

## Results of Cosmic-Ray Surveys between Japan and the Antarctic

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### 日本南極地域観測隊宇宙線部門船上観測結果報告

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#### 要 旨

第1次から第6次までの、南極観測船「宗谷」  
船上で行なった宇宙線強度の観測データの最終

結果を集録した。地磁気緯度並びに dipole  
model の cut off rigidity も同時に与えてある。

**Abstract:** Cosmic-ray intensities have been measured along a constant ship-route between Japan and the Antarctic, five times for the nucleonic component and three times for the meson component during 1956–62. Final results of the cosmic-ray data obtained are presented with descriptions of observational conditions in each survey and procedure of data reduction.

#### 1. Introduction

As one of projects of the Japanese Antarctic Research Expedition, measurements of cosmic-ray intensities were carried out aboard the expedition ship M/S SOYA along a constant route between Japan and the Antarctic, five times during 1956–62. This route happens to pass through the two intense geomagnetic anomalies around Singapore and Cape Town, as seen in Fig. 1. Each survey started in October or November and finished in next April or May every year excepting in 1957–58. The period of these surveys corresponds to one from the maximum of solar activity to near the minimum. Considering the above circumstances, the cosmic ray data obtained from these surveys may be of use for those who are interested in problems of threshold rigidity and solar cycle modulation in cosmic rays. In this report, results of the five surveys are tabulated, together with the related data such as ship position or threshold rigidity.

#### 2. Measurements

For ship-board measurements, both a Simpson type neutron pile containing five

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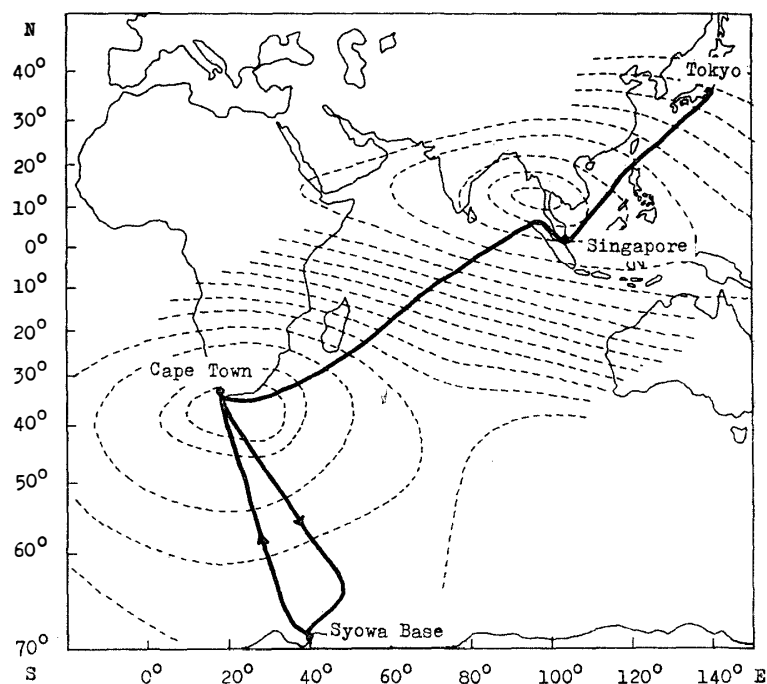


Fig. 1 The voyage route along which cosmic ray measurements were carried out. Dashed contour lines show geomagnetic horizontal intensity.

neutron counters and a Neher type ionization chamber were used; the former in every survey and the latter in the first, the fourth and the fifth surveys. The position and the surrounding condition of the observation room where both instruments were installed, were not always the same throughout the whole survey. Details of them are described below every and each survey.

#### *The first survey* (November 1956–April 1957)

The observation hut, 3 metres square, was specially built on the upper deck of the SOYA. This position is best suited for the observation, for less absorber above it and no moving heavy materials in its surroundings.

The number of operated neutron counters was four during the voyage from Japan to Cape Town on back way.

#### *The second survey* (November 1958–April 1959)

The observation room was removed on to the middle deck, which is lower by one stair than on the first. This resulted in increasing the absorber, the amount of which is roughly estimated at 15 g/cm<sup>2</sup>.

#### *The third survey* (November 1959–April 1960)

The position of the room was the same as in the second but a new hut was built above it. This resulted in addition of the absorber, about 20 g/cm<sup>2</sup>. After this survey,

all of electronic equipments for the neutron monitor were transistorized.

*The fourth survey* (November 1960–May 1961)

Both the room and the instruments were quite the same condition as in the third.

*The fifth survey* (October 1961–April 1962)

Only an electronic equipment for the neutron monitor was changed to different type, resulting in small changes of absolute counting rates.

The room temperature was kept at 15°C–25°C by means of an air-conditioner throughout the whole survey.

Under the circumstances above mentioned, a direct comparison of observed counting rates among each other is not significant in the absolute except in the relative.

### 3. Reduction of data

At first, cosmic ray data obtained were corrected for the barometric pressure effect, using coefficient of  $-0.76\%/mb$  for the nucleonic component and  $-0.13\%/mb$  for the meson. Next, correction for the world-wide time variation in cosmic ray intensity was made by the following procedure.

Using the neutron data from selected 18 stations in the world, we deduced a latitude dependence of intensity decrement averaged over seven remarkable Forbush events occurred during July–December 1957. A latitude curve of ratio  $\alpha$  of the decrement at Mt. Norikura station to that at every station is determined from the above latitude dependence, as shown in Fig. 2. Thus, the intensity variation at Mt. Norikura multiplied by  $\alpha$  is assumed as the world-wide variation which should be applied according to ship positions. In tables of results, two values of counting rates of neutron intensities, one corrected for the barometer effect and another for the world-wide time

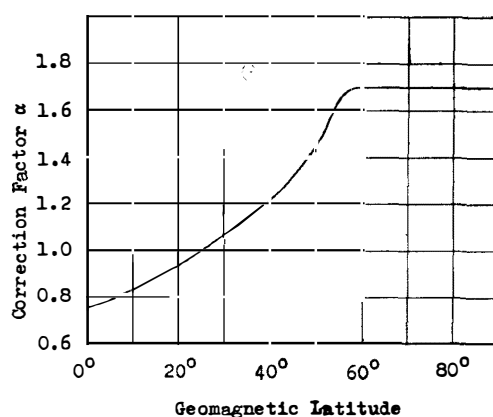


Fig. 2. Latitude dependence of correction factor  $\alpha$  for the world-wide time variation in cosmic ray intensity when the Mt. Norikura neutron data were used.

variation too, are given together with the relative value of the latter represented by natural logarithm. In case of meson component, relative values corrected for the barometer effect only are given excepting those in the Antarctic Ocean.

In the above procedure, there is a noticeable point concerning the barometric pressure value itself. It is well known that some amount of depression in readings of a barograph arises under a blow of strong wind by Bernouille's effect. For the reason of using a conventional barograph in our surveys, unusual intensity fluctuation in final cosmic ray data corrected for pressure, if any, seems to be attributed to this effect.

#### 4. Explanation of tables

Daily mean values averaged in GMT of nucleonic intensities are tabulated from page 31 to 49 and meson intensities follow. In tables of the former, the following nine kinds of numerical values are given for convenience of users.

$I_P$ : cosmic ray intensity corrected for the barometer effect.

$I_{PW}$ : cosmic ray intensity corrected for the barometer effect and also for the world-wide intensity time variation.

( $I_P$  and  $I_{PW}$  are given by counting rates per unit time, but one should be notified that unit of the time and scaling factor are not always identified throughout the whole survey).

$\ln I_{PW}$ : natural logarithm of  $I_{PW}$ , in units of 0.1%.

$\phi$ : geographic latitude.

$\lambda$ : geographic longitude.

( $\phi$  and  $\lambda$  were determined once a day at noon in GMT).

$\phi, P_D$ : geomagnetic latitude and threshold rigidity calculated in a dipole model of the earth's magnetic field.

$\phi^*, P_E$ : geomagnetic latitude and threshold rigidity calculated in an eccentric dipole model of the earth's magnetic field.

In tables of meson intensities,  $I_P$  only during the outward and back voyages is given in units of 0.01%.

#### Acknowledgements

This work was carried out by support of Science Council of Japan, and also by constant help of expedition members and crews aboard the SOYA. The authors wish to express their hearty thanks for accommodations and efforts given for cosmic ray surveys.

Computations for geomagnetic latitudes and cut-off rigidities have been performed using an electric computer in Nagoya University.

