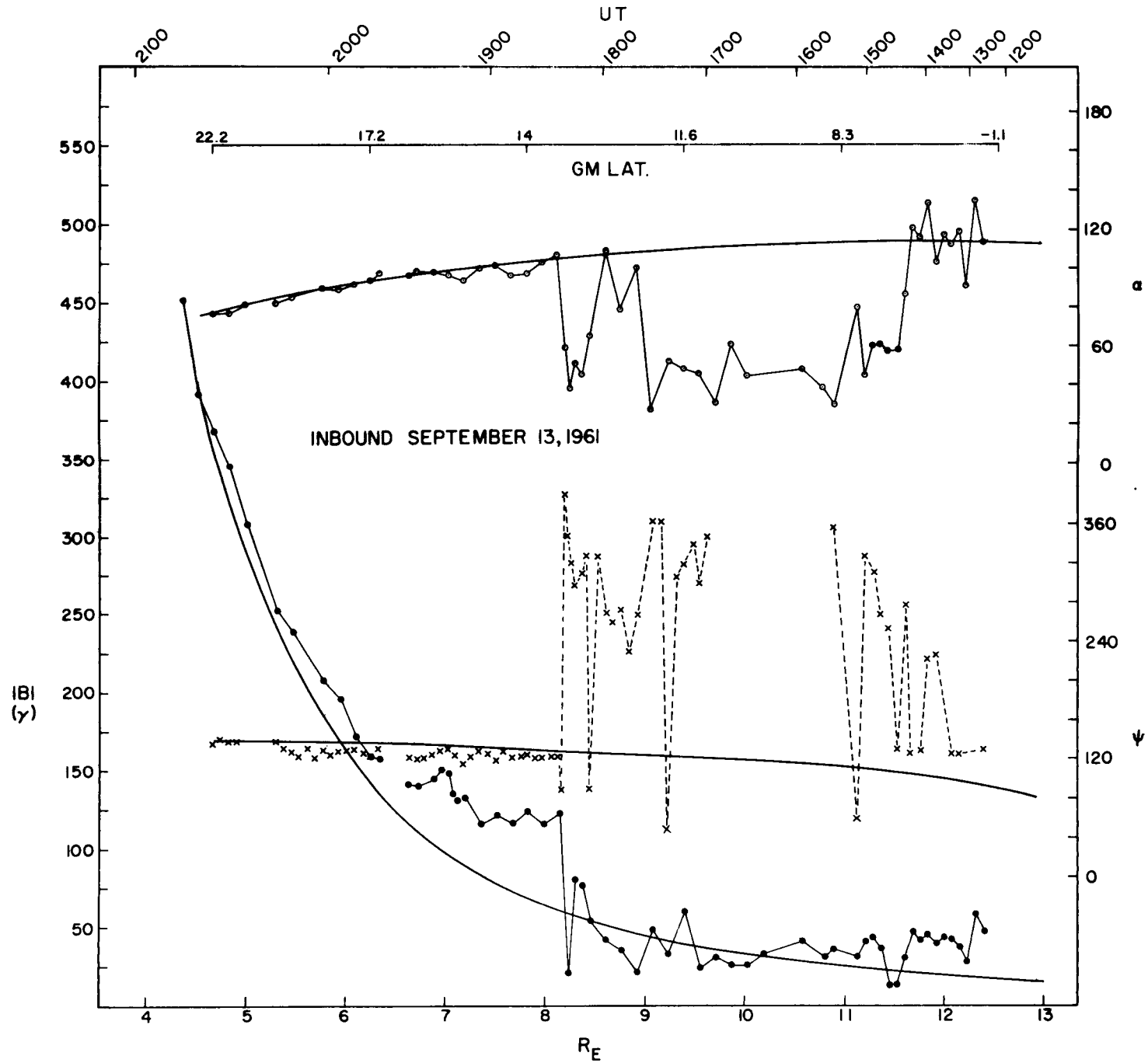

UT
0800
0700
0600
0500
0400
0300
0200
4.6
-.5
-2.6
-5.9
-10.4
-13.6
-14.5
GM LAT.
INBOUND SEPTEMBER 8, 1961
|B|
(γ)
550
500
450
400
350
300
250
200
150
100
50
180
120
60
0
360
240
120
0
α
ψ
4
5
6
7
8
9
10
11
12
13
R_E

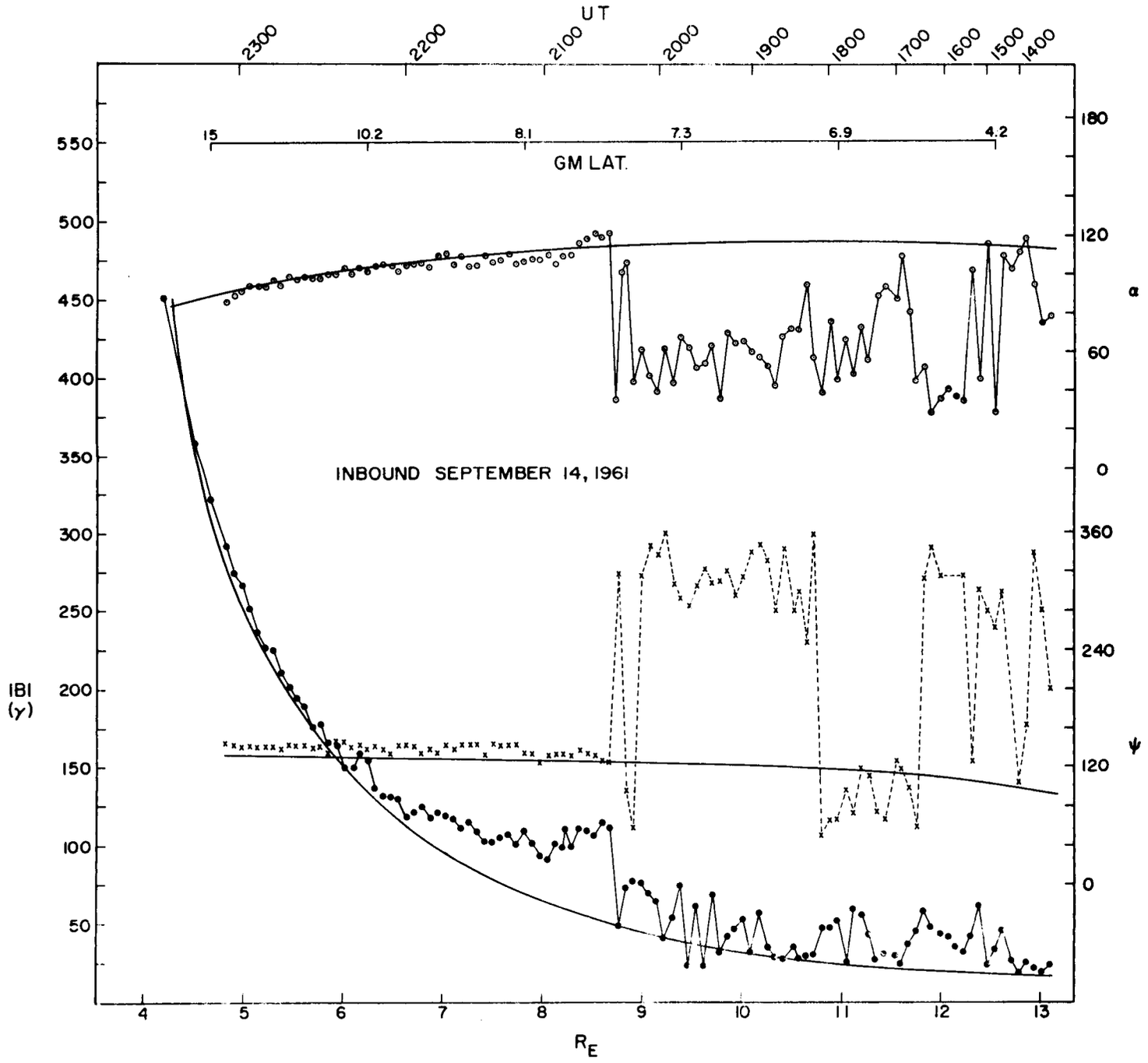

UT
1000
0900
0800
0700
0600
0500
0400
5.5
-1
-7
-12.9
-15.3
GM LAT.
INBOUND SEPTEMBER 9, 1961
|B|
(γ)
550
500
450
400
350
300
250
200
150
100
50
180
120
60
0
360
240
120
0
α
ψ
4
5
6
7
8
9
10
11
12
13
R_E

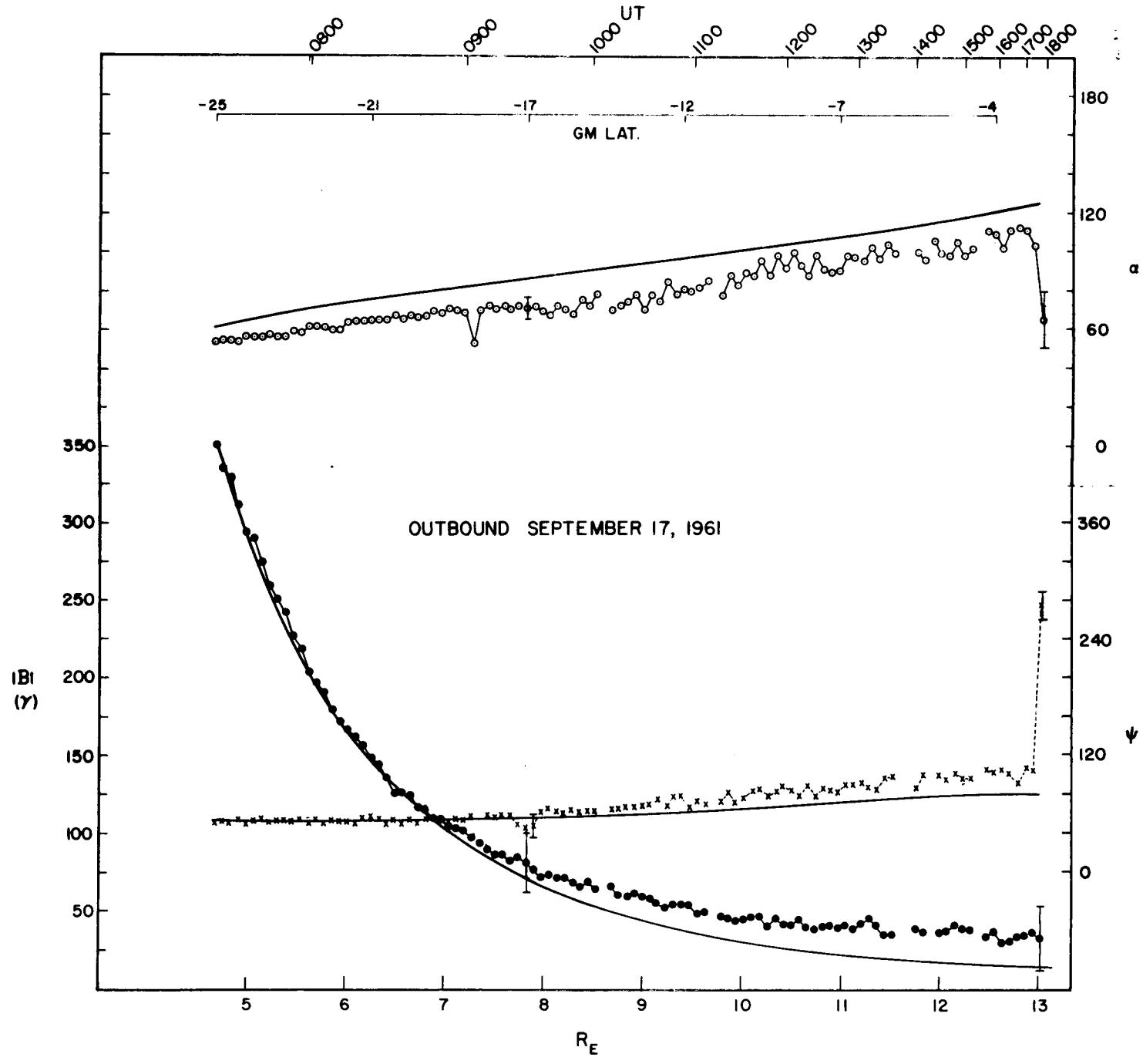

UT
1500
1600
1700
1800
1900
2000
2100
2200
-15.6
-13.9
-13.6
-15.6
-18.4
GM LAT.
OUTBOUND SEPTEMBER 9, 1961
|B|
(γ)
550
500
450
400
350
300
250
200
150
100
50
180
120
60
0
360
240
120
0
α
ψ
4
5
6
7
8
9
10
11
12
13
R_E

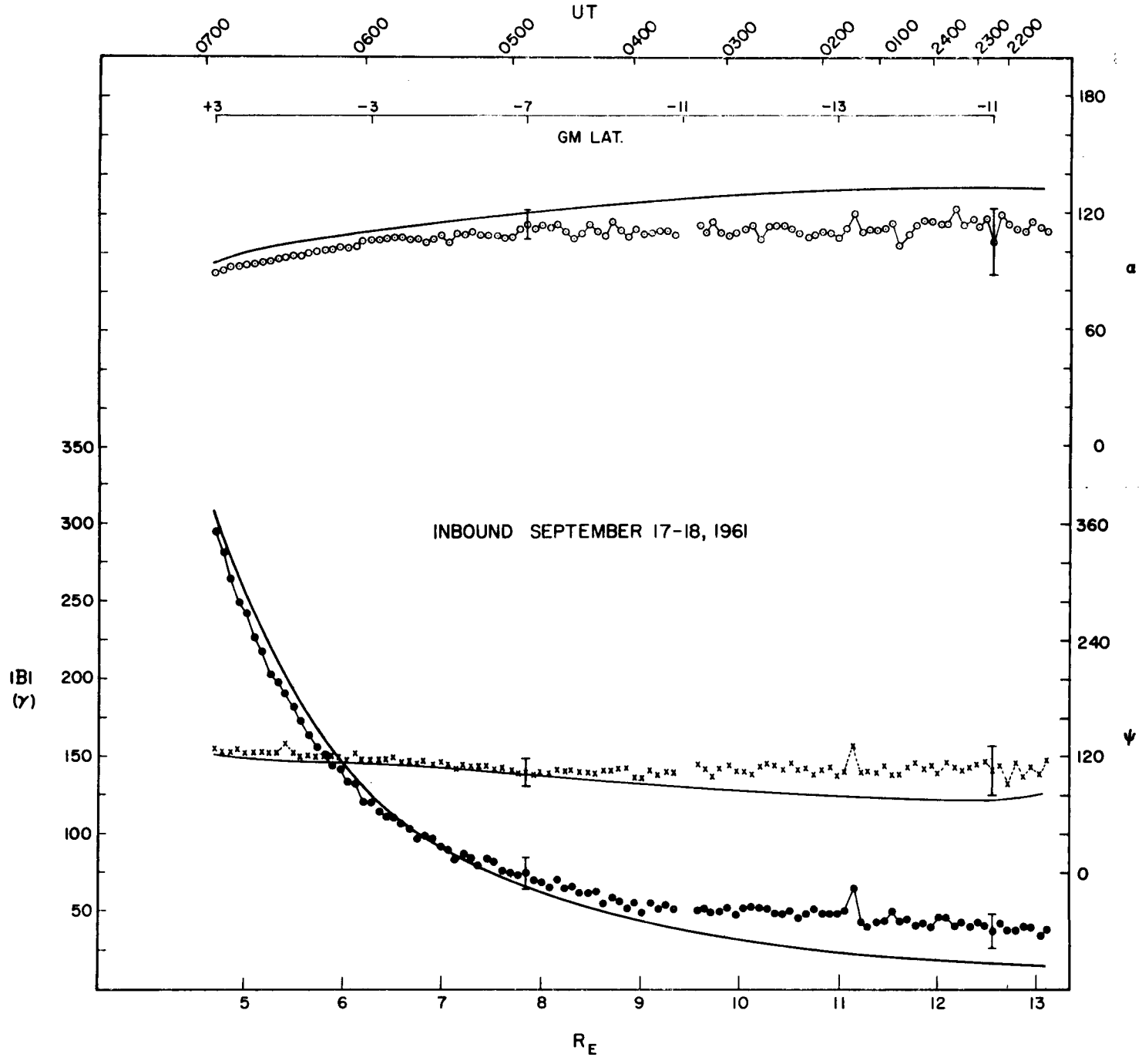

UT
1500
1400
1300
1200
1100
1000
0900
0800
0700
0600
+23
+16.5
+11.3
+4.6
-2.5
-15
GM LAT
180
120
60
0
α
INBOUND SEPTEMBER 11, 1961
350
300
250
200
150
100
50
|B|
(γ)
360
240
120
0
ψ
5
6
7
8
9
10
11
12
13
R_E

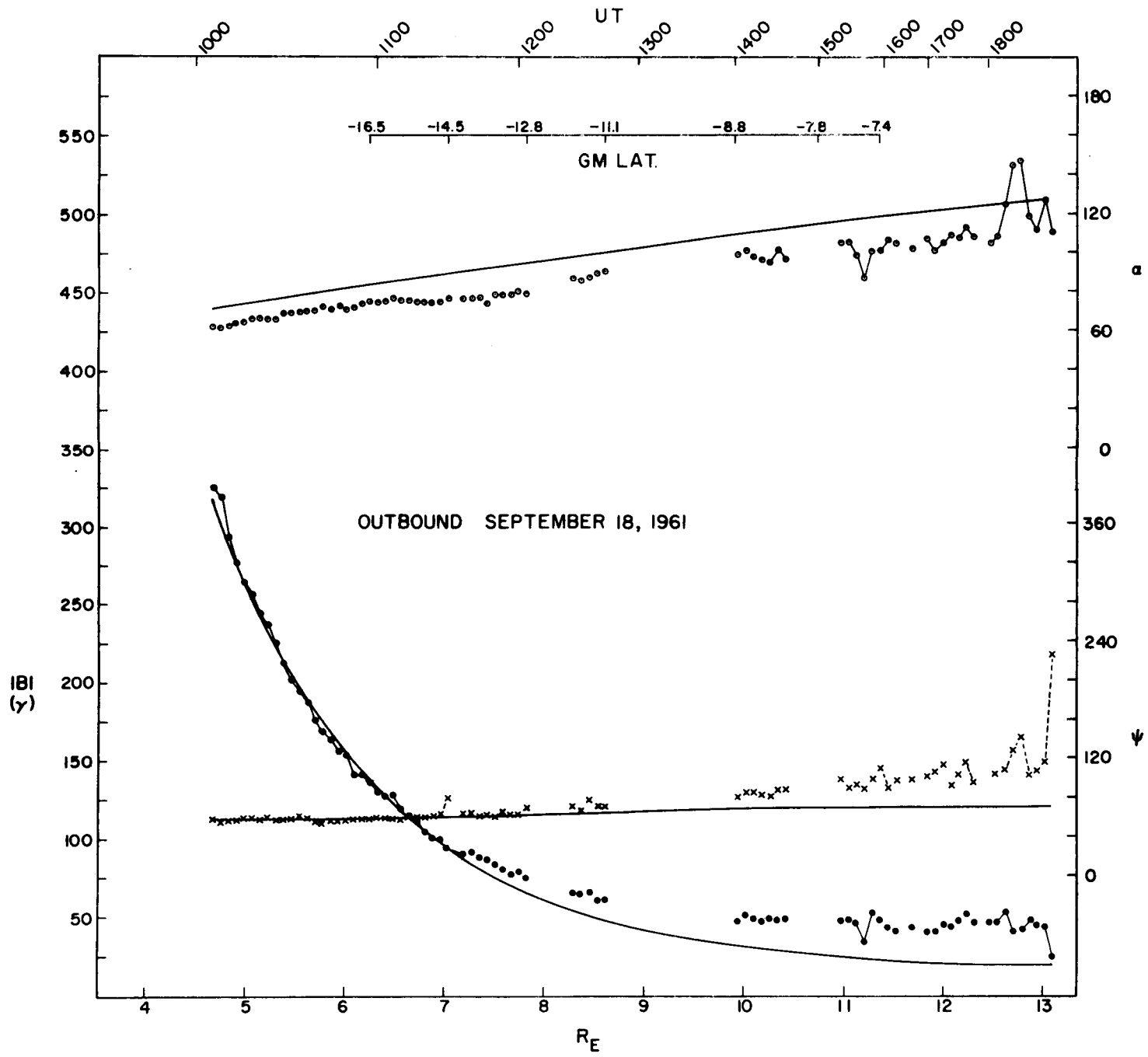

UT
1800
1700
1600
1500
1400
1300
1200
1100
1000
0900
25.4
19.8
15.2
10.7
4.2
-8.7
GM LAT.
INBOUND SEPTEMBER 12, 1961
|B|
(γ)
α
ψ
R_E

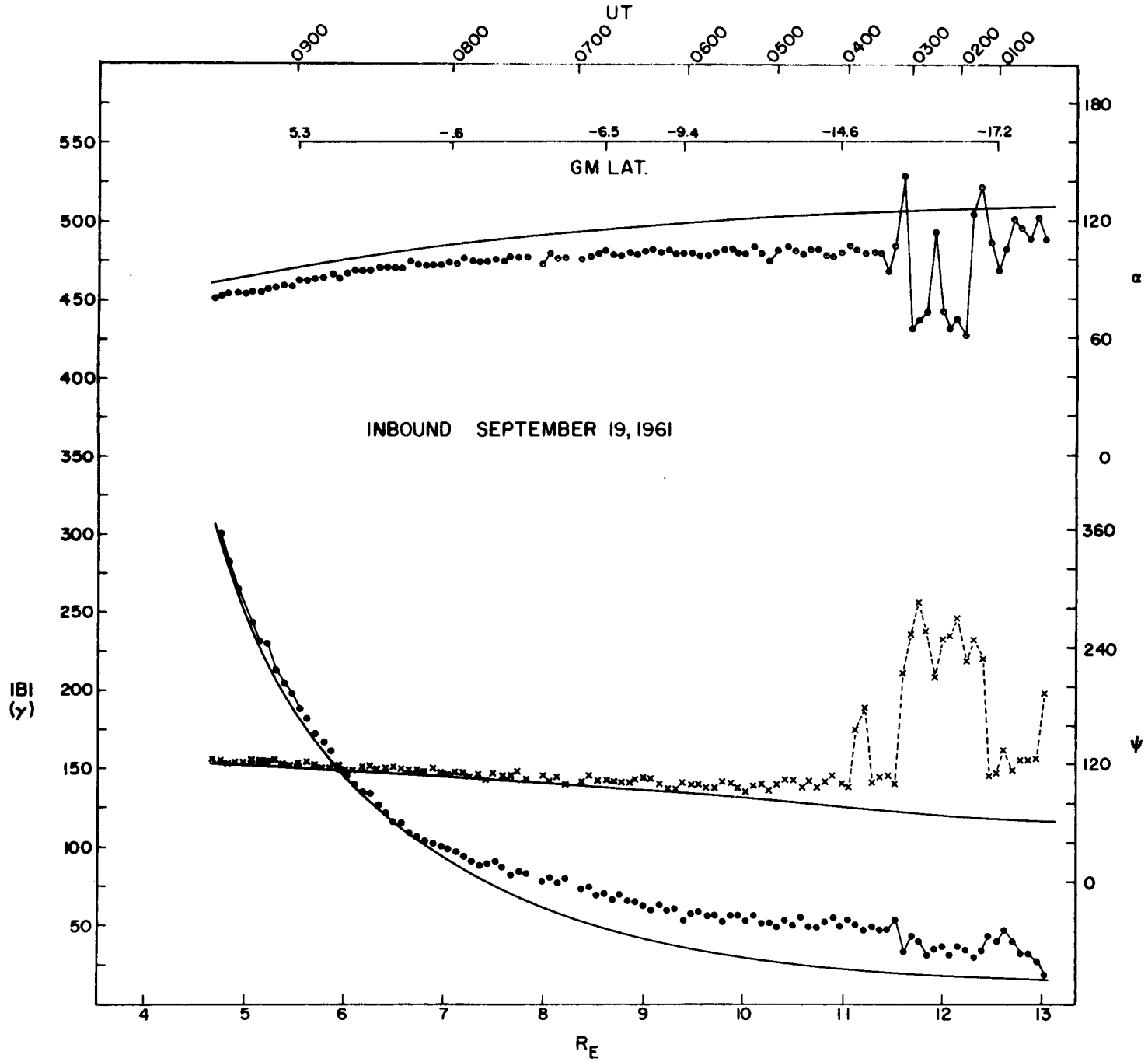

UT
2100
2000
1900
1800
1700
1600
1500
1400
1300
1200
22.2
17.2
14
11.6
8.3
-1.1
GM LAT.
INBOUND SEPTEMBER 13, 1961
|B|
(γ)
550
500
450
400
350
300
250
200
150
100
50
180
120
60
0
360
240
120
0
α
ψ
4
5
6
7
8
9
10
11
12
13
R_E

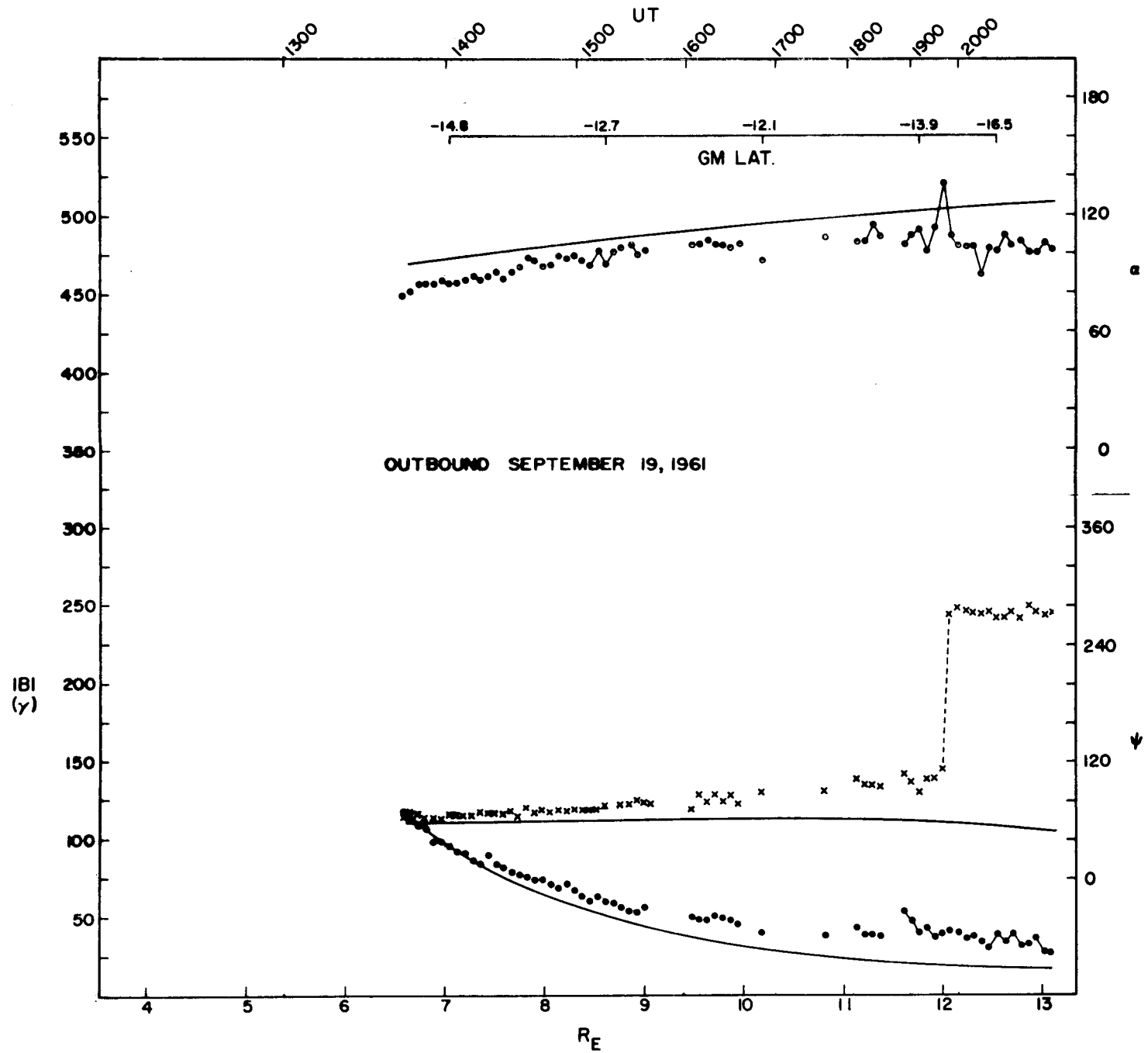

UT
2300
2200
2100
2000
1900
1800
1700
1600
1500
1400
15
10.2
8.1
7.3
6.9
4.2
GM LAT.
INBOUND SEPTEMBER 14, 1961
|B|
(γ)
550
500
450
400
350
300
250
200
150
100
50
180
120
60
0
360
240
120
0
α
ψ
4
5
6
7
8
9
10
11
12
13
R_E

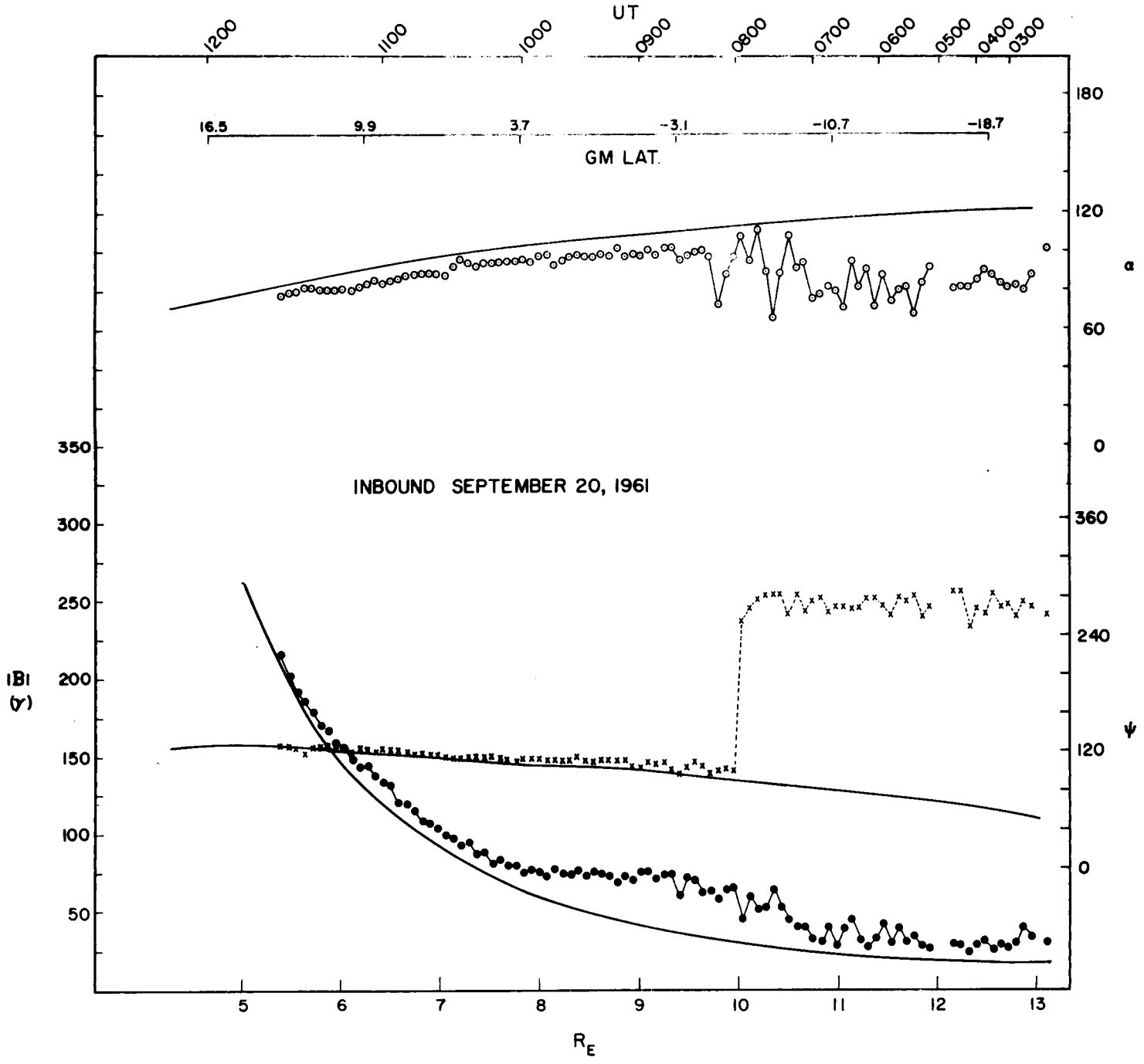

UT
0800
0900
1000
1100
1200
1300
1400
1500
1600
1700
1800
-25
-21
-17
-12
-7
-4
GM LAT.
180
120
60
0
α
OUTBOUND SEPTEMBER 17, 1961
350
300
250
200
150
100
50
|B|
(γ)
360
240
120
0
ψ
5
6
7
8
9
10
11
12
13
R_E

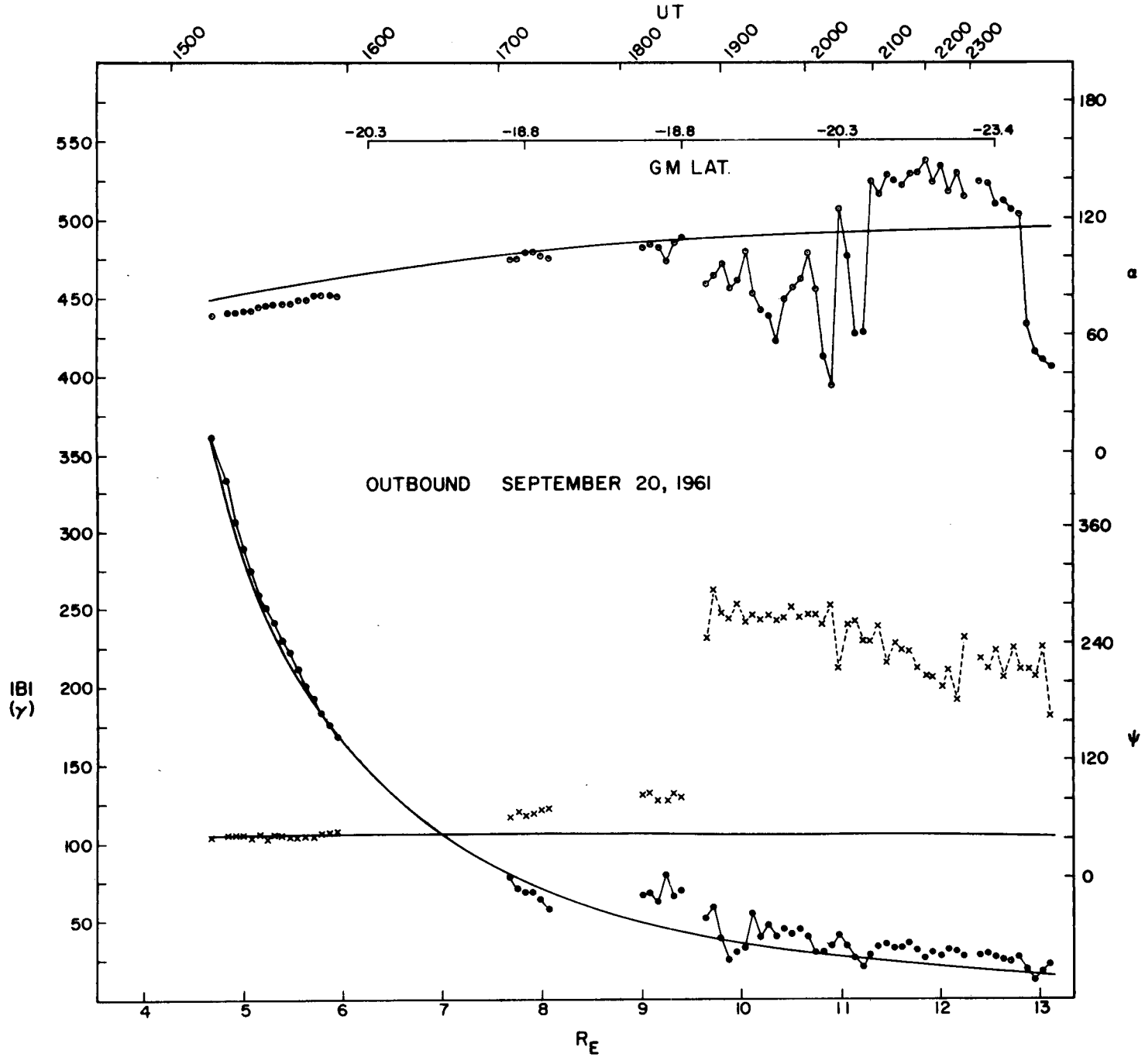

UT
0700
0600
0500
0400
0300
0200
0100
2400
2300
2200
+3
-3
-7
-11
-13
-11
GM LAT.
180
120
60
0
α
INBOUND SEPTEMBER 17-18, 1961
350
300
250
200
150
100
50
|B|
(γ)
360
240
120
0
ψ
5
6
7
8
9
10
11
12
13
R_E

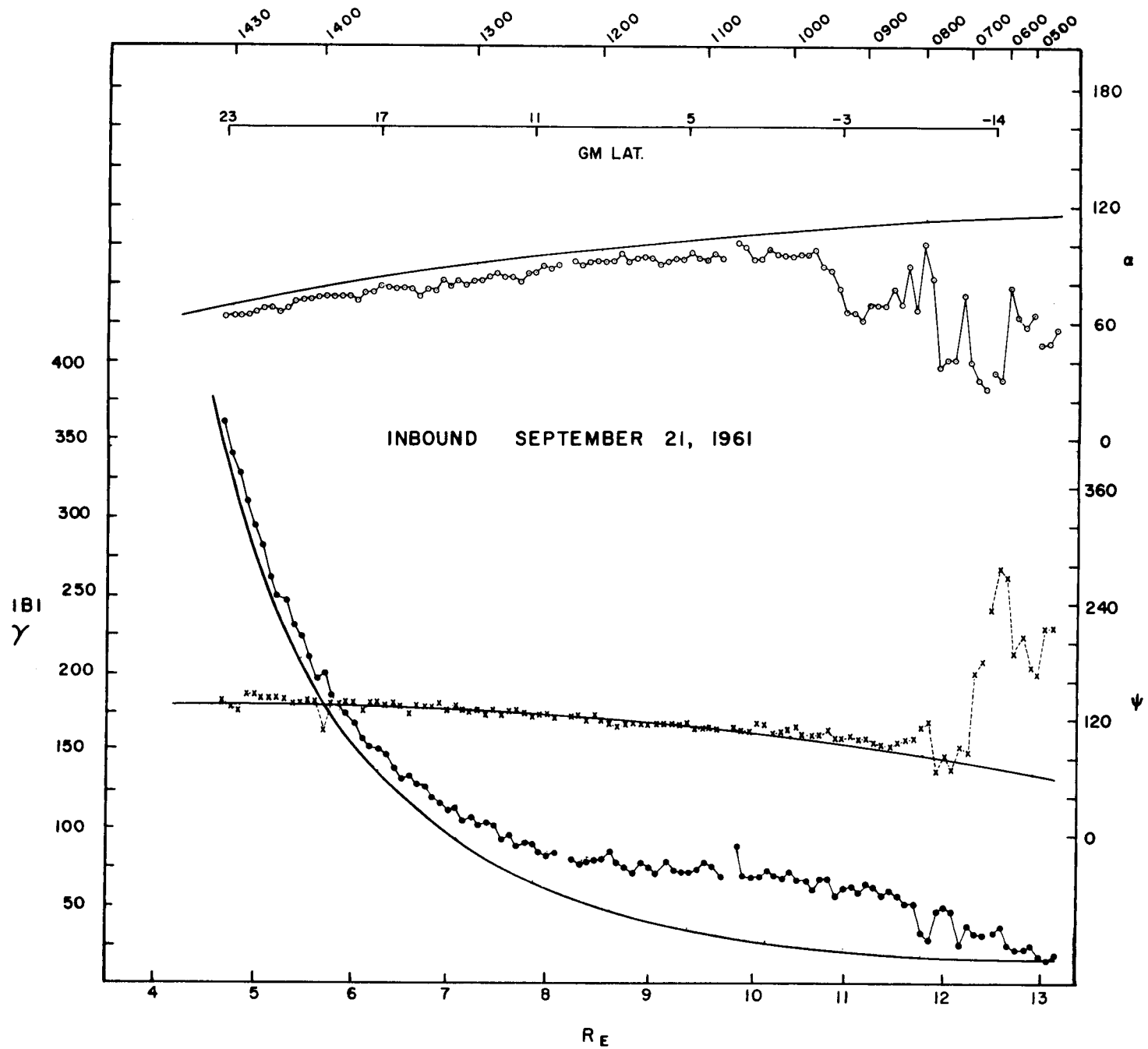

UT
1000
1100
1200
1300
1400
1500
1600
1700
1800
-16.5
-14.5
-12.8
-11.1
-8.8
-7.8
-7.4
GM LAT.
OUTBOUND SEPTEMBER 18, 1961
|B|
(γ)
550
500
450
400
350
300
250
200
150
100
50
180
120
60
0
360
240
120
0
α
ψ
4
5
6
7
8
9
10
11
12
13
R_E