(Received March 19, 1963)

# APPENDICES

## COSMIC RAY DATA

### (I) Nucleonic Component

The first survey (November 1956 — April 1957)

Date	Counts/2hr ÷ 8		$\ln I_{PW}$ (%)	$\phi$	$\lambda$	$\phi$	$\phi^*$	$P_D$	$P_E$
	$I_P$	$I_{PW}$							
Nov. 25	1070	1049	4.8	1.3°N	103.9°E	−10.0	−10.8	13.9	15.2
26	1045	1027	2.7	"	"	"	"	"	"
27	1063	1048	4.7	1.9	102.4	− 9.4	−10.2	14.0	15.3
28	1063	1050	4.9	4.3	98.9	− 6.9	− 7.5	14.4	15.7
29	1061	1048	4.7	5.4	94.8	− 5.6	− 6.2	14.5	15.8
30	1068	1055	5.4	3.1	90.7	− 7.7	− 8.2	14.3	15.4
Dec. 1	1078	1083	8.0	0.3N	87.1	−10.2	−10.8	13.9	14.8
2	1105	1112	10.6	2.7S	83.5	−12.9	−13.5	13.4	14.1
3	1121	1125	11.8	5.6	80.0	−15.4	−16.0	12.8	13.3
4	1171	1178	16.4	8.6	76.7	−18.1	−18.6	12.1	12.5
5	1197	1212	19.2	10.7	72.9	−19.7	−20.2	11.6	11.9
6	1245	1258	23.0	12.7	69.3	−21.2	−21.6	11.2	11.3
7	1300	1329	28.4	15.3	65.9	−23.3	−23.6	10.5	10.6
8	1374	1383	32.4	18.0	62.3	−25.4	−25.6	9.8	9.8
9	1388	1470	38.6	20.7	58.5	−27.5	−27.5	9.2	9.1
10	1518	1539	43.1	23.3	54.5	−29.4	−29.2	8.5	8.5
11	1627	1653	50.3	25.5	50.7	−30.9	−30.6	8.0	7.9
12	1724	1749	55.9	28.1	47.0	−32.7	−32.3	7.4	7.3
13	1821	1844	61.2	30.1	43.3	−34.0	−33.4	7.0	6.9
14	1954	1980	68.4	31.6	40.0	−34.8	−34.1	6.7	6.7
15	1883	1899	64.2	33.3	35.7	−35.7	−34.8	6.5	6.4
16	1879	1911	64.8	34.7	30.6	−36.0	−35.0	6.3	6.3
17	1931	1969	67.8	35.1	25.7	−35.4	−34.3	6.5	6.4
18	1865	1913	64.9	35.1	20.4	−34.4	−33.2	6.9	6.7
19	1835	1899	64.1	34.1	18.3	−33.0	−31.8	7.3	7.1
20	—	—	—	33.9	18.5	−32.9	−31.7	7.4	7.2
21	1816	1932	65.9	"	"	"	"	"	"
22	1789	1896	64.0	"	"	"	"	"	"
23	1770	1883	62.3	"	"	"	"	"	"
24	1842	1930	65.8	"	"	"	"	"	"
25	1779	1902	64.3	"	"	"	"	"	"
26	1748	1893	63.8	"	"	"	"	"	"
27	1763	1894	63.9	"	"	"	"	"	"
28	1737	1871	62.7	"	"	"	"	"	"
29	1772	1869	62.5	34.4	18.7	−33.4	−32.2	7.2	7.0
30	—	—	—	37.8	20.1	−36.9	−35.6	6.0	6.0
31	1900	2009	69.8	41.7	22.2	−41.1	−39.6	4.8	4.8

Date	Counts/2hr ÷ 8		ln $I_{PW}$ (%)	$\psi$	$\lambda$	$\phi$	$\phi^*$	$P_D$	$P_E$	
	$I_P$	$I_{PW}$								
Jan.	1	1883	1991	68.9	45.0	26.1	-45.1	-43.5	3.7	3.8
	2	1829	1967	67.7	47.9	30.5	-48.7	-47.1	2.8	3.0
	3	1851	2008	69.7	50.7	33.1	-51.9	-50.2	2.1	2.3
	4	1779	1907	64.6	53.7	35.5	-55.2	-53.4	1.6	1.8
	5	—	—	—	57.4	40.1	-59.6	-57.7	1.0	1.1
	6	1868	1960	67.3	61.0	45.4	-64.0	-62.1	0.5	0.7
	7	1923	2009	69.8	64.2	51.2	-68.0	-66.1	0.3	0.4
	8	1905	1985	68.6	65.4	49.7	-68.8	-66.7	0.3	0.3
	9	1912	2010	69.8	65.9	45.1	-68.3	-66.1	0.3	0.4
	10	1949	2054	72.0	66.4	41.9	-68.1	-65.8	0.3	0.4
	11	1988	2088	73.7	66.9	39.2	-68.0	-65.6	0.3	0.4
	12	1999	2097	74.1	67.9	35.3	-68.1	-65.5	0.3	0.4
	13	2006	2071	72.9	"	35.0	-68.0	-65.5	0.3	0.4
	14	2013	2107	74.5	"	34.8	-68.0	-65.4	0.3	0.4
	15	2025	2135	75.9	67.1	38.5	-68.0	-65.6	0.3	0.4
	16	1999	2074	73.0	"	40.2	-68.4	-65.9	0.3	0.4
	17	2012	2060	72.3	67.5	39.9	-68.7	-66.2	0.3	0.4
	18	1986	2021	70.4	68.0	40.3	-69.2	-66.7	0.2	0.3
	19	1985	2026	70.7	68.4	38.8	-69.2	-66.7	0.2	0.3
	20	1992	2022	70.4	68.9	"	-69.6	-66.1	0.2	0.3
	21	1967	2042	71.4	69.0	39.0	-69.8	-67.2	0.2	0.3
	22	1779	2116	75.0	"	"	"	"	"	"
	23	1774	2043	71.5	"	39.1	-69.8	-67.2	0.2	0.3
	24	1849	2068	72.7	"	"	"	"	"	"
	25	1862	2037	71.2	"	"	"	"	"	"
	26	1907	2085	73.5	"	"	"	"	"	"
	27	1902	2081	73.3	"	"	"	"	"	"
	28	1915	2045	71.6	"	"	"	"	"	"
	29	1895	2007	69.7	"	"	"	"	"	"
	30	1875	2046	71.6	"	"	"	"	"	"
	31	1869	2043	71.5	"	"	"	"	"	"
Feb.	1	1895	2058	72.2	"	"	"	"	"	"
	2	1919	2050	71.8	"	"	"	"	"	"
	3	1909	2019	70.3	"	"	"	"	"	"
	4	1907	2009	69.8	"	"	"	"	"	"
	5	1909	1983	68.5	"	"	"	"	"	"
	6	1902	1984	68.6	"	"	"	"	"	"
	7	1909	1915	65.0	"	"	"	"	"	"
	8	1905	1888	63.6	"	"	"	"	"	"
	9	1909	1884	63.4	"	"	"	"	"	"
	10	1908	1861	62.2	"	"	"	"	"	"

Date	Counts/2hr ÷ 8		ln $I_{PW}$ (%)	$\phi$	$\lambda$	$\Phi$	$\Phi^*$	$P_D$	$P_E$	
	$I_P$	$I_{PW}$								
Feb.	11	1910	1919	65.2	"	"	"	"	"	"
	12	1909	1932	65.9	"	"	"	"	"	"
	13	1918	1945	66.6	"	"	"	"	"	"
	14	—	—	—	"	"	"	"	"	"
	15	1886	1917	65.1	68.8	38.9	−69.6	−67.0	0.2	0.3
	16	1892	1870	62.6	68.4	38.8	−69.2	−66.7	0.2	0.3
	17	1908	1892	63.8	"	38.7	−69.2	−66.6	0.2	0.3
	18	1890	1870	62.6	"	"	"	"	"	"
	—	—	—	—	—	—	—	—	—	—
Mar.	1	1844	1804	59.0	66.0	33.3	−66.1	−63.6	0.4	0.6
	2	1866	1816	59.7	62.1	30.3	−62.0	−59.6	0.7	0.9
	3	1859	1851	61.6	58.5	26.8	−58.0	−55.8	1.2	1.4
	4	1868	1864	62.3	54.9	25.0	−54.3	−52.2	1.7	2.0
	5	1859	1834	60.7	51.6	23.7	−50.9	−49.0	2.3	2.6
	6	1914	1904	64.4	47.1	22.9	−46.5	−44.7	3.3	3.5
	7	1897	1849	61.5	42.6	21.7	−41.9	−40.4	4.5	4.6
	8	1913	1867	62.4	38.4	20.0	−37.5	−36.1	5.9	5.8
	9	1798	1811	59.4	34.6	18.4	−33.5	−32.3	7.2	7.0
	10	1747	1771	57.2	33.9	18.5	−32.9	−31.7	7.4	7.2
	11	1738	1779	57.6	"	"	"	"	"	"
	12	1792	1781	57.8	"	"	"	"	"	"
	13	1835	1807	59.2	"	"	"	"	"	"
	14	1818	1797	58.6	"	"	"	"	"	"
	15	1862	1834	60.7	34.3	18.9	−33.3	−32.1	7.2	7.0
	16	1860	1859	62.1	34.6	23.2	−34.5	−33.3	6.8	6.7
	17	1839	1843	61.1	33.8	28.3	−34.7	−33.6	6.8	6.7
	18	1816	1818	59.8	32.4	33.2	−34.3	−33.4	6.9	6.8
	19	1787	1785	58.0	30.7	38.1	−33.6	−32.8	7.1	7.0
	20	1722	1722	54.3	29.1	42.3	−32.8	−32.2	7.4	7.3
	21	1692	1682	52.0	27.6	45.4	−32.0	−31.5	7.7	7.6
	22	1653	1641	49.5	26.0	48.8	−31.0	−30.7	8.0	7.9
	23	1563	1549	43.8	24.0	52.9	−29.8	−29.6	8.4	8.3
	24	1461	1444	36.8	21.6	57.1	−28.1	−29.1	8.9	8.9
	25	1416	1398	33.5	19.1	61.0	−26.3	−26.4	9.6	9.5
	26	1333	1316	27.5	16.7	64.5	−24.5	−24.7	10.2	10.2
	27	1254	1237	21.3	14.0	68.3	−22.4	−22.7	10.8	10.9
	28	1214	1182	16.7	11.4	72.2	−20.3	−20.8	11.5	11.7
	29	1172	1162	15.0	8.4	75.8	−17.8	−18.3	12.2	12.5
	30	1121	1122	11.5	5.6	79.9	−15.4	−16.0	12.8	13.3
	31	1097	1093	8.9	2.9 S	84.0	−13.1	−13.8	13.3	14.5
Apr.	1	1067	1064	6.2	0.1 N	87.9	−10.5	−11.1	13.8	14.8

Date	Counts/2hr ÷ 8		$\ln I_{PW}$ (%)	$\psi$	$\lambda$	$\phi$	$\phi^*$	$P_D$	$P_E$
	$I_P$	$I_{PW}$							
Apr. 2	1058	1046	4.5	3.2	91.6	- 7.6	- 8.2	14.3	15.4
3	1043	1026	2.6	5.5	95.5	- 5.5	- 6.1	14.5	15.8
4	1050	1042	4.1	3.8	99.7	- 7.4	- 8.1	14.3	15.7
5	1050	1044	4.3	1.6	103.2	- 9.7	-10.5	14.0	15.3
6	1054	1055	5.4	1.3	103.9	-10.0	-10.8	13.9	15.2
7	1063	1063	6.1	"	"	"	"	"	"
8	1058	1055	5.4	"	"	"	"	"	"
9	1059	1057	5.5	"	"	"	"	"	"
10	1061	1055	5.4	"	"	"	"	"	"
11	1066	1064	6.2	"	"	"	"	"	"
12	1061	1053	5.2	"	"	"	"	"	"
13	1051	1041	4.0	2.4	104.9	- 9.0	- 9.7	14.1	15.5
14	1052	1053	5.2	6.0	107.6	- 5.4	- 6.0	14.5	16.1
15	1045	1046	4.5	9.6	110.4	- 1.8	- 2.3	14.8	16.5
16	1054	1058	5.6	13.2	113.3	+ 1.8	+ 1.5	14.8	16.6
17	1081	1092	8.8	16.5	116.4	5.2	5.0	14.6	16.4
18	1090	1118	11.2	19.9	119.5	8.6	8.7	14.1	16.0
19	1141	1170	15.7	23.8	122.8	12.7	13.0	13.4	15.1
20	1179	1223	20.1	27.5	126.8	16.5	17.1	12.5	14.0
21	1296	1338	29.1	31.0	131.0	20.3	21.1	11.5	12.7
22	1347	1389	32.9	33.2	135.7	22.8	23.8	10.7	11.7
23	1403	1432	35.9	34.5	139.0	24.4	25.5	10.2	11.1

The second survey (November 1958 — April 1959)

Date	Counts/2hr ÷ 8		$\ln I_{PW}$ (%)	$\psi$	$\lambda$	$\phi$	$\phi^*$	$P_D$	$P_E$
	$I_P$	$I_{PW}$							
Nov. 13	1178	1203	28.5	32.1°N	134.8°E	21.6	22.6	11.0	12.2
14	1103	1115	20.9	29.3	131.6	18.6	19.4	11.9	13.3
15	1097	1095	19.1	26.5	128.4	15.6	16.2	12.7	14.3
16	—	—	—	23.2	125.4	12.2	12.5	13.5	15.3
17	1011	1003	10.3	20.4	122.2	9.2	9.4	14.0	15.9
18	976	971	7.1	18.0	118.5	6.7	6.7	14.4	16.3
19	967	961	6.0	15.0	115.0	3.6	+ 3.4	14.7	16.6
20	956	946	4.4	11.4	112.2	0.0	- 0.4	14.8	16.6
21	948	939	3.7	7.8	109.4	- 3.6	- 4.2	14.7	16.4
22	954	944	4.2	4.3	106.4	- 7.1	- 7.8	14.4	15.9
23	953	941	3.9	1.3	103.9	- 10.0	-10.8	13.9	15.2
24	971	962	6.1	"	"	"	"	"	"
25	965	955	5.5	"	"	"	"	"	"



Date	Counts/2hr ÷ 8		$\ln I_{PW}$ (%)	$\psi$	$\lambda$	$\phi$	$\theta^*$	$P_D$	$P_E$
	$I_P$	$I_{PW}$							
Nov. 26	960	958	5.7	"	"	"	"	"	"
27	956	949	4.8	"	"	"	"	"	"
28	947	947	4.5	1.9	102.5	- 9.4	-10.2	14.0	15.3
29	941	938	3.6	4.3	99.1	- 6.9	- 7.5	14.4	15.7
30	950	943	4.1	6.0	95.4	- 5.0	- 5.6	14.6	15.9
Dec. 1	950	945	4.3	3.6	91.9	- 7.2	- 7.8	14.3	15.5
2	955	946	4.4	0.9 N	88.1	- 9.7	-10.3	14.0	14.9
3	966	965	6.4	2.0 S	84.8	-12.3	-12.9	13.5	14.3
4	992	993	9.3	5.0	81.7	-15.0	-15.6	12.9	13.5
5	1030	1021	12.1	7.9	78.3	-17.5	-18.1	12.2	12.7
6	1077	1071	16.9	10.6	74.8	-19.8	-20.4	11.6	11.9
7	1120	1115	20.9	13.2	71.2	-22.0	-22.4	11.0	11.1
8	1150	1150	24.0	15.8	67.2	-24.0	-24.3	10.3	10.4
9	1213	1220	30.0	18.3	63.3	-25.9	-26.1	9.7	9.7
10	1270	1272	34.1	20.8	59.4	-27.7	-27.8	9.1	9.0
11	1320	1325	38.1	23.2	55.4	-29.4	-29.3	8.5	8.4
12	1374	1395	43.3	25.4	51.3	-30.9	-30.6	8.0	7.9
13	1444	1455	47.5	27.5	47.0	-32.2	-31.7	7.6	7.5
14	1474	1487	49.7	29.5	42.8	-33.3	-32.7	7.2	7.1
15	1532	1540	53.2	31.1	38.3	-34.0	-33.3	7.0	6.9
16	1550	1557	54.3	32.7	33.4	-34.6	-33.7	6.8	6.7
17	1581	1598	56.9	34.1	28.4	-35.0	-33.9	6.7	6.6
18	1552	1585	56.1	34.9	23.1	-34.7	-33.6	6.8	6.6
19	1560	1591	56.5	34.9	19.4	-34.0	-32.8	7.0	6.9
20	1535	1569	55.0	33.9	18.5	-32.9	-31.7	7.4	7.2
21	1554	1586	56.2	"	"	"	"	"	"
22	1571	1583	55.9	"	"	"	"	"	"
23	1567	1556	54.2	"	"	"	"	"	"
24	1582	1573	55.3	34.4	18.3	-33.3	-32.1	7.2	7.1
25	1629	1613	57.8	37.6	21.2	-37.0	-35.6	6.0	6.0
26	1653	1650	60.1	41.2	24.3	-41.1	-39.6	4.8	4.9
27	1648	1639	59.4	44.7	27.6	-45.1	-43.5	3.7	3.8
28	1642	1634	59.1	48.2	31.1	-49.1	-47.5	2.7	2.9
29	1647	1647	60.0	51.4	34.8	-52.9	-51.2	2.0	2.2
30	1659	1659	60.7	54.9	38.4	-56.9	-55.1	1.3	1.5
31	1657	1660	60.7	58.6	42.3	-61.1	-59.3	0.8	1.0
Jan. 1	1677	1652	60.2	62.4	46.4	-65.4	-63.5	0.4	0.6
2	1690	1677	61.7	65.7	51.5	-69.4	-67.4	0.2	0.3
3	1723	1722	64.3	65.9	46.4	-68.5	-66.4	0.3	0.4
4	1707	1692	62.6	66.0	40.0	-67.4	-65.0	0.3	0.4
5	1622	1577	55.6	66.3	41.2	-67.9	-65.5	0.3	0.4