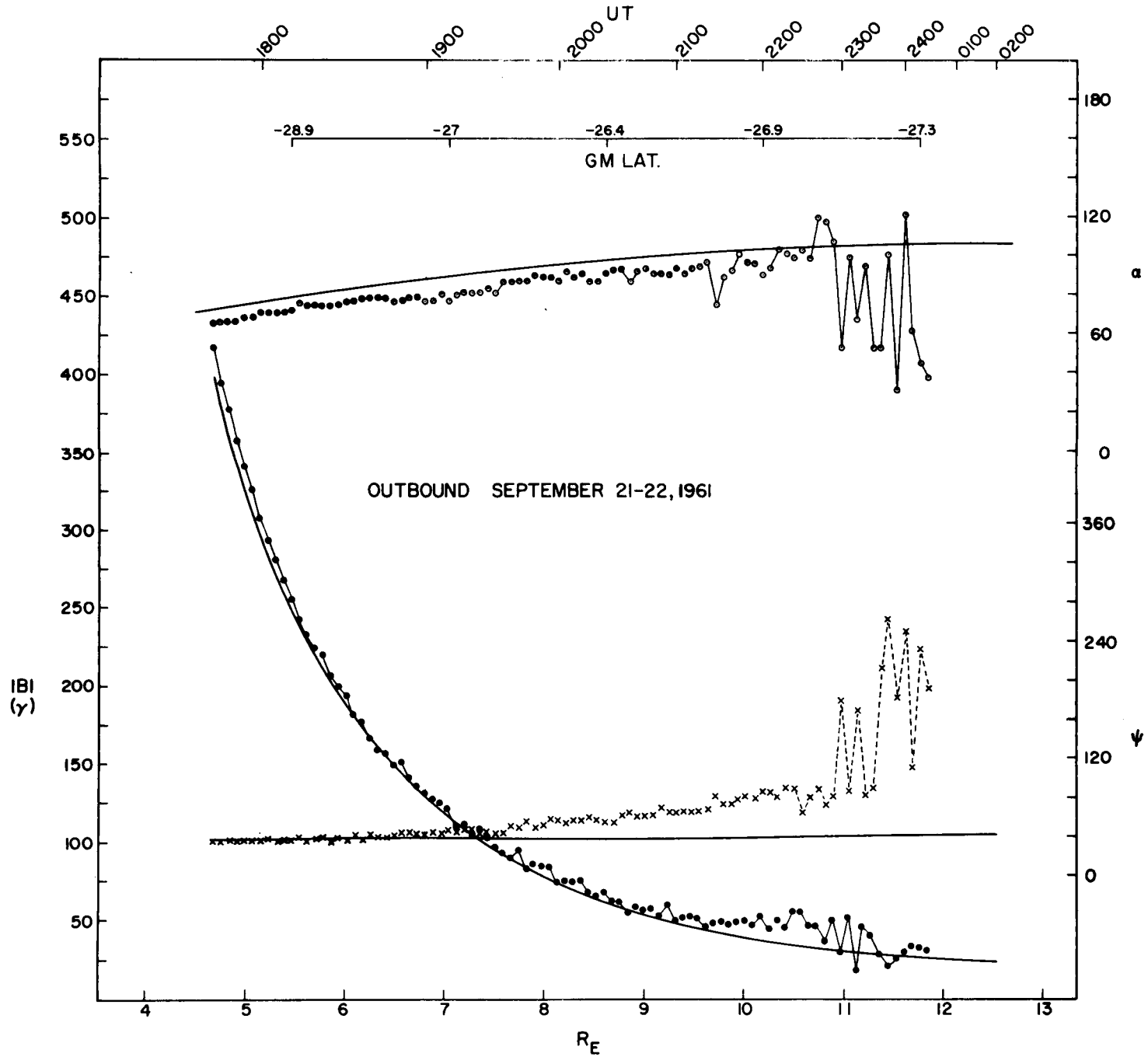

UT
0900
0800
0700
0600
0500
0400
0300
0200
0100
5.3
-.6
-6.5
-9.4
-14.6
-17.2
GM LAT.
INBOUND SEPTEMBER 19, 1961
|B|
(γ)
α
ψ
R_E

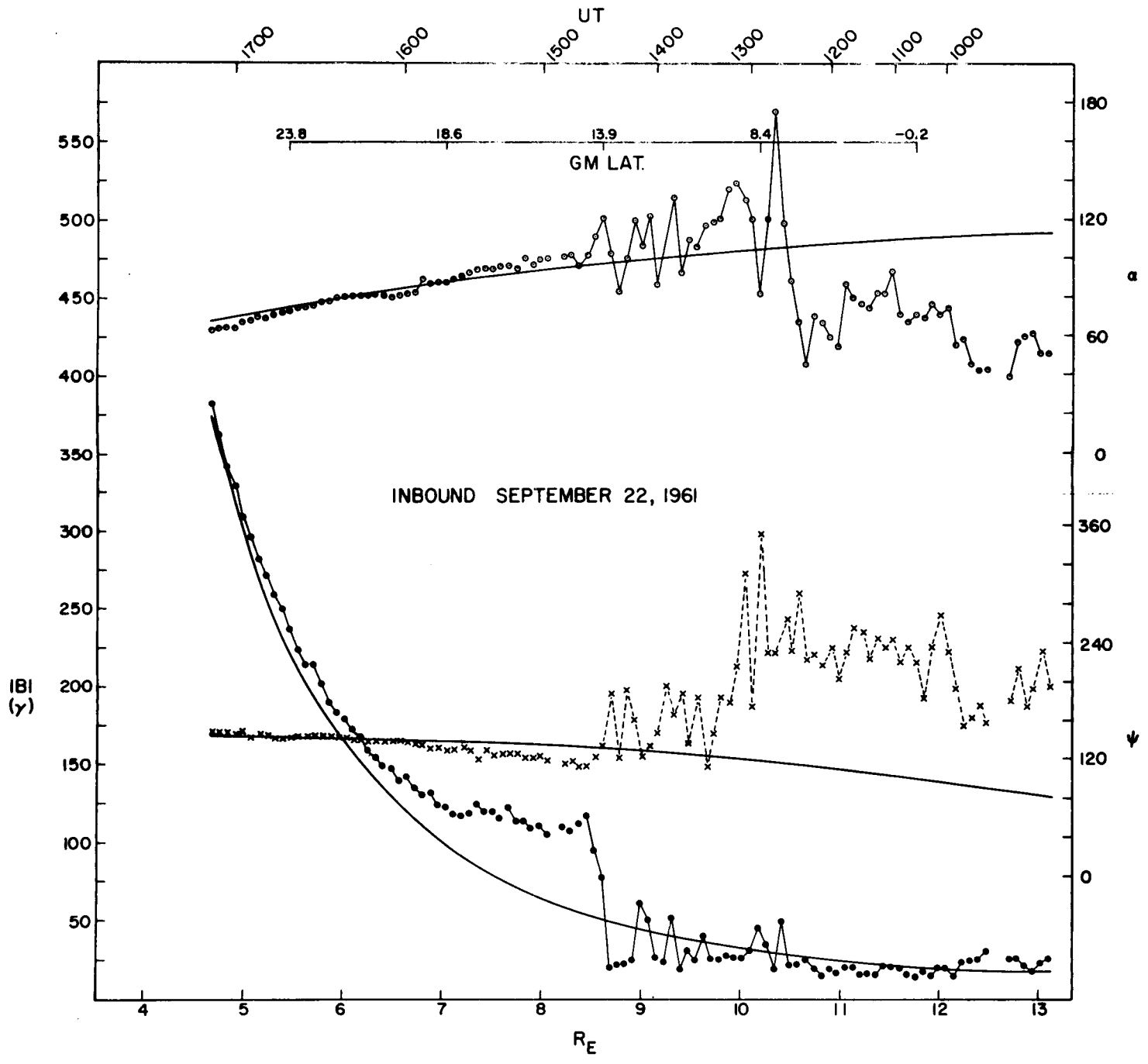

UT
1300
1400
1500
1600
1700
1800
1900
2000
-14.8
-12.7
-12.1
-13.9
-16.5
GM LAT.
OUTBOUND SEPTEMBER 19, 1961
|B|
(γ)
550
500
450
400
360
300
250
200
150
100
50
180
120
60
0
α
360
240
120
0
ψ
4
5
6
7
8
9
10
11
12
13
R_E

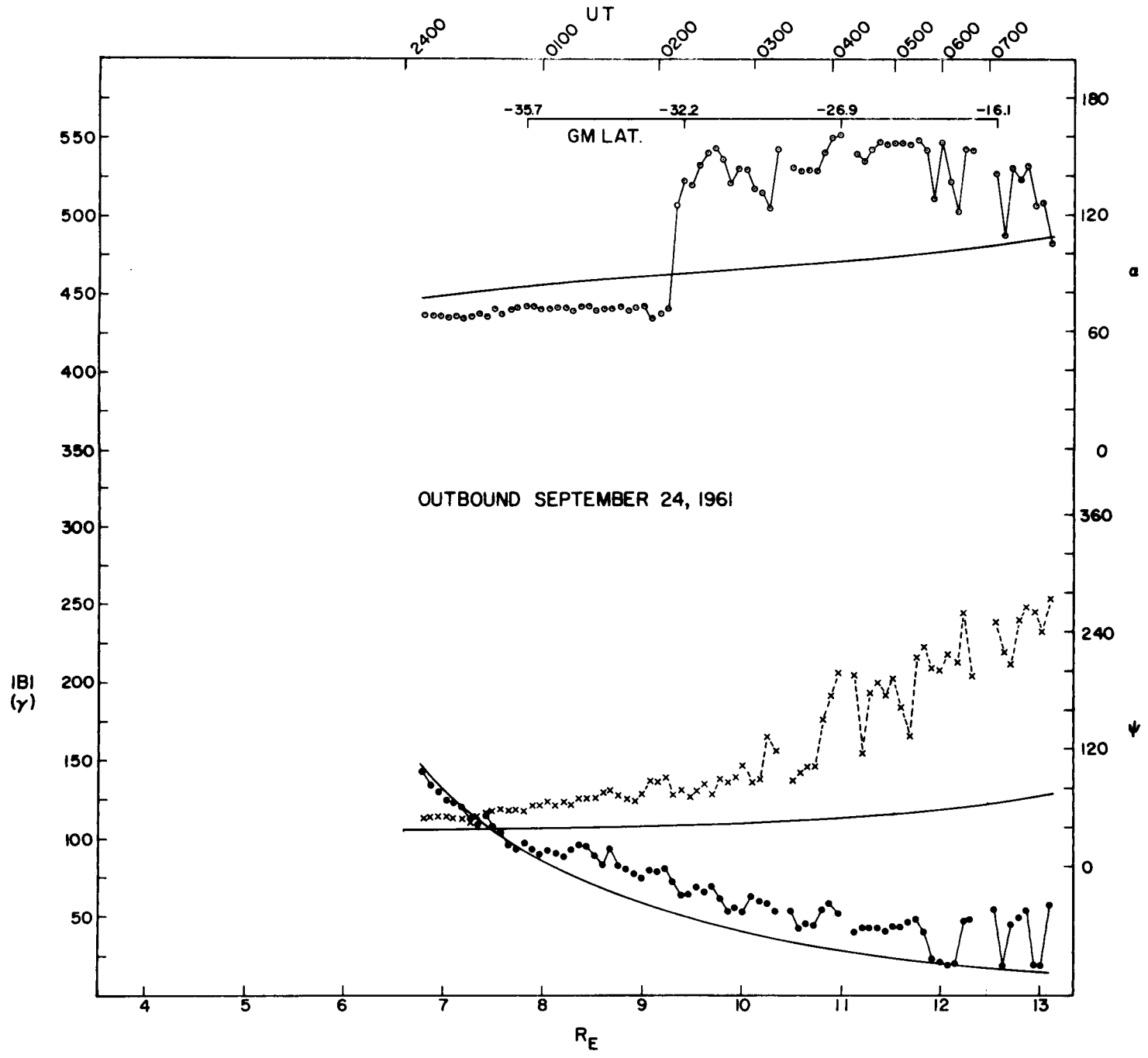

UT
1200
1100
1000
0900
0800
0700
0600
0500
0400
0300
16.5
9.9
3.7
-3.1
-10.7
-18.7
GM LAT.
INBOUND SEPTEMBER 20, 1961
180
120
60
0
α
350
300
250
200
150
100
50
|B|
(γ)
360
240
120
0
ψ
5
6
7
8
9
10
11
12
13
R_E

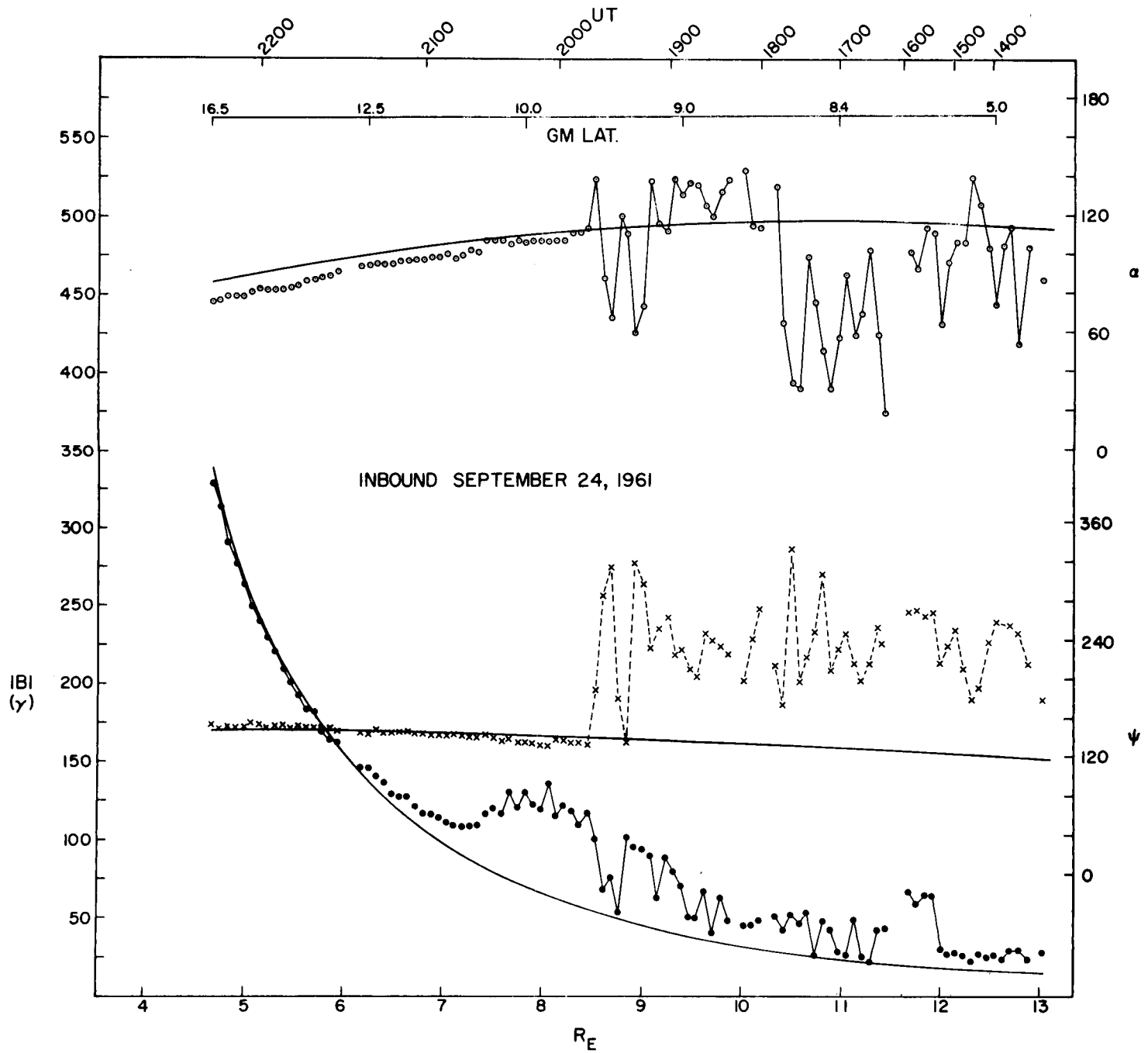

UT
1500
1600
1700
1800
1900
2000
2100
2200
2300
-20.3
-18.8
-18.8
-20.3
-23.4
GM LAT.
OUTBOUND SEPTEMBER 20, 1961
|B| (γ)
550
500
450
400
350
300
250
200
150
100
50
180
120
60
0
360
240
120
0
α
ψ
4
5
6
7
8
9
10
11
12
13
R_E

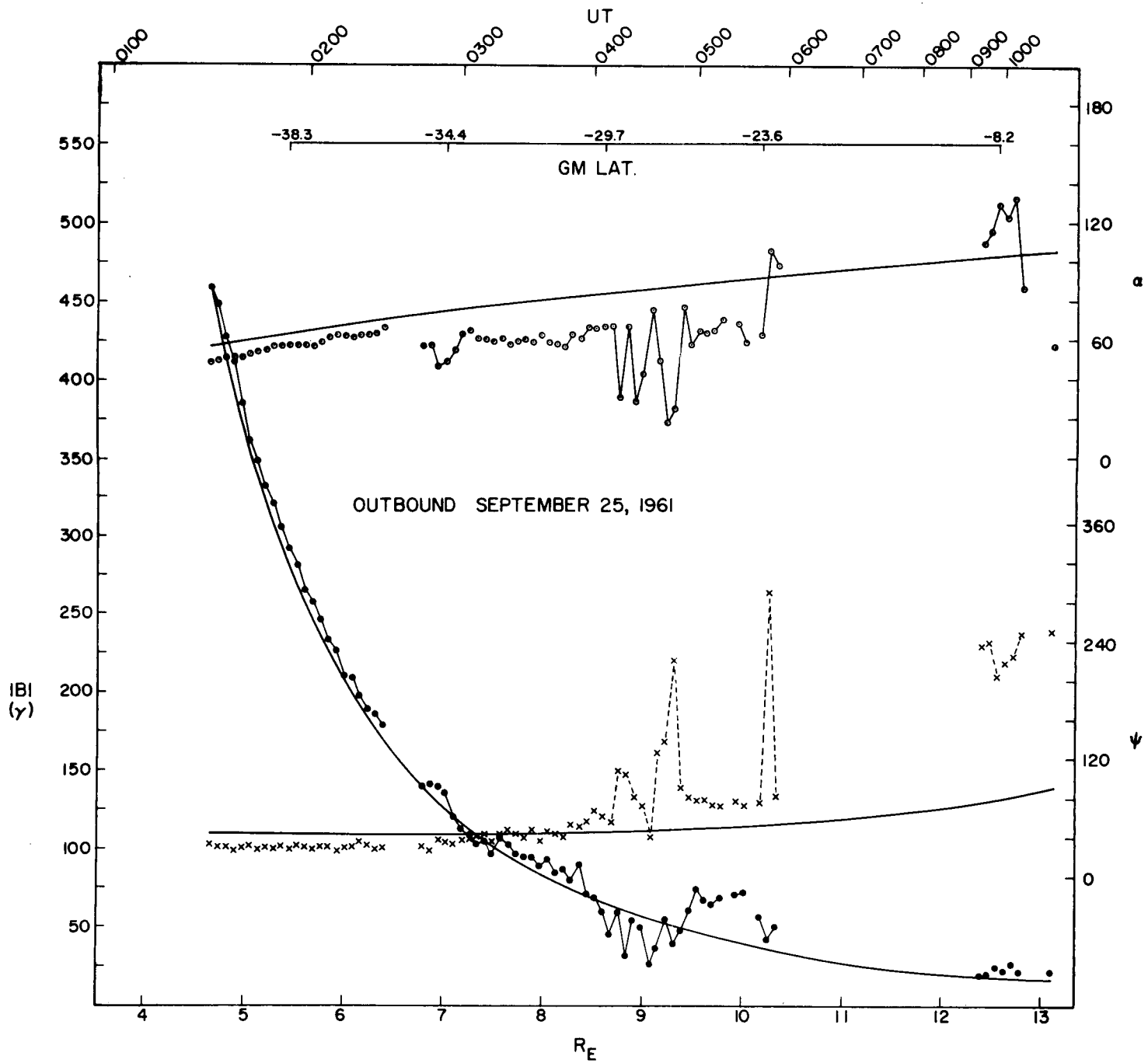

1430
1400
1300
1200
1100
1000
0900
0800
0700
0600
0500
23
17
11
5
-3
-14
GM LAT.
180
120
60
0
α
INBOUND SEPTEMBER 21, 1961
400
350
300
250
200
150
100
50
|B|
γ
360
240
120
0
ψ
4
5
6
7
8
9
10
11
12
13
R E

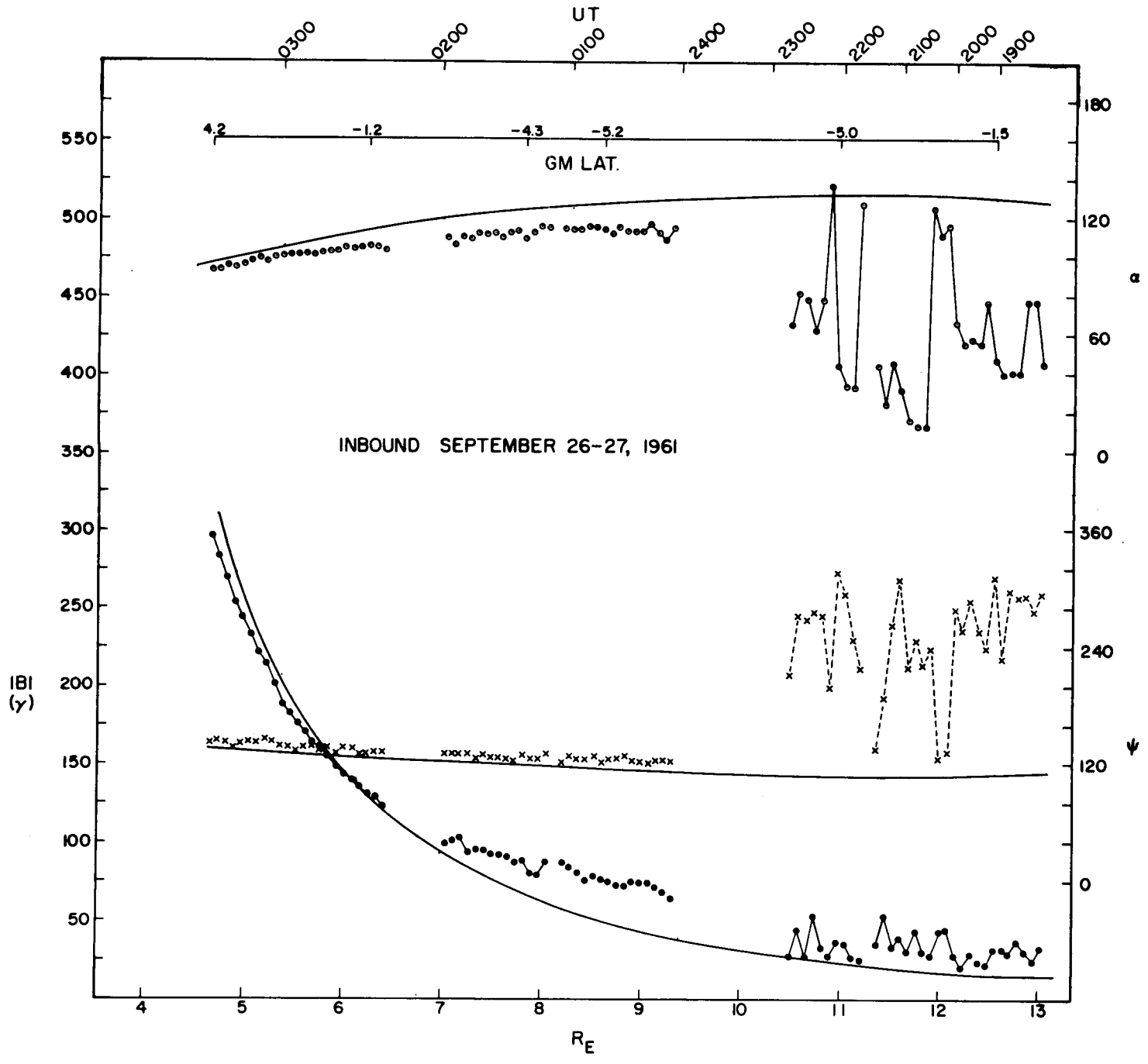

UT
1800
1900
2000
2100
2200
2300
2400
0100
0200
-28.9
-27
-26.4
-26.9
-27.3
GM LAT.
OUTBOUND SEPTEMBER 21-22, 1961
|B|
(γ)
α
ψ
R_E

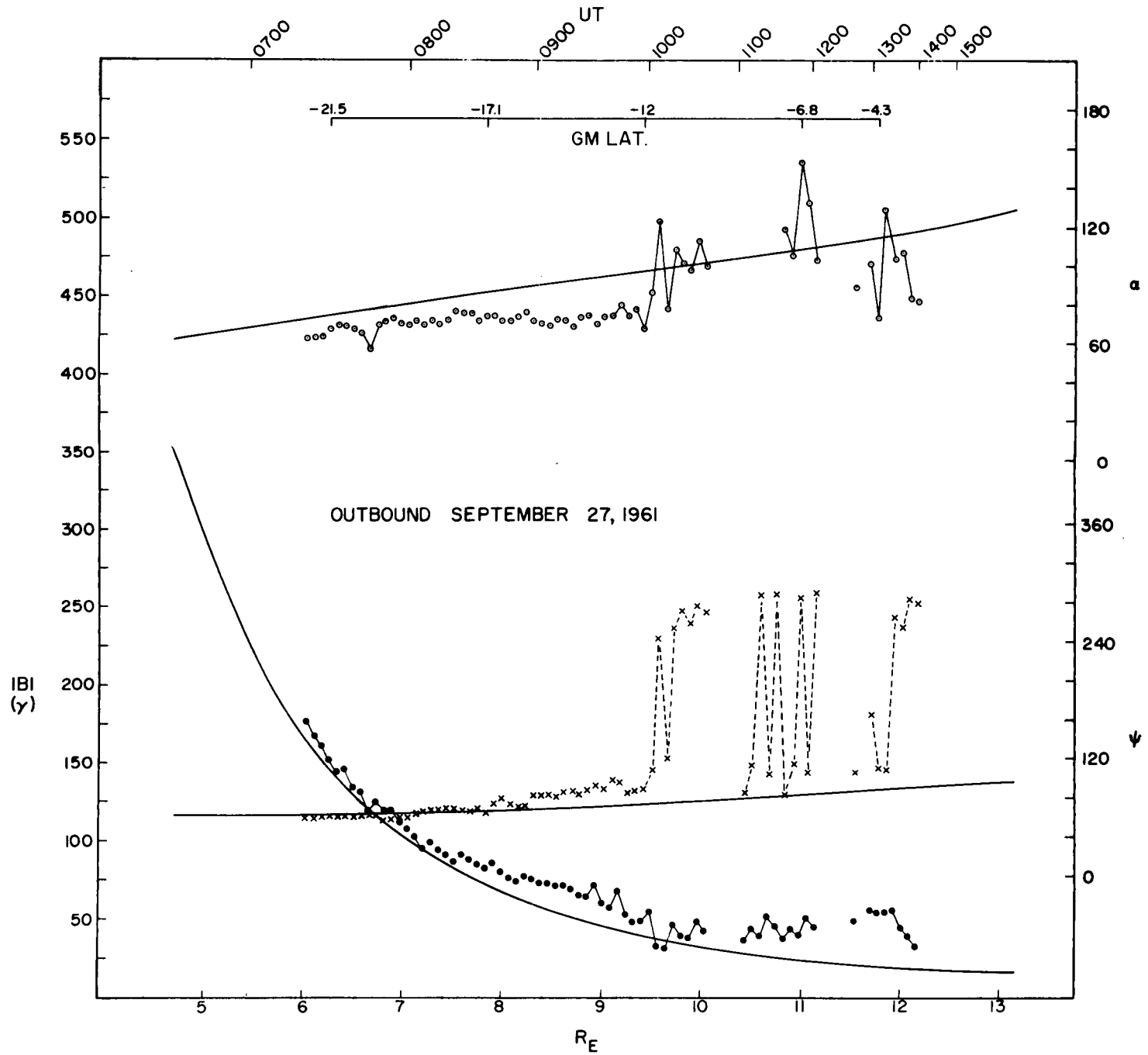

UT
1700
1600
1500
1400
1300
1200
1100
1000
23.8
18.6
13.9
8.4
-0.2
GM LAT.
INBOUND SEPTEMBER 22, 1961
|B| (γ)
α
ψ
R_E

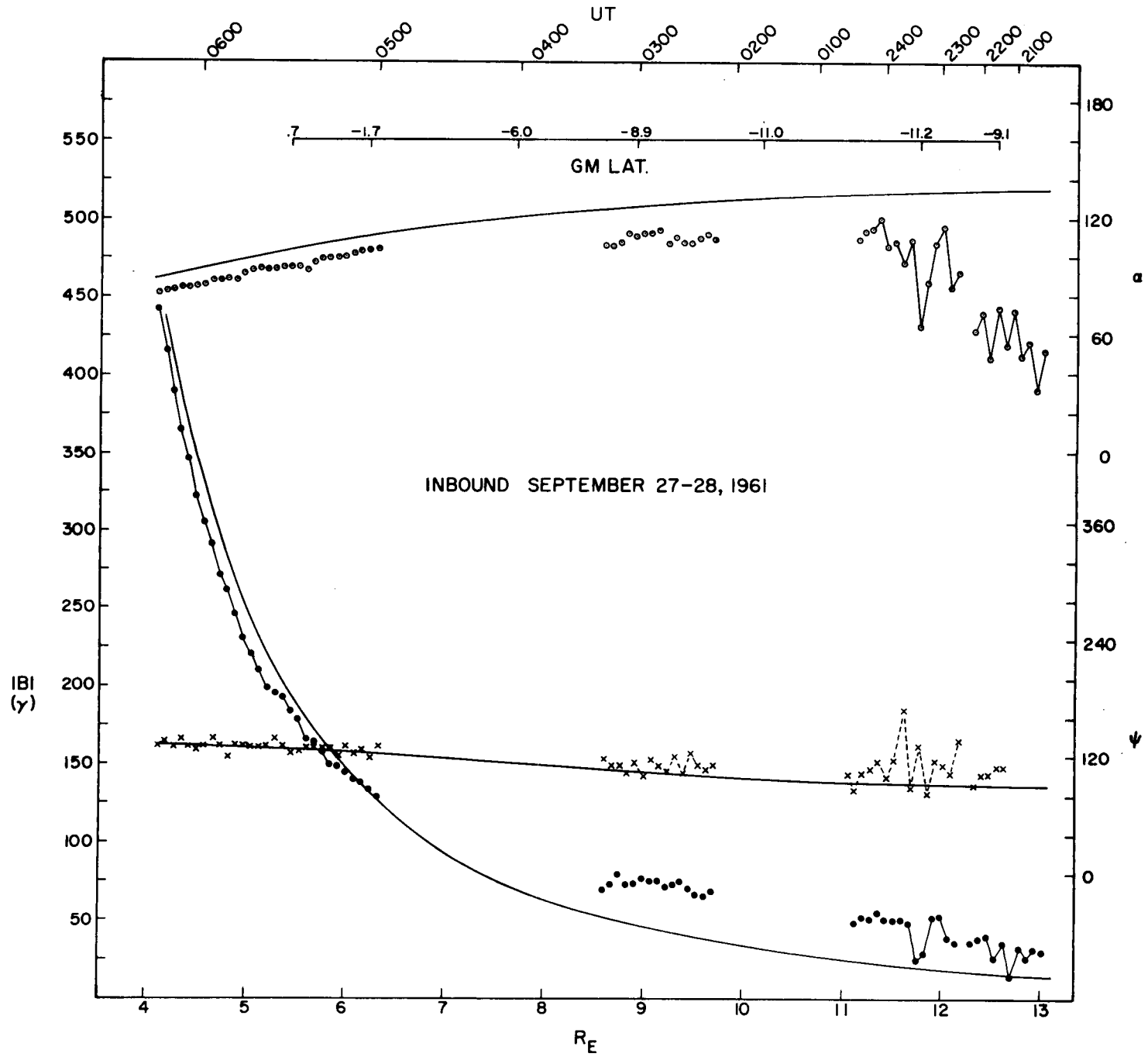

UT
2400
0100
0200
0300
0400
0500
0600
0700
-35.7
-32.2
-26.9
-16.1
GM LAT.
OUTBOUND SEPTEMBER 24, 1961
|B|
(γ)
550
500
450
400
350
300
250
200
150
100
50
180
120
60
0
360
240
120
0
α
ψ
4
5
6
7
8
9
10
11
12
13
R_E

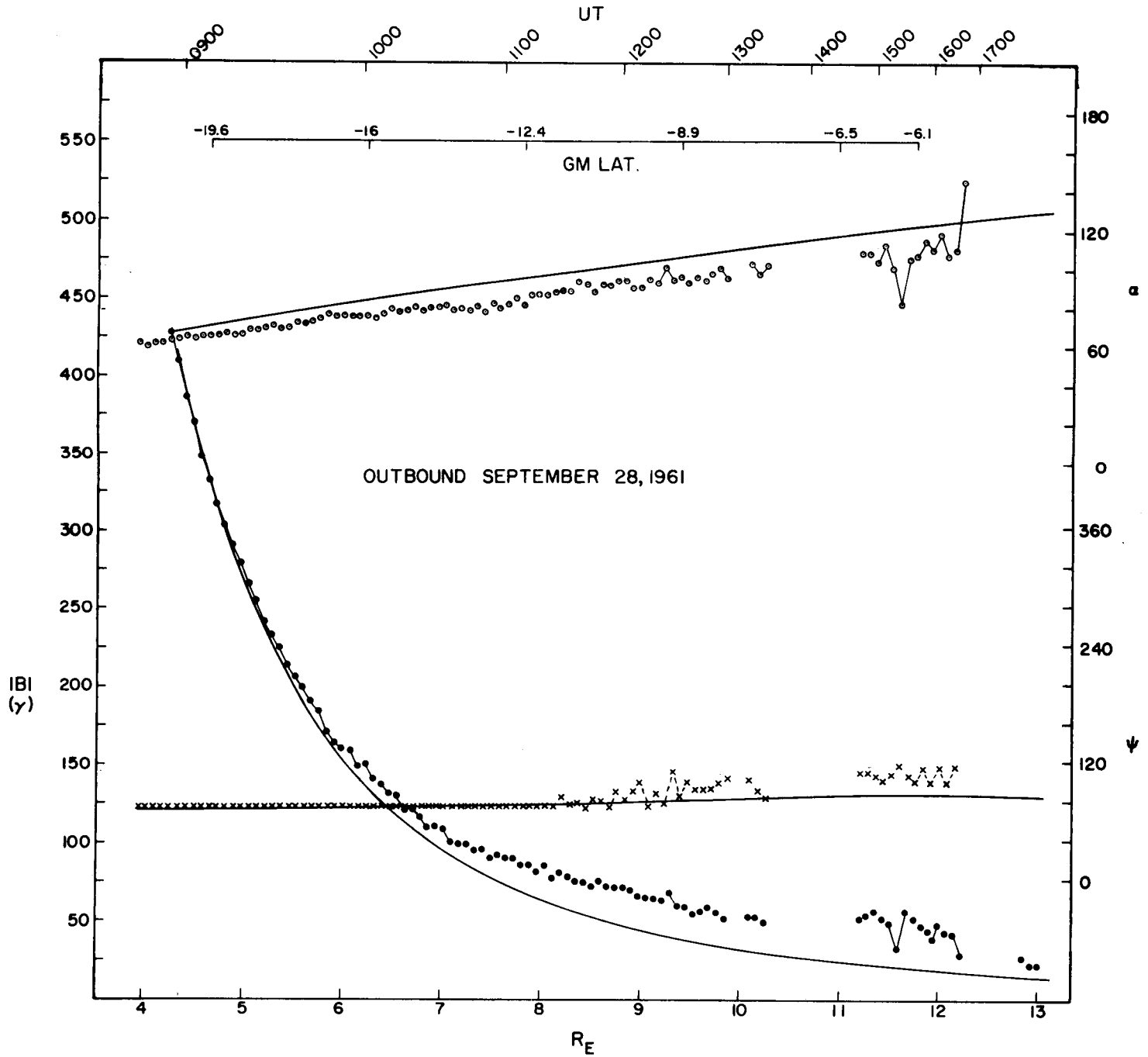

UT
2200
2100
2000
1900
1800
1700
1600
1500
1400
16.5
12.5
10.0
9.0
8.4
5.0
GM LAT.
INBOUND SEPTEMBER 24, 1961
|B|
(γ)
α
ψ
R_E

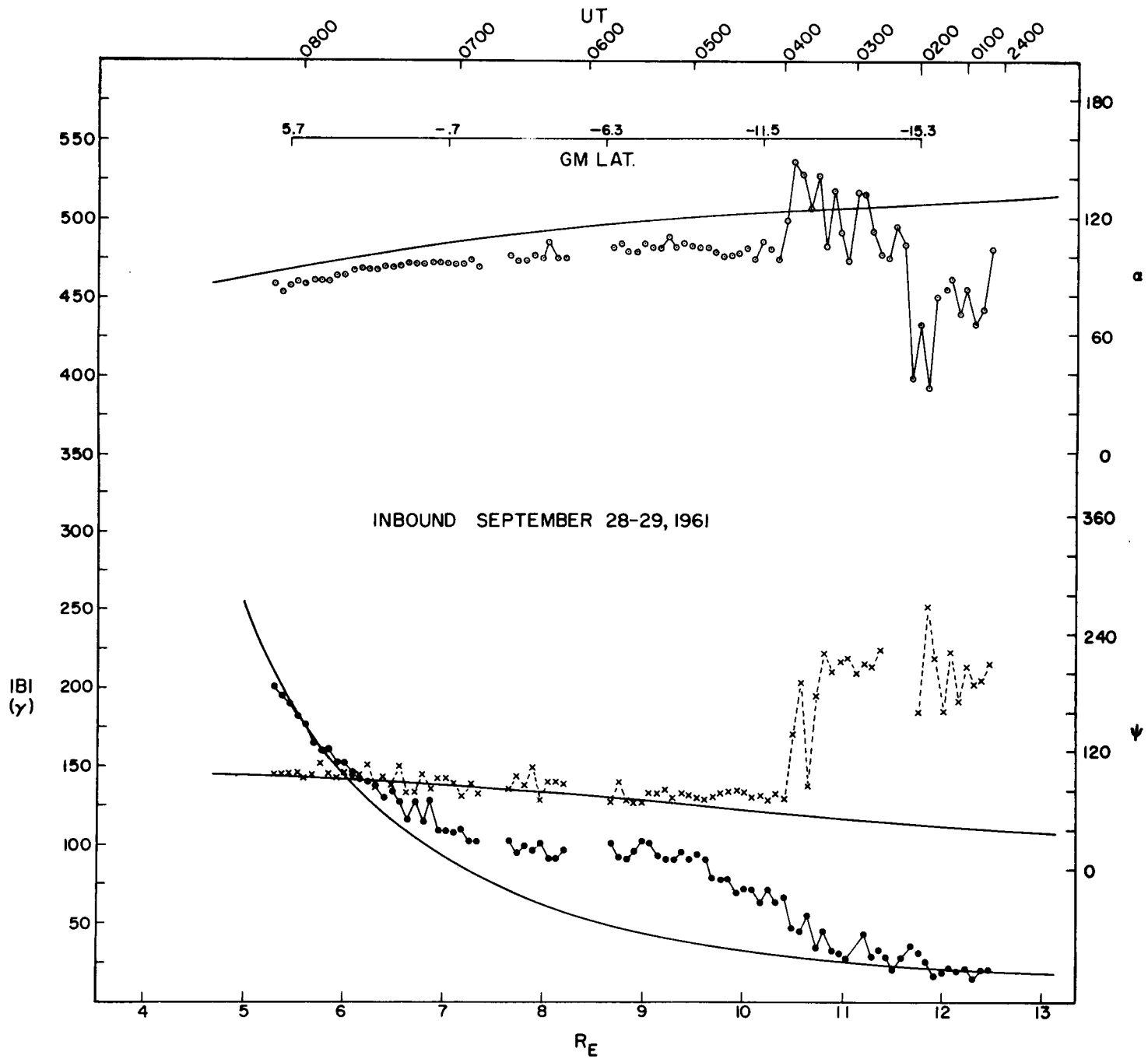

UT
0100
0200
0300
0400
0500
0600
0700
0800
0900
1000
-38.3
-34.4
-29.7
-23.6
-8.2
GM LAT.
OUTBOUND SEPTEMBER 25, 1961
|B|
(γ)
550
500
450
400
350
300
250
200
150
100
50
180
120
60
0
360
240
120
0
α
ψ
4
5
6
7
8
9
10
11
12
13
R_E