Date	Counts/2hr ÷ 8		ln $I_{PW}$ (%)	$\phi$	$\lambda$	$\phi$	$\phi^*$	$P_D$	$P_E$		
	$I_P$	$I_{PW}$									
Jan.	6	1629	1598	56.9	67.0	41.8	-68.6	-66.2	0.3	0.4	
	7	1644	1648	60.0	66.7	44.2	-68.8	-66.5	0.3	0.4	
	8	1630	1621	58.3	67.1	41.7	-68.7	-66.3	0.3	0.4	
	9	1627	1625	58.6	67.3	40.2	-68.5	-66.1	0.8	0.4	
	10	1636	1642	59.6	67.4	40.1	-68.6	-66.2	0.3	0.4	
	11	1663	1662	60.8	67.4	39.9	-68.6	-66.1	0.3	0.4	
	12	1667	1652	60.2	67.4	40.3	-68.6	-66.2	0.3	0.4	
	13	1702	1665	61.0	67.5	40.4	-68.8	-66.3	0.3	0.4	
	14	1695	1670	61.3	67.6	40.4	-68.8	-66.4	0.3	0.4	
	15	1690	1656	60.4	67.7	40.3	-68.9	-66.4	0.2	0.4	
	16	1712	1668	61.2	"	40.2	-68.9	-66.4	0.2	0.4	
	17	1704	1659	60.6	"	40.1	-68.9	-66.4	0.3	0.4	
	18	1718	1682	62.0	"	39.9	-68.8	-66.3	0.3	0.4	
	19	1736	1686	62.3	"	39.8	-68.8	-66.3	0.3	0.4	
	20	1739	1682	62.0	"	39.7	-68.8	-66.3	0.3	0.4	
	21	1728	1682	62.0	"	39.6	-68.8	-66.3	0.3	0.4	
	22	1728	1672	61.4	67.8	39.1	-68.8	-66.3	0.3	0.4	
	23	1757	1717	64.1	67.9	38.7	-68.8	-66.2	0.3	0.4	
	24	1752	1738	65.3	"	38.3	-68.7	-66.2	0.3	0.4	
	25	1723	1725	64.5	"	37.9	-68.6	-66.1	0.3	0.4	
	26	1738	1764	66.8	"	37.5	-68.5	-66.0	0.3	0.4	
	27	1712	1771	67.1	"	37.4	-68.5	-66.0	0.3	0.4	
	28	1688	1741	65.5	"	"	"	"	"	"	
	29	1710	1763	66.7	"	37.3	-68.5	-65.9	0.3	0.4	
	30	1728	1751	66.0	"	37.2	-68.5	-65.9	0.3	0.4	
	31	1719	1717	64.1	"	"	"	"	"	"	
	Feb.	1	1730	1716	64.0	67.8	37.3	-68.4	-65.9	0.2	0.4
		2	1743	1741	65.4	"	37.4	-68.4	-65.9	0.3	0.4
		3	1691	1718	64.2	67.3	40.4	-68.6	-66.1	0.3	0.4
		4	1688	1668	61.2	67.1	40.1	-68.3	-65.9	0.3	0.4
		5	1723	1708	63.6	67.2	40.2	-68.5	-66.0	0.3	0.4
6		1716	1692	62.6	67.3	40.9	-68.7	-66.2	0.3	0.4	
7		1717	1674	61.6	66.6	45.5	-69.0	-66.7	0.2	0.3	
8		1733	1704	63.3	65.7	50.5	-69.2	-67.1	0.2	0.3	
9		1734	1690	62.5	66.7	44.8	-68.9	-66.6	0.2	0.3	
10		1743	1673	61.5	67.4	34.3	-67.5	-64.9	0.3	0.5	
11		1713	1679	61.8	67.7	30.9	-67.1	-64.4	0.3	0.5	
12		1695	1764	66.8	67.2	32.3	-66.9	-64.3	0.3	0.5	
13		1694	1769	67.0	63.7	30.0	-63.4	-60.9	0.6	0.8	
14		1698	1772	67.2	58.9	28.6	-59.6	-57.4	1.0	1.2	
15		1640	1749	65.9	56.9	27.9	-56.7	-54.6	1.3	1.6	

Date	Counts/2hr ÷ 8		ln $I_{PW}$ (%)	$\psi$	$\lambda$	$\phi$	$\phi^*$	$P_D$	$P_E$	
	$I_P$	$I_{PW}$								
Feb.	16	1676	1760	66.6	53.8	26.4	-53.5	-51.5	1.8	2.1
	17	1687	1764	66.8	50.1	24.4	-49.6	-47.8	2.6	2.8
	18	1649	1686	62.2	46.3	22.5	-45.6	-43.9	3.5	3.7
	19	1648	1683	62.1	42.6	20.7	-41.7	-40.1	4.6	4.7
	20	1688	1712	63.8	40.7	18.1	-39.4	-37.9	5.3	5.3
	21	1708	1714	63.9	37.7	18.2	-36.5	-35.1	6.2	6.1
	22	—	—	—	36.4	17.1	-35.0	-33.7	6.7	6.6
	23	—	—	—	34.4	17.9	-33.2	-32.0	7.2	7.1
	24	1633	1622	58.4	34.8	19.4	-33.9	-32.7	7.0	6.9
	25	1652	1628	58.7	33.9	18.5	-32.9	-31.7	7.4	7.2
	26	1679	1653	60.3	"	"	"	"	"	"
	27	1649	1632	59.0	"	"	"	"	"	"
	28	1656	1638	59.4	"	"	"	"	"	"
Mar.	1	1705	1687	62.3	"	"	"	"	"	"
	2	1673	1668	61.2	"	"	"	"	"	"
	3	1667	1652	60.2	34.4	18.4	-33.3	-32.1	7.2	7.0
	4	1627	1619	58.2	34.7	22.3	-34.5	-33.3	6.8	6.7
	5	1650	1642	59.6	34.0	26.9	-34.6	-33.5	6.8	6.7
	6	1639	1634	59.1	33.3	30.5	-34.6	-33.6	6.8	6.7
	7	1597	1577	55.6	32.1	34.6	-34.3	-33.4	6.9	6.8
	8	1577	1561	54.6	30.6	38.8	-33.6	-32.9	7.1	7.0
	9	1580	1545	53.5	29.2	42.7	-33.0	-32.4	7.3	7.2
	10	1570	1532	52.7	27.6	46.1	-32.1	-31.6	7.6	7.5
	11	1453	1419	45.0	25.6	50.0	-30.8	-30.5	8.0	7.9
	12	1368	1339	39.2	22.6	53.0	-28.4	-28.3	8.9	8.8
	13	1311	1291	35.6	19.5	55.9	-25.9	-25.9	9.7	9.6
	14	1224	1205	28.7	17.5	59.5	-24.5	-24.6	10.1	10.1
	15	1172	1157	24.6	15.6	62.8	-23.1	-23.4	10.6	10.6
	16	1149	1129	22.2	13.3	66.3	-21.4	-21.7	11.1	11.2
	17	1126	1099	19.4	10.9	71.0	-19.6	-20.1	11.6	11.9
	18	1099	1072	17.1	8.8	73.7	-17.9	-18.4	12.1	12.5
	19	1087	1066	16.4	6.4	77.6	-16.0	-16.5	12.6	13.1
	20	—	—	—	3.8	81.4	-13.8	-14.4	13.2	13.8
	21	1031	1014	11.4	1.3 S	85.0	-11.6	-12.2	13.6	14.4
	22	1012	1002	10.2	1.2 N	88.2	- 9.4	-10.0	14.0	15.0
	23	991	977	7.7	3.7	91.6	- 7.1	- 7.7	14.3	15.5
	24	980	962	6.2	6.0	95.5	- 5.0	- 5.6	14.6	15.9
	25	982	963	6.2	4.0	99.4	- 7.2	- 7.9	14.3	15.7
	26	999	987	8.7	2.0	102.4	- 9.3	-10.0	14.0	15.4
	27	989	988	8.7	1.3	103.9	-10.0	-10.8	13.9	15.2
	28	1000	1002	10.3	"	"	"	"	"	"

Date	Counts/2hr ÷ 8		$\ln I_{PW}$ (%)	$\psi$	$\lambda$	$\phi$	$\phi^*$	$P_D$	$P_E$
	$I_P$	$I_{PW}$							
Mar. 29	995	992	9.2	"	"	"	"	"	"
30	1002	991	9.1	"	"	"	"	"	"
31	1002	979	7.9	"	"	"	"	"	"
Apr. 1	1006	982	8.2	"	"	"	"	"	"
2	992	972	7.2	4.3	106.6	- 7.1	- 7.8	14.4	15.9
3	998	978	7.8	7.4	109.2	- 4.0	- 4.6	14.7	16.3
4	993	972	7.2	10.5	111.8	- 0.9	- 1.3	14.8	16.6
5	1007	988	8.8	13.7	114.5	+ 2.3	+ 2.1	14.8	16.6
6	1018	1004	10.4	16.6	117.3	5.3	5.2	14.5	16.4
7	1033	1012	11.2	19.6	120.1	8.4	8.4	14.2	16.0
8	1049	1020	12.0	23.1	122.7	12.0	12.2	13.6	15.3
9	1093	1061	15.9	26.5	125.7	15.5	16.0	12.8	14.3
10	1133	1129	22.1	30.1	129.5	19.3	20.0	11.7	13.1
11	1163	1166	25.4	32.3	133.7	21.8	22.7	11.0	12.1
12	1192	1185	27.0	33.9	137.7	23.7	24.7	10.4	11.4