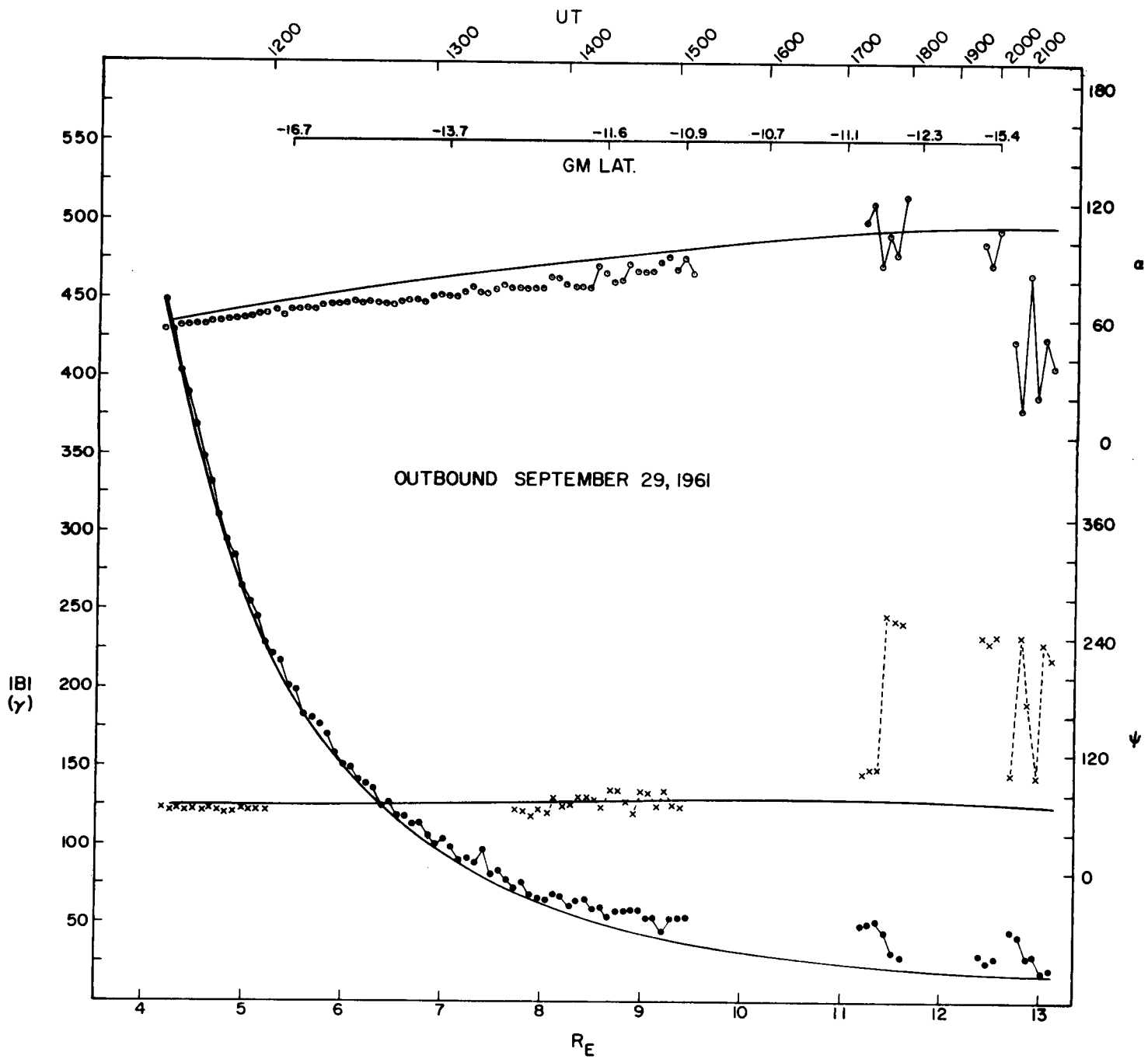

UT
0300
0200
0100
2400
2300
2200
2100
2000
1900
4.2
-1.2
-4.3
-5.2
-5.0
-1.5
GM LAT.
INBOUND SEPTEMBER 26-27, 1961
|B|
(γ)
α
ψ
180
120
60
0
360
240
120
0
550
500
450
400
350
300
250
200
150
100
50
4
5
6
7
8
9
10
11
12
13
R_E

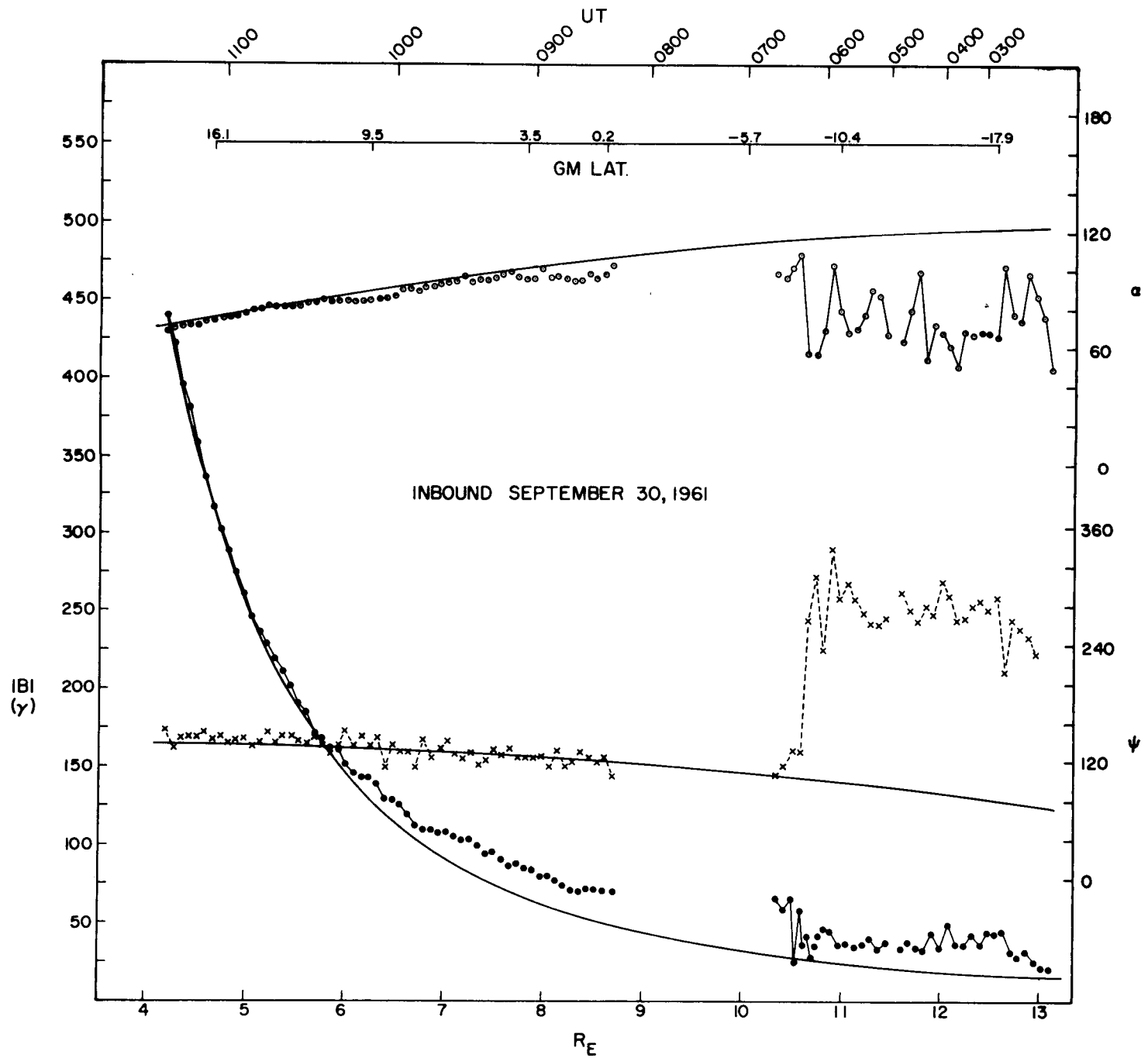

UT
0700
0800
0900
1000
1100
1200
1300
1400
1500
-21.5
-17.1
-12
-6.8
-4.3
GM LAT.
OUTBOUND SEPTEMBER 27, 1961
|B|
(γ)
550
500
450
400
350
300
250
200
150
100
50
180
120
60
0
360
240
120
0
α
ψ
5
6
7
8
9
10
11
12
13
R_E

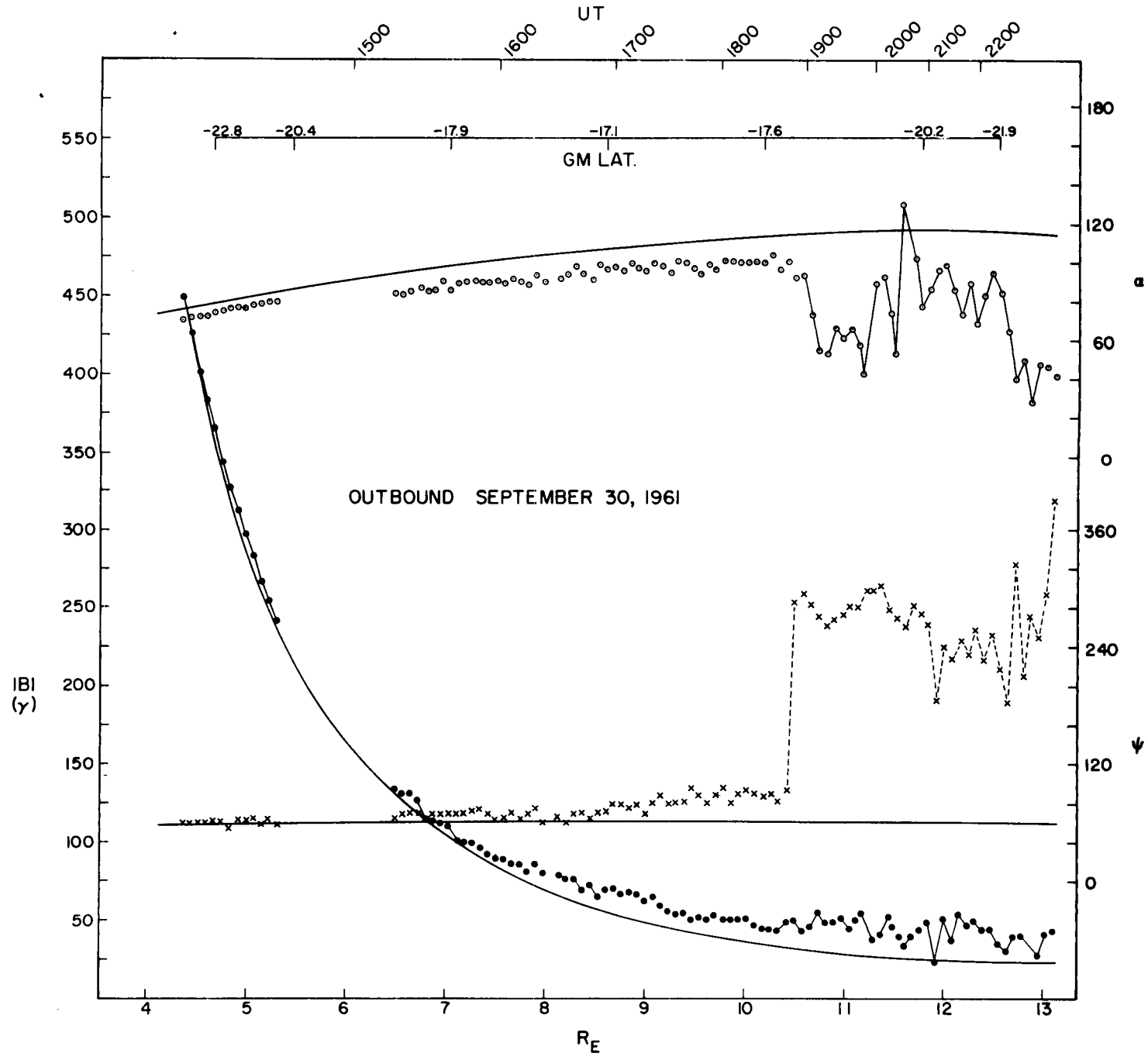

UT
0600
0500
0400
0300
0200
0100
2400
2300
2200
2100
.7
-1.7
-6.0
-8.9
-11.0
-11.2
-9.1
GM LAT.
INBOUND SEPTEMBER 27-28, 1961
|B|
(γ)
550
500
450
400
350
300
250
200
150
100
50
180
120
60
0
360
240
120
0
α
ψ
4
5
6
7
8
9
10
11
12
13
R_E

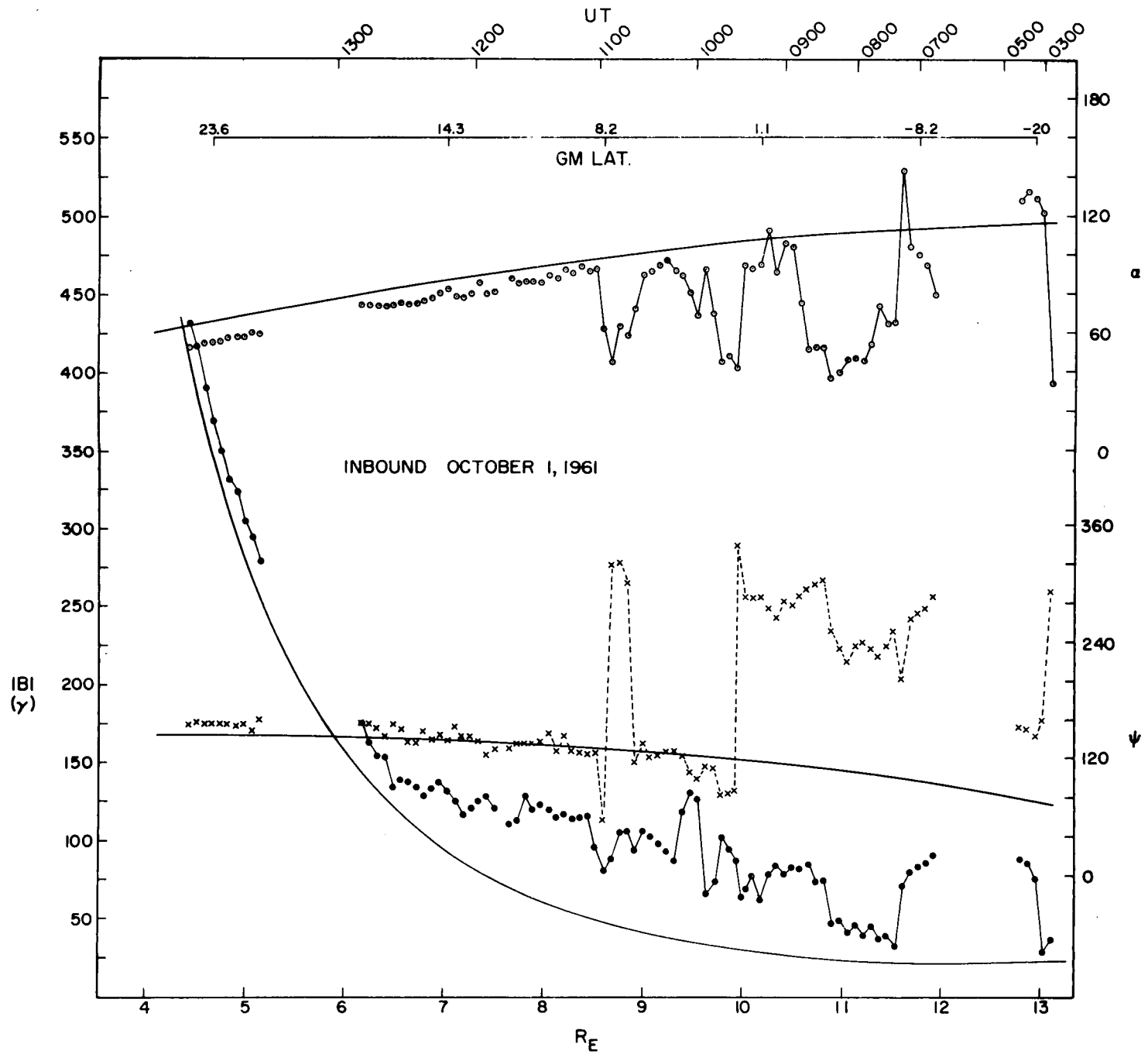

UT
0900
1000
1100
1200
1300
1400
1500
1600
1700
-19.6
-16
-12.4
-8.9
-6.5
-6.1
GM LAT.
OUTBOUND SEPTEMBER 28, 1961
|B|
(γ)
550
500
450
400
350
300
250
200
150
100
50
180
120
60
0
360
240
120
0
α
ψ
4
5
6
7
8
9
10
11
12
13
R_E

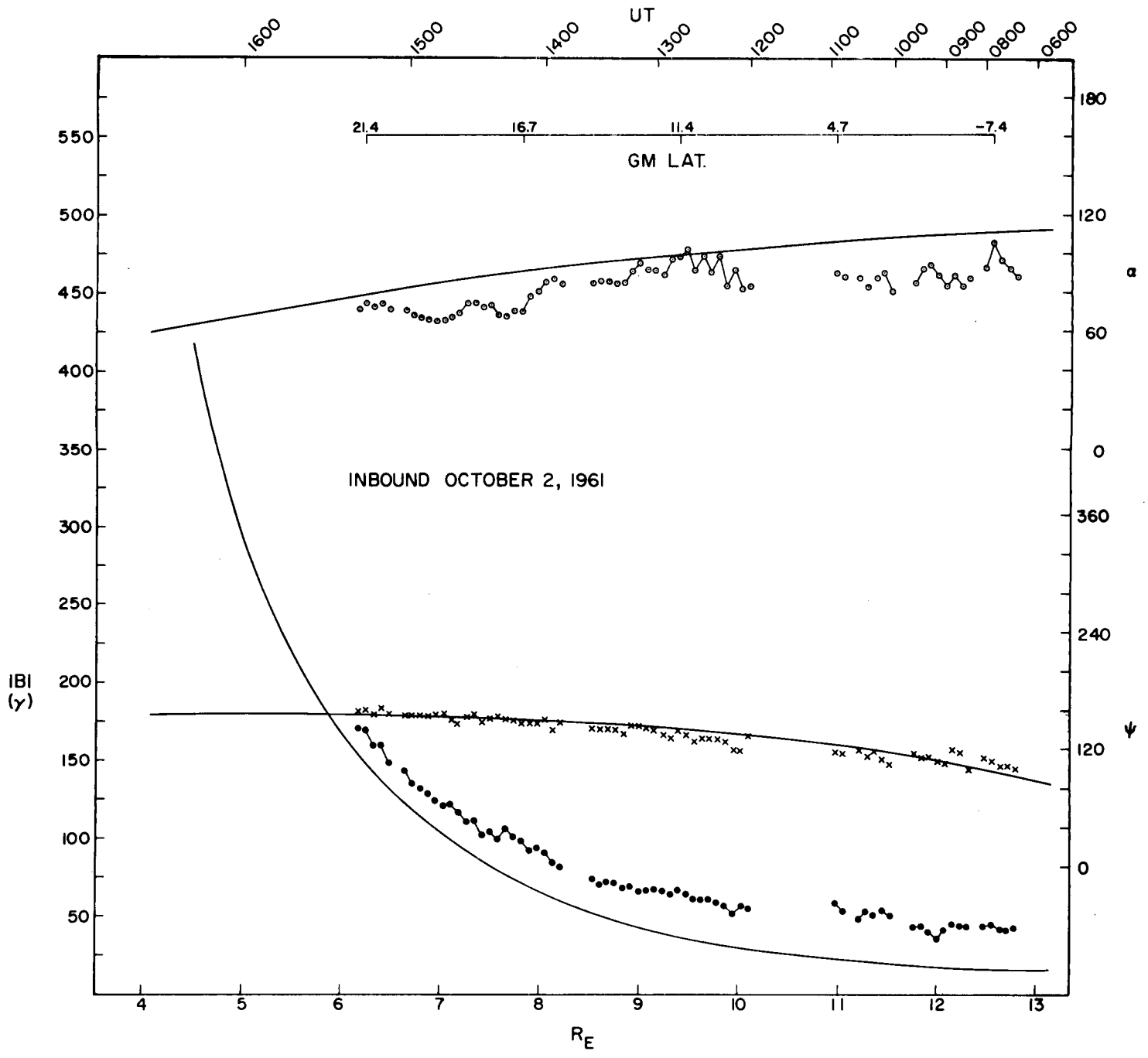

UT
0800
0700
0600
0500
0400
0300
0200
0100
2400
5.7
-.7
-6.3
-11.5
-15.3
GM LAT.
INBOUND SEPTEMBER 28-29, 1961
|B|
(γ)
α
ψ
R_E

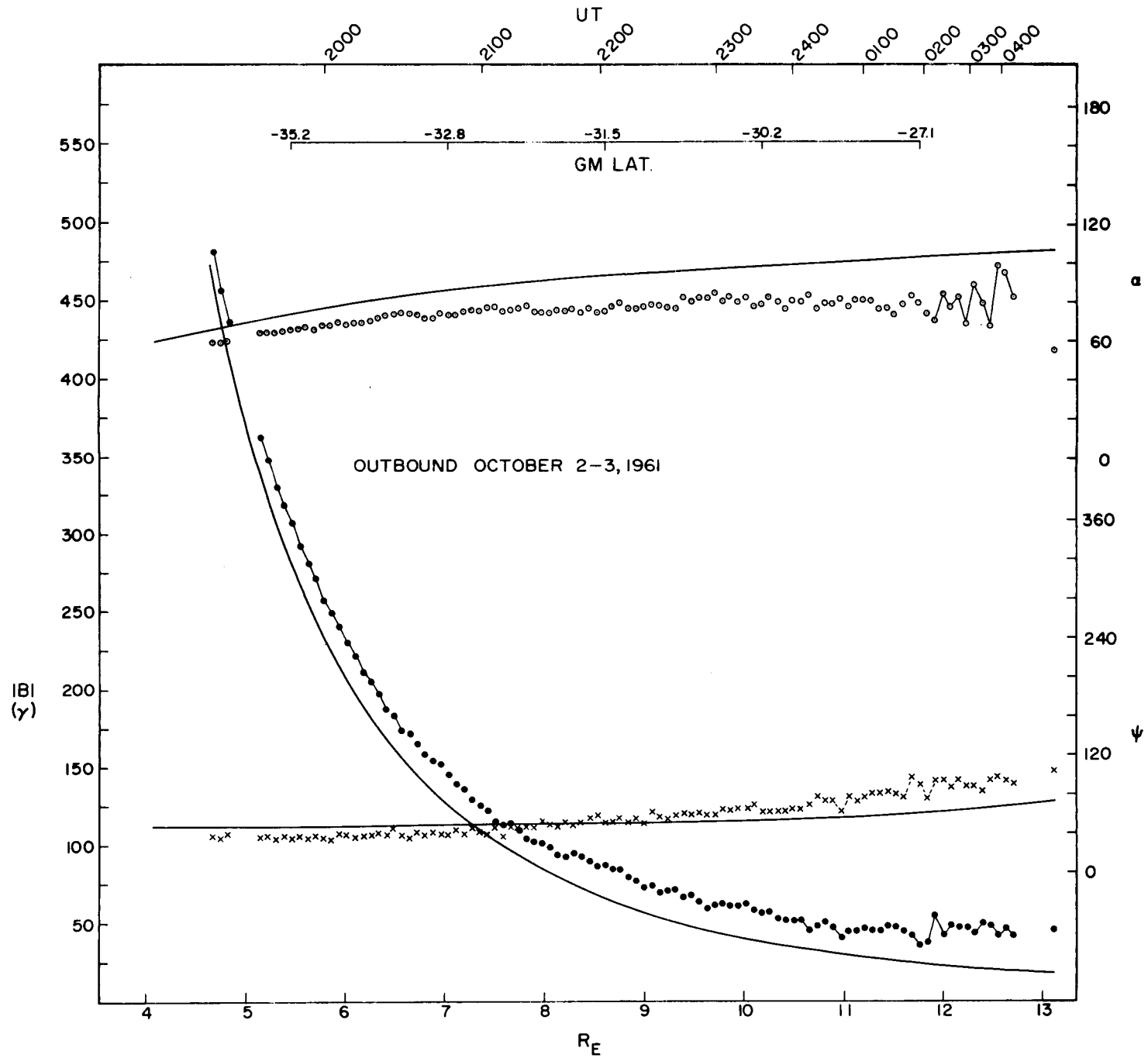

UT
1200
1300
1400
1500
1600
1700
1800
1900
2000
2100
-16.7
-13.7
-11.6
-10.9
-10.7
-11.1
-12.3
-15.4
GM LAT.
OUTBOUND SEPTEMBER 29, 1961
|B|
(γ)
550
500
450
400
350
300
250
200
150
100
50
180
120
60
0
360
240
120
0
α
ψ
4
5
6
7
8
9
10
11
12
13
R_E

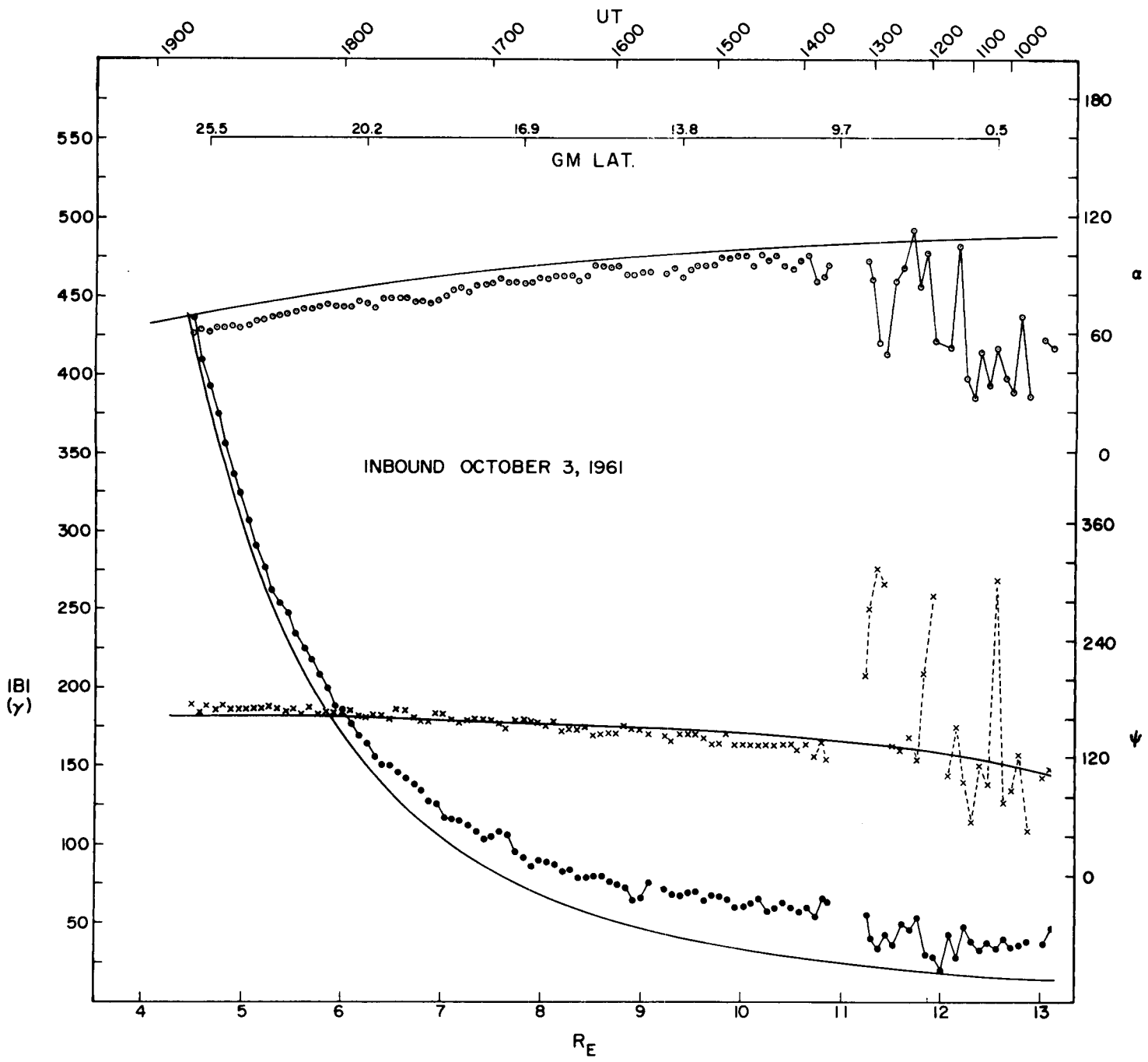

UT
1100
1000
0900
0800
0700
0600
0500
0400
0300
16.1
9.5
3.5
0.2
-5.7
-10.4
-17.9
GM LAT.
INBOUND SEPTEMBER 30, 1961
|B|
(γ)
550
500
450
400
350
300
250
200
150
100
50
180
120
60
0
360
240
120
0
α
ψ
4
5
6
7
8
9
10
11
12
13
R_E

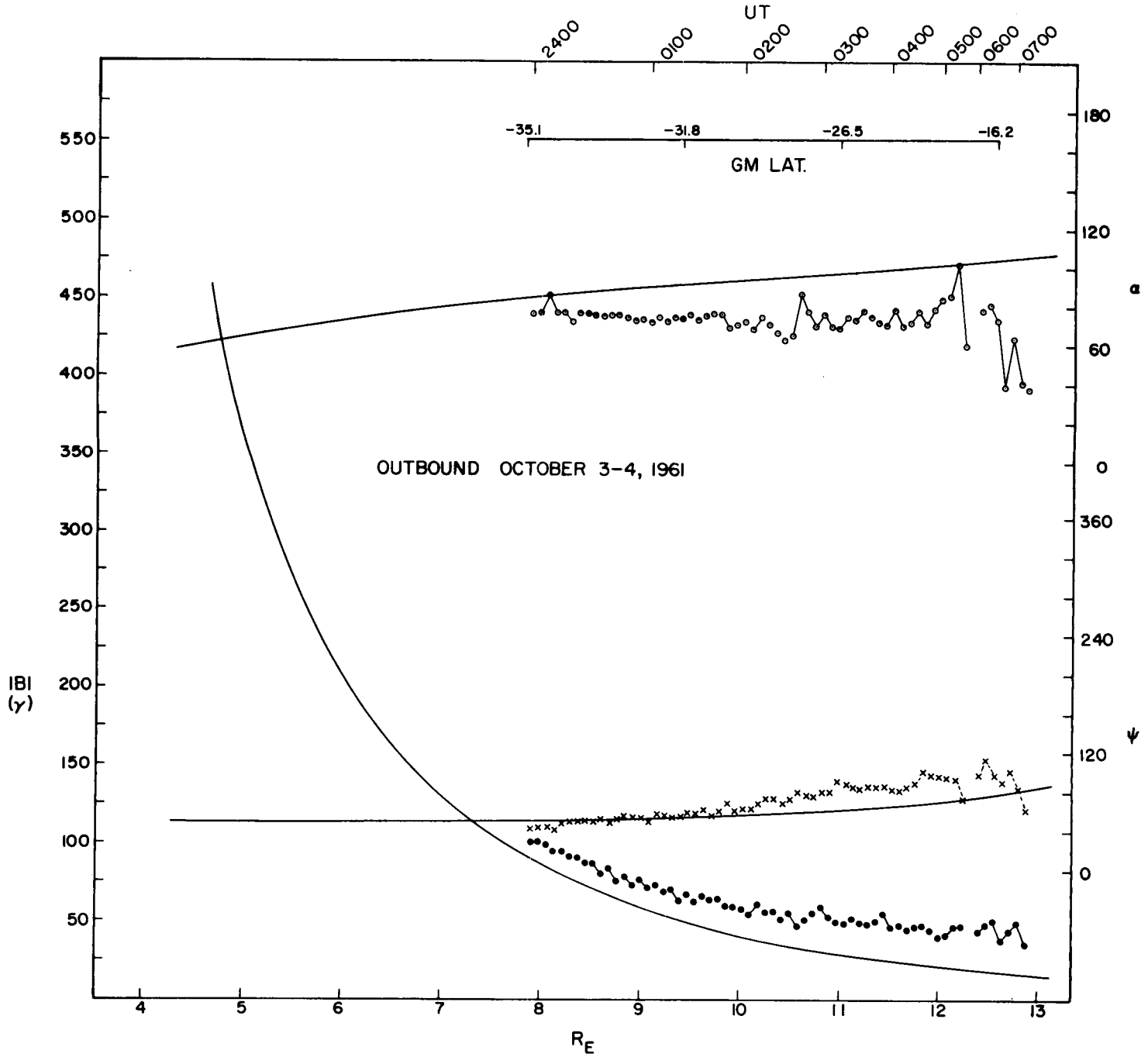

UT
1500
1600
1700
1800
1900
2000
2100
2200
-22.8
-20.4
-17.9
-17.1
-17.6
-20.2
-21.9
GM LAT.
OUTBOUND SEPTEMBER 30, 1961
|B|
(γ)
550
500
450
400
350
300
250
200
150
100
50
180
120
60
0
360
240
120
0
α
ψ
4
5
6
7
8
9
10
11
12
13
R_E

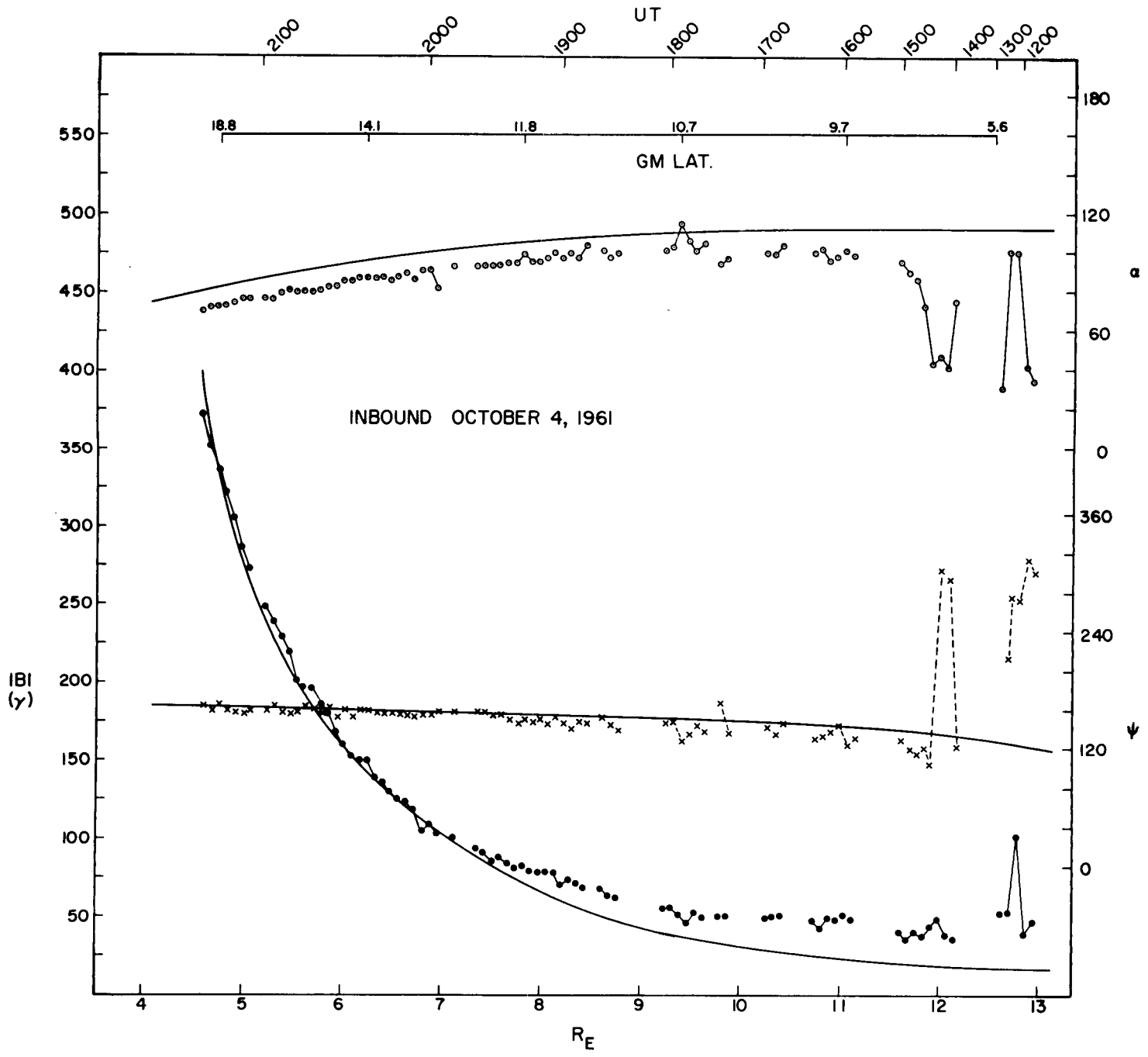

UT
1300
1200
1100
1000
0900
0800
0700
0500
0300
23.6
14.3
8.2
1.1
-8.2
-20
GM LAT.
INBOUND OCTOBER 1, 1961
|B|
(γ)
α
ψ
R_E

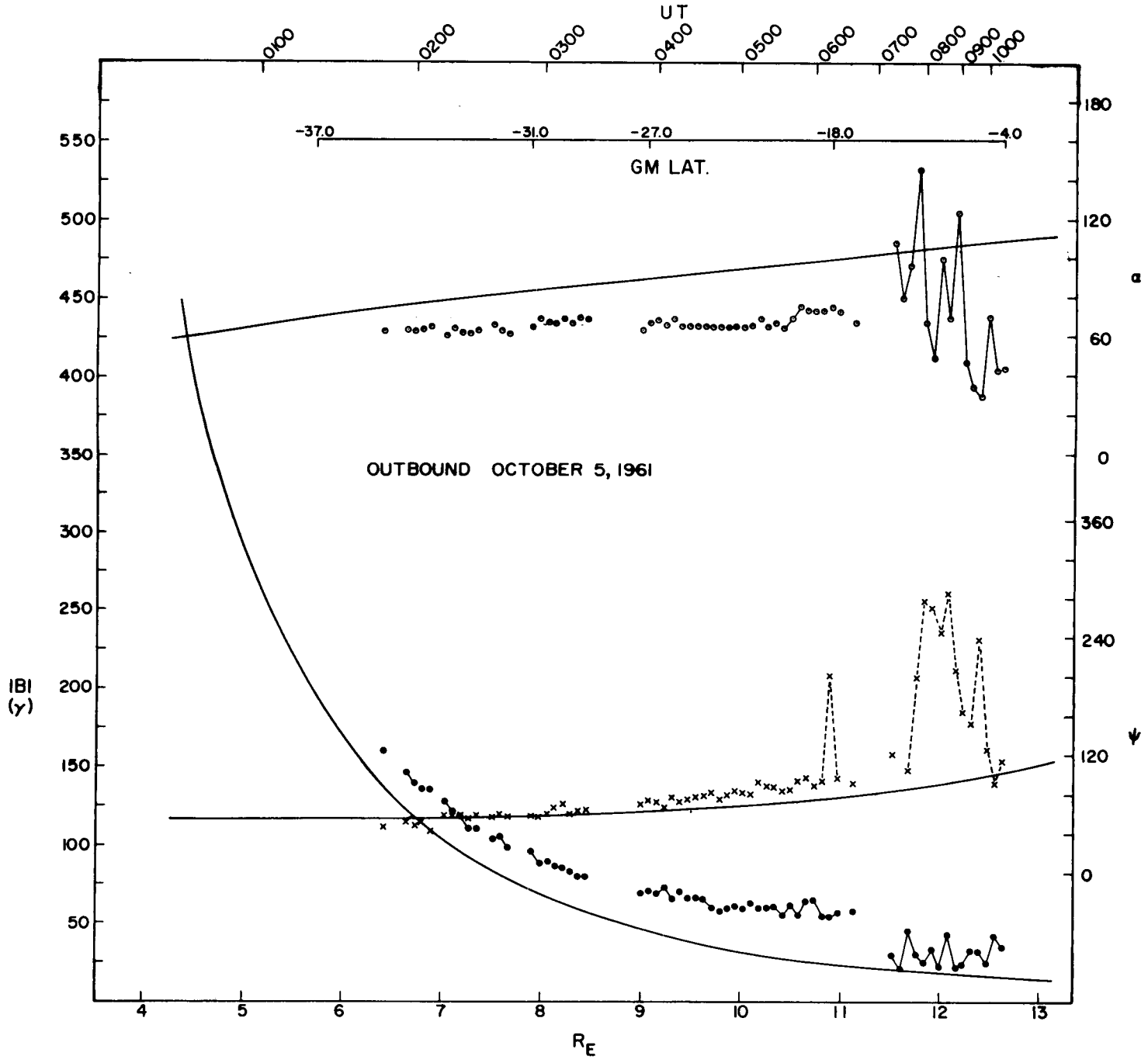

UT
1600
1500
1400
1300
1200
1100
1000
0900
0800
0600
21.4
16.7
11.4
4.7
-7.4
GM LAT.
INBOUND OCTOBER 2, 1961
|B|
(γ)
550
500
450
400
350
300
250
200
150
100
50
180
120
60
0
360
240
120
0
α
ψ
4
5
6
7
8
9
10
11
12
13
R_E

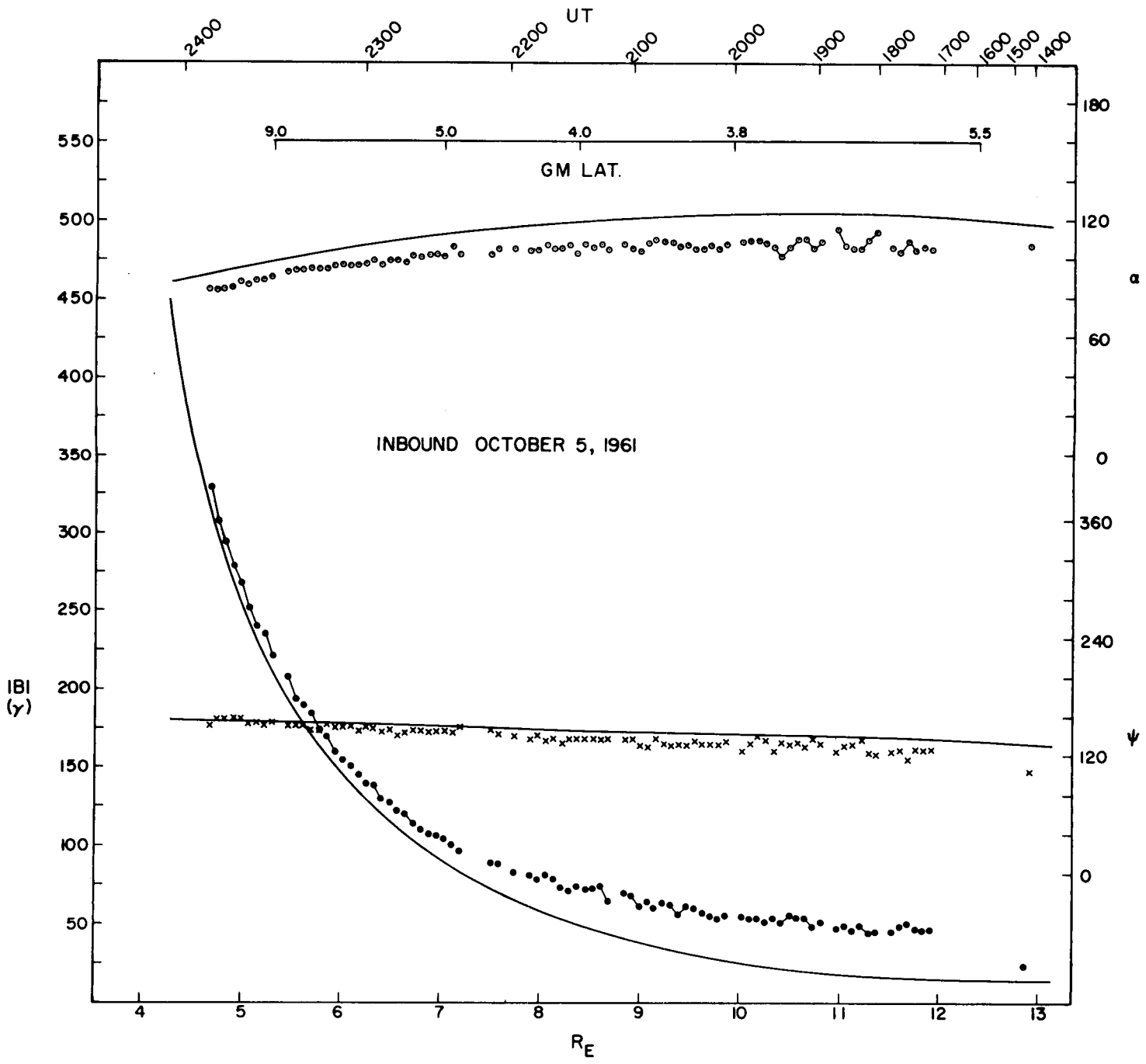

UT
2000
2100
2200
2300
2400
0100
0200
0300
0400
-35.2
-32.8
-31.5
-30.2
-27.1
GM LAT.
OUTBOUND OCTOBER 2-3, 1961
|B| (γ)
550
500
450
400
350
300
250
200
150
100
50
180
120
60
0
360
240
120
0
α
ψ
4
5
6
7
8
9
10
11
12
13
R_E

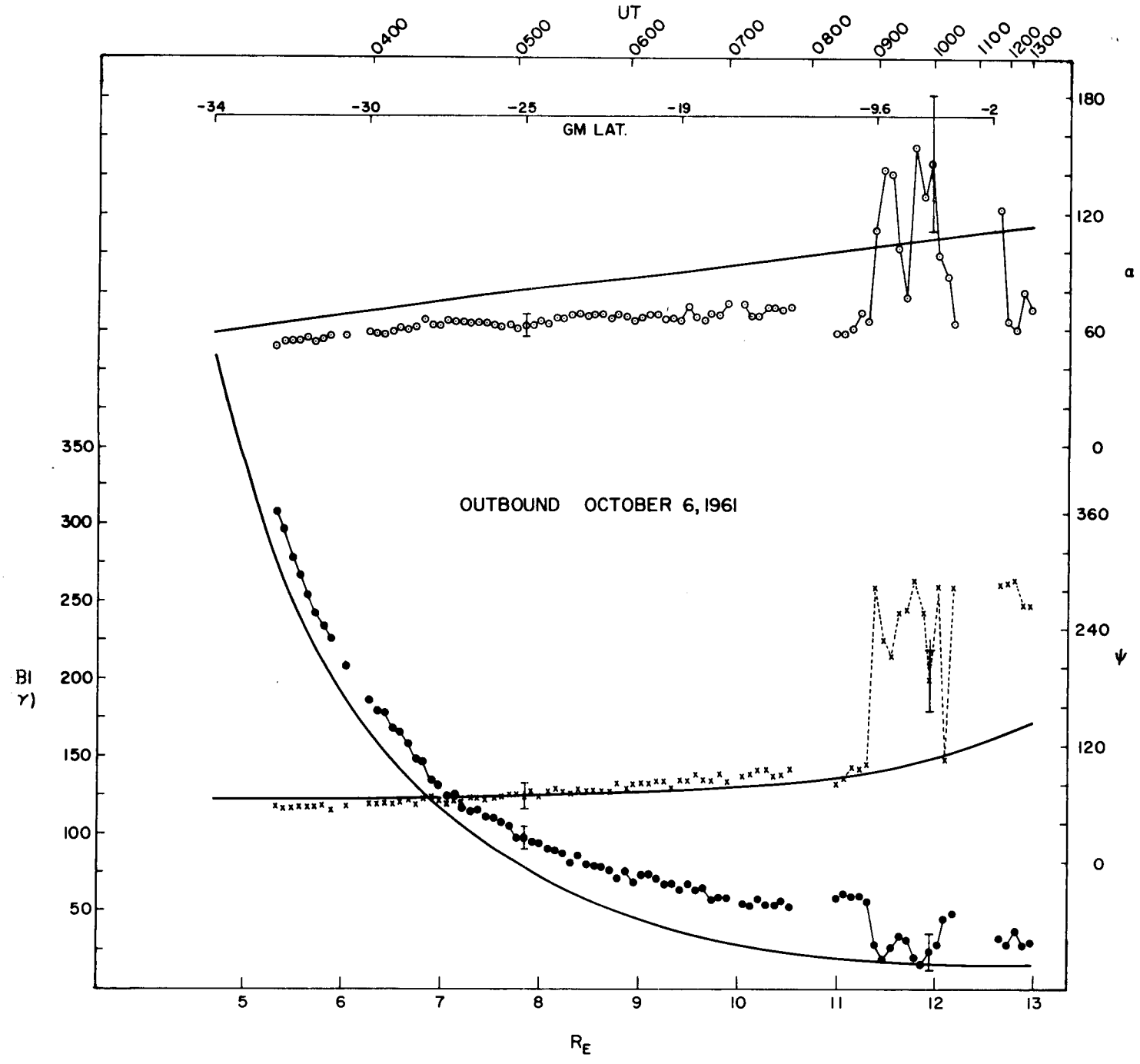

UT
1900
1800
1700
1600
1500
1400
1300
1200
1100
1000
25.5
20.2
16.9
13.8
9.7
0.5
GM LAT.
INBOUND OCTOBER 3, 1961
|B|
(γ)
550
500
450
400
350
300
250
200
150
100
50
180
120
60
0
360
240
120
0
α
ψ
4
5
6
7
8
9
10
11
12
13
R_E

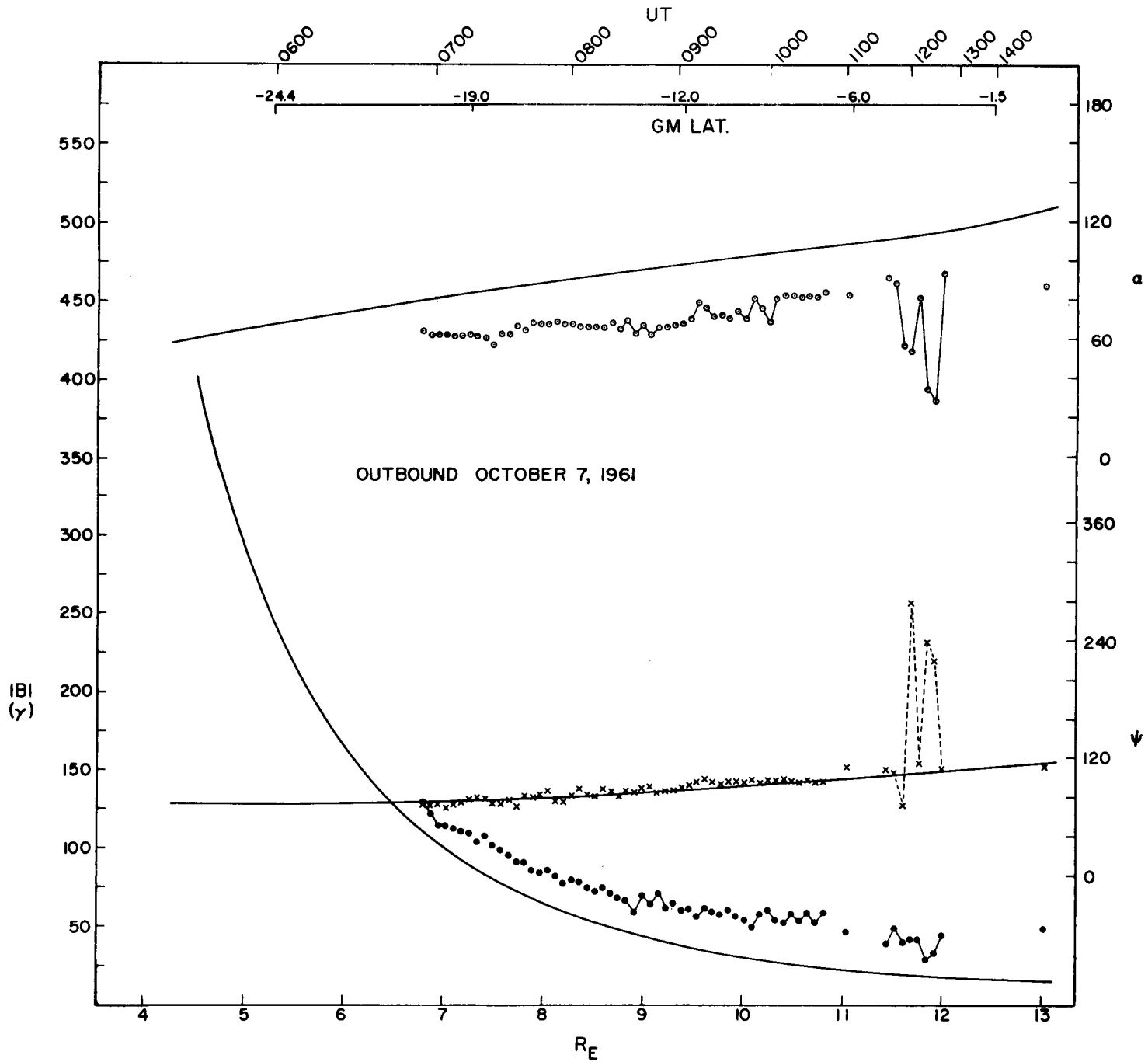

UT
2400
0100
0200
0300
0400
0500
0600
0700
-35.1
-31.8
-26.5
-16.2
GM LAT.
OUTBOUND OCTOBER 3-4, 1961
|B| (γ)
550
500
450
400
350
300
250
200
150
100
50
180
120
60
0
360
240
120
0
α
ψ
4
5
6
7
8
9
10
11
12
13
R_E

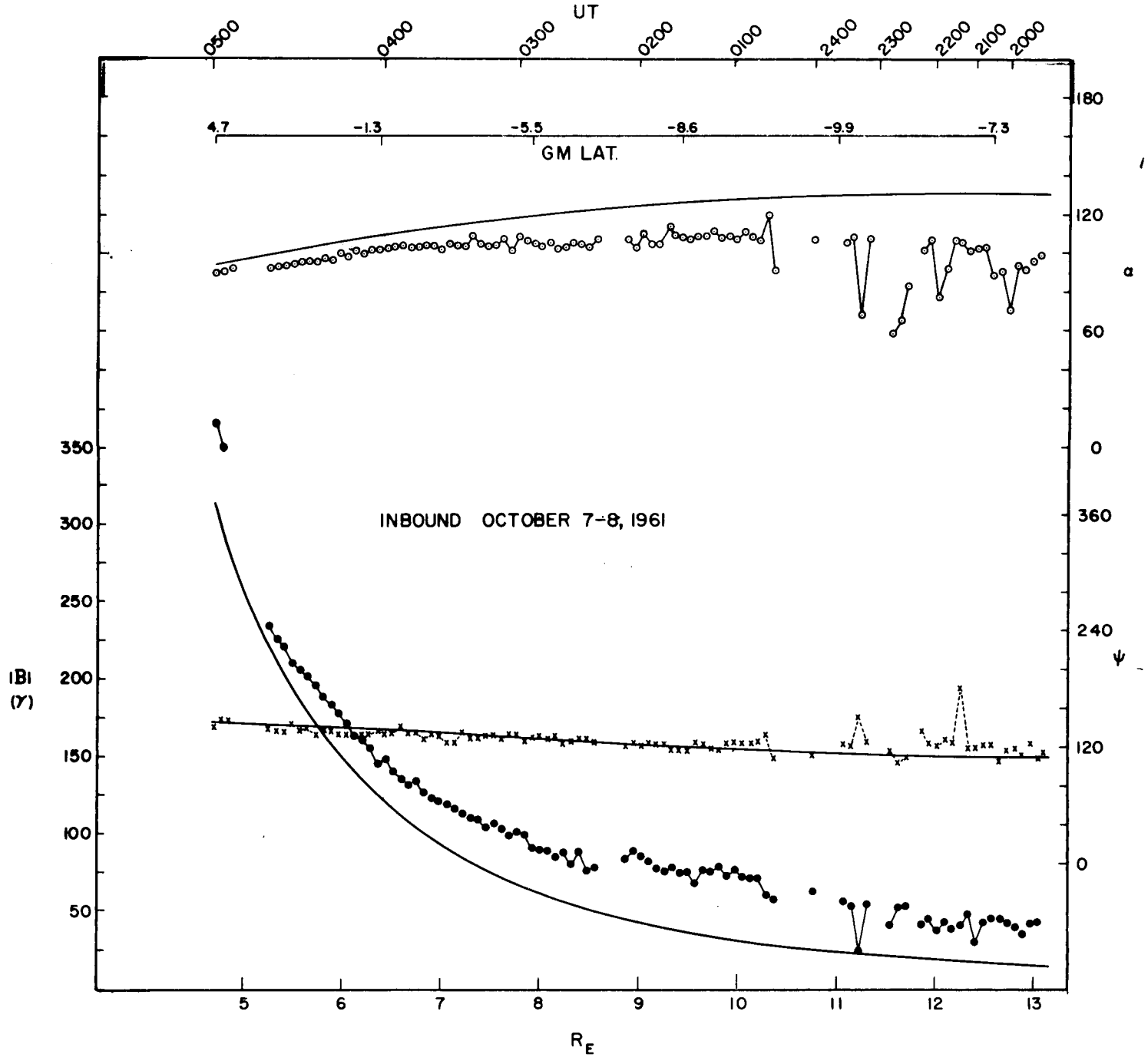

UT
2100
2000
1900
1800
1700
1600
1500
1400
1300
1200
18.8
14.1
11.8
10.7
9.7
5.6
GM LAT.
INBOUND OCTOBER 4, 1961
|B|
(γ)
550
500
450
400
350
300
250
200
150
100
50
180
120
60
0
360
240
120
0
α
ψ
4
5
6
7
8
9
10
11
12
13
R_E

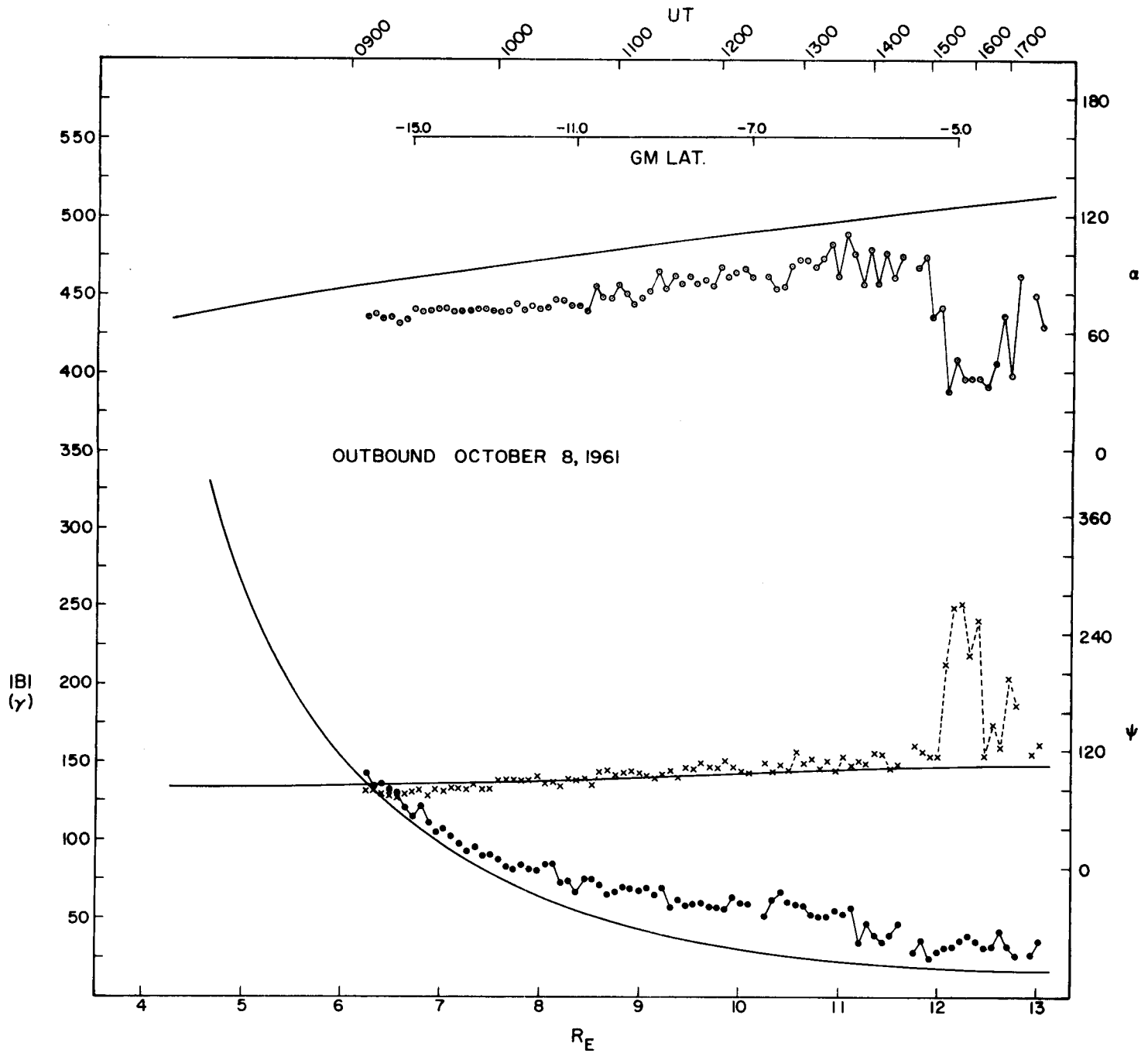

UT
0100
0200
0300
0400
0500
0600
0700
0800
0900
1000
-37.0
-31.0
-27.0
-18.0
-4.0
GM LAT.
OUTBOUND OCTOBER 5, 1961
|B|
(γ)
550
500
450
400
350
300
250
200
150
100
50
180
120
60
0
360
240
120
0
α
ψ
4
5
6
7
8
9
10
11
12
13
R_E

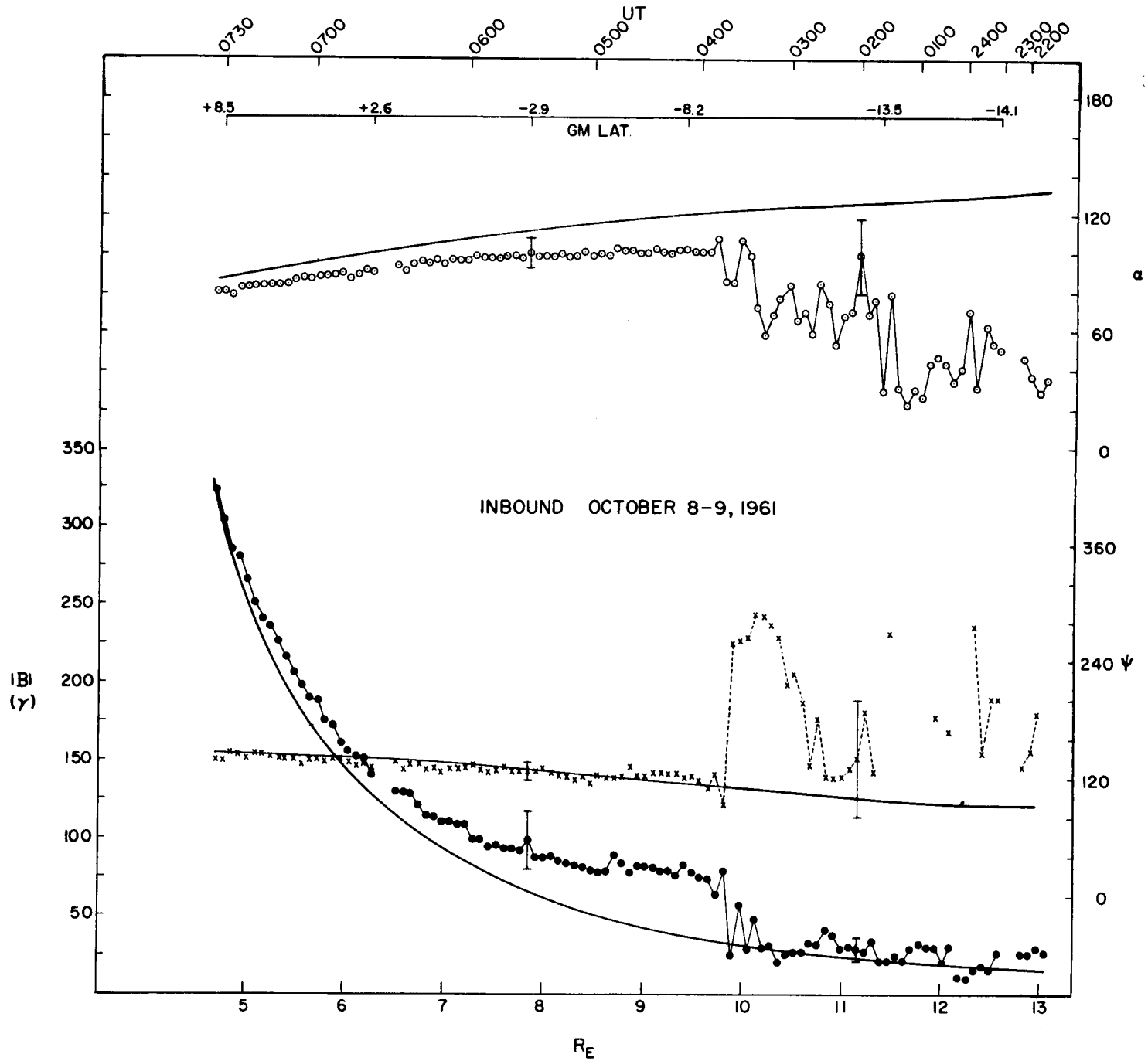

UT
2400
2300
2200
2100
2000
1900
1800
1700
1600
1500
1400
9.0
5.0
4.0
3.8
5.5
GM LAT.
INBOUND OCTOBER 5, 1961
|B|
(γ)
550
500
450
400
350
300
250
200
150
100
50
180
120
60
0
360
240
120
0
α
ψ
4
5
6
7
8
9
10
11
12
13
R_E

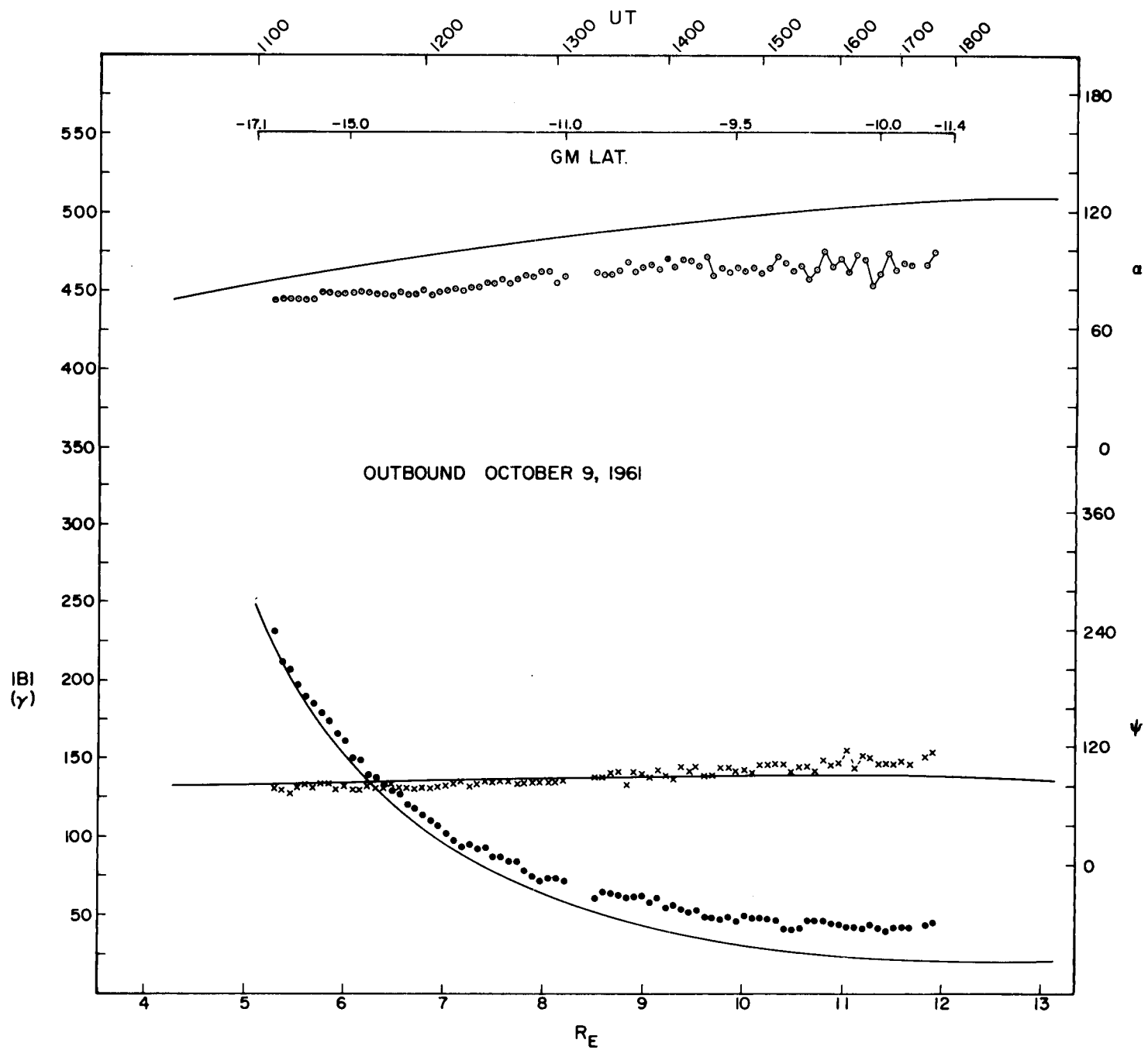

UT
0400
0500
0600
0700
0800
0900
1000
1100
1200
1300
-34
-30
-25
-19
-9.6
-2
GM LAT.
180
120
60
0
α
OUTBOUND OCTOBER 6, 1961
350
300
250
200
150
100
50
BI
γ)
360
240
120
0
ψ
5
6
7
8
9
10
11
12
13
R_E

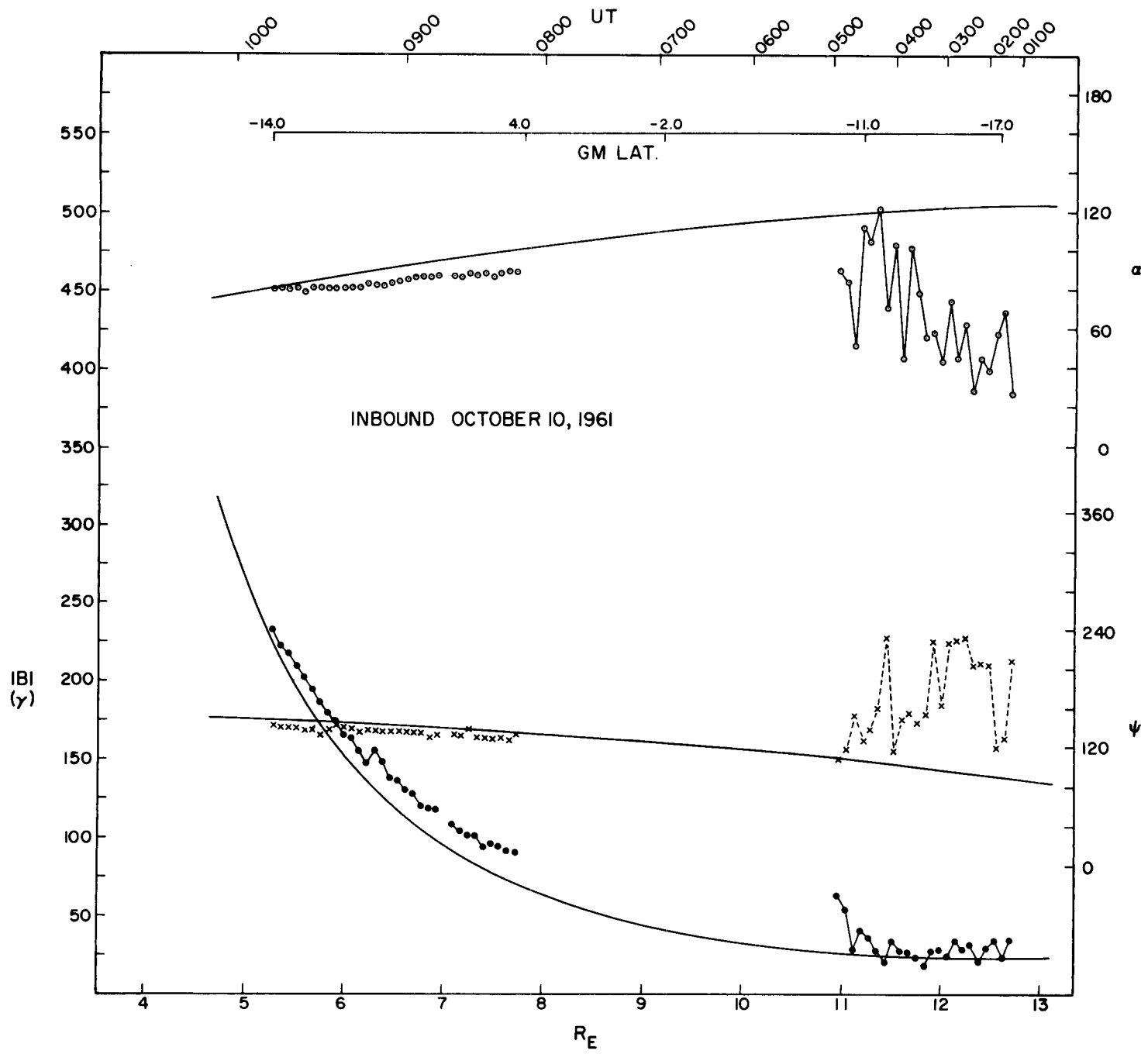

UT
0600
0700
0800
0900
1000
1100
1200
1300
1400
-24.4
-19.0
-12.0
-6.0
-1.5
GM LAT.
OUTBOUND OCTOBER 7, 1961
|B|
(γ)
550
500
450
400
350
300
250
200
150
100
50
180
120
60
0
360
240
120
0
α
ψ
4
5
6
7
8
9
10
11
12
13
R_E

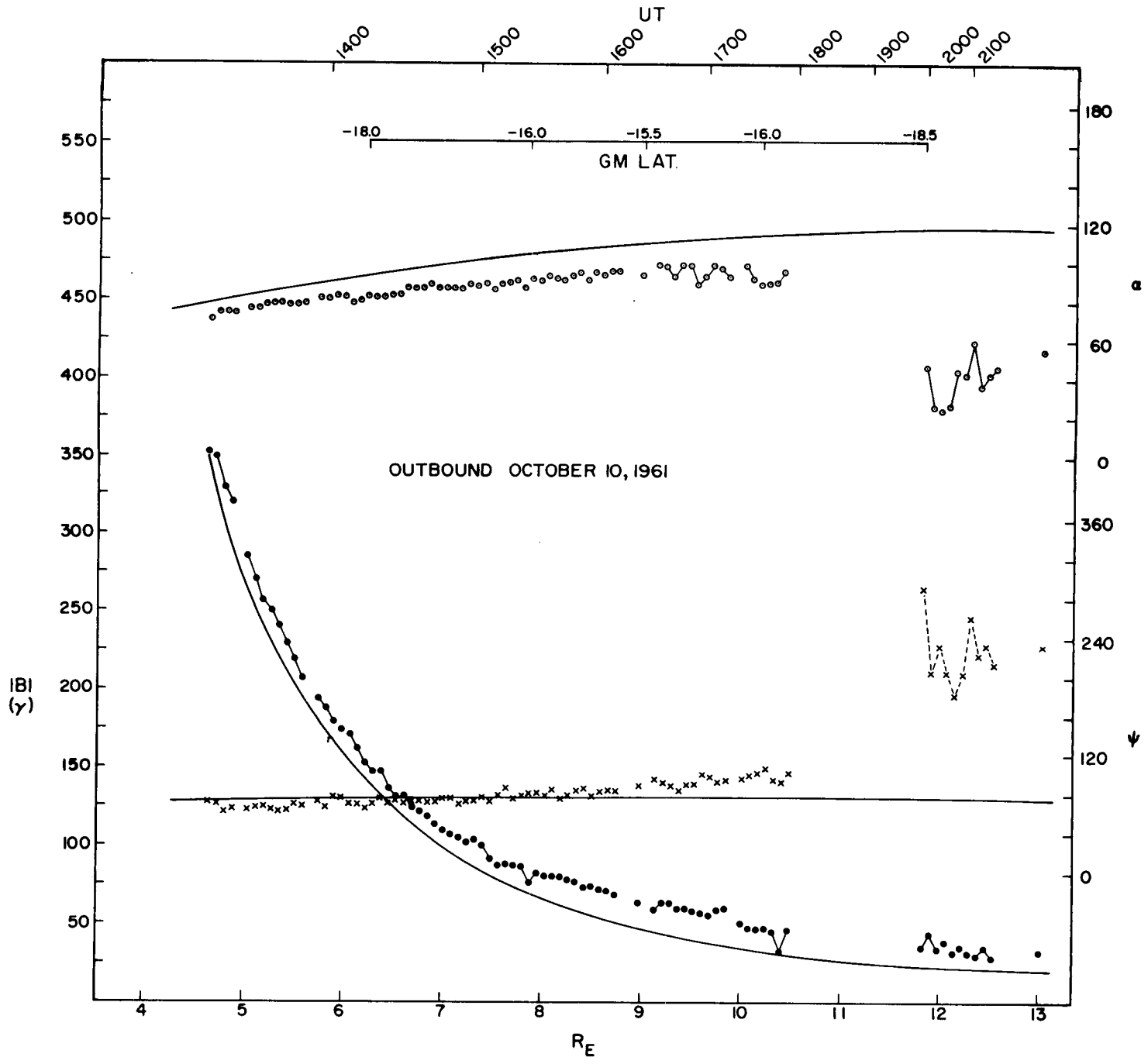

UT
0500
0400
0300
0200
0100
2400
2300
2200
2100
2000
4.7
-1.3
-5.5
-8.6
-9.9
-7.3
GM LAT.
180
120
60
0
α
INBOUND OCTOBER 7-8, 1961
350
300
250
200
150
100
50
|B|
(γ)
360
240
120
0
ψ
5
6
7
8
9
10
11
12
13
R_E

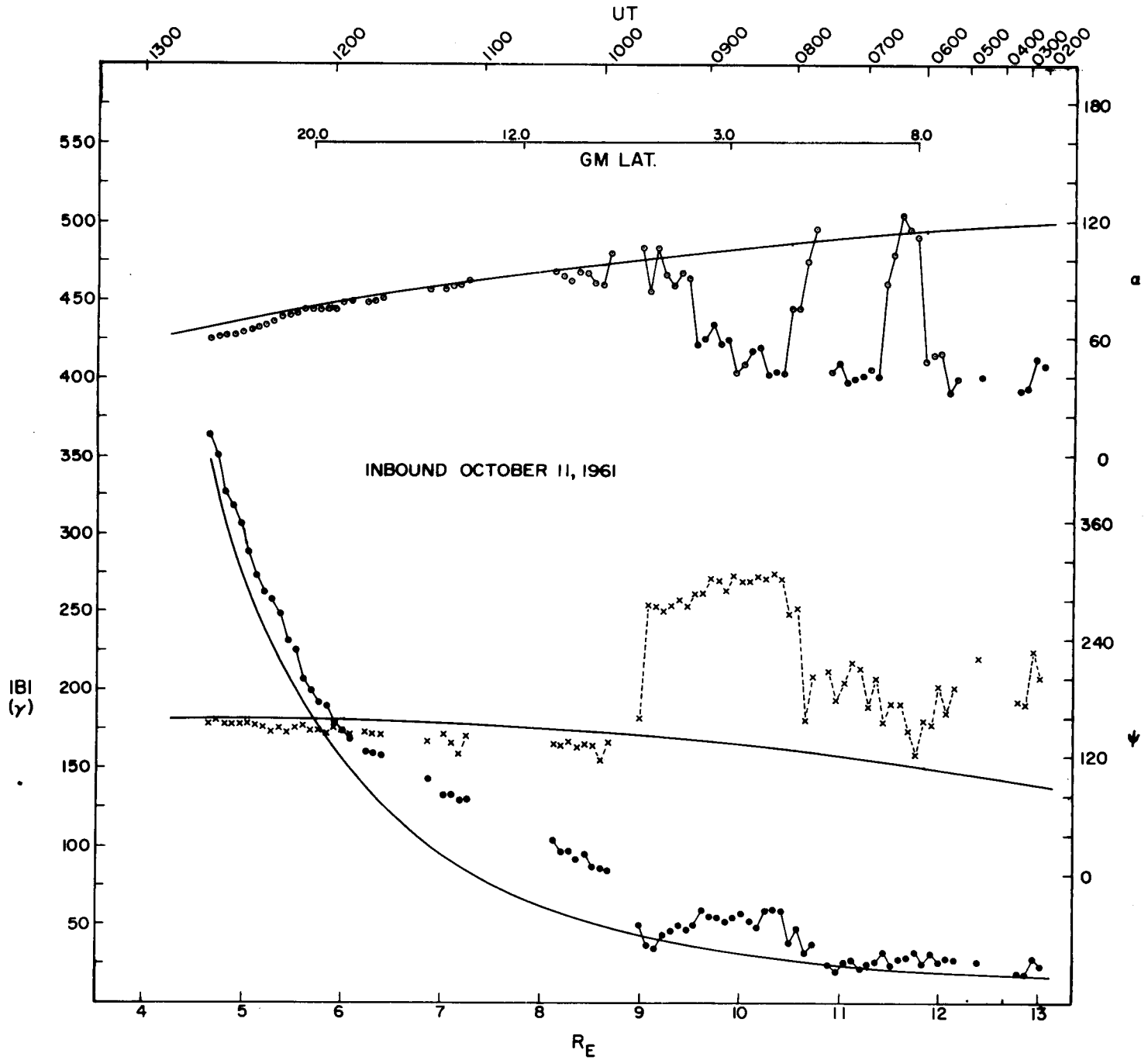

UT
0900
1000
1100
1200
1300
1400
1500
1600
1700
-15.0
-11.0
-7.0
-5.0
GM LAT.
OUTBOUND OCTOBER 8, 1961
|B|
(γ)
550
500
450
400
350
300
250
200
150
100
50
180
120
60
0
360
240
120
0
α
ψ
4
5
6
7
8
9
10
11
12
13
R_E

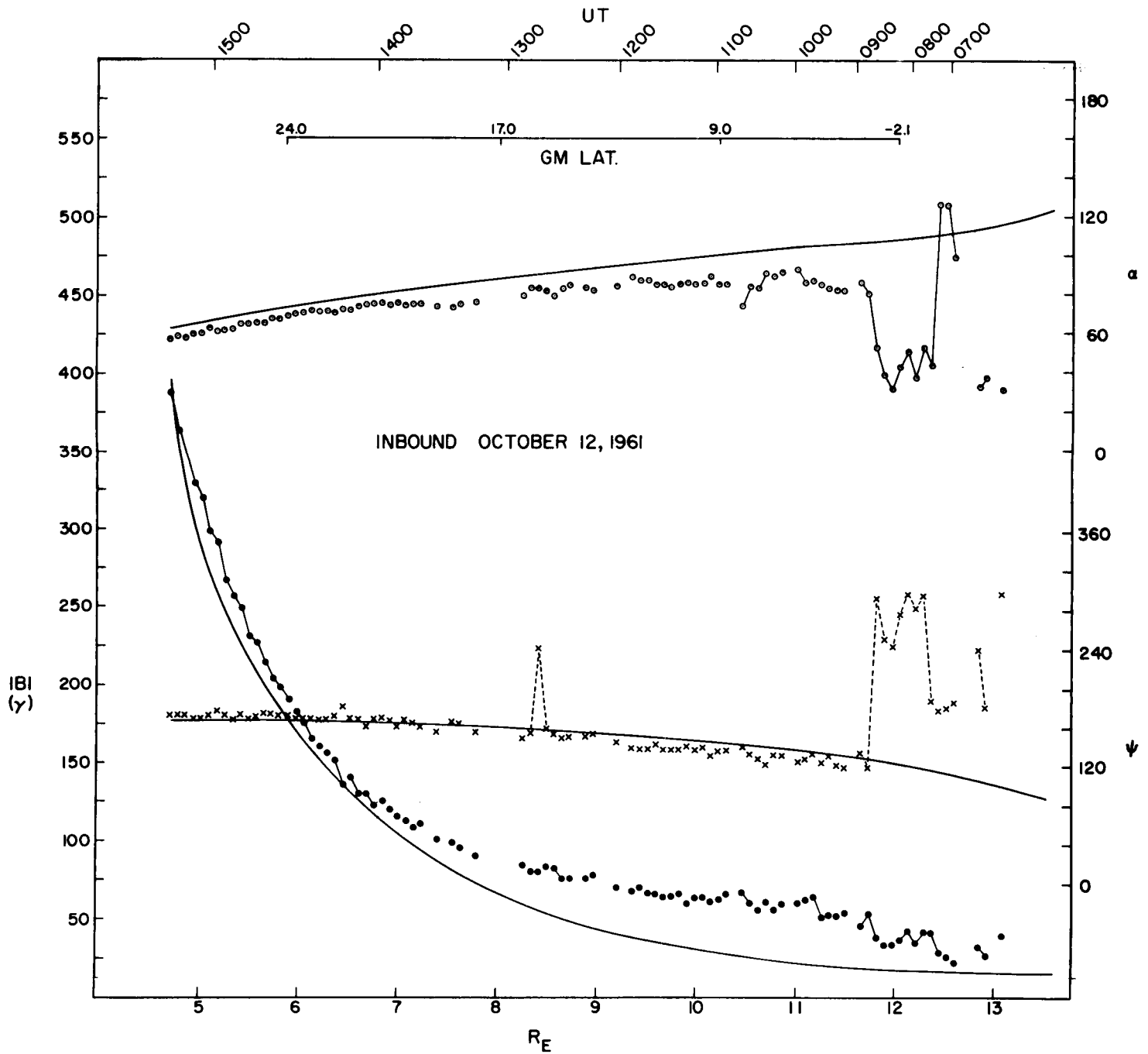

UT
0730
0700
0600
0500
0400
0300
0200
0100
2400
2300
2200
+8.5
+2.6
-2.9
-8.2
-13.5
-14.1
GM LAT.
180
120
60
0
α
INBOUND OCTOBER 8-9, 1961
350
300
250
200
150
100
50
|B|
(γ)
360
240
120
0
ψ
5
6
7
8
9
10
11
12
13
R_E