The third survey (November 1959 — April 1970)

Date	Counts/2hr ÷ 8		$\ln I_{PW}$ (%)	$\psi$	$\lambda$	$\phi$	$\phi^*$	$P_D$	$P_E$
	$I_P$	$I_{PW}$							
Nov. 16	1733	1719	4.2	1.3°N	103.9°E	-10.0	-10.8	13.9	15.2
17	1744	1736	5.2	"	"	"	"	"	"
18	1751	1738	5.3	1.9	102.6	- 9.4	-10.2	14.0	15.3
19	1743	1724	4.5	4.5	98.9	- 6.7	- 7.3	14.4	15.8
20	1728	1715	3.9	5.7	95.5	- 5.3	- 5.9	14.5	15.9
21	1741	1735	5.1	3.8	91.8	- 7.0	- 7.6	14.4	15.5
22	1750	1755	6.3	1.5N	88.7	- 9.1	- 9.7	14.1	15.1
23	1763	1759	6.5	1.0 S	85.9	-11.4	-12.0	13.7	14.5
24	1803	1802	8.9	3.5	83.2	-13.6	-14.3	13.2	13.9
25	1847	1832	10.5	5.4	79.9	-15.2	-15.8	12.8	13.4
26	1879	1858	11.9	7.7	76.3	-17.1	-17.7	12.3	12.7
27	1928	1902	14.3	10.1	72.8	-19.1	-19.6	11.8	12.1
28	1972	1951	16.8	12.4	69.4	-20.9	-21.3	11.3	11.4
29	2040	2028	20.8	15.0	66.0	-23.0	-23.3	10.6	10.7
30	2177	2160	27.1	17.3	63.2	-24.9	-25.1	10.0	10.0
Dec. 1	2306	2281	32.5	20.4	59.4	-27.3	-27.4	9.2	9.2
2	2374	2340	35.0	22.1	55.3	-28.3	-28.3	8.9	8.8
3	2382	2421	38.4	23.9	51.4	-29.4	-29.2	8.5	8.4
4	2470	2563	44.2	25.8	47.5	-30.6	-30.2	8.1	8.0
5	2603	2638	47.0	27.7	42.8	-31.6	-31.0	7.8	7.7

Date	Counts/2hr ÷ 8		$\ln I_{PW}$ (%)	$\psi$	$\lambda$	$\phi$	$\phi^*$	$P_D$	$P_E$
	$I_P$	$I_{PW}$							
Dec. 6	2668	2666	48.1	28.5	38.0	-31.4	-30.8	7.8	7.7
7	2711	2719	50.1	29.7	33.4	-31.7	-30.9	7.8	7.6
8	2765	2784	52.4	32.5	28.9	-33.5	-32.6	7.1	7.0
9	2820	2823	53.8	34.4	24.4	-34.5	-33.4	6.8	6.7
10	2784	2779	52.3	35.0	19.7	-34.2	-32.9	6.9	6.8
11	2842	2853	54.9	33.9	18.5	-32.9	-31.7	7.4	7.2
12	2810	2827	54.0	"	"	"	"	"	"
13	2823	2823	53.8	"	"	"	"	"	"
14	2828	2820	53.7	"	"	"	"	"	"
15	2810	2820	53.7	"	"	"	"	"	"
16	2795	2793	52.7	"	"	"	"	"	"
17	2834	2825	53.9	"	"	"	"	"	"
18	2857	2851	54.8	34.4	18.5	-33.3	-32.1	7.2	7.0
19	2942	2947	58.1	37.7	20.2	-36.9	-35.5	6.1	6.0
20	3016	2983	59.3	41.3	22.4	-40.8	-39.3	4.9	4.9
21	3076	3031	60.9	45.0	24.9	-44.8	-43.2	3.7	3.9
22	3078	3070	62.2	48.6	27.9	-48.9	-47.1	2.8	3.0
23	3027	3047	61.5	52.3	31.4	-53.1	-51.3	1.9	2.1
24	2985	2991	59.6	55.7	35.0	-57.0	-55.1	1.3	1.5
25	2970	3014	60.4	59.2	38.7	-61.0	-59.0	0.8	1.0
26	3029	3001	59.9	62.5	43.9	-65.0	-63.0	0.5	0.6
27	2985	2985	59.4	65.0	47.3	-67.9	-65.8	0.3	0.4
28	2913	2935	57.7	66.2	42.4	-68.0	-65.7	0.3	0.4
29	2888	2907	56.7	65.8	34.5	-66.1	-63.7	0.4	0.5
30	2908	2954	58.3	66.3	41.5	-67.9	-65.6	0.3	0.4
31	2908	2953	58.3	—	—	—	—	—	—
Jan. 1	2908	2955	58.4	67.5	40.8	-68.8	-66.4	0.3	0.4
2	2947	2926	57.4	68.4	38.7	-69.2	-66.6	0.2	0.3
3	2964	2979	59.2	—	—	—	—	—	—
4	2991	3042	61.3	—	—	—	—	—	—
5	2957	3058	61.8	—	—	—	—	—	—
6	2936	3059	61.8	67.9	39.7	-69.0	-66.5	0.2	0.4
7	2881	2975	59.1	66.0	39.3	-67.2	-64.9	0.3	0.5
8	2926	2991	59.6	66.5	38.9	-67.6	-65.2	0.3	0.4
9	2871	2947	58.1	66.6	38.8	-67.7	-65.2	0.3	0.4
10	2872	2911	56.9	66.5	38.3	-67.5	-65.0	0.3	0.4
11	2898	2957	58.5	66.7	38.1	-67.6	-65.2	0.3	0.4
12	2912	2975	59.1	66.4	37.7	-67.3	-64.8	0.3	0.5
13	2920	3000	59.9	66.2	33.4	-66.3	-63.7	0.4	0.5
14	2802	2969	58.9	66.7	38.0	-67.6	-65.1	0.3	0.4
15	2809	2958	58.5	66.4	38.1	-67.3	-64.9	0.3	0.5

Date		Counts/2hr ÷ 8		ln $I_{PW}$ (%)	$\psi$	$\lambda$	$\phi$	$\phi^*$	$P_D$	$P_E$	
		$I_P$	$I_{PW}$								
Jan.	16	2809	2888	56.1	67.8	40.5	-69.0	-66.6	0.2	0.4	
	17	2807	3019	60.5	67.7	40.7	-69.0	-66.5	0.2	0.4	
	18	2830	3036	61.1	67.7	40.8	-69.0	-66.5	0.2	0.4	
	19	2824	2994	59.7	67.4	40.8	-68.7	-66.3	0.3	0.4	
	20	2903	3049	61.5	66.8	41.7	-68.4	-66.0	0.3	0.4	
	21	2865	3025	60.7	66.6	43.3	-68.5	-66.2	0.3	0.4	
	22	2918	2968	58.8	66.3	46.0	-68.8	-66.6	0.3	0.4	
	23	2860	2879	55.8	66.6	45.5	-69.0	-66.7	0.2	0.3	
	24	2902	2923	57.3	66.9	45.0	-69.1	-66.8	0.2	0.3	
	25	2894	2914	57.0	67.0	44.0	-69.0	-66.7	0.2	0.3	
	26	2929	2988	59.5	67.1	43.3	-69.0	-66.6	0.2	0.4	
	27	2888	2944	58.0	66.9	44.6	-69.1	-66.8	0.2	0.3	
	28	2931	2947	58.1	66.3	49.1	-69.4	-67.3	0.2	0.3	
	29	2910	2940	57.9	66.6	45.7	-69.0	-66.8	0.2	0.3	
	30	2885	2930	57.5	66.8	45.0	-69.1	-66.8	0.2	0.3	
	31	2889	2932	57.6	67.1	43.1	-68.9	-66.6	0.2	0.4	
	Feb.	1	2952	2936	57.7	67.9	40.6	-69.1	-66.7	0.2	0.3
		2	2897	2882	55.9	68.0	40.0	-69.1	-66.6	0.2	0.4
		3	2869	2844	54.6	68.1	39.6	-69.1	-66.6	0.2	0.4
		4	2924	2900	56.5	68.3	39.9	-69.3	-66.8	0.2	0.3
		5	2965	2913	57.0	"	"	"	"	"	"
		6	3022	3003	60.0	"	"	"	"	"	"
		7	3015	3018	60.5	"	"	"	"	"	"
		8	3066	3034	61.0	"	"	"	"	"	"
		9	3030	3073	62.3	"	"	"	"	"	"
		10	3042	3038	61.2	"	"	"	"	"	"
		11	3050	3085	62.7	67.6	40.0	-68.8	-66.3	0.3	0.4
		12	3056	3006	60.1	"	"	"	"	"	"
		13	2979	3024	60.7	67.0	40.2	-68.3	-65.9	0.3	0.4
		14	2953	2912	56.9	67.7	40.8	-69.0	-66.5	0.2	0.4
		15	3024	2986	59.4	66.7	44.7	-68.9	-66.6	0.2	0.4
16		2997	2967	58.8	66.1	50.1	-69.5	-67.4	0.2	0.3	
17		3063	3036	61.1	67.1	42.7	-68.9	-66.5	0.3	0.4	
18		2996	2950	58.2	67.8	39.8	-68.9	-66.4	0.2	0.4	
19		3050	3015	60.4	67.6	40.3	-68.8	-66.4	0.3	0.4	
20		3093	3064	62.0	67.6	33.7	-67.5	-66.0	0.3	0.5	
21		3066	3050	61.5	"	"	"	"	"	"	
22		3018	3033	61.0	"	"	"	"	"	"	
23		2958	2970	58.9	61.6	30.2	-61.5	-59.2	0.8	1.0	
24		2930	2947	58.1	59.8	29.4	-59.7	-57.5	1.0	1.2	
25		2982	3004	60.0	57.2	27.6	-56.9	-54.8	1.3	1.5	