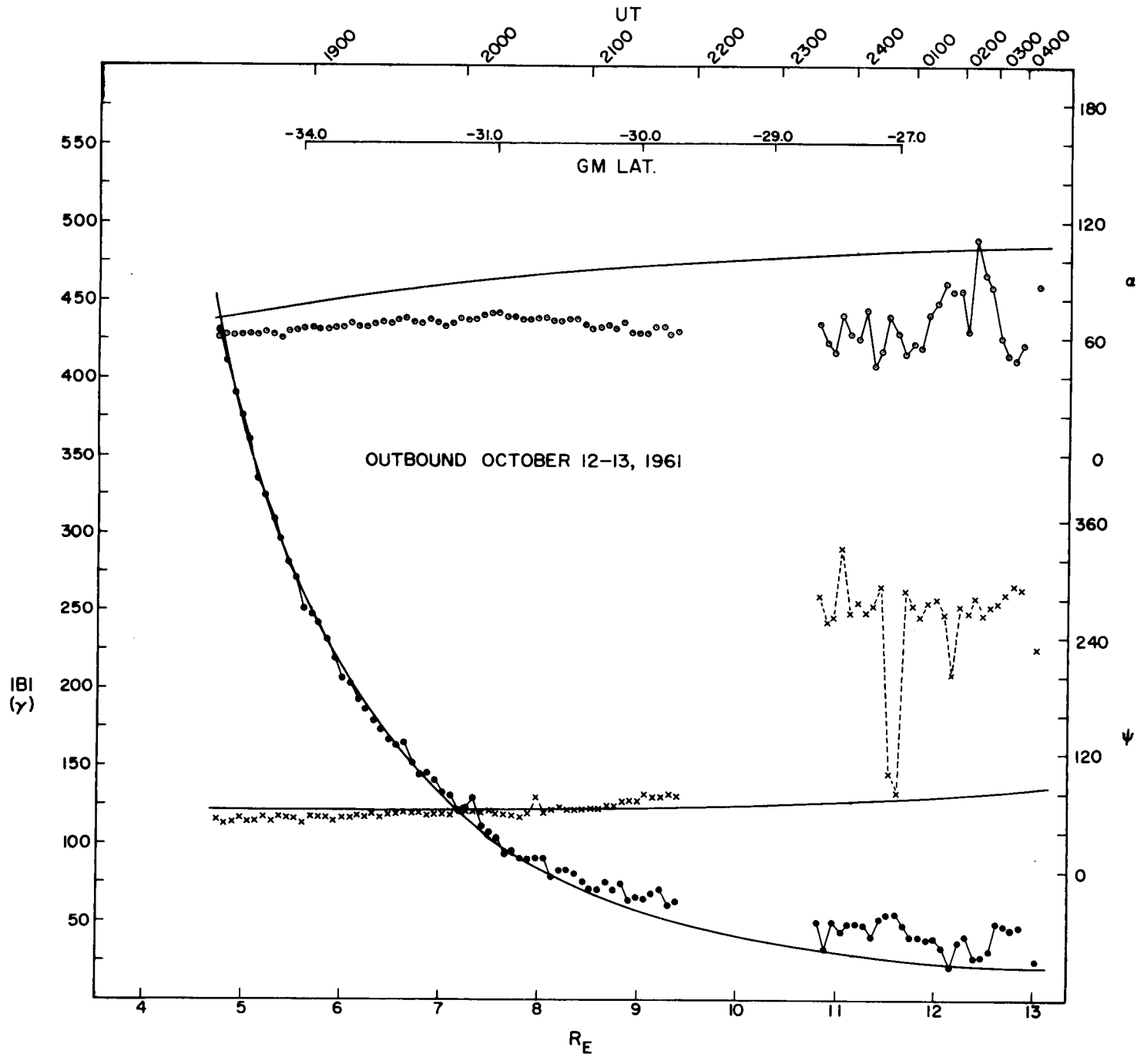

UT
1100
1200
1300
1400
1500
1600
1700
1800
-17.1
-15.0
-11.0
-9.5
-10.0
-11.4
GM LAT.
OUTBOUND OCTOBER 9, 1961
|B|
(γ)
550
500
450
400
350
300
250
200
150
100
50
180
120
60
0
360
240
120
0
α
ψ
4
5
6
7
8
9
10
11
12
13
R_E

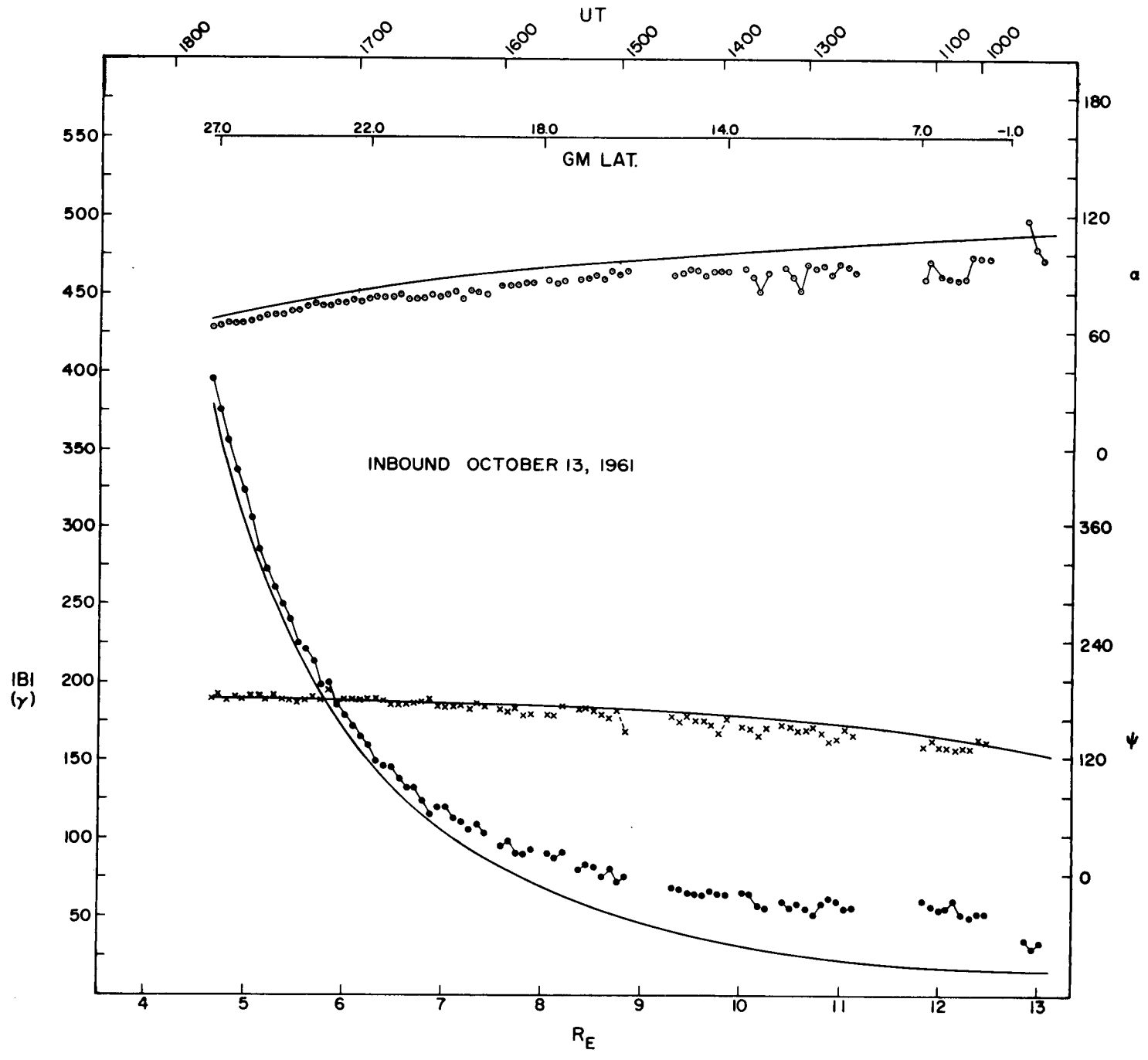

UT
1000
0900
0800
0700
0600
0500
0400
0300
0200
0100
-14.0
4.0
-2.0
-11.0
-17.0
GM LAT.
INBOUND OCTOBER 10, 1961
|B|
(γ)
550
500
450
400
350
300
250
200
150
100
50
180
120
60
0
360
240
120
0
α
ψ
4
5
6
7
8
9
10
11
12
13
R_E

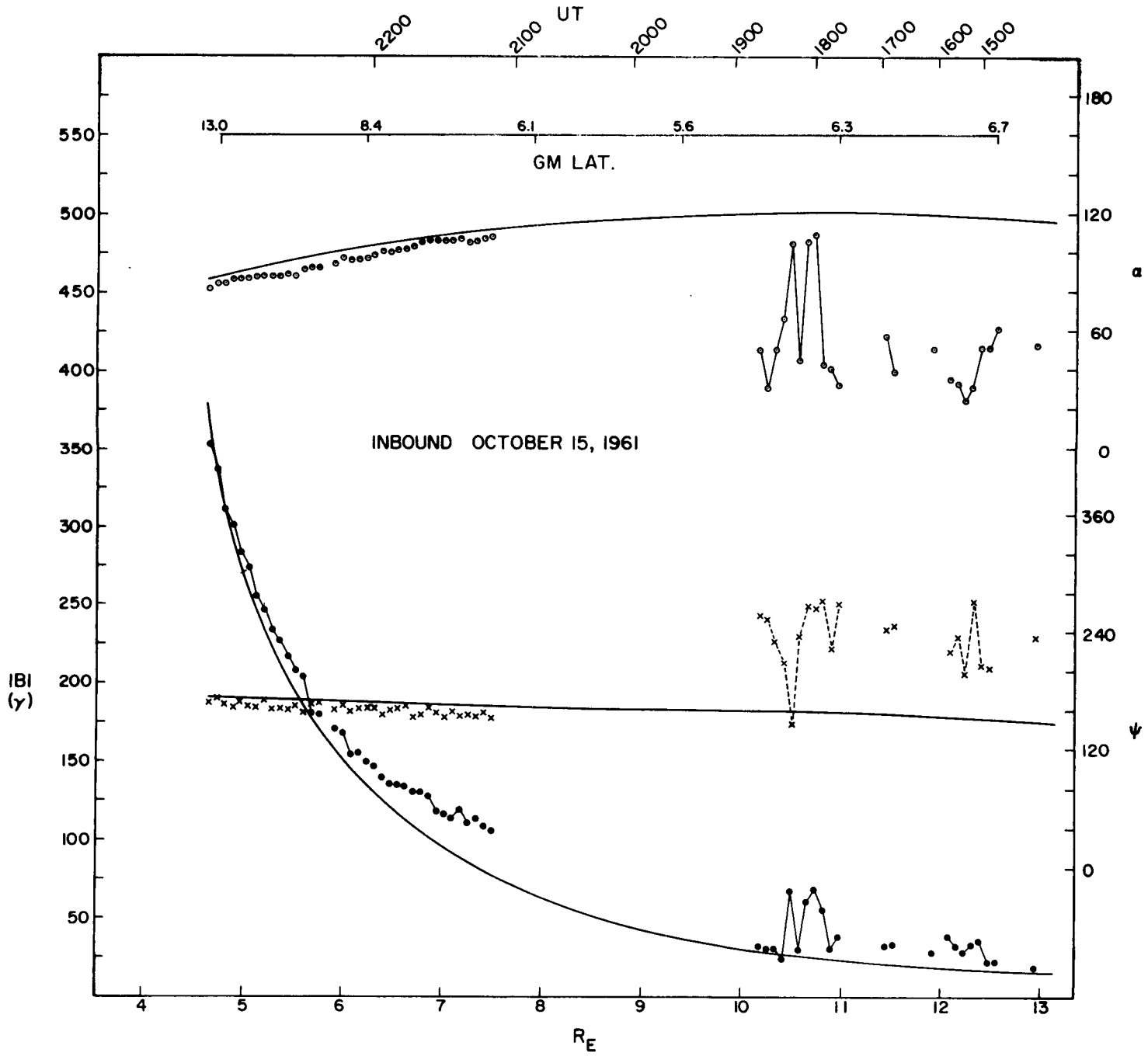

UT
1400
1500
1600
1700
1800
1900
2000
2100
-18.0
-16.0
-15.5
-16.0
-18.5
GM LAT.
OUTBOUND OCTOBER 10, 1961
|B|
(γ)
550
500
450
400
350
300
250
200
150
100
50
180
120
60
0
360
240
120
0
α
ψ
4
5
6
7
8
9
10
11
12
13
R_E

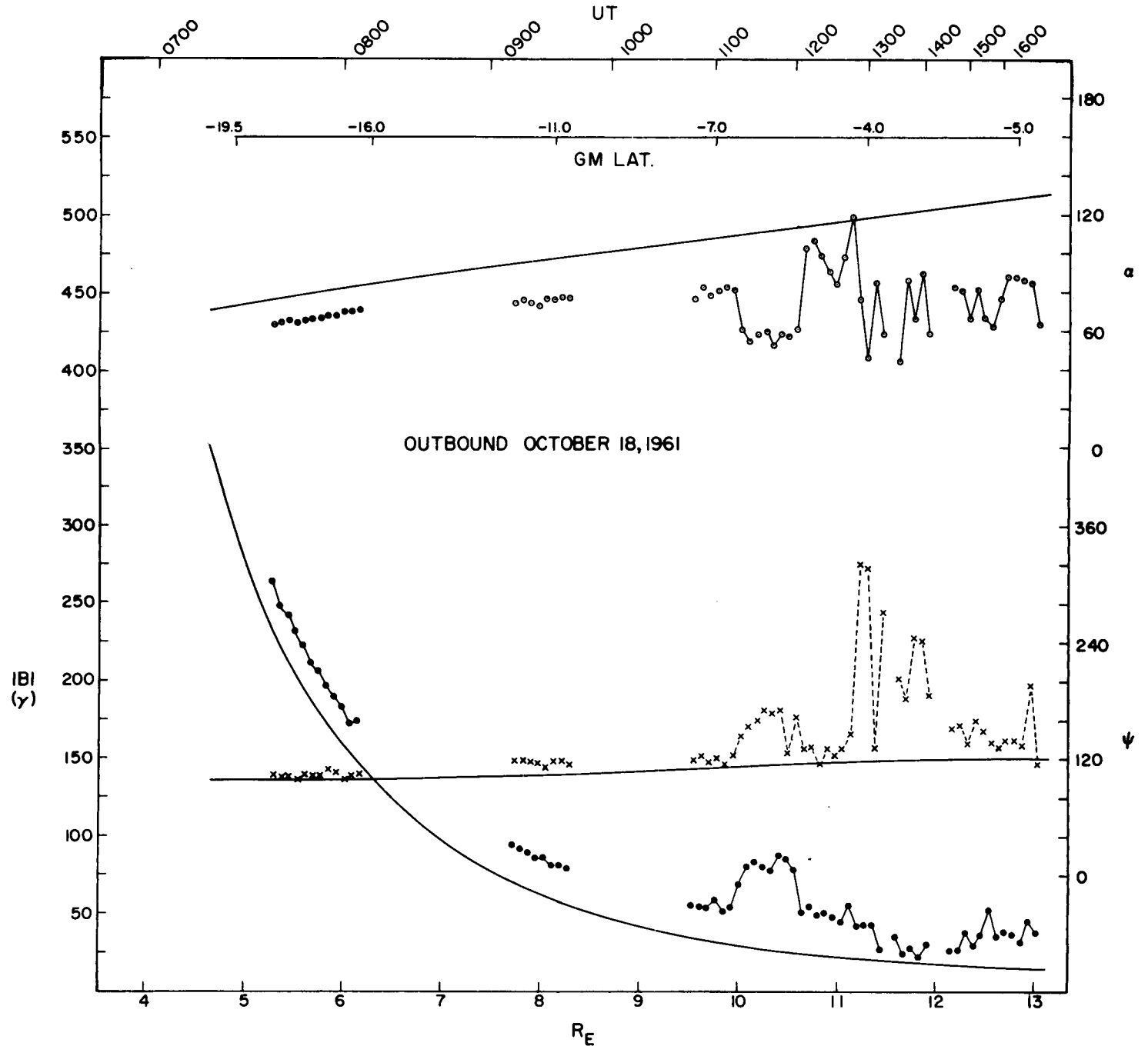

UT
1300
1200
1100
1000
0900
0800
0700
0600
0500
0400
0300
0200
20.0
12.0
3.0
8.0
GM LAT.
INBOUND OCTOBER 11, 1961
|B|
(γ)
550
500
450
400
350
300
250
200
150
100
50
180
120
60
0
360
240
120
0
α
ψ
4
5
6
7
8
9
10
11
12
13
R_E

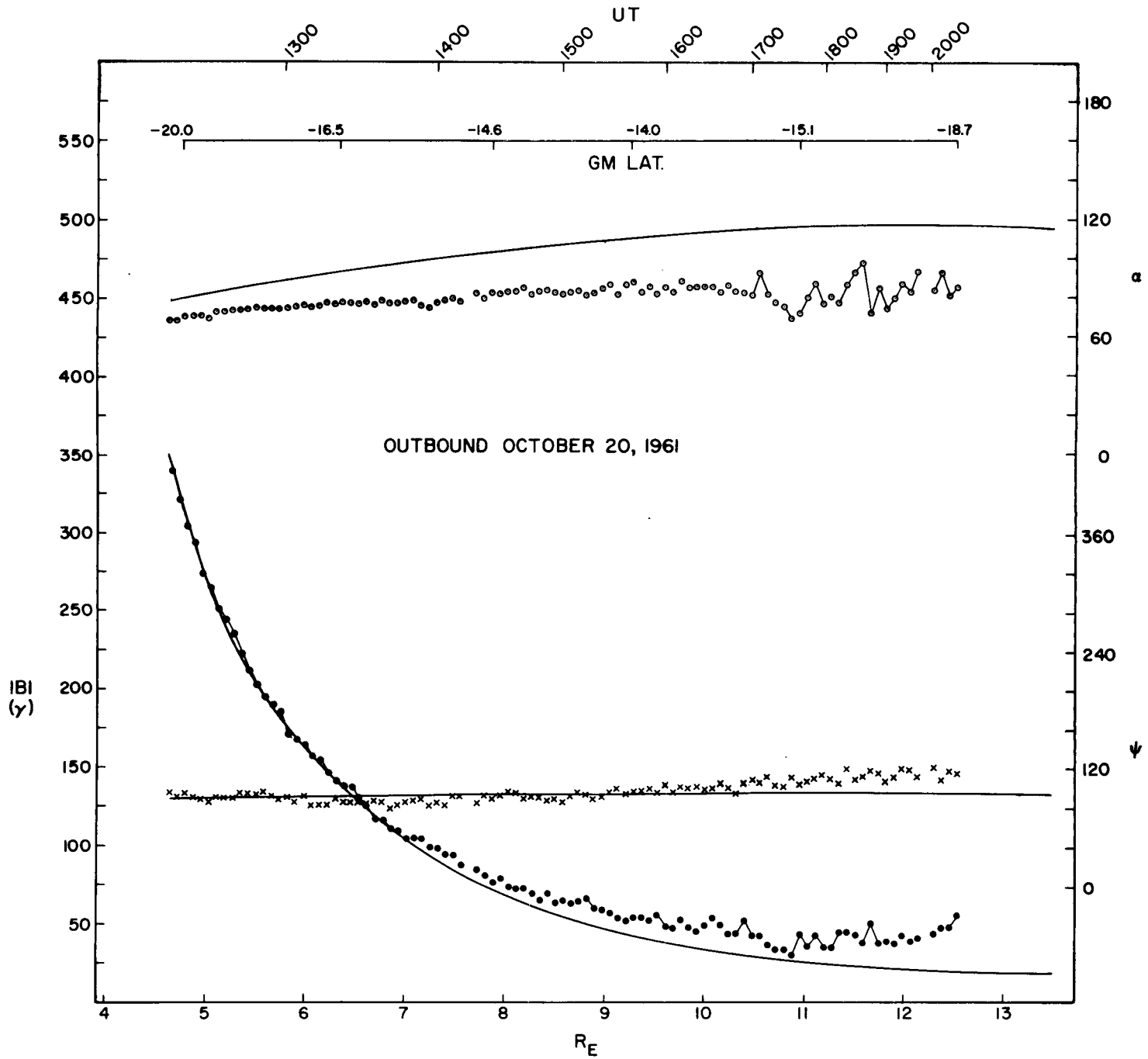

UT
1500
1400
1300
1200
1100
1000
0900
0800
0700
24.0
17.0
9.0
-2.1
GM LAT.
INBOUND OCTOBER 12, 1961
|B| (γ)
550
500
450
400
350
300
250
200
150
100
50
180
120
60
0
360
240
120
0
α
ψ
5
6
7
8
9
10
11
12
13
R_E

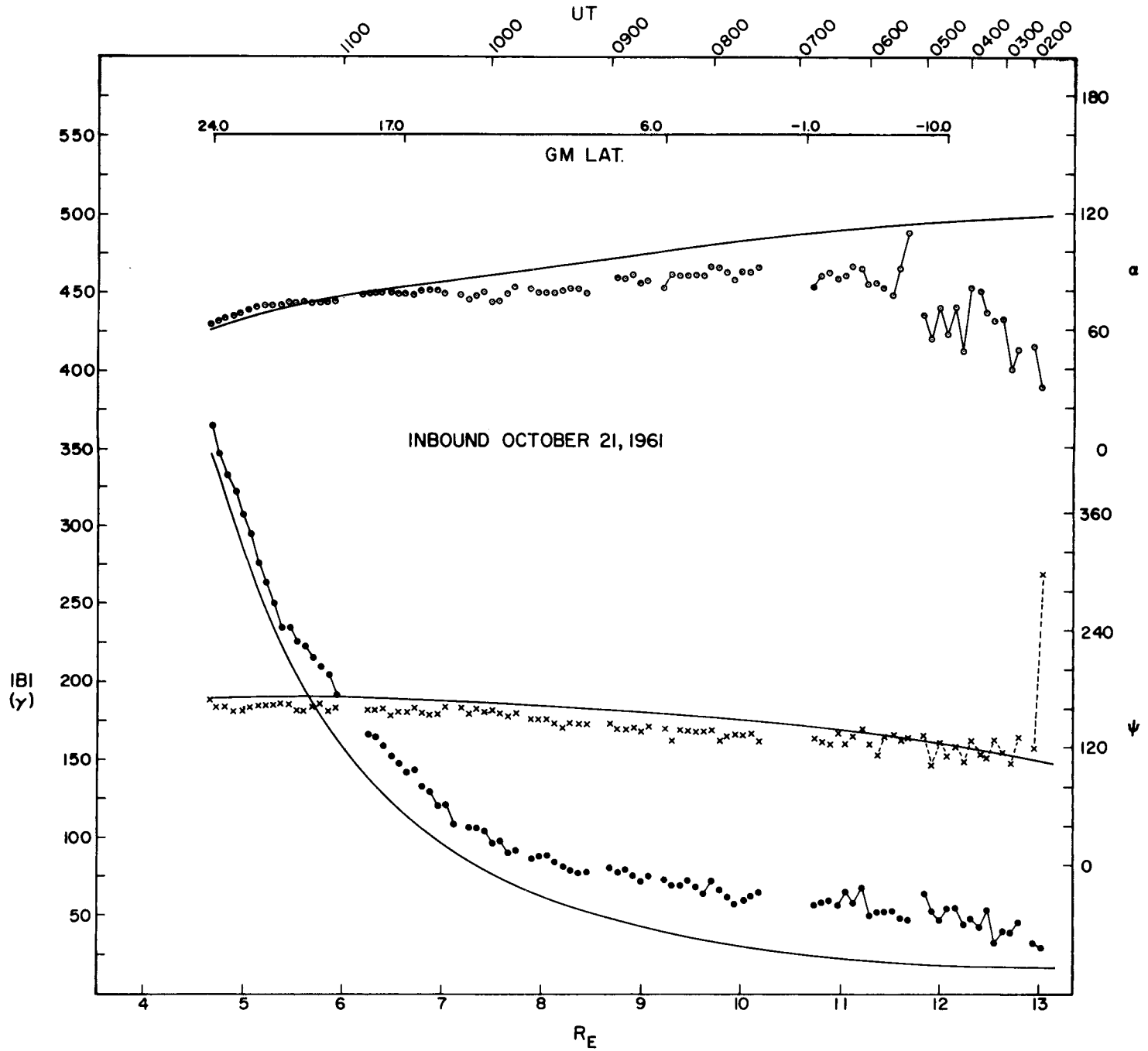

UT
1900
2000
2100
2200
2300
2400
0100
0200
0300
0400
-34.0
-31.0
-30.0
-29.0
-27.0
GM LAT.
OUTBOUND OCTOBER 12-13, 1961
|B|
(γ)
550
500
450
400
350
300
250
200
150
100
50
180
120
60
0
360
240
120
0
α
ψ
4
5
6
7
8
9
10
11
12
13
R_E

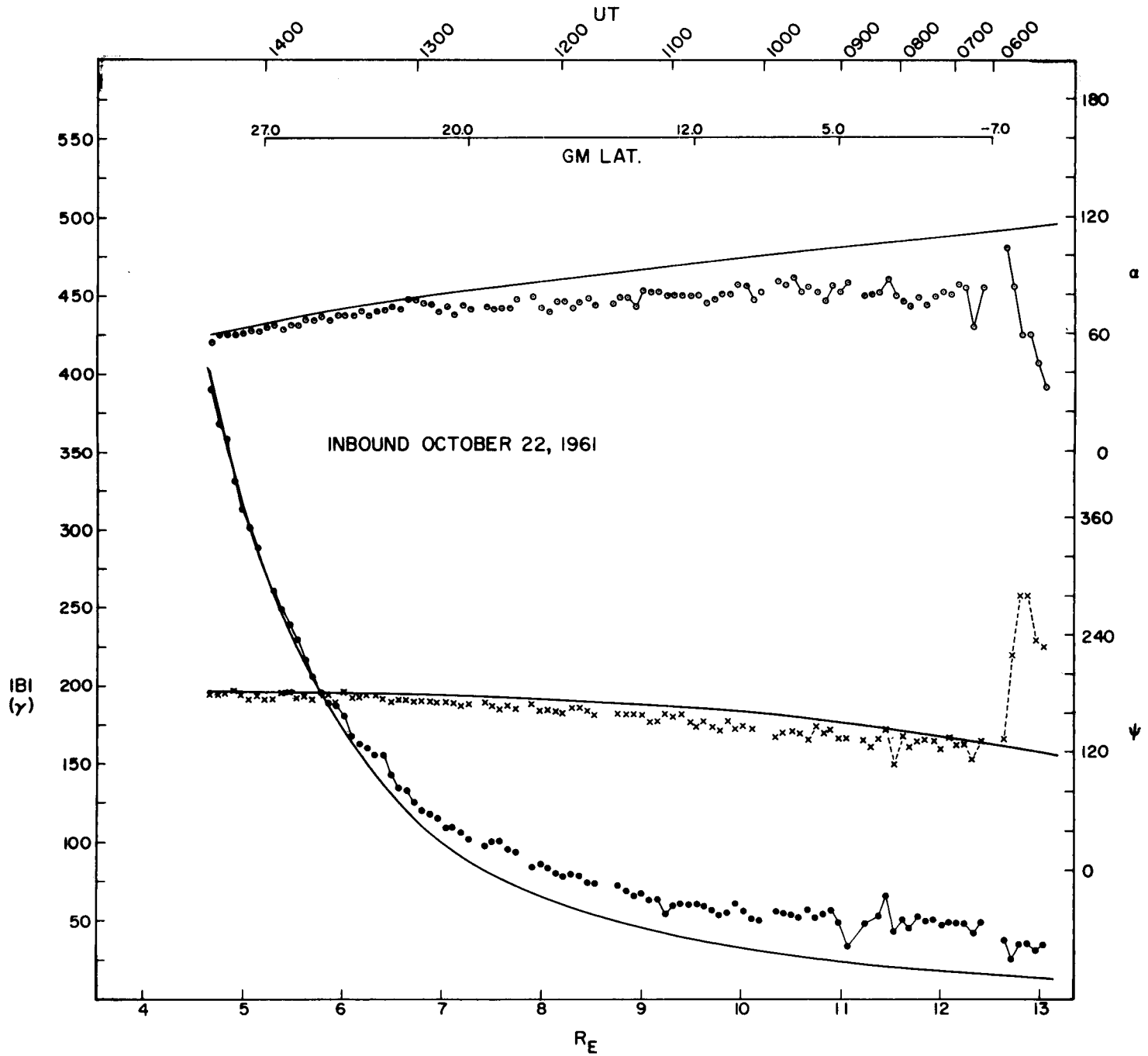

UT
1800
1700
1600
1500
1400
1300
1100
1000
27.0
22.0
18.0
14.0
7.0
-1.0
GM LAT.
INBOUND OCTOBER 13, 1961
|B|
(γ)
550
500
450
400
350
300
250
200
150
100
50
180
120
60
0
360
240
120
0
α
ψ
4
5
6
7
8
9
10
11
12
13
R_E

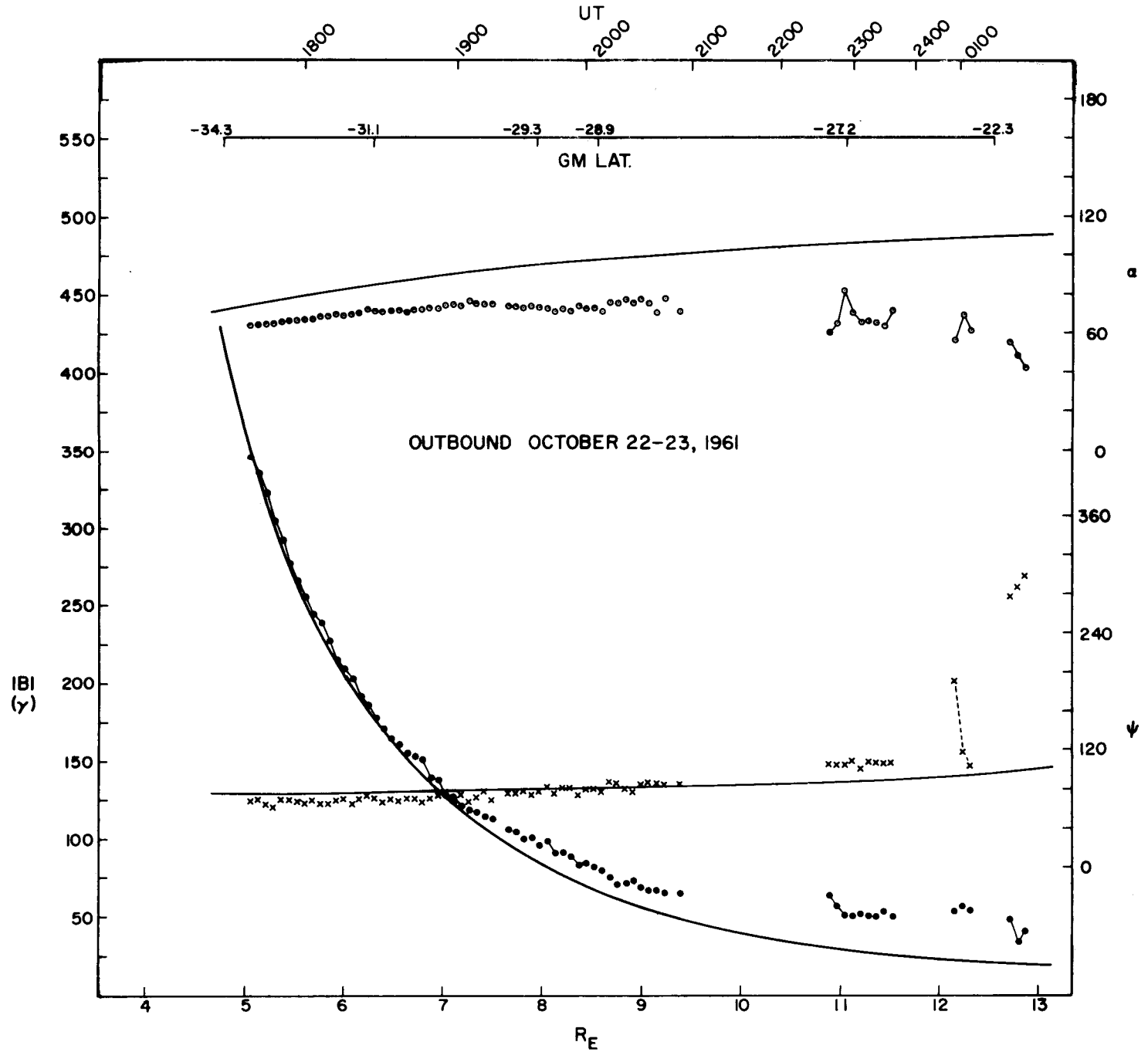

UT
2200
2100
2000
1900
1800
1700
1600
1500
13.0
8.4
6.1
5.6
6.3
6.7
GM LAT.
INBOUND OCTOBER 15, 1961
|B|
(γ)
550
500
450
400
350
300
250
200
150
100
50
180
120
60
0
360
240
120
0
α
ψ
4
5
6
7
8
9
10
11
12
13
R_E

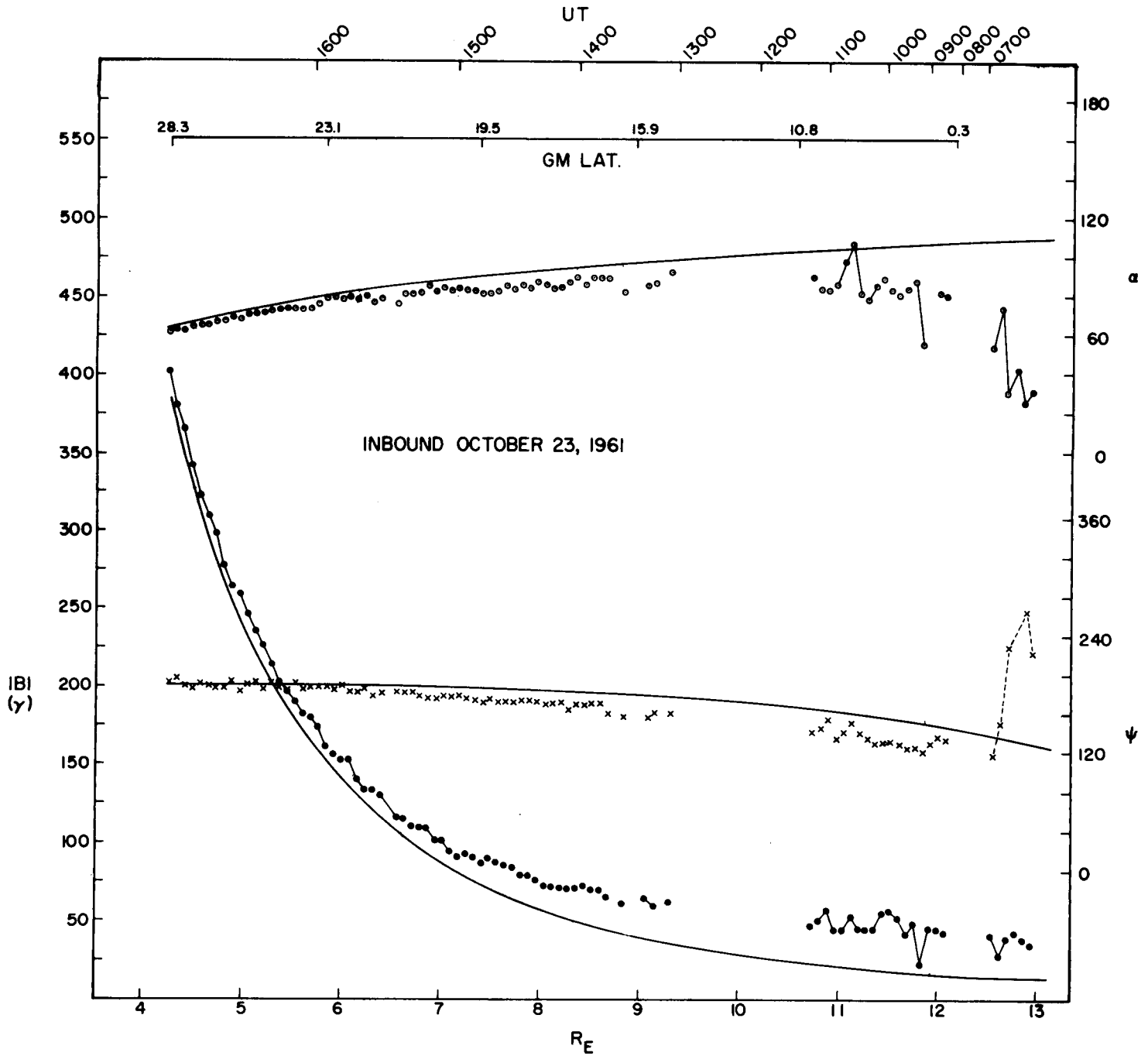

UT
0700
0800
0900
1000
1100
1200
1300
1400
1500
1600
-19.5
-16.0
-11.0
-7.0
-4.0
-5.0
GM LAT.
OUTBOUND OCTOBER 18, 1961
|B| (γ)
550
500
450
400
350
300
250
200
150
100
50
180
120
60
0
360
240
120
0
α
ψ
4
5
6
7
8
9
10
11
12
13
R_E

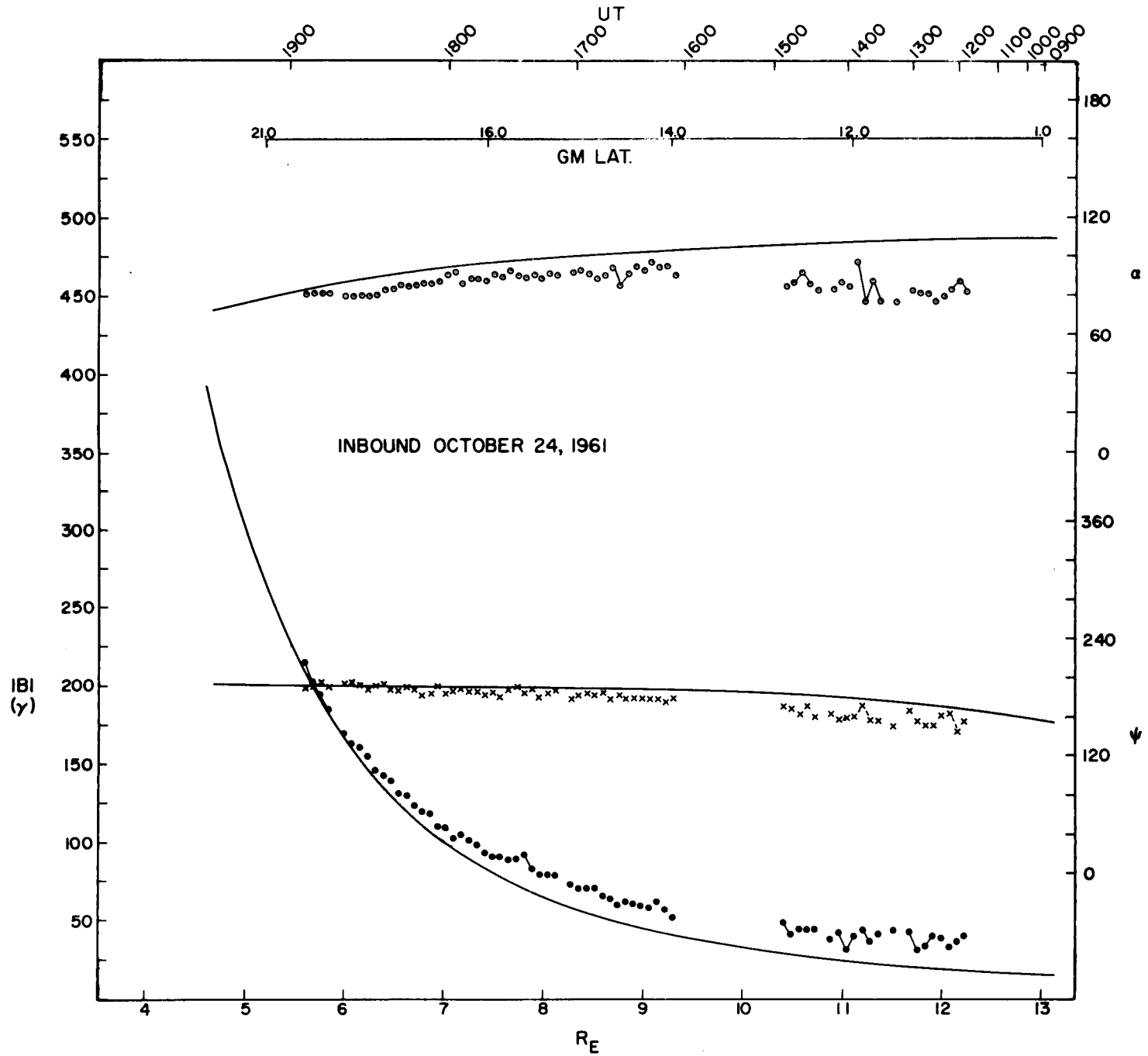

UT
1300
1400
1500
1600
1700
1800
1900
2000
-20.0
-16.5
-14.6
-14.0
-15.1
-18.7
GM LAT.
OUTBOUND OCTOBER 20, 1961
|B|
(γ)
550
500
450
400
350
300
250
200
150
100
50
180
120
60
0
360
240
120
0
α
ψ
4
5
6
7
8
9
10
11
12
13
R_E

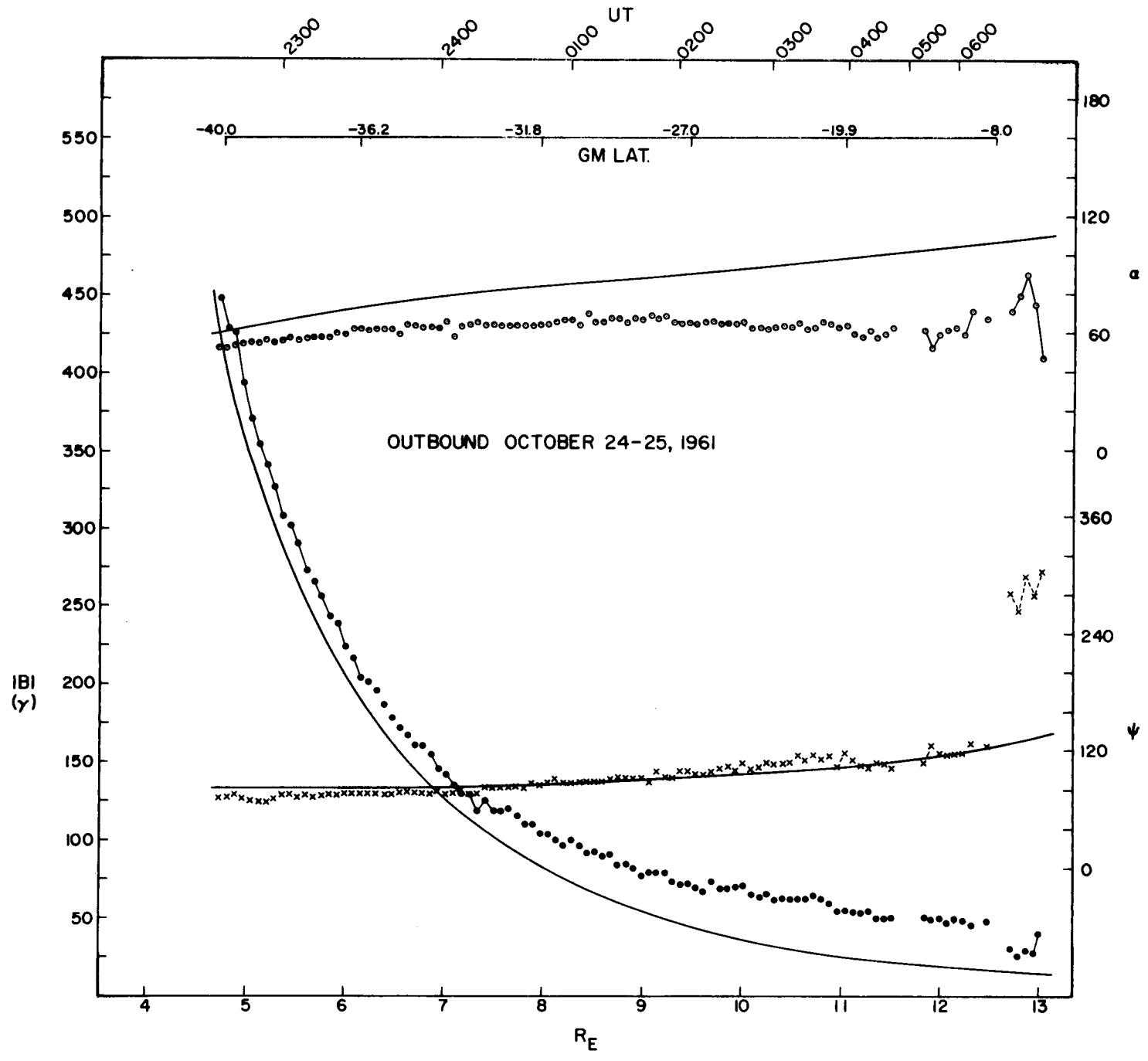

UT
1100
1000
0900
0800
0700
0600
0500
0400
0300
0200
24.0
17.0
6.0
-1.0
-10.0
GM LAT.
INBOUND OCTOBER 21, 1961
|B|
(γ)
550
500
450
400
350
300
250
200
150
100
50
180
120
60
0
360
240
120
0
α
ψ
4
5
6
7
8
9
10
11
12
13
R_E

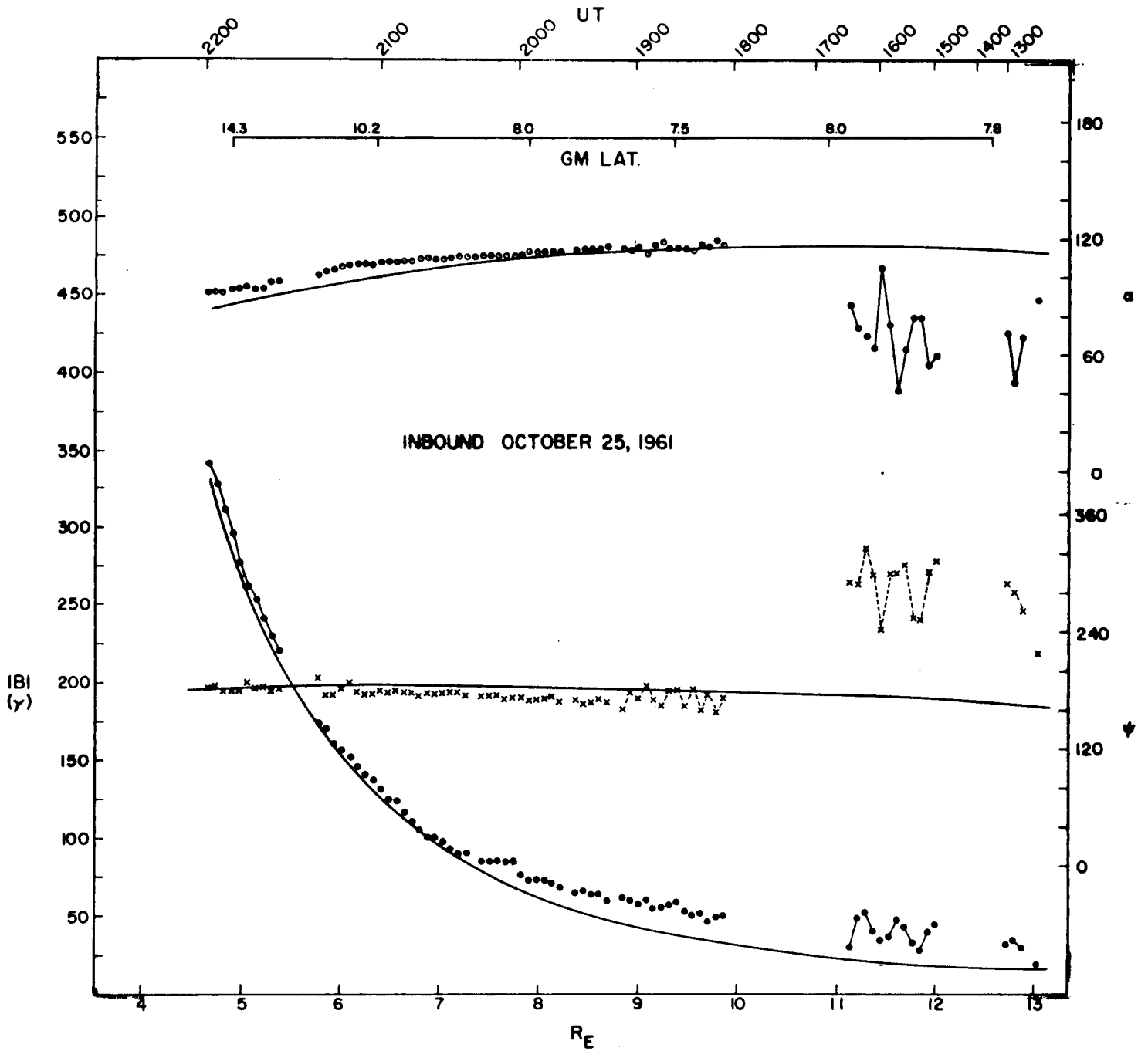

UT
1400
1300
1200
1100
1000
0900
0800
0700
0600
27.0
20.0
12.0
5.0
-7.0
GM LAT.
INBOUND OCTOBER 22, 1961
|B|
(γ)
550
500
450
400
350
300
250
200
150
100
50
180
120
60
0
360
240
120
0
α
ψ
4
5
6
7
8
9
10
11
12
13
R_E

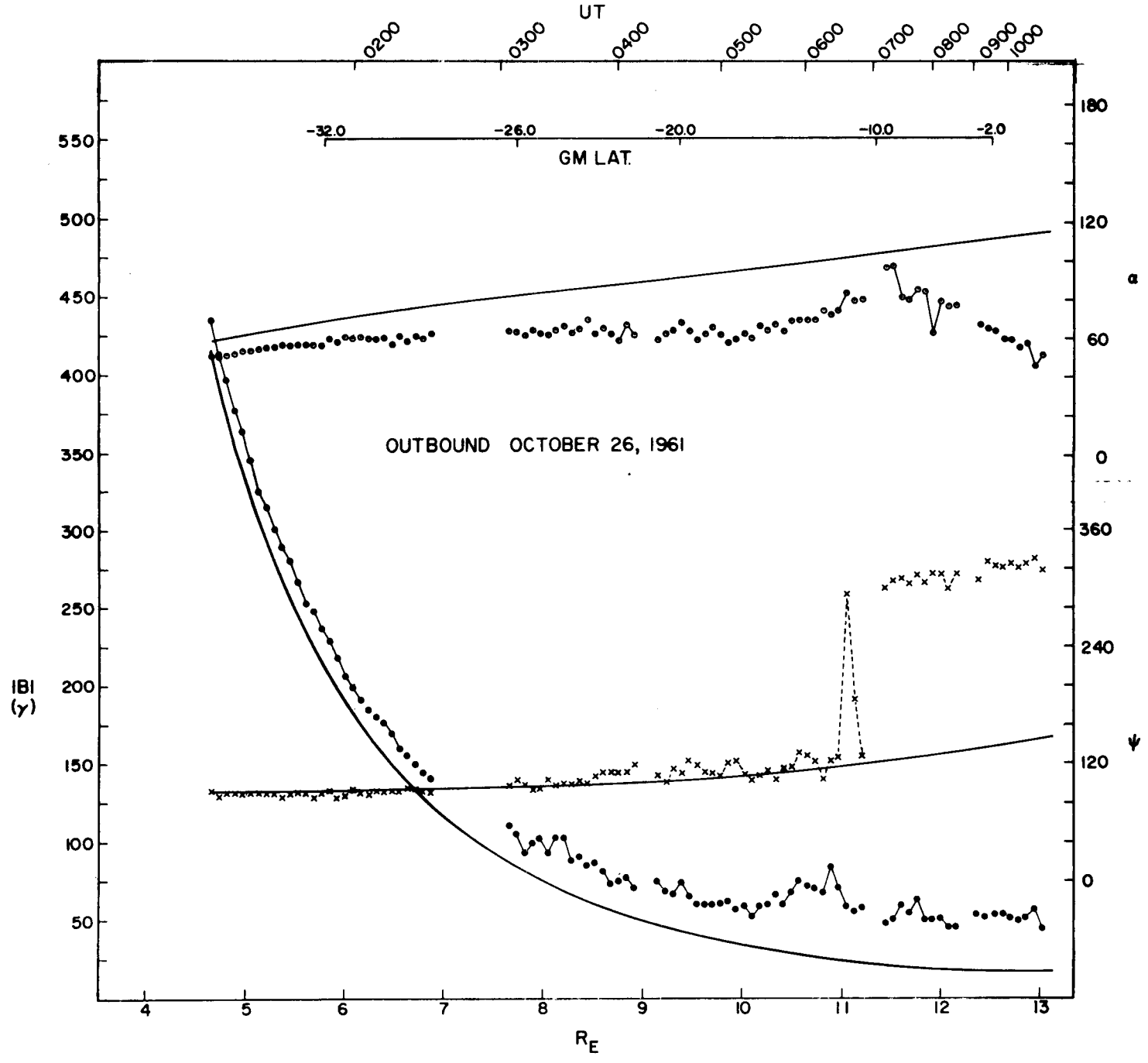

UT
1800
1900
2000
2100
2200
2300
2400
0100
-34.3
-31.1
-29.3
-28.9
-27.2
-22.3
GM LAT.
OUTBOUND OCTOBER 22-23, 1961
|B| (γ)
550
500
450
400
350
300
250
200
150
100
50
180
120
60
0
360
240
120
0
α
ψ
4
5
6
7
8
9
10
11
12
13
R_E

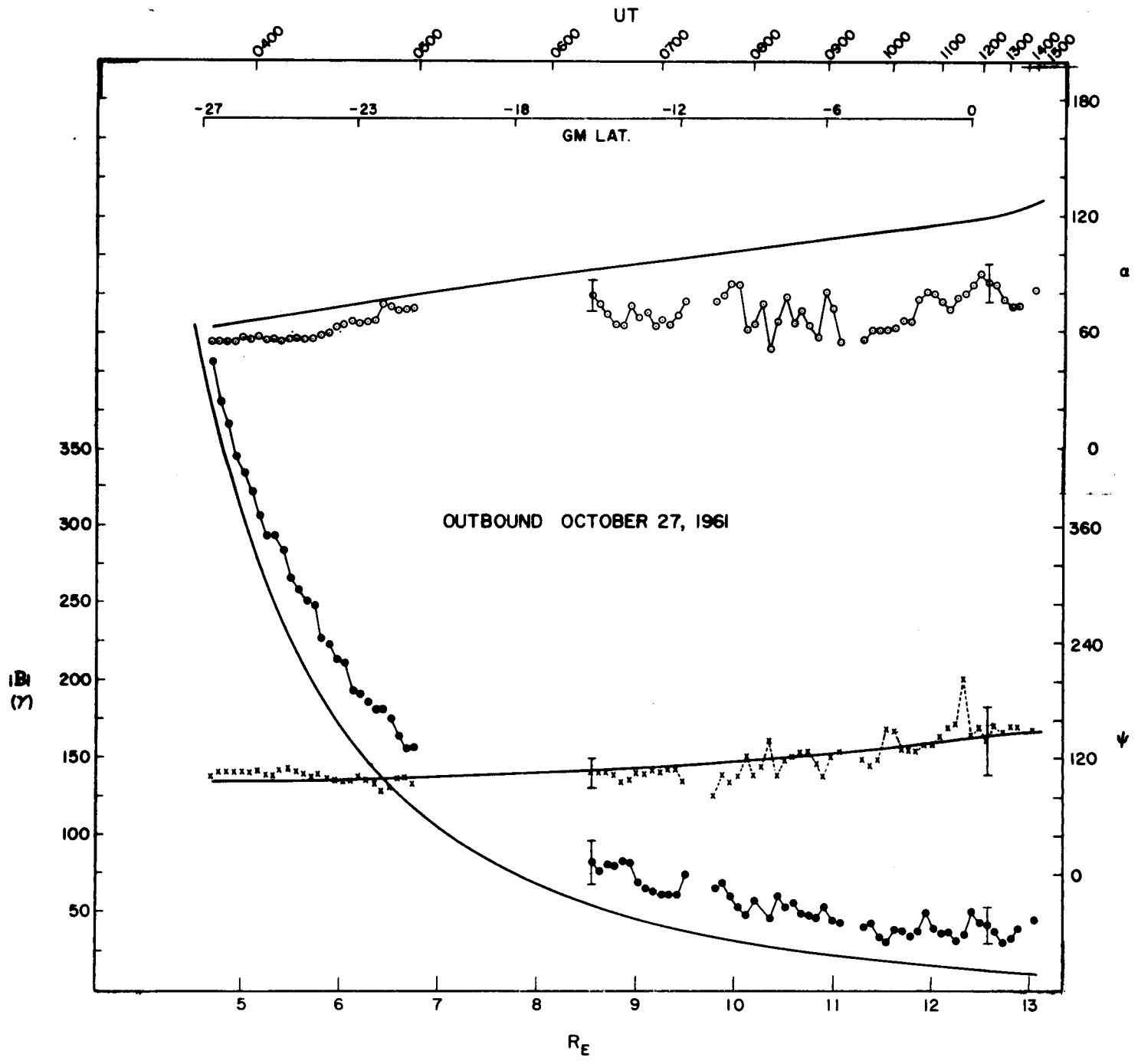

UT
1600
1500
1400
1300
1200
1100
1000
0900
0800
0700
28.3
23.1
19.5
15.9
10.8
0.3
GM LAT.
INBOUND OCTOBER 23, 1961
|B|
(γ)
550
500
450
400
350
300
250
200
150
100
50
180
120
60
0
360
240
120
0
α
ψ
4
5
6
7
8
9
10
11
12
13
R_E

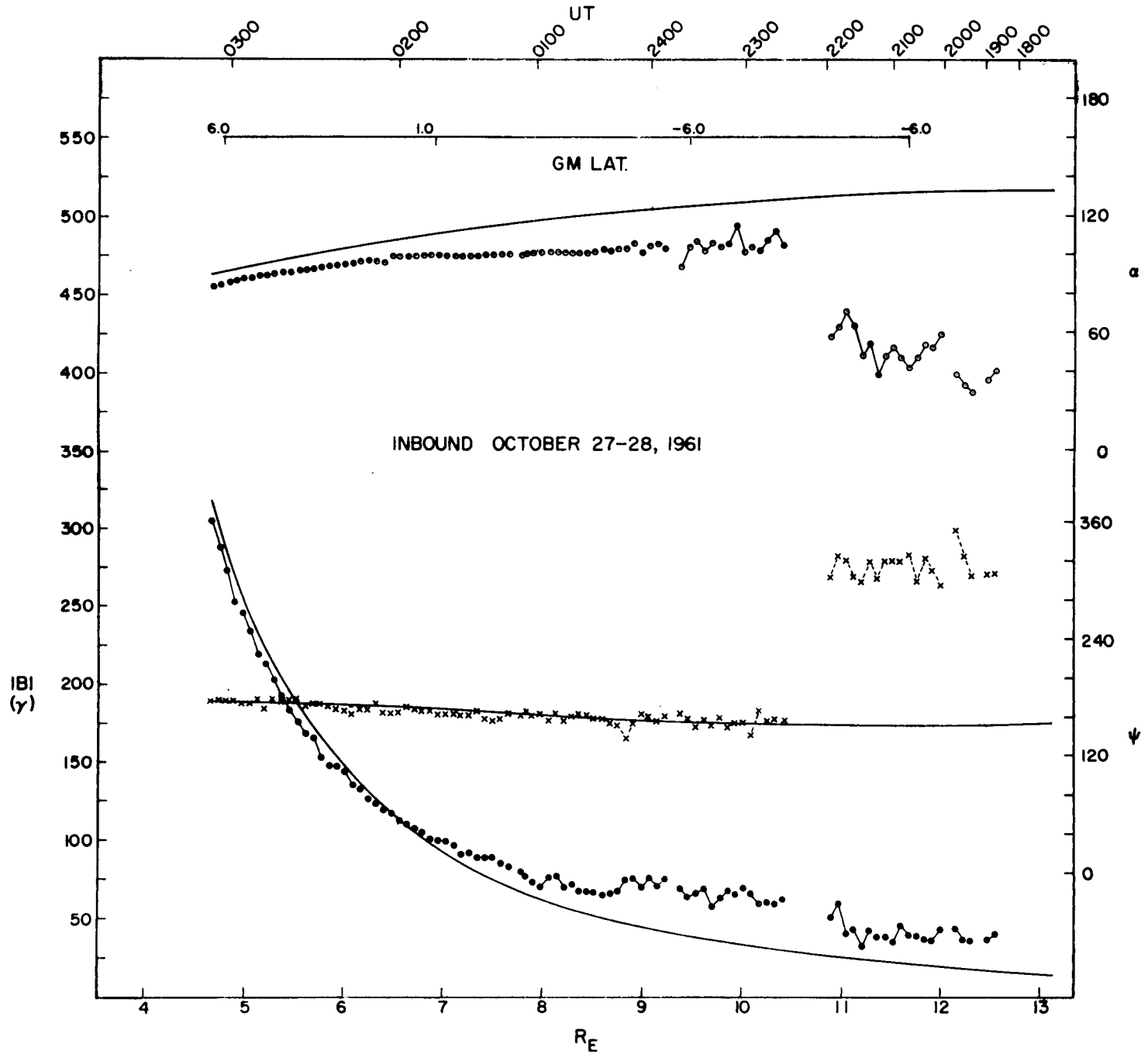

UT
1900
1800
1700
1600
1500
1400
1300
1200
1100
1000
0900
21.0
16.0
14.0
12.0
1.0
GM LAT.
INBOUND OCTOBER 24, 1961
|B|
(γ)
550
500
450
400
350
300
250
200
150
100
50
180
120
60
0
360
240
120
0
α
ψ
4
5
6
7
8
9
10
11
12
13
R_E

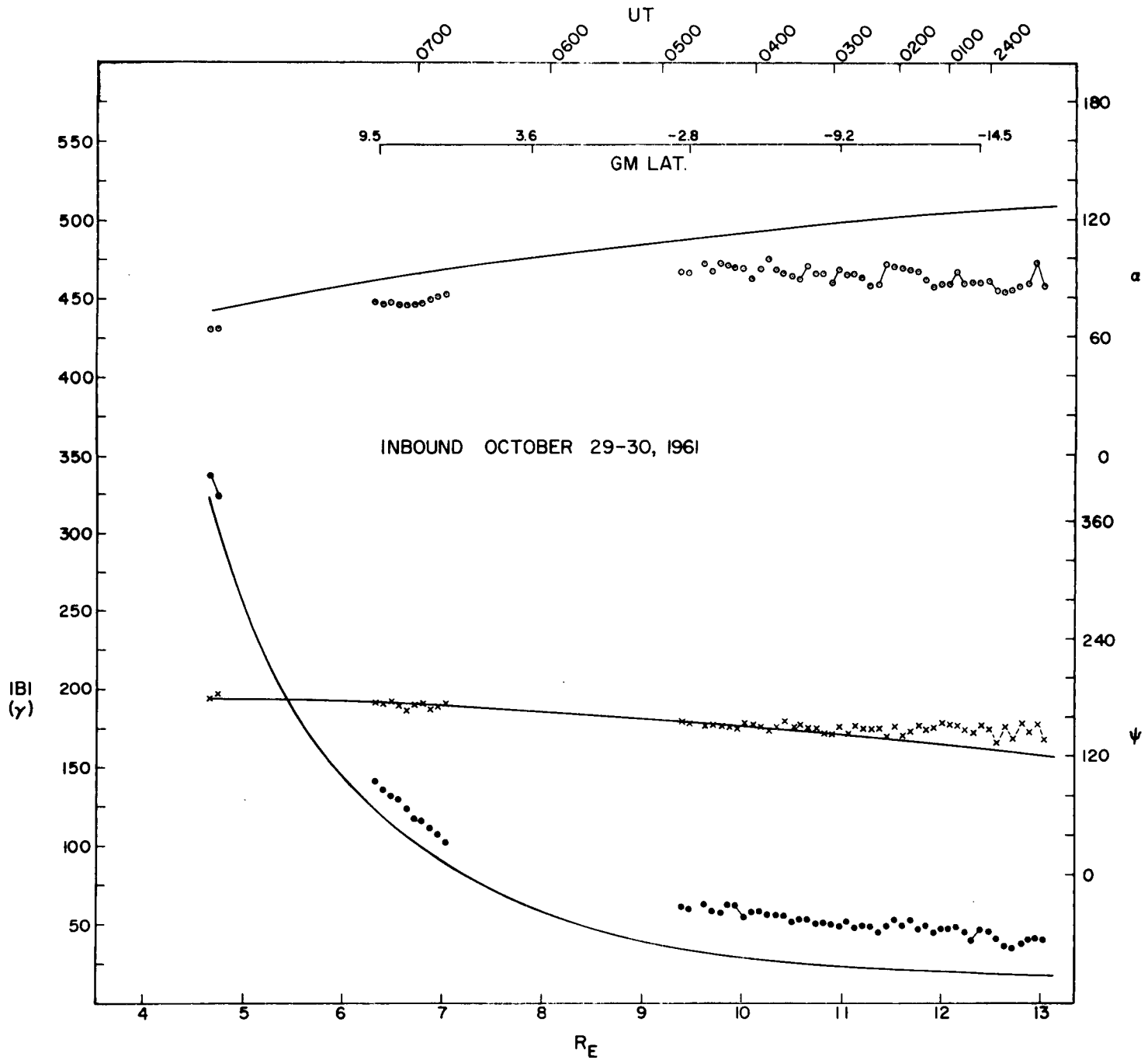

UT
2300
2400
0100
0200
0300
0400
0500
0600
-40.0
-36.2
-31.8
-27.0
-19.9
-8.0
GM LAT.
OUTBOUND OCTOBER 24-25, 1961
|B|
(γ)
550
500
450
400
350
300
250
200
150
100
50
180
120
60
0
360
240
120
0
α
ψ
4
5
6
7
8
9
10
11
12
13
R_E

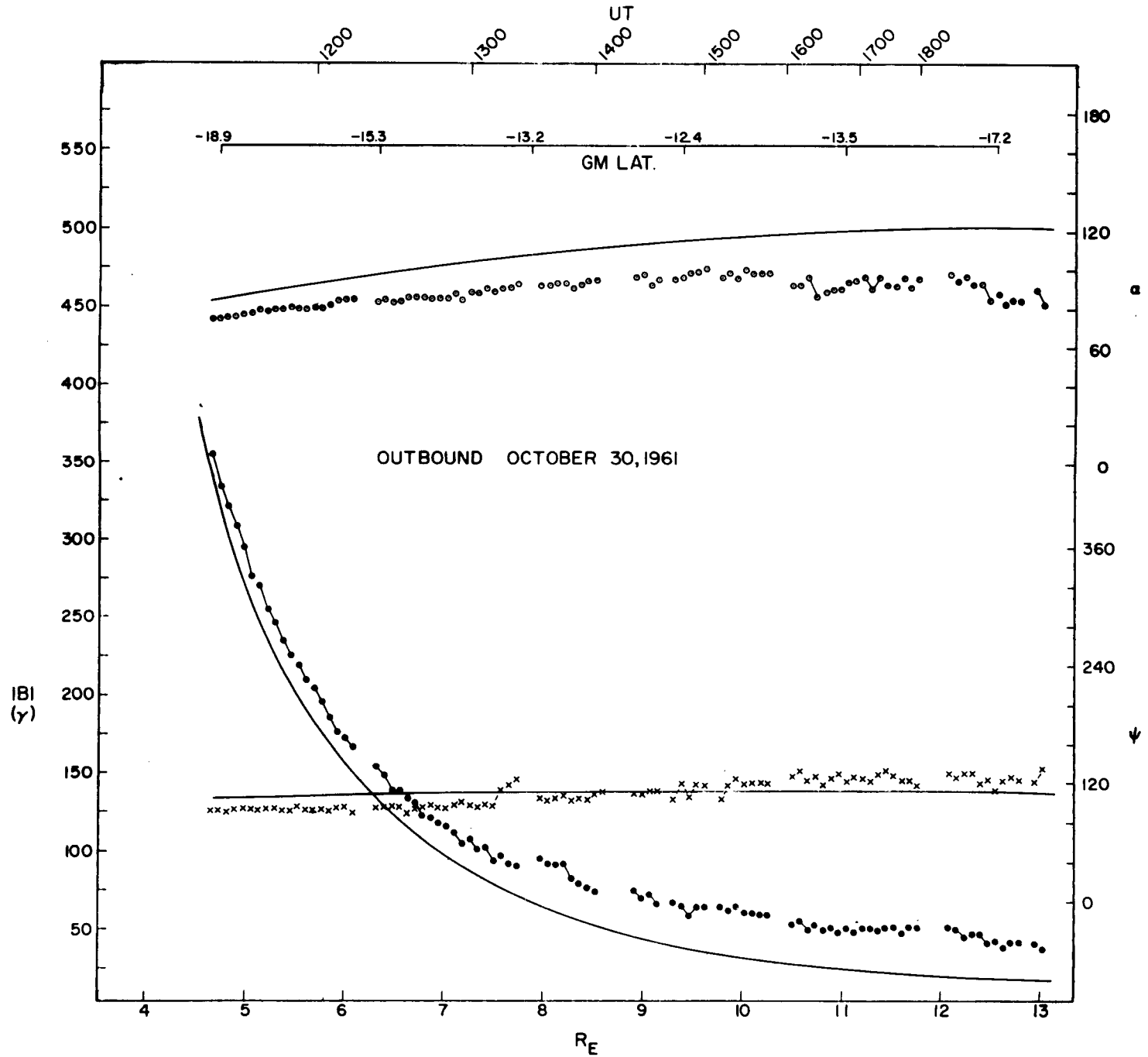

UT
2200
2100
2000
1900
1800
1700
1600
1500
1400
1300
14.3
10.2
8.0
7.5
8.0
7.8
GM LAT.
INBOUND OCTOBER 25, 1961
|B|
(γ)
550
500
450
400
350
300
250
200
150
100
50
180
120
60
0
360
240
120
0
α
ψ
4
5
6
7
8
9
10
11
12
15
R_E

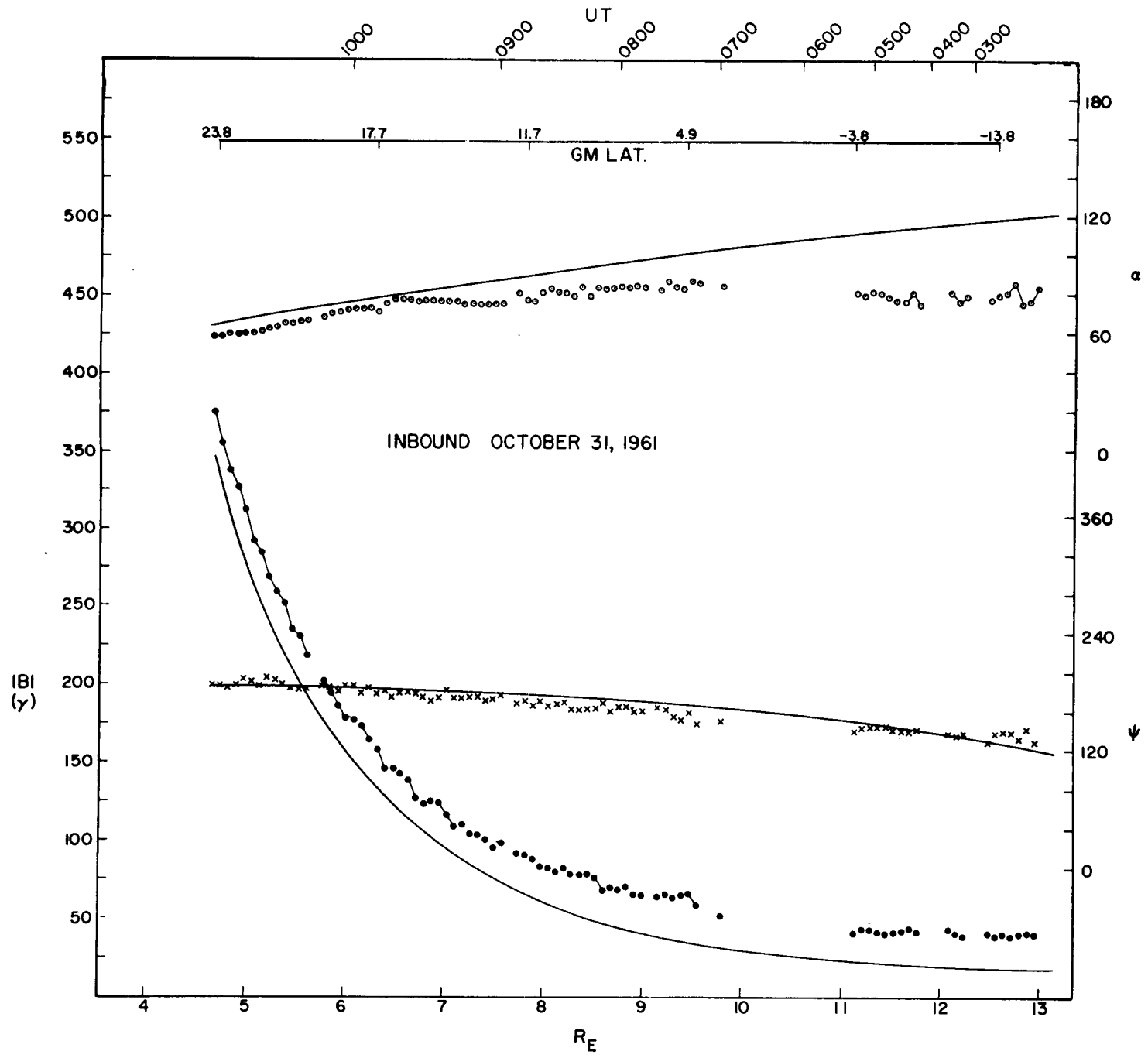

UT
0200
0300
0400
0500
0600
0700
0800
0900
1000
-32.0
-26.0
-20.0
-10.0
-2.0
GM LAT.
OUTBOUND OCTOBER 26, 1961
|B|
(γ)
550
500
450
400
350
300
250
200
150
100
50
180
120
60
0
360
240
120
0
α
ψ
4
5
6
7
8
9
10
11
12
13
R_E

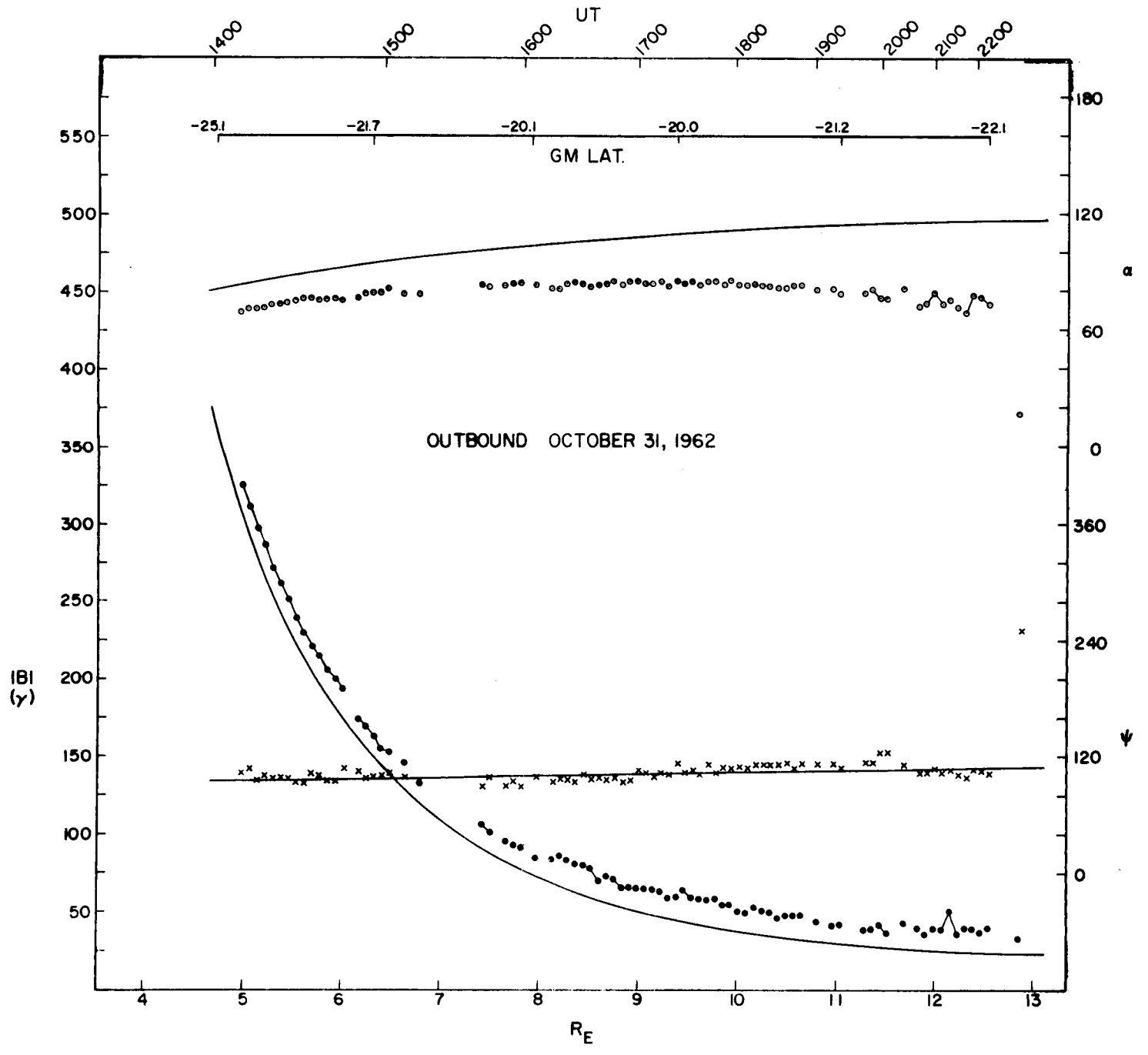

UT
0400
0500
0600
0700
0800
0900
1000
1100
1200
1300
1400
1500
-27
-23
-18
-12
-6
0
GM LAT.
180
120
60
0
α
OUTBOUND OCTOBER 27, 1961
350
300
250
200
150
100
50
|B|
(γ)
360
240
120
0
ψ
5
6
7
8
9
10
11
12
13
R_E

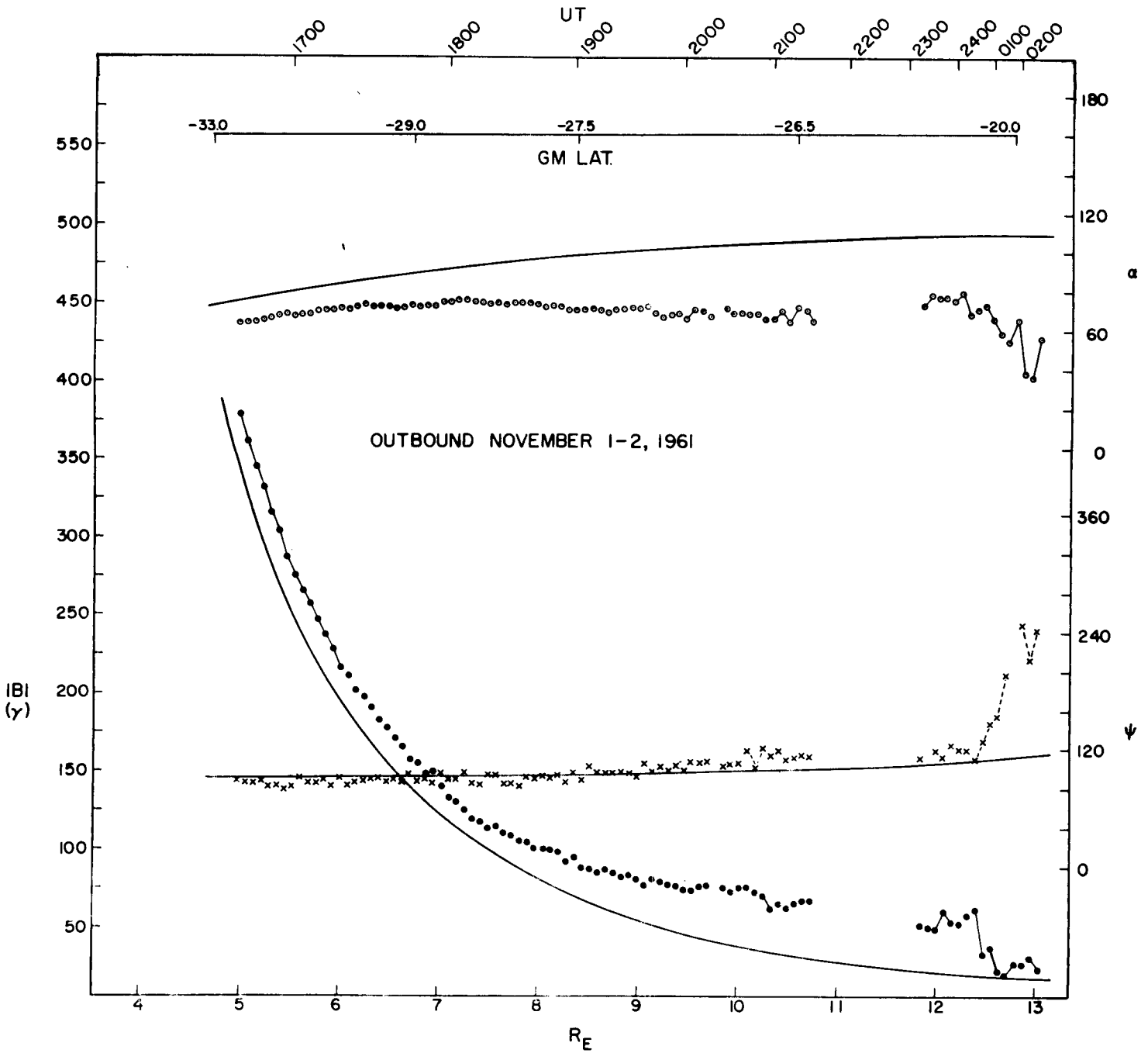

UT
0300
0200
0100
2400
2300
2200
2100
2000
1900
1800
6.0
1.0
-6.0
-6.0
GM LAT.
INBOUND OCTOBER 27-28, 1961
IBI
(γ)
550
500
450
400
350
300
250
200
150
100
50
180
120
60
0
360
240
120
0
α
ψ
4
5
6
7
8
9
10
11
12
13
R_E