Date	Counts/2hr ÷ 8		ln $I_{PW}$ (%)	$\psi$	$\lambda$	$\emptyset$	$\emptyset^*$	$P_D$	$P_E$	
	$I_P$	$I_{PW}$								
Feb.	26	2944	2985	59.4	54.7	26.5	-54.4	-52.3	1.7	1.9
	27	3002	2997	59.8	51.2	24.9	-50.8	-48.9	2.4	2.6
	28	3028	3008	60.2	48.2	23.0	-47.5	-45.7	3.1	3.3
	29	3013	2992	59.6	44.5	21.7	-43.7	-42.1	4.0	4.2
Mar.	1	2938	2923	57.3	41.7	20.0	-40.7	-39.2	4.9	5.0
	2	2917	2914	56.9	33.9	18.5	-32.9	-31.7	7.4	7.2
	3	2868	2853	54.9	"	"	"	"	"	"
	4	2860	2848	54.7	"	"	"	"	"	"
	5	2857	2833	54.2	"	"	"	"	"	"
	6	2857	2855	54.9	"	"	"	"	"	"
	7	2871	2855	54.9	"	"	"	"	"	"
	—	—	—	—	—	—	—	—	—	—
	13	2859	2825	53.9	33.0	33.0	-34.8	-33.9	6.7	6.6
	14	2820	2758	51.5	31.2	36.5	-33.8	-33.0	7.1	7.0
15	2736	2695	49.2	29.6	39.9	-32.9	-32.2	7.4	7.3	
16	2721	2659	47.8	28.1	43.1	-32.0	-31.5	7.7	7.5	
17	2555	2516	42.3	25.9	16.3	-30.5	-30.1	8.2	8.1	
18	2491	2454	39.8	24.4	49.9	-29.6	-29.4	8.4	8.3	
19	2379	2360	35.9	22.8	53.8	-28.8	-28.6	8.7	8.7	
20	2304	2282	32.6	21.0	57.5	-27.6	-27.6	9.1	9.1	
21	2236	2205	29.1	18.6	61.1	-25.8	-26.0	9.7	9.7	
22	2144	2097	24.1	16.1	64.4	-23.9	-24.1	10.3	10.4	
23	2044	2007	19.7	12.5	67.7	-20.8	-21.2	11.3	11.4	
24	2006	1969	17.8	10.9	71.2	-19.7	-10.1	11.6	11.9	
25	1948	1917	15.1	8.7	74.6	-17.9	-18.4	12.1	12.5	
26	1902	1872	12.7	6.5	78.0	-16.1	-16.7	12.6	13.1	
27	1861	1804	9.0	4.1	81.8	-14.1	-14.7	13.1	13.7	
28	1811	1802	8.9	1.2 S	85.3	-11.5	-12.2	13.6	14.5	
29	1804	1792	8.4	1.7 N	88.9	- 8.9	- 9.5	14.1	15.1	
30	1770	1757	6.4	4.1	92.6	- 6.8	- 7.4	14.4	15.6	
31	1753	1745	5.7	5.7	96.0	- 5.4	- 5.9	14.5	15.9	
Apr.	1	1751	1773	7.3	3.7	99.8	- 4.5	- 8.2	14.3	15.6
	2	1751	1765	6.9	1.6	103.0	- 9.7	-10.5	14.0	15.3
	3	1764	1802	8.9	1.3	103.9	-10.0	-10.8	13.9	15.2
	4	1768	1793	8.4	"	"	"	"	"	"
	5	1792	1820	9.9	"	"	"	"	"	"
	6	1775	1818	9.8	"	"	"	"	"	"
	7	1773	1809	9.3	1.6	104.3	- 9.7	-10.5	14.0	15.3
	8	1757	1781	7.8	4.2	106.5	- 7.2	- 7.9	14.3	15.8
	9	1767	1779	7.6	7.2	108.9	- 4.2	- 4.8	14.6	16.3
	10	1789	1798	8.7	10.3	111.5	- 1.1	- 1.5	14.8	16.6

Date	Counts/2hr ÷ 8		$\ln I_{PW}$ (%)	$\phi$	$\lambda$	$\phi$	$\phi^*$	$P_D$	$P_E$
	$I_P$	$I_{PW}$							
Apr. 11	1800	1795	8.5	13.4	114.2	+ 2.0	+ 1.7	14.8	16.6
12	1844	1833	10.6	16.2	116.9	4.9	4.7	14.6	16.5
13	1857	1846	11.3	19.3	119.9	8.1	8.1	14.2	16.1
14	1915	1914	15.0	22.4	123.1	11.3	11.5	13.7	15.5
15	1940	1930	15.8	25.0	126.3	14.0	14.4	13.1	14.8
16	1976	1971	17.9	26.2	127.7	15.3	15.8	12.8	14.4
17	1972	1964	17.5	"	"	"	"	"	"
18	1966	1951	16.8	26.8	127.8	15.9	16.4	12.7	14.2
19	1988	1978	18.2	30.3	129.7	19.5	20.3	11.7	13.0
20	2023	2003	19.5	32.7	133.1	22.2	23.1	10.9	12.0
21	2165	2037	21.2	34.0	136.6	23.7	24.8	10.4	11.4
22	2189	2170	27.5	35.8	139.7	25.7	26.9	9.7	10.6

The fourth survey (November 1960 — May 1961)

Date	Counts/2hr ÷ 8		$\ln I_{PW}$ (%)	$\phi$	$\lambda$	$\phi$	$\phi^*$	$P_D$	$P_E$
	$I_P$	$I_{PW}$							
Nov. 10	1896	1896	34.0	35.8°N	139.7°E	25.7	26.9	9.7	10.6
11	1894	1898	34.1	"	"	"	"	"	"
12	1834	1853	31.7	34.4	138.5	24.2	25.4	10.2	11.2
13	1727	1801	28.9	32.7	134.3	22.2	23.2	10.9	12.0
14	1651	1753	26.2	30.3	131.2	19.6	20.4	11.7	12.9
15	1558	1639	19.4	26.6	128.6	15.7	16.3	12.7	14.3
16	1528	1594	16.6	23.6	125.5	12.6	12.9	13.4	15.2
17	1517	1562	14.6	20.5	122.2	9.3	9.5	14.0	15.9
18	1486	1519	11.8	17.7	119.1	6.4	6.4	14.4	16.3
19	1474	1500	10.5	14.9	116.0	3.6	3.4	14.7	16.6
20	1455	1472	8.7	11.9	113.0	+ 0.5	+ 0.2	14.8	16.6
21	1427	1446	6.9	8.9	109.9	- 2.5	- 3.0	14.7	16.5
22	1421	1449	7.1	5.7	107.2	- 5.7	- 6.3	14.5	16.1
23	1425	1451	7.3	2.2	104.9	- 9.2	- 9.9	14.1	15.4
24	1424	1458	7.7	1.3	103.9	-10.0	-10.8	13.9	15.2
25	1442	1457	7.7	"	"	"	"	"	"
26	1429	1440	6.5	"	"	"	"	"	"
27	1462	1465	8.2	"	"	"	"	"	"
28	1463	1470	8.6	"	"	"	"	"	"
29	1462	1472	8.7	"	"	"	"	"	"
30	1452	1472	8.7	2.1	102.3	- 9.2	- 9.9	14.1	15.4
Dec. 1	1436	1444	6.8	4.6	98.6	- 6.6	- 7.2	14.4	15.8
2	1452	1458	7.7	5.6	95.0	- 5.4	- 6.0	14.5	15.8