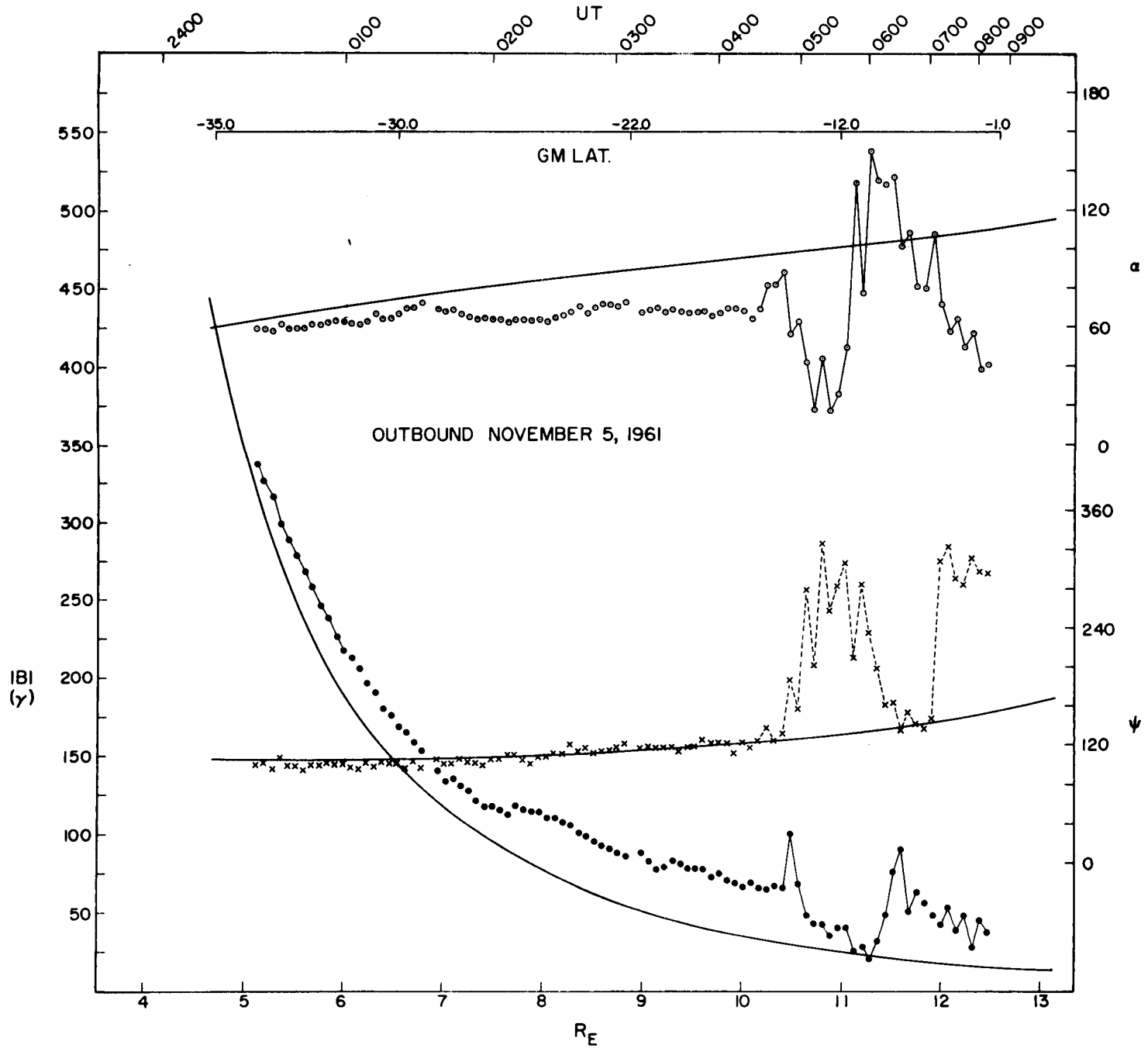

UT
0700
0600
0500
0400
0300
0200
0100
2400
9.5
3.6
-2.8
-9.2
-14.5
GM LAT.
INBOUND OCTOBER 29-30, 1961
|B|
(γ)
550
500
450
400
350
300
250
200
150
100
50
180
120
60
0
360
240
120
0
α
ψ
4
5
6
7
8
9
10
11
12
13
R_E

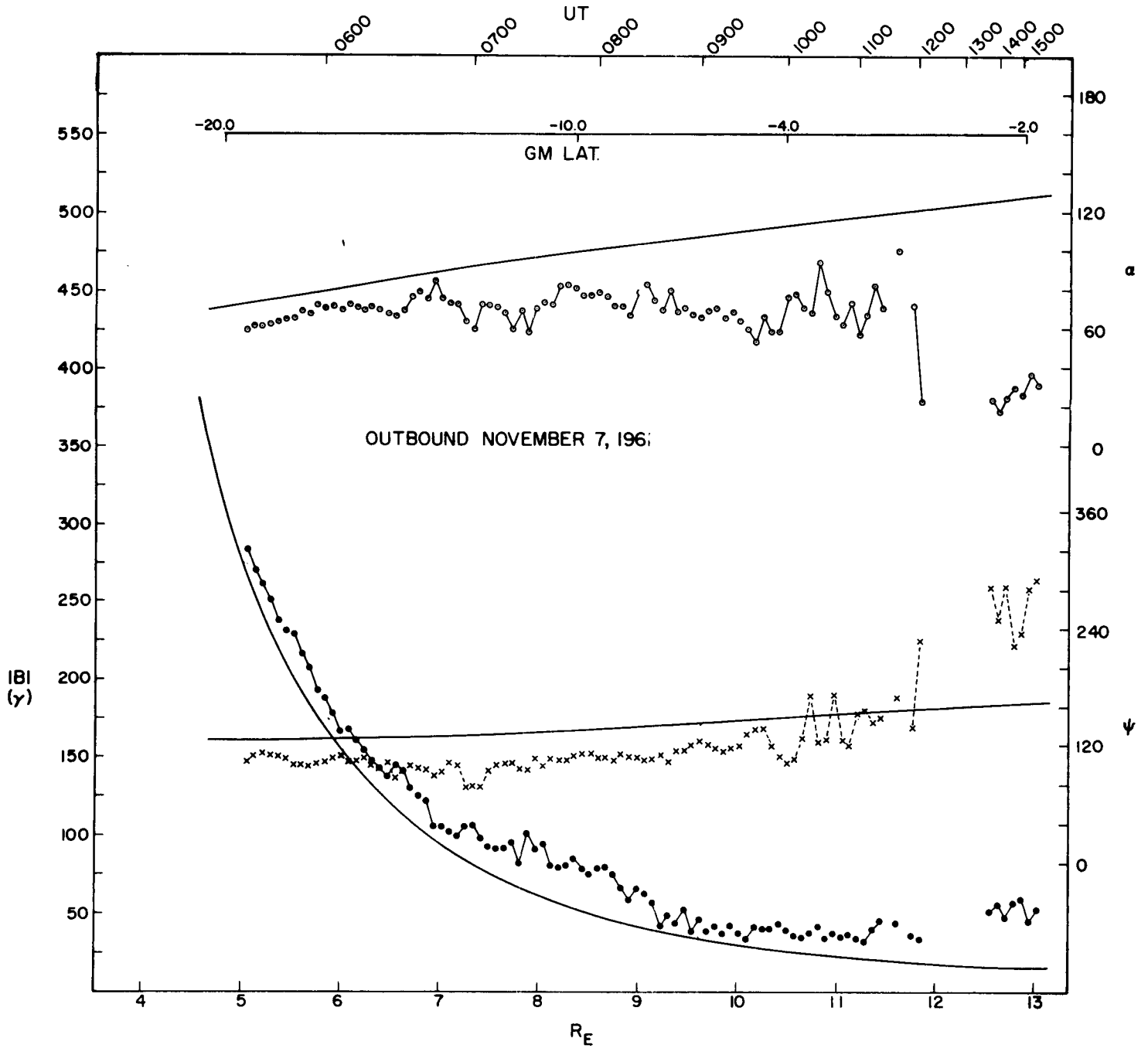

UT
1200
1300
1400
1500
1600
1700
1800
-18.9
-15.3
-13.2
-12.4
-13.5
-17.2
GM LAT.
OUTBOUND OCTOBER 30, 1961
|B| (γ)
550
500
450
400
350
300
250
200
150
100
50
180
120
60
0
360
240
120
0
α
ψ
4
5
6
7
8
9
10
11
12
13
R_E

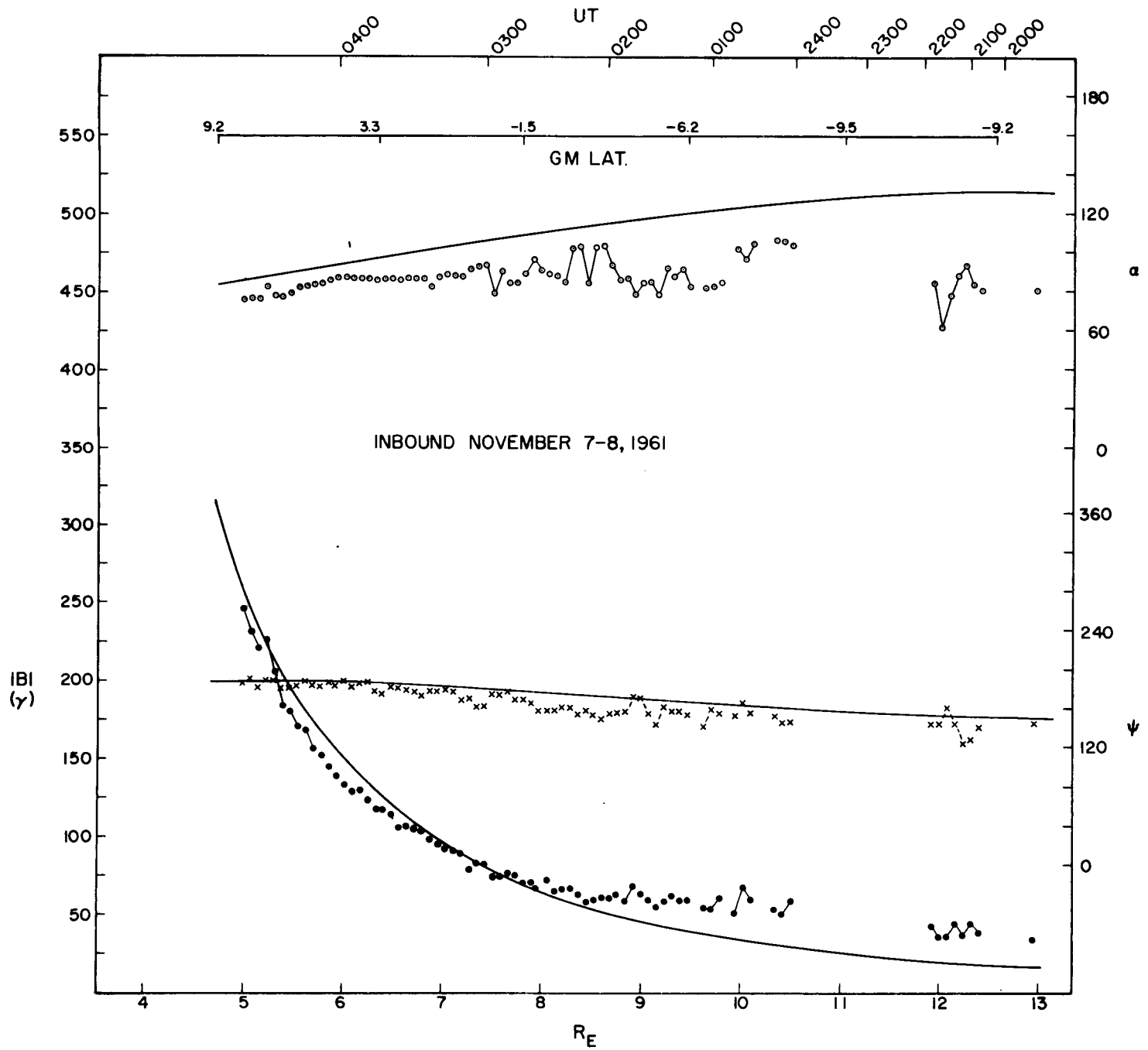

UT
1000
0900
0800
0700
0600
0500
0400
0300
23.8
17.7
11.7
4.9
-3.8
-13.8
GM LAT.
INBOUND OCTOBER 31, 1961
|B|
(γ)
550
500
450
400
350
300
250
200
150
100
50
180
120
60
0
360
240
120
0
α
ψ
4
5
6
7
8
9
10
11
12
13
R_E

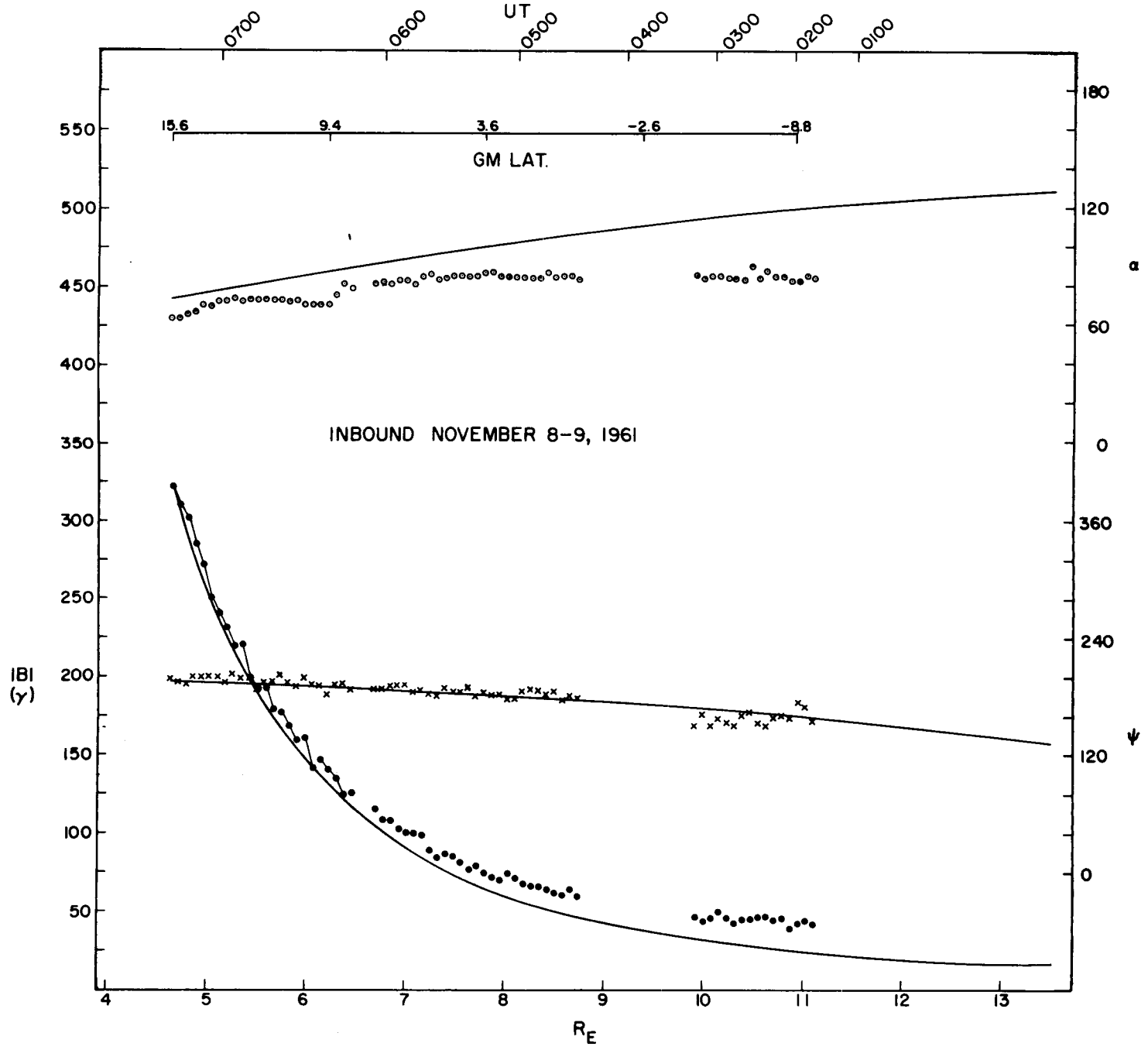

UT
1400
1500
1600
1700
1800
1900
2000
2100
2200
-25.1
-21.7
-20.1
-20.0
-21.2
-22.1
GM LAT.
OUTBOUND OCTOBER 31, 1962
|B|
(γ)
550
500
450
400
350
300
250
200
150
100
50
180
120
60
0
360
240
120
0
α
ψ
4
5
6
7
8
9
10
11
12
13
R_E

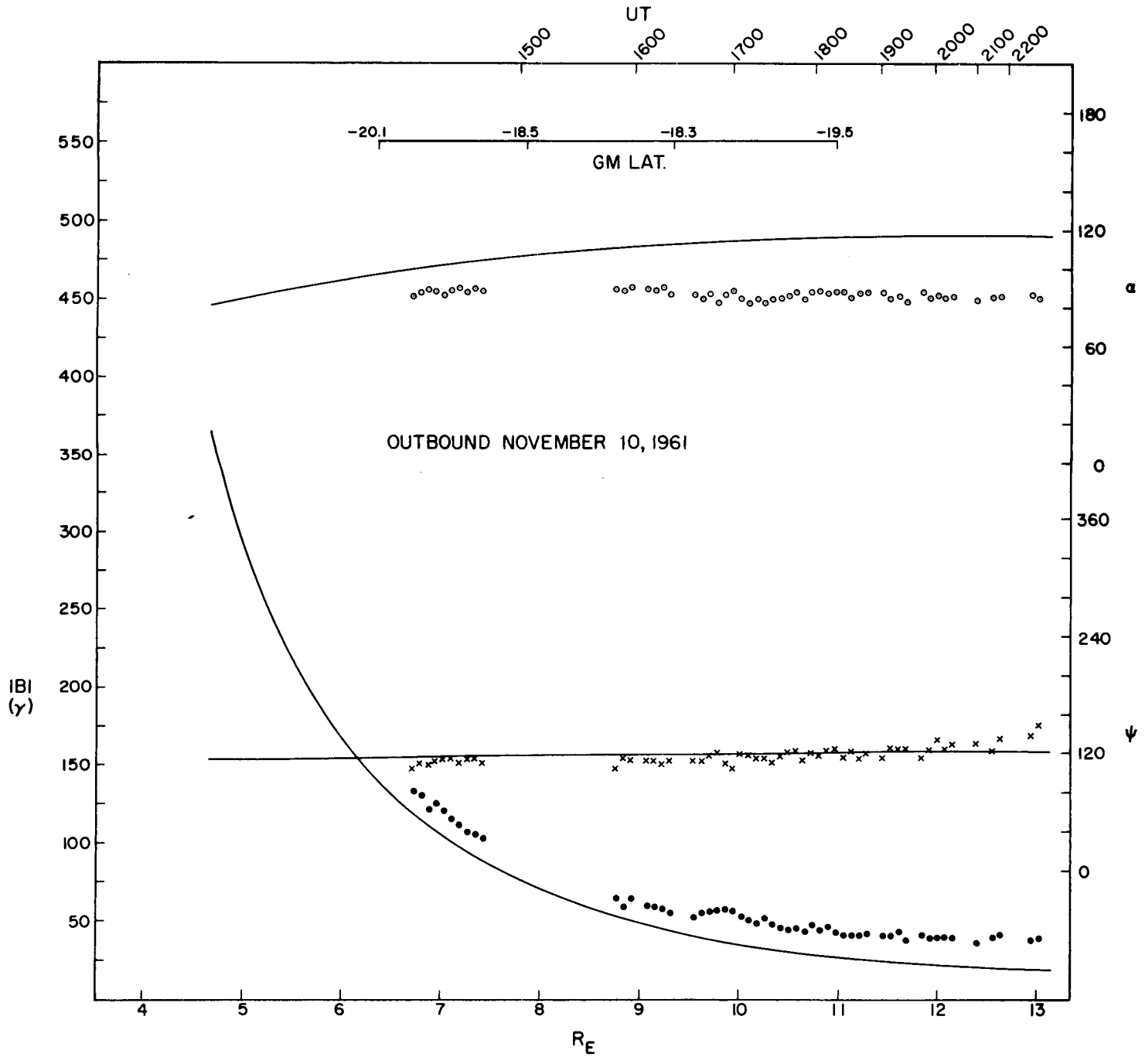

UT
1700
1800
1900
2000
2100
2200
2300
2400
0100
0200
-33.0
-29.0
-27.5
-26.5
-20.0
GM LAT.
OUTBOUND NOVEMBER 1-2, 1961
|B|
(γ)
550
500
450
400
350
300
250
200
150
100
50
180
120
60
0
360
240
120
0
α
ψ
4
5
6
7
8
9
10
11
12
13
R_E

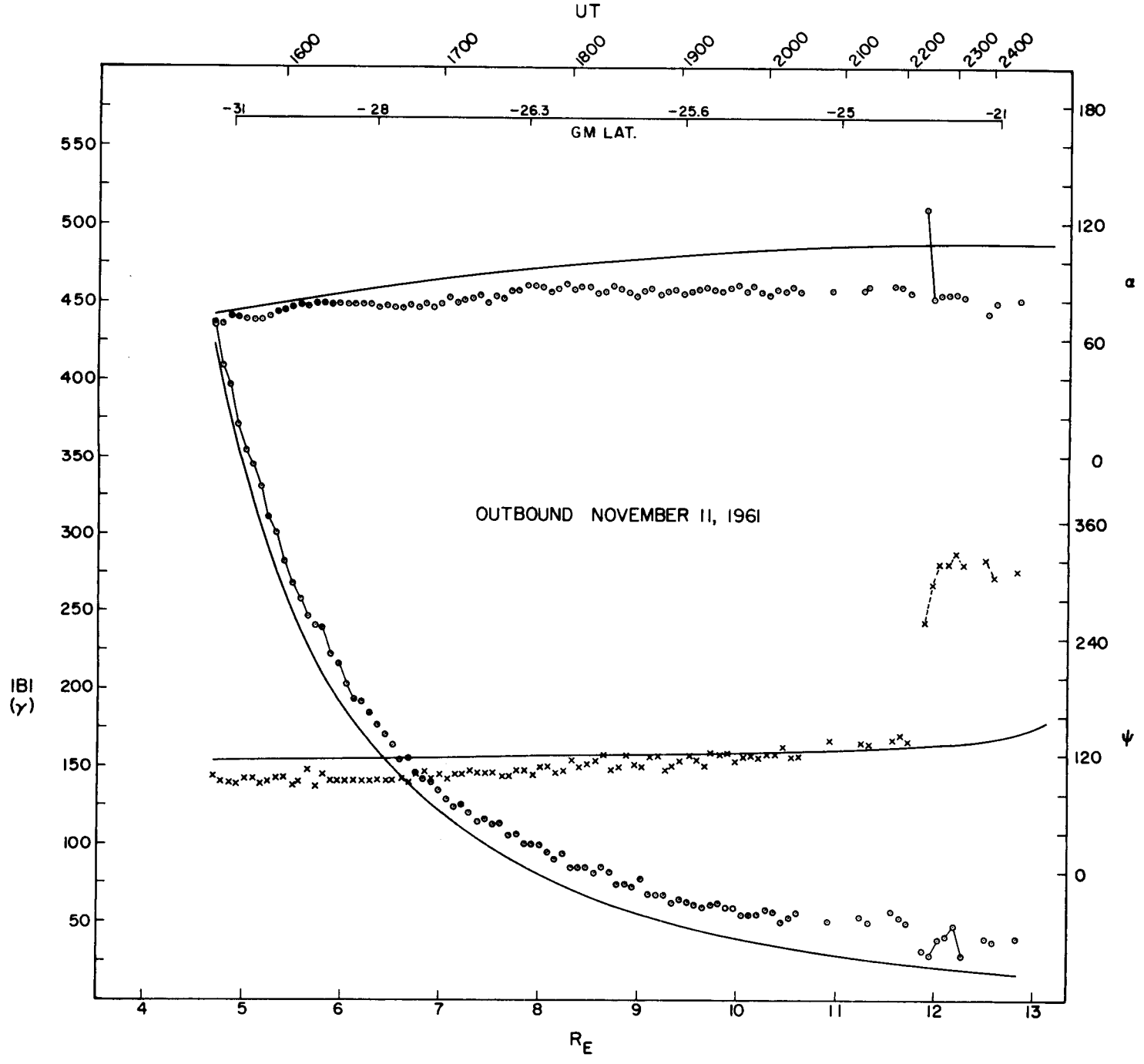

UT
2400
0100
0200
0300
0400
0500
0600
0700
0800
0900
-35.0
-30.0
-22.0
-12.0
-1.0
GM LAT.
OUTBOUND NOVEMBER 5, 1961
|B|
(γ)
550
500
450
400
350
300
250
200
150
100
50
180
120
60
0
360
240
120
0
α
ψ
4
5
6
7
8
9
10
11
12
13
R_E

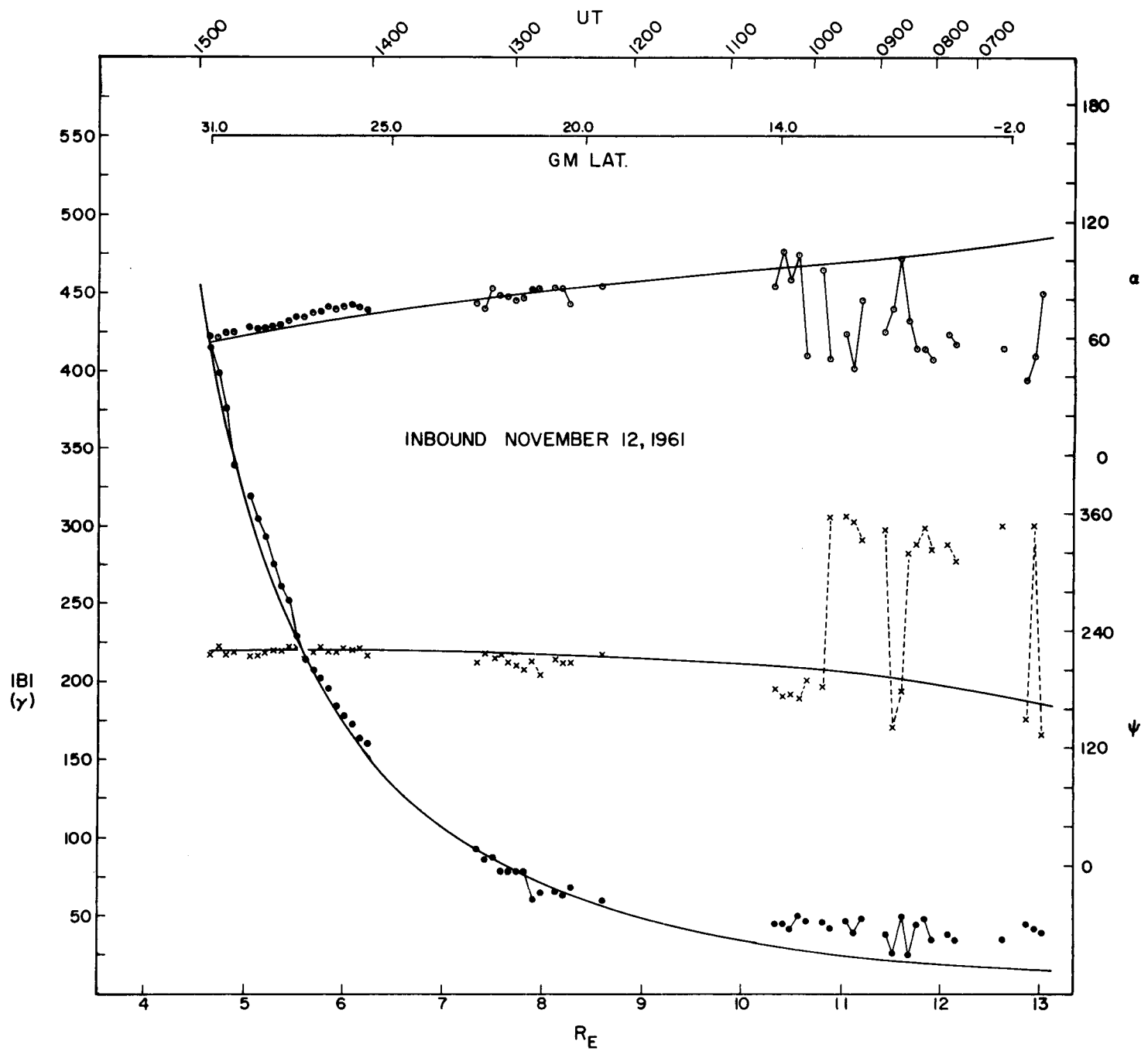

UT
0600
0700
0800
0900
1000
1100
1200
1300
1400
1500
-20.0
-10.0
-4.0
-2.0
GM LAT.
OUTBOUND NOVEMBER 7, 196
IBI
(γ)
550
500
450
400
350
300
250
200
150
100
50
180
120
60
0
360
240
120
0
α
ψ
4
5
6
7
8
9
10
11
12
13
R_E

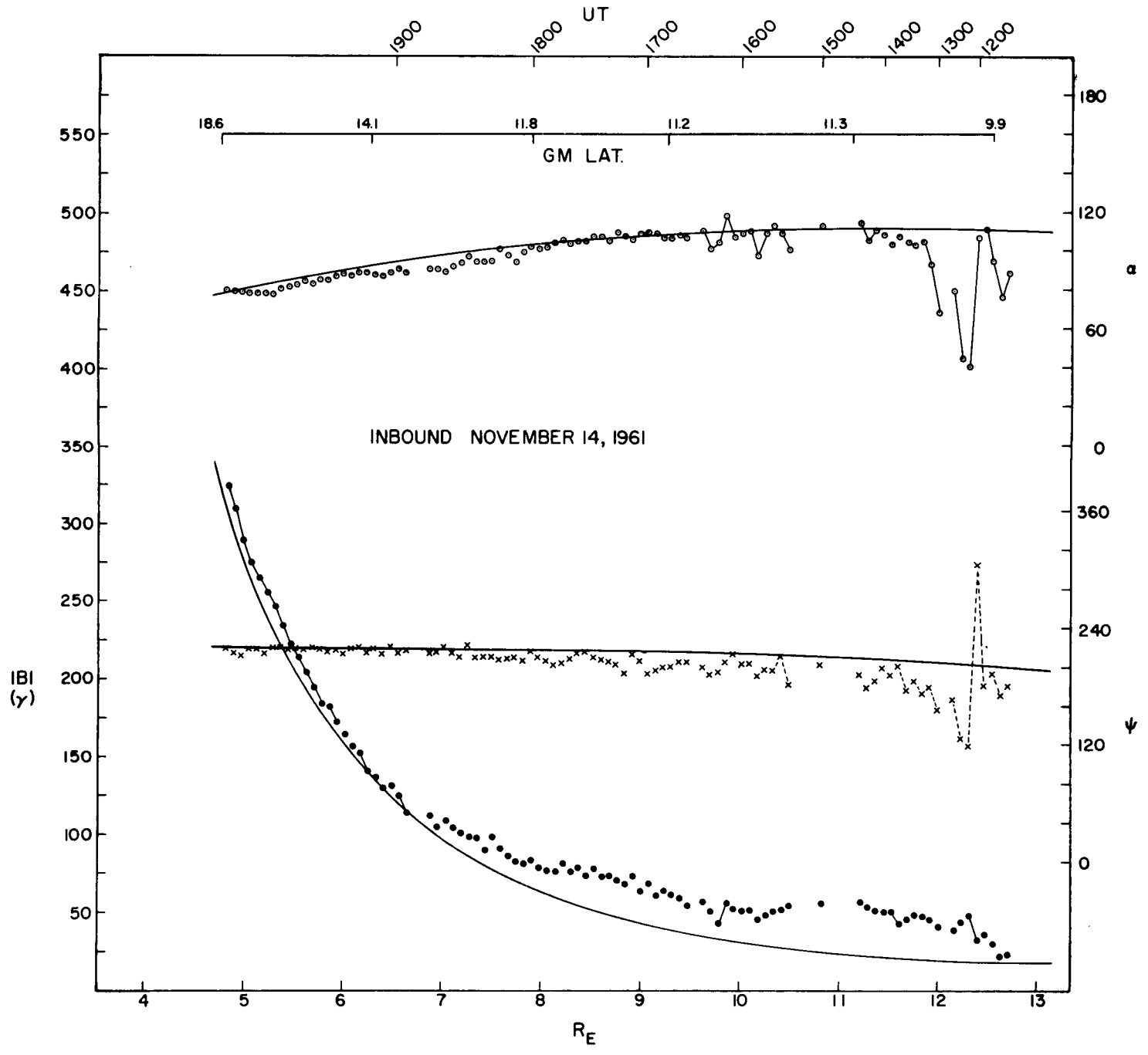

UT
0400
0300
0200
0100
2400
2300
2200
2100
2000
9.2
3.3
-1.5
-6.2
-9.5
-9.2
GM LAT.
INBOUND NOVEMBER 7-8, 1961
|B|
(γ)
550
500
450
400
350
300
250
200
150
100
50
180
120
60
0
360
240
120
0
α
ψ
4
5
6
7
8
9
10
11
12
13
R_E

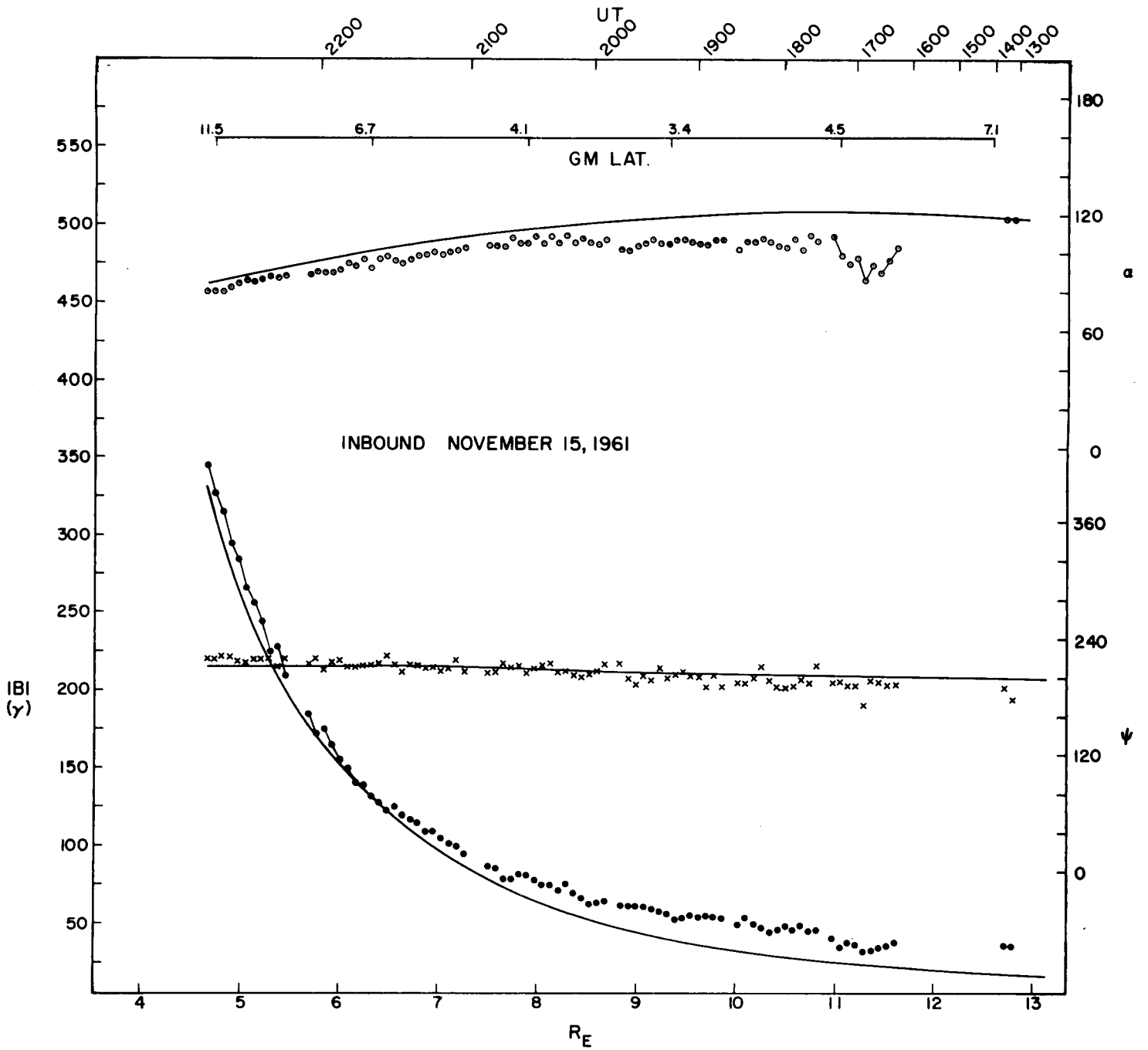

UT
0700
0600
0500
0400
0300
0200
0100
15.6
9.4
3.6
-2.6
-8.8
GM LAT.
INBOUND NOVEMBER 8-9, 1961
|B|
(γ)
550
500
450
400
350
300
250
200
150
100
50
180
120
60
0
360
240
120
0
α
ψ
4
5
6
7
8
9
10
11
12
13
R_E

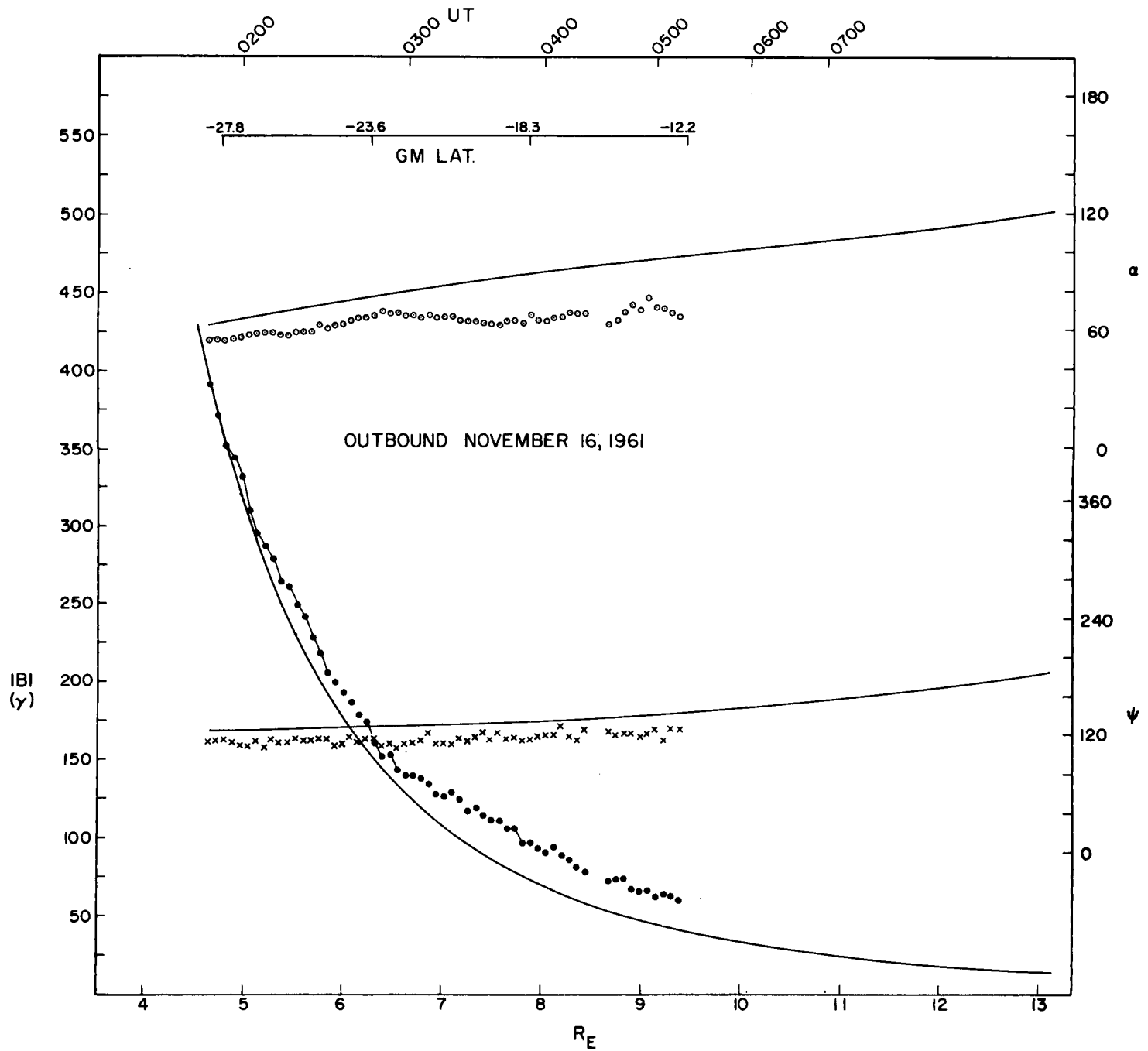

UT
1500
1600
1700
1800
1900
2000
2100
2200
-20.1
-18.5
-18.3
-19.5
GM LAT.
OUTBOUND NOVEMBER 10, 1961
|B|
(γ)
550
500
450
400
350
300
250
200
150
100
50
180
120
60
0
360
240
120
0
α
ψ
4
5
6
7
8
9
10
11
12
13
R_E

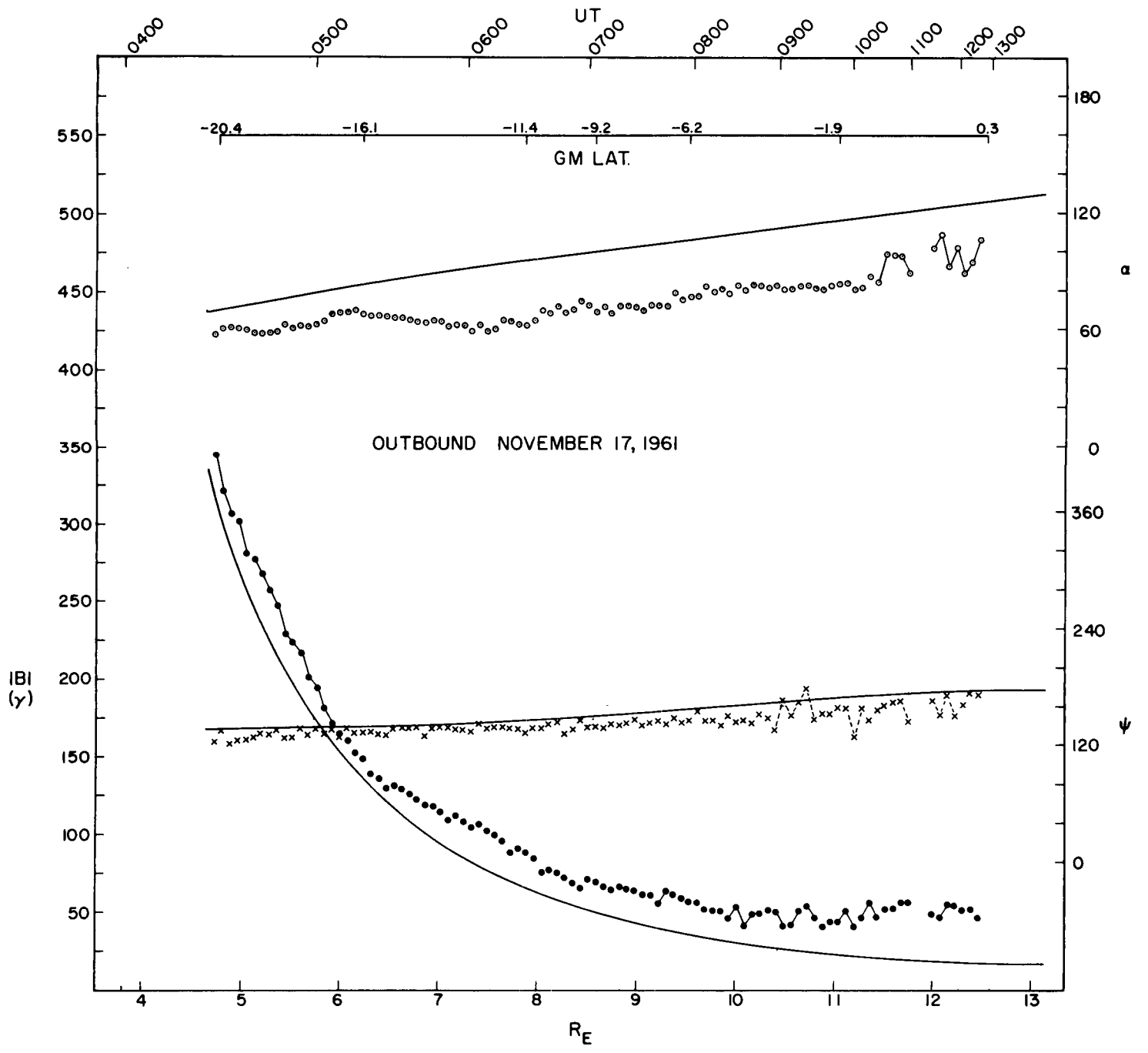

UT
1600
1700
1800
1900
2000
2100
2200
2300
2400
-31
-28
-26.3
-25.6
-25
-21
GM LAT.
OUTBOUND NOVEMBER 11, 1961
|B|
(γ)
550
500
450
400
350
300
250
200
150
100
50
180
120
60
0
360
240
120
0
α
ψ
4
5
6
7
8
9
10
11
12
13
R_E

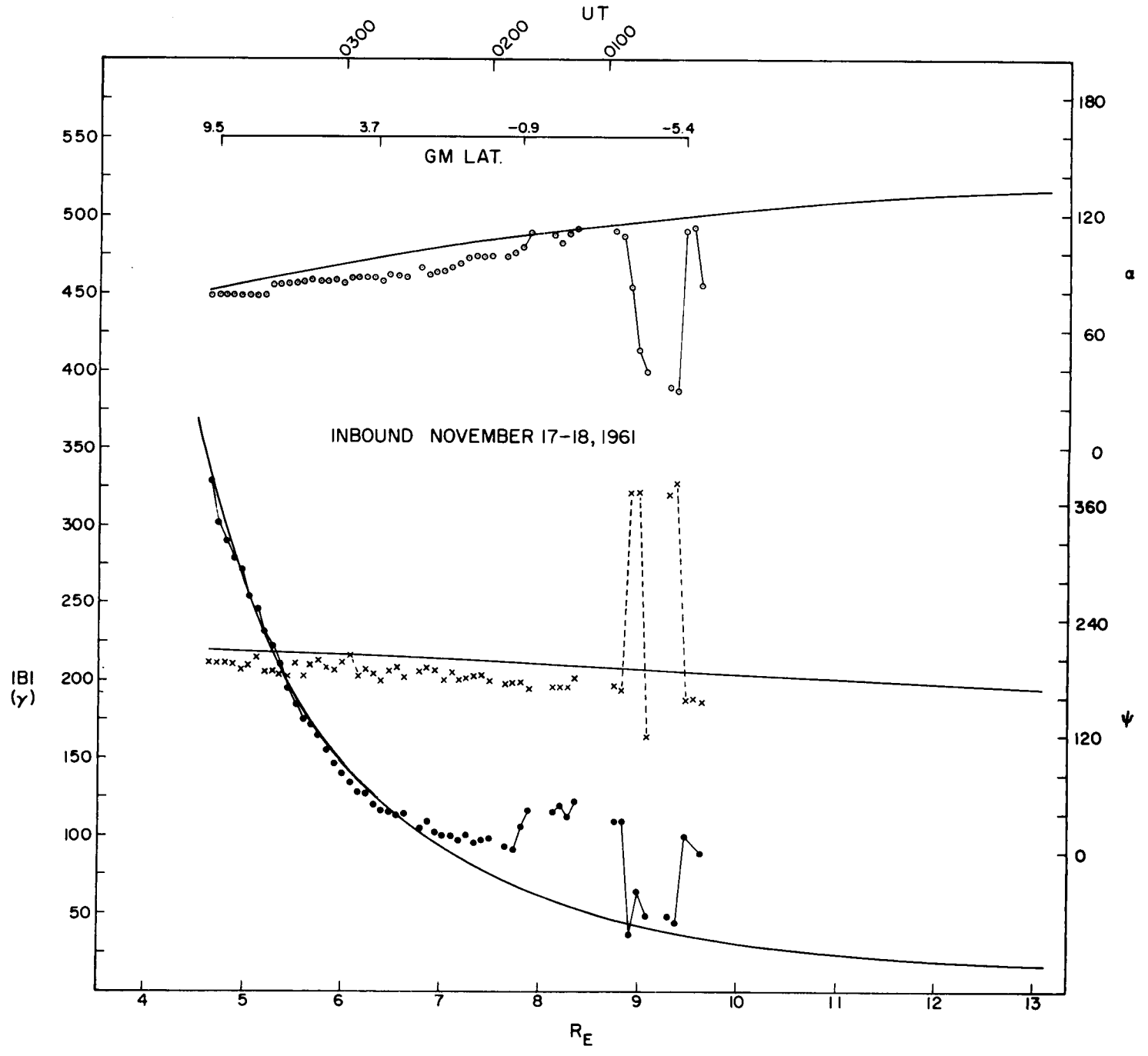

UT
1500
1400
1300
1200
1100
1000
0900
0800
0700
31.0
25.0
20.0
14.0
-2.0
GM LAT.
INBOUND NOVEMBER 12, 1961
|B|
(γ)
550
500
450
400
350
300
250
200
150
100
50
180
120
60
0
360
240
120
0
α
ψ
4
5
6
7
8
9
10
11
12
13
R_E

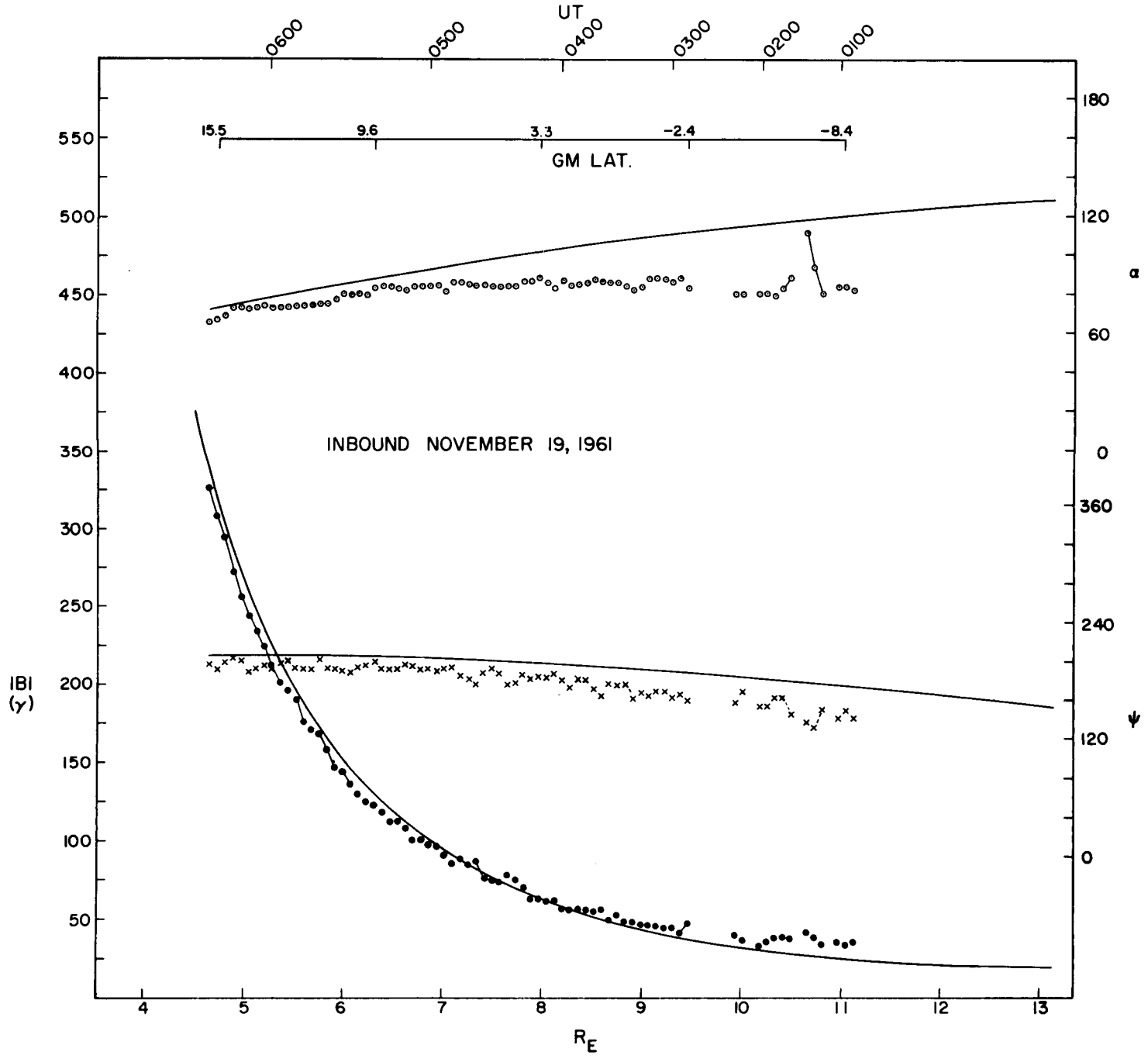

UT
1900
1800
1700
1600
1500
1400
1300
1200
18.6
14.1
11.8
11.2
11.3
9.9
GM LAT.
INBOUND NOVEMBER 14, 1961
|B|
(γ)
550
500
450
400
350
300
250
200
150
100
50
180
120
60
0
360
240
120
0
α
ψ
4
5
6
7
8
9
10
11
12
13
R_E

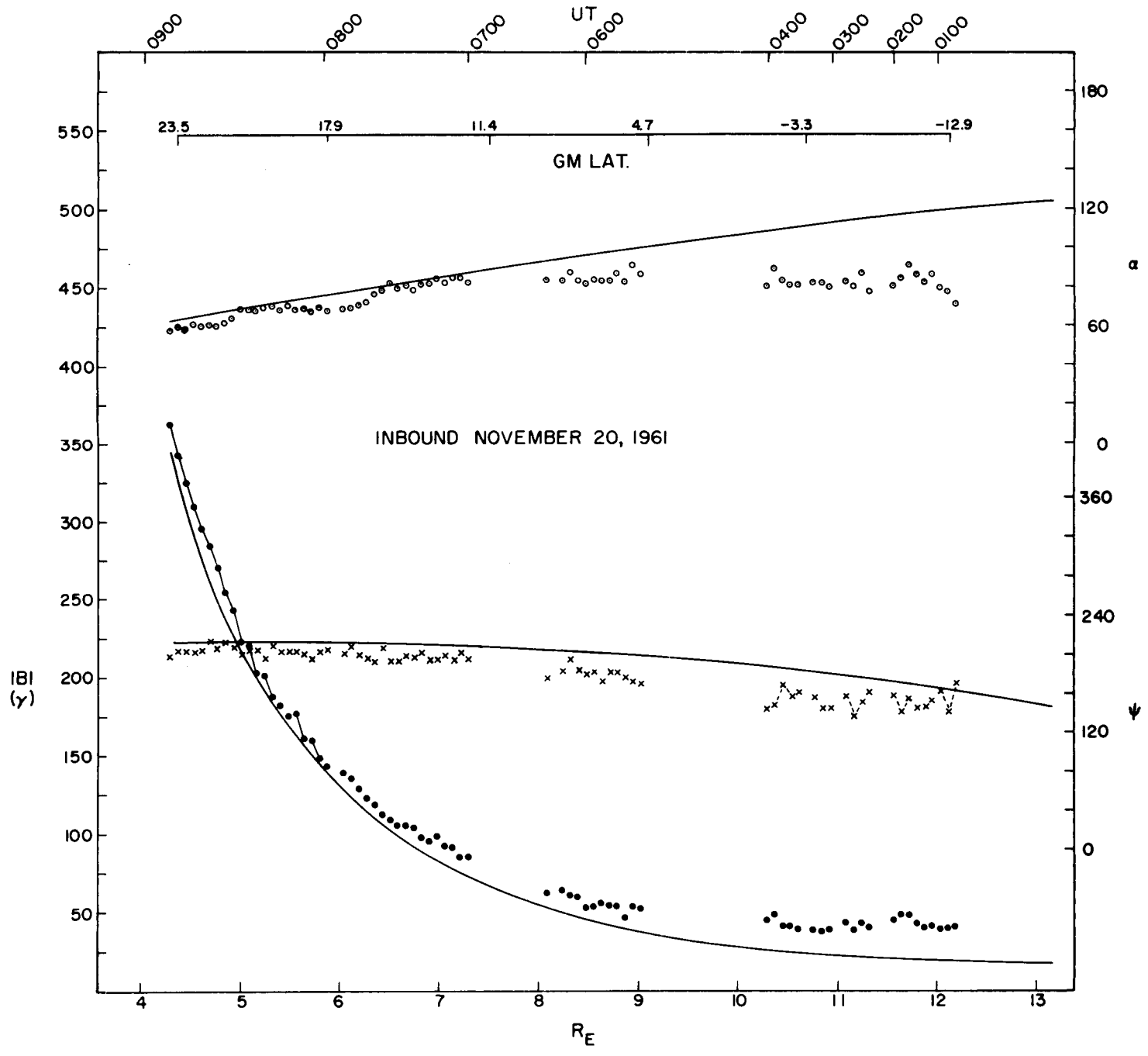

UT
2200
2100
2000
1900
1800
1700
1600
1500
1400
1300
11.5
6.7
4.1
3.4
4.5
7.1
GM LAT.
INBOUND NOVEMBER 15, 1961
|B|
(γ)
550
500
450
400
350
300
250
200
150
100
50
180
120
60
0
360
240
120
0
α
ψ
4
5
6
7
8
9
10
11
12
13
R_E

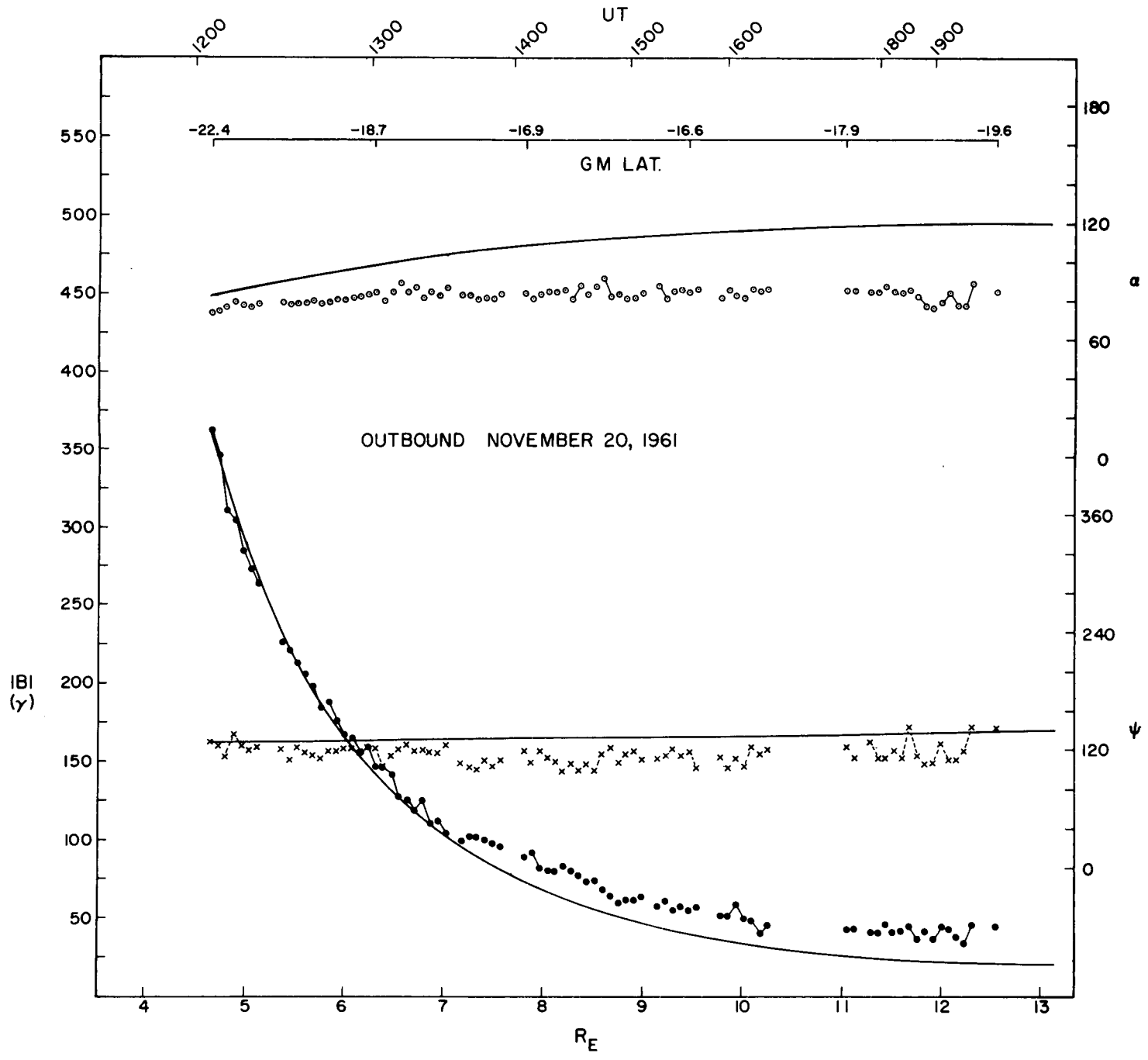

0200
0300 UT
0400
0500
0600
0700
-27.8
-23.6
-18.3
-12.2
GM LAT.
OUTBOUND NOVEMBER 16, 1961
|B|
(γ)
550
500
450
400
350
300
250
200
150
100
50
180
120
60
0
360
240
120
0
α
ψ
4
5
6
7
8
9
10
11
12
13
R_E

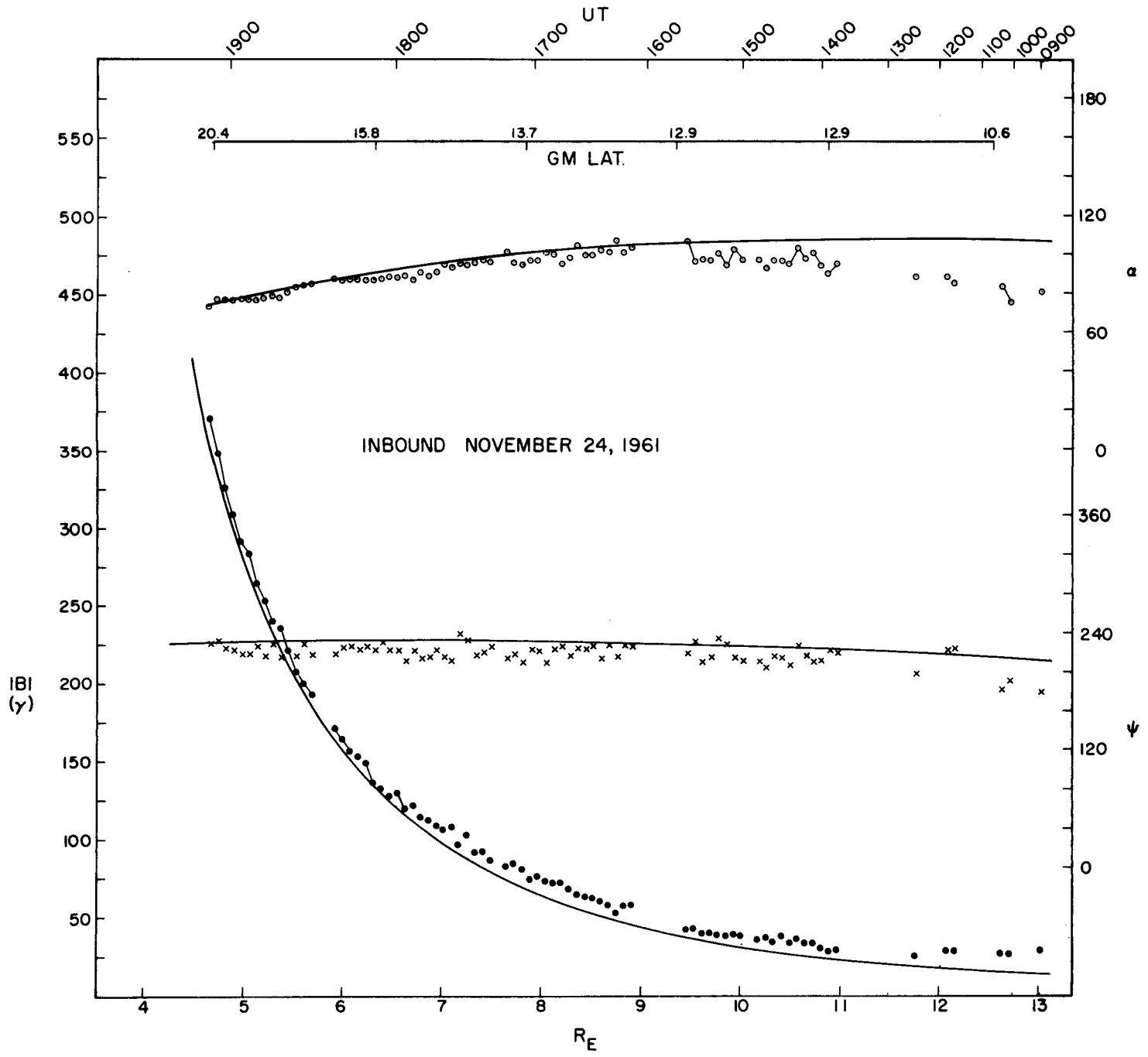

UT
0400
0500
0600
0700
0800
0900
1000
1100
1200
1300
-20.4
-16.1
-11.4
-9.2
-6.2
-1.9
0.3
GM LAT.
OUTBOUND NOVEMBER 17, 1961
|B|
(γ)
550
500
450
400
350
300
250
200
150
100
50
180
120
60
0
360
240
120
0
α
ψ
4
5
6
7
8
9
10
11
12
13
R_E

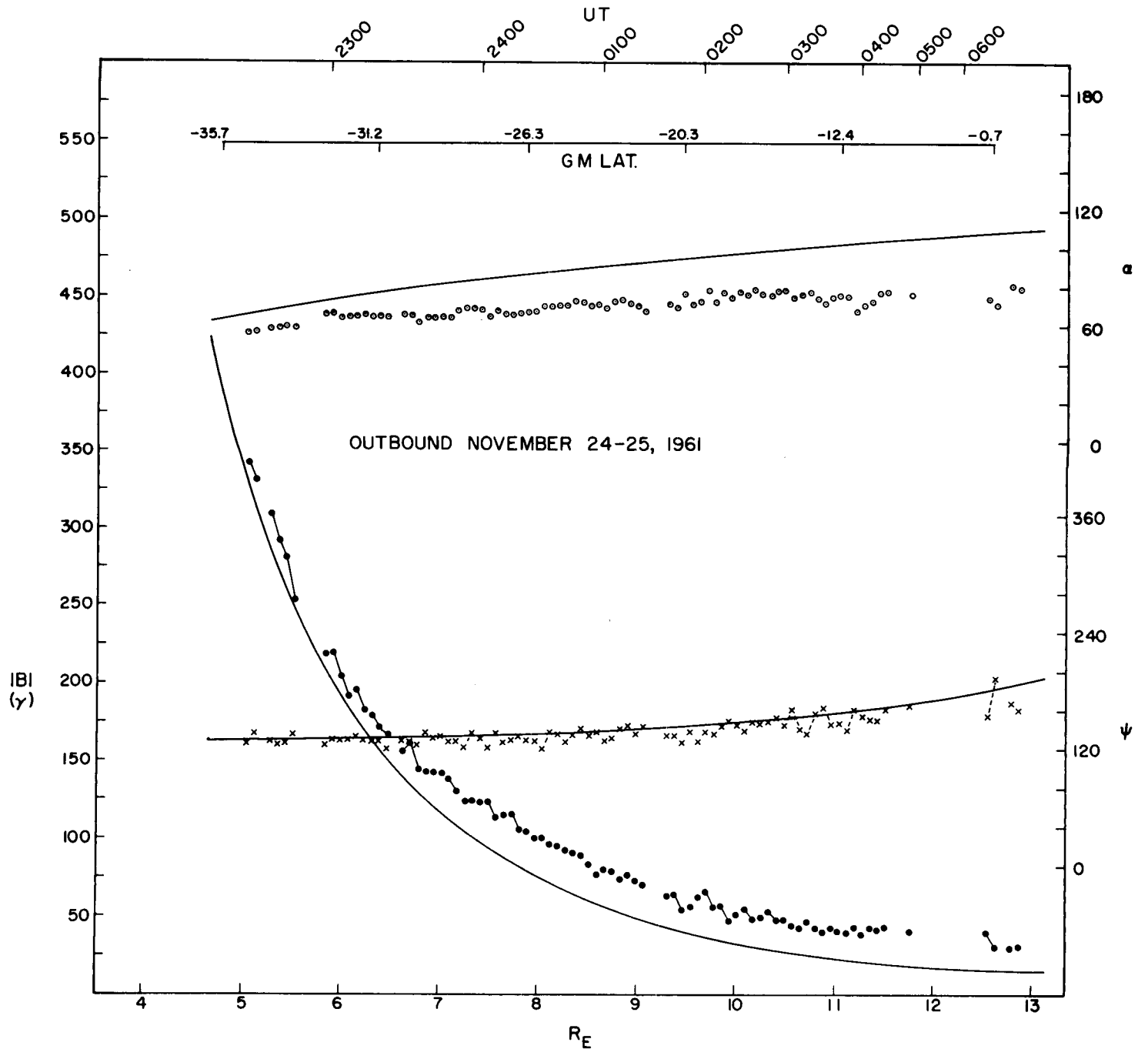

UT
0300
0200
0100
9.5
3.7
-0.9
-5.4
GM LAT.
INBOUND NOVEMBER 17-18, 1961
|B|
(γ)
550
500
450
400
350
300
250
200
150
100
50
180
120
60
0
360
240
120
0
α
ψ
4
5
6
7
8
9
10
11
12
13
R_E

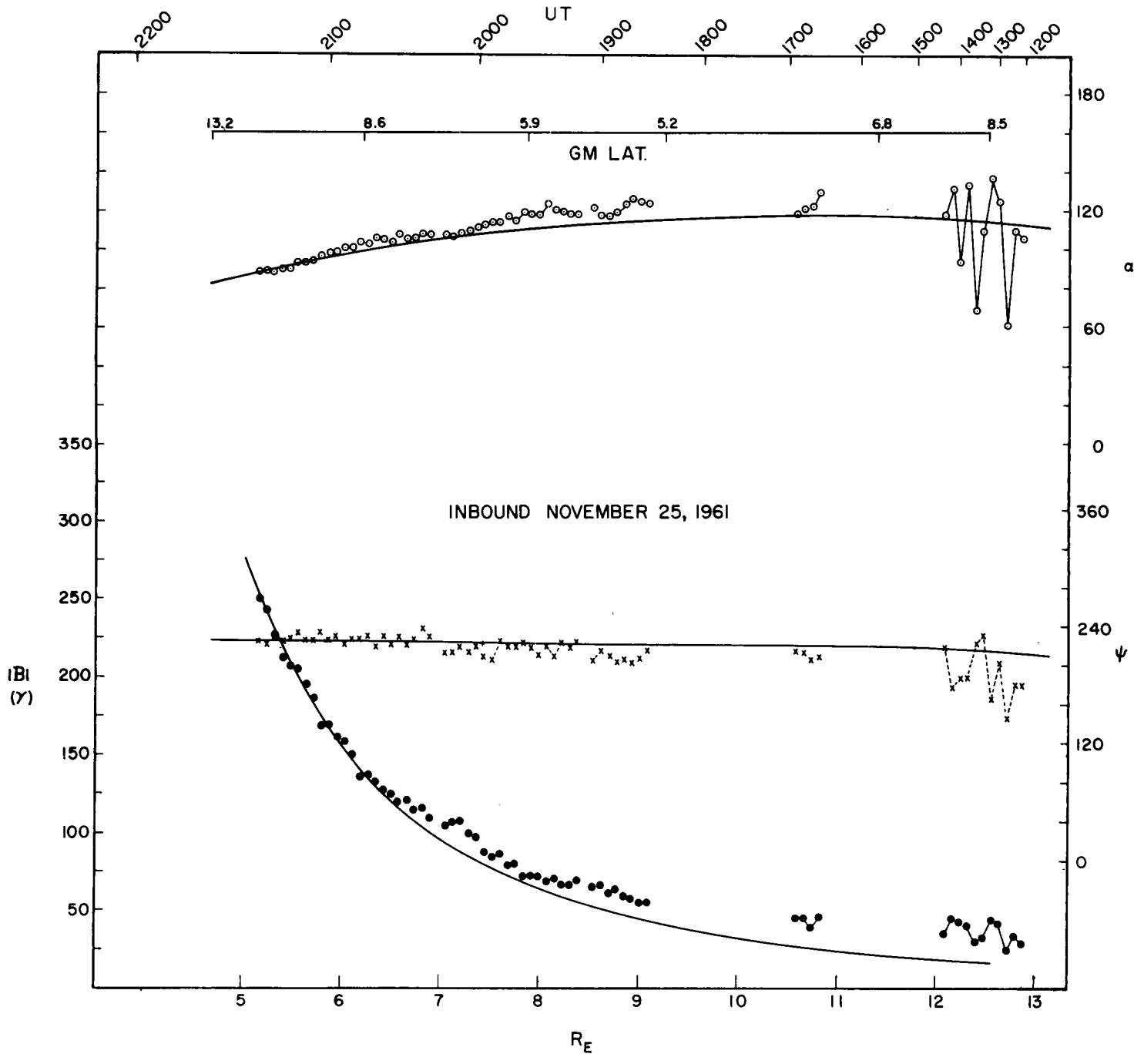

UT
0600
0500
0400
0300
0200
0100
15.5
9.6
3.3
-2.4
-8.4
GM LAT.
INBOUND NOVEMBER 19, 1961
|B|
(γ)
550
500
450
400
350
300
250
200
150
100
50
180
120
60
0
360
240
120
0
α
ψ
4
5
6
7
8
9
10
11
12
13
R_E

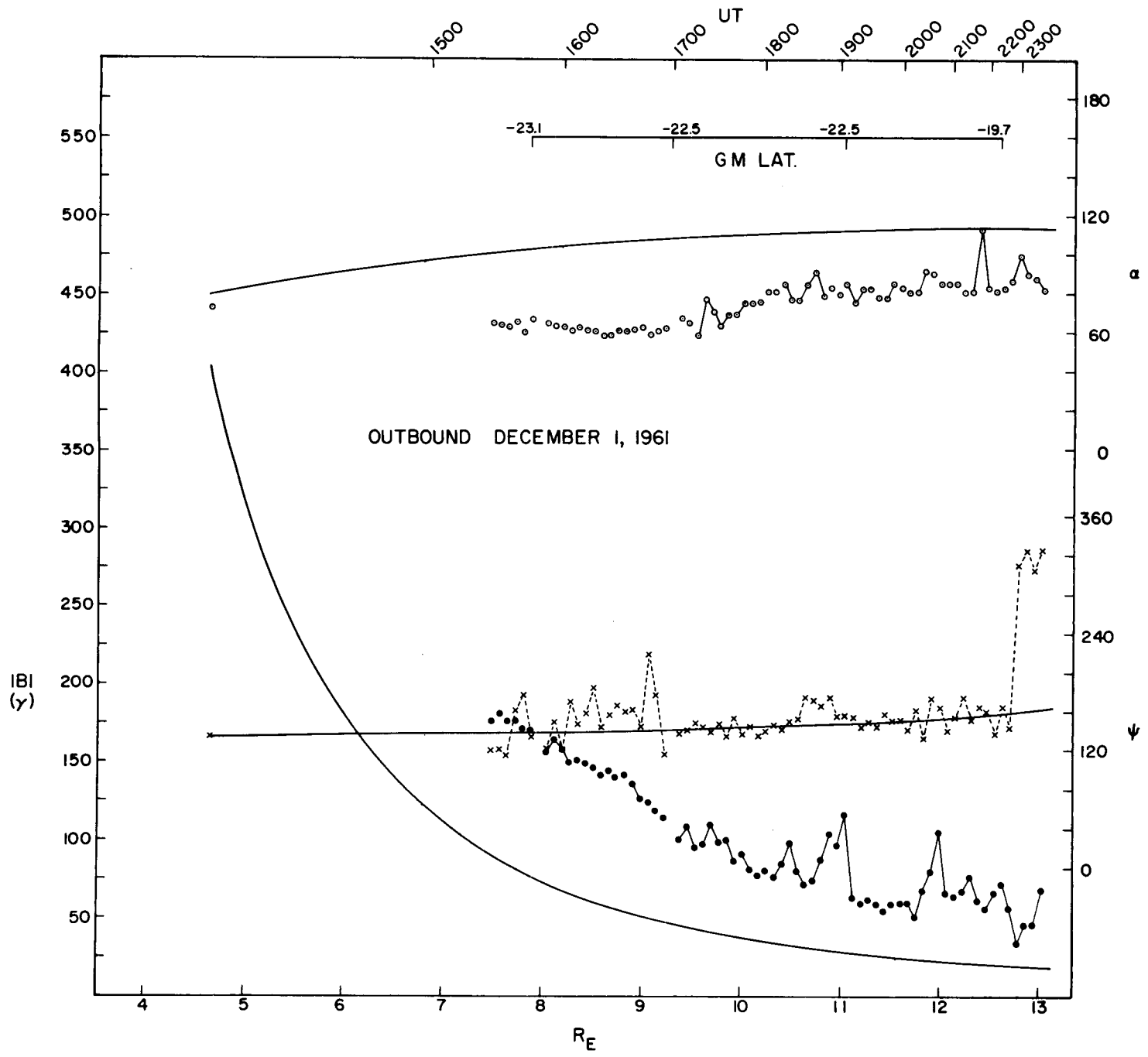

UT
0900
0800
0700
0600
0400
0300
0200
0100
23.5
17.9
11.4
4.7
-3.3
-12.9
GM LAT.
INBOUND NOVEMBER 20, 1961
|B|
(γ)
550
500
450
400
350
300
250
200
150
100
50
180
120
60
0
360
240
120
0
α
ψ
4
5
6
7
8
9
10
11
12
13
R_E

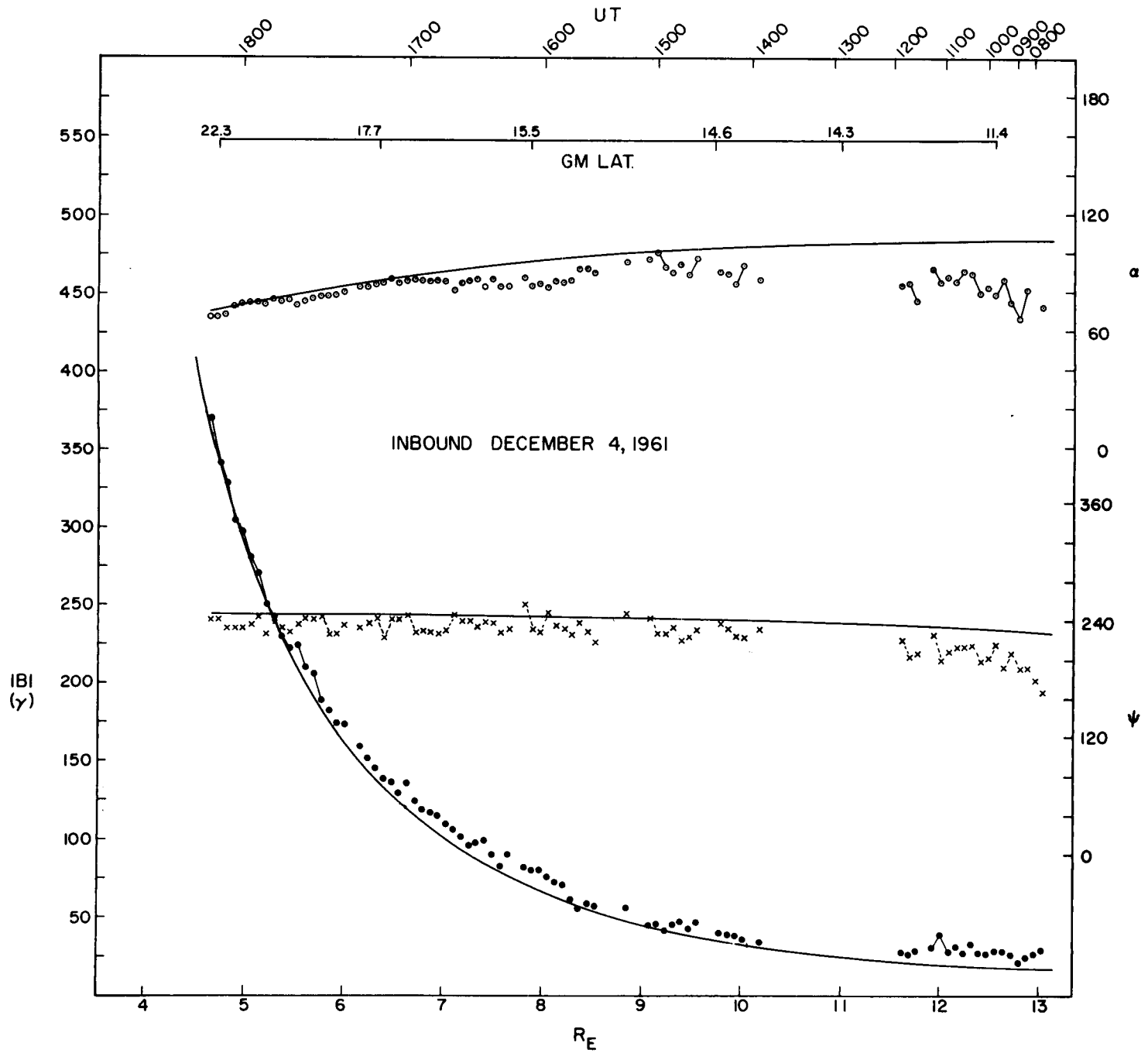

UT
1200
1300
1400
1500
1600
1800
1900
-22.4
-18.7
-16.9
-16.6
-17.9
-19.6
GM LAT.
OUTBOUND NOVEMBER 20, 1961
|B|
(γ)
550
500
450
400
350
300
250
200
150
100
50
180
120
60
0
360
240
120
0
α
ψ
4
5
6
7
8
9
10
11
12
13
R_E


UT
1900
1800
1700
1600
1500
1400
1300
1200
1100
1000
0900
20.4
15.8
13.7
12.9
12.9
10.6
GM LAT.
INBOUND NOVEMBER 24, 1961
|B|
(γ)
550
500
450
400
350
300
250
200
150
100
50
180
120
60
0
360
240
120
0
α
ψ
4
5
6
7
8
9
10
11
12
13
R_E


UT
2300
2400
0100
0200
0300
0400
0500
0600
-35.7
-31.2
-26.3
-20.3
-12.4
-0.7
GM LAT.
OUTBOUND NOVEMBER 24-25, 1961
|B|
(γ)
550
500
450
400
350
300
250
200
150
100
50
180
120
60
0
360
240
120
0
α
ψ
4
5
6
7
8
9
10
11
12
13
R_E


UT
2200
2100
2000
1900
1800
1700
1600
1500
1400
1300
1200
13.2
8.6
5.9
5.2
6.8
8.5
GM LAT.
180
120
60
0
α
INBOUND NOVEMBER 25, 1961
350
300
250
200
150
100
50
|B|
(γ)
360
240
120
0
ψ
5
6
7
8
9
10
11
12
13
R_E


UT
1500
1600
1700
1800
1900
2000
2100
2200
2300
-23.1
-22.5
-22.5
-19.7
GM LAT.
OUTBOUND DECEMBER 1, 1961
|B|
(γ)
550
500
450
400
350
300
250
200
150
100
50
180
120
60
0
360
240
120
0
α
ψ
4
5
6
7
8
9
10
11
12
13
R_E


UT
1800
1700
1600
1500
1400
1300
1200
1100
1000
0900
0800
22.3
17.7
15.5
14.6
14.3
11.4
GM LAT.
INBOUND DECEMBER 4, 1961
|B|
(γ)
550
500
450
400
350
300
250
200
150
100
50
180
120
60
0
360
240
120
0
α
ψ
4
5
6
7
8
9
10
11
12
13
R_E