Date	Counts/2hr ÷ 8		ln $I_{PW}$ (%)	$\psi$	$\lambda$	$\phi$	$\phi^*$	$P_D$	$P_E$	
	$I_P$	$I_{PW}$								
Dec.	3	1472	1478	9.1	3.5	91.4	— 7.3	— 7.9	14.3	15.5
	4	1487	1492	10.0	1.2N	88.0	— 9.4	—10.0	14.0	15.0
	5	1523	1522	12.0	1.5 S	84.7	—11.8	—12.4	13.6	14.4
	6	1539	1550	13.9	4.0	81.3	—14.0	—14.6	13.1	13.8
	7	1571	1575	15.4	6.2	78.1	—15.8	—16.4	12.7	13.2
	8	1601	1615	17.9	8.3	74.6	—17.5	—18.0	11.7	12.6
	9	1629	1639	19.4	10.7	71.3	—19.5	—19.9	12.2	11.9
	10	1695	1726	24.6	13.0	67.5	—21.3	—21.6	11.2	11.3
	11	1790	1803	29.0	15.4	63.7	—23.1	—23.3	10.6	10.6
	12	1871	1890	33.7	18.1	60.2	—25.2	—25.3	9.9	9.9
	13	1973	1999	39.3	20.3	56.3	—26.7	—26.7	9.4	9.3
	14	2013	2066	42.6	22.6	52.5	—28.3	—28.2	8.9	8.8
	15	2134	2159	47.0	24.8	48.3	—29.8	—29.4	8.4	8.3
	16	2220	2247	51.0	26.7	44.1	—30.8	—30.4	8.0	7.9
	17	2313	2336	54.9	28.7	39.4	—31.9	—31.2	7.7	7.6
	18	2413	2372	57.4	30.5	35.1	—32.8	—32.0	7.4	7.3
	19	2460	2456	59.9	32.2	31.1	—33.7	—32.7	7.1	7.0
	20	2514	2515	62.3	34.2	25.9	—34.6	—33.5	6.8	6.7
	21	2534	2525	62.7	34.8	21.3	—34.3	—33.1	6.9	6.8
	22	2540	2533	63.0	34.2	19.6	—33.4	—32.2	7.2	7.0
	23	2515	2505	61.8	33.9	18.5	—32.9	—31.7	7.4	7.2
	24	2483	2471	60.5	"	"	"	"	"	"
	25	2509	2461	60.1	"	"	"	"	"	"
	26	2456	2498	61.6	"	"	"	"	"	"
	27	2479	2501	61.7	"	"	"	"	"	"
	28	2509	2496	61.5	"	"	"	"	"	"
	29	2591	2569	64.4	36.6	19.9	—35.7	—34.5	6.4	6.3
	30	2673	2658	67.8	39.8	22.5	—39.4	—37.9	5.3	5.3
	31	2730	2721	70.1	43.1	25.3	—43.1	—41.6	4.2	4.3
Jan.	1	2754	2731	70.5	46.4	28.8	—46.9	—45.3	3.2	3.4
	2	2779	2782	72.4	49.6	32.3	—50.7	—49.0	2.4	2.6
	3	2810	2817	73.6	52.9	35.6	—54.5	—52.7	1.7	1.9
	4	2772	2811	73.4	56.5	39.3	—58.6	—56.8	1.1	1.3
	5	2788	2779	72.2	60.1	43.0	—62.7	—60.7	0.7	0.8
	6	2782	2758	71.5	63.5	47.1	—66.6	—64.6	0.4	0.5
	7	2795	2770	71.9	66.4	49.0	—69.5	—67.4	0.2	0.3
	8	2791	2775	72.1	67.3	42.4	—69.0	—66.6	0.2	0.4
Level change										
14	2903	2852	74.8	67.8	40.3	—69.0	—66.5	0.2	0.4	
15	2915	2929	77.5	67.7	40.5	—68.9	—66.5	0.2	0.4	
16	2905	2865	75.3	67.1	37.1	—67.8	—65.3	0.3	0.4	

Date	Counts/2hr ÷ 8		ln $I_{PW}$ (%)	$\phi$	$\lambda$	$\phi$	$\phi^*$	$P_D$	$P_E$	
	$I_P$	$I_{WP}$								
Jan.	17	2906	2862	75.2	67.2	39.3	-68.3	-65.8	0.3	0.4
	18	2925	2845	74.6	66.6	44.6	-68.8	-66.5	0.3	0.4
	19	2907	2855	75.0	68.1	40.1	-69.2	-66.7	0.2	0.3
	20	2914	2878	75.8	68.1	39.8	-69.1	-66.6	0.2	0.3
	21	2900	2918	77.1	68.2	39.5	-69.2	-66.7	0.2	0.3
	22	2861	2887	76.0	"	"	"	"	"	"
	23	2845	2848	74.7	68.3	38.9	-69.1	-66.6	0.2	0.4
	24	2861	2868	75.4	68.2	38.8	-69.0	-66.5	0.2	0.4
	25	2886	2896	76.3	"	"	"	"	"	"
	26	2898	2896	76.3	"	"	"	"	"	"
	27	2878	2864	75.2	68.0	39.4	-69.0	-66.5	0.2	0.4
	28	2865	2820	73.7	"	"	"	"	"	"
	29	2885	2827	73.9	67.9	39.6	-68.9	-66.4	0.2	0.4
	30	—	—	—	"	"	"	"	"	"
	31	—	—	—	68.1	39.8	-69.1	-66.6	0.2	0.3
Feb.	1	2901	2815	73.5	"	"	"	"	"	"
	2	2920	2823	73.8	68.0	39.6	-69.0	-66.5	0.2	0.4
	3	2913	2877	75.7	68.2	40.3	-69.3	-66.8	0.2	0.3
	4	2892	2874	75.6	"	40.1	-69.3	-66.8	0.2	0.3
	5	2842	2825	73.9	68.1	39.7	-69.1	-66.6	0.2	0.3
	6	2883	2825	73.9	67.9	39.8	-69.0	-66.5	0.2	0.4
	7	2924	2862	75.2	67.6	41.9	-69.1	-66.7	0.2	0.3
	8	2927	2841	74.4	67.2	43.1	-69.0	-66.7	0.2	0.3
	9	2916	2912	76.9	67.0	45.9	-69.4	-67.1	0.2	0.3
	10	2953	2920	77.2	67.3	45.1	-69.5	-67.2	0.2	0.3
	11	2934	2883	75.9	67.2	44.9	-69.4	-67.1	0.2	0.3
	12	2920	2891	76.2	"	"	"	"	"	"
	13	2922	2863	75.2	67.3	43.5	-69.2	-66.8	0.2	0.3
	14	2941	2914	77.0	"	44.1	-69.3	-67.0	0.2	0.3
	15	2917	2912	76.9	66.7	50.1	-70.0	-67.8	0.2	0.3
	16	2887	2922	77.2	"	50.0	-70.0	-67.8	0.2	0.3
	17	2876	2918	77.1	66.5	48.6	-69.5	-67.3	0.2	0.3
	18	2906	2882	75.8	66.7	47.4	-69.4	-67.2	0.2	0.3
	19	2886	2884	75.9	66.9	44.5	-69.0	-66.7	0.2	0.3
	20	2894	2909	76.8	67.6	41.9	-69.1	-66.7	0.2	0.3
	21	2900	2880	75.8	67.8	40.9	-69.1	-66.6	0.2	0.3
	22	2910	2891	76.2	68.2	39.7	-69.2	-66.7	0.2	0.3
	23	2945	2930	77.6	68.3	39.1	-69.2	-66.6	0.2	0.3
	24	2935	2906	76.7	"	39.7	-69.3	-66.8	0.2	0.3
	25	2921	2861	75.1	"	39.3	-69.2	-66.7	0.2	0.3
	26	2940	2862	75.2	68.8	38.9	-69.6	-67.0	0.2	0.3

Date	Counts/2hr÷8		$\ln I_{PW}$ (%)	$\psi$	$\lambda$	$\phi$	$\phi^*$	$P_D$	$P_E$
	$I_P$	$I_{PW}$							
Feb. 27	2966	2889	76.2	68.2	38.6	-69.0	-66.5	0.2	0.4
28	2958	2937	77.8	68.4	33.1	-68.1	-65.5	0.3	0.4
Mar. 1	2958	2955	78.4	68.9	30.9	-68.1	-65.4	0.3	0.4
2	2966	2995	79.7	69.0	30.7	-68.2	-65.5	0.3	0.4
3	2939	2974	79.0	68.5	30.2	-67.7	-65.0	0.3	0.5
4	2898	2897	76.4	65.2	28.5	-64.4	-61.9	0.5	0.7
5	2888	2825	73.9	62.3	27.2	-61.6	-59.2	0.8	1.0
6	2883	2800	73.0	58.9	25.9	-58.2	-55.9	1.1	1.4
7	2903	2880	75.8	56.6	26.1	-56.1	-53.9	1.4	1.7
8	2883	2840	74.4	53.6	24.9	-53.0	-51.0	1.9	2.2
9	2891	2865	75.3	50.9	23.6	-50.2	-48.3	2.5	2.7
10	2863	2846	74.6	47.4	22.0	-46.6	-44.8	3.3	3.5
11	2825	2823	73.8	43.8	20.8	-42.9	-41.3	4.3	4.4
12	2845	2848	74.7	39.7	19.4	-38.7	-37.2	5.5	5.5
13	2702	2717	70.0	36.4	18.6	-35.3	-34.0	6.6	6.5
14	2697	2694	79.1	33.9	18.5	-32.9	-31.7	7.4	7.2
15	2710	2693	79.1	"	"	"	"	"	"
16	2754	2735	70.6	"	"	"	"	"	"
17	2719	2723	70.2	"	"	"	"	"	"
18	2737	2747	71.1	"	"	"	"	"	"
19	2748	2739	70.8	"	"	"	"	"	"
20	2746	2735	70.6	"	"	"	"	"	"
21	2757	2742	70.9	34.7	22.0	-34.3	-33.1	6.9	6.8
22	2742	2715	69.9	33.8	26.7	-34.4	-33.3	6.9	6.8
23	2717	2688	68.9	32.5	30.5	-33.9	-32.9	7.0	6.9
24	2653	2628	66.7	31.0	34.5	-33.2	-32.4	7.3	7.1
25	2613	2585	65.0	29.0	38.7	-32.1	-31.4	7.6	7.5
26	2516	2480	60.9	27.8	42.3	-31.6	-31.0	7.8	7.7
27	2435	2394	57.3	26.6	45.4	-31.0	-30.5	8.0	7.9
28	2304	2305	53.6	24.8	48.7	-29.8	-29.5	8.4	8.3
29	2239	2237	50.5	22.4	52.2	-28.1	-27.9	9.0	8.9
30	2165	2165	47.3	20.5	55.8	-26.3	-26.8	9.4	9.3
31	2158	2154	46.8	20.3	56.8	-26.8	-26.8	9.4	9.3
Apr. 1	2152	2142	46.2	"	"	"	"	"	"
2	2138	2131	45.7	19.9	57.4	-26.5	-26.5	9.5	9.4
3	2038	2032	40.9	17.5	60.8	-24.7	-24.9	10.1	10.1
4	1939	1938	36.2	15.4	64.2	-23.2	-23.4	10.6	10.6
5	1867	1863	32.2	13.3	67.5	-21.6	-21.9	11.1	11.2
6	1809	1813	29.5	11.0	70.7	-19.7	-20.1	11.6	11.8
7	1769	1764	26.8	8.8	73.9	-17.9	-18.4	12.1	12.5
8	1717	1716	24.0	6.3	77.2	-15.8	-16.4	12.7	13.1

Date	Counts/2hr ÷ 8		ln $I_{PW}$ (%)	$\phi$	$\lambda$	$\phi$	$\phi^*$	$P_D$	$P_E$	
	$I_P$	$I_{PW}$								
Apr.	9	1682	1677	21.7	3.7	81.2	−13.7	−14.3	13.2	13.8
	10	1623	1623	18.5	1.1 S	84.9	−11.4	−12.0	13.7	14.5
	11	1629	1629	18.8	0.9 N	88.3	− 9.7	−10.3	14.0	14.9
	12	1606	1606	17.4	3.5	92.0	− 7.3	− 7.9	14.3	15.5
	13	1605	1598	16.9	5.6	94.8	− 5.4	− 6.0	14.5	15.8
	14	1603	1608	17.5	4.4	98.8	− 6.8	− 7.4	14.4	15.7
	15	1595	1605	17.3	2.1	102.1	− 9.2	− 9.9	14.1	15.4
	16	1586	1609	17.6	1.3	103.9	−10.0	−10.8	13.9	15.2
	17	1582	1605	17.3	"	"	"	"	"	"
	18	1581	1591	16.5	"	"	"	"	"	"
	19	—	—	—	"	"	"	"	"	"
	20	1584	1589	16.3	"	"	"	"	"	"
	21	1590	1588	16.3	1.8	104.4	− 9.5	−10.3	14.0	15.3
	22	1614	1601	17.1	5.0	106.9	− 6.4	− 7.0	14.4	16.0
	23	1595	1590	16.4	8.4	109.6	− 3.0	− 3.5	14.7	16.4
	24	1608	1600	17.0	11.5	112.5	+ 0.1	− 0.3	14.8	16.6
	25	1617	1616	18.0	14.5	115.4	3.1	+ 2.9	14.7	16.6
	26	—	—	—	17.6	118.6	6.3	6.3	14.4	16.3
	27	1658	1653	20.6	20.5	121.0	9.3	9.4	14.0	15.9
	28	1697	1693	22.7	23.7	123.4	12.6	12.9	13.4	15.1
	29	—	—	—	25.6	127.3	14.7	15.1	13.0	14.6
	30	2015	2010	39.9	28.8	130.4	18.1	18.7	12.1	13.5
May	1	2062	2067	42.6	32.0	133.6	21.5	22.4	11.1	12.3
	2	2108	2110	44.7	33.9	136.7	23.6	24.7	10.4	11.4
	3	2137	2132	45.8	35.8	139.7	25.7	26.9	9.7	10.6

The fifth survey (October 1961 — April 1962)

Date		Counts/2hr ÷ 8		$\ln I_{PW}$ (%)	$\phi$	$\lambda$	$\phi$	$\phi^*$	$P_D$	$P_E$
		$I_P$	$I_{PW}$							
Oct.	30	1283	1284	35.0	35.0°N	138.5°E	24.8	26.0	10.0	10.9
	31	1197	1191	27.5	32.5	135.0	22.1	23.0	10.9	12.0
Nov.	1	1178	1163	25.1	30.0	131.5	19.3	20.1	11.7	13.0
	2	1101	1094	19.0	27.3	129.1	16.5	17.1	12.5	14.0
	3	1080	1077	17.4	24.2	126.0	13.2	13.6	13.3	15.0
	4	1049	1041	14.0	21.1	122.9	10.0	10.1	13.9	15.8
	5	1011	1000	10.0	18.1	119.7	6.9	6.8	14.4	16.3
	6	1004	994	9.4	15.2	116.6	3.9	3.7	14.7	16.6
	7	988	977	7.7	12.1	113.4	+ 0.7	+ 0.4	14.8	16.6
	8	971	962	6.1	9.0	110.2	− 2.4	− 2.9	14.7	16.5

Date	Counts/2hr ÷ 8		$\ln I_{PW}$ (%)	$\phi$	$\lambda$	$\phi$	$\phi^*$	$P_D$	$P_E$
	$I_P$	$I_{PW}$							
Nov. 9	973	968	6.8	6.1	107.6	- 5.3	- 5.9	14.5	16.1
10	981	974	7.4	2.4	105.1	- 9.0	- 9.7	14.1	15.5
11	987	977	7.7	1.3	103.9	-10.0	-10.8	13.9	15.2
12	983	971	7.1	"	"	"	"	"	"
16	966	961	5.9	1.3	103.9	-10.0	-10.8	13.9	15.2
17	967	963	6.2	3.9	99.6	- 7.3	- 8.0	14.3	15.7
18	963	957	5.5	5.8	96.0	- 5.3	- 5.8	14.6	15.9
19	970	960	5.8	4.2	92.4	- 6.7	- 7.2	14.4	15.6
20	986	974	7.4	1.7N	89.0	- 8.9	- 9.5	14.1	15.1
21	1001	988	8.8	0.8S	85.4	-11.2	-11.8	13.7	14.6
22	1012	1006	10.6	3.4	81.8	-13.4	-14.0	13.2	13.9
23	1040	1027	12.7	5.9	78.2	-15.5	-16.1	12.8	13.2
24	1084	1077	17.4	8.6	74.6	-17.8	-18.3	12.2	12.5
25	1115	1104	21.0	11.3	71.4	-20.1	-20.5	11.5	11.7
26	1148	1141	23.2	13.7	67.9	-22.0	-22.4	10.9	11.1
27	1204	1198	18.1	16.2	64.2	-23.9	-24.2	10.3	10.4
28	1266	1261	33.2	18.8	60.6	-26.0	-26.1	9.7	9.6
29	1327	1306	36.7	21.1	56.8	-27.6	-27.6	9.1	9.1
30	1364	1339	39.2	22.9	52.8	-28.7	-28.5	8.8	8.7
Dec. 1	1416	1391	43.0	24.8	48.6	-29.8	-29.5	8.4	8.3
2	1452	1443	46.7	26.7	44.6	-30.9	-30.5	8.0	7.9
3	1545	1526	52.3	28.2	41.0	-31.7	-31.1	7.8	7.6
4	1592	1571	55.3	30.1	36.6	-32.7	-32.0	7.4	7.3
5	1642	1625	58.6	32.0	32.1	-33.7	-32.8	7.1	7.0
6	1680	1682	56.0	34.0	27.5	-34.7	-33.6	6.8	6.7
7	1677	1661	60.8	35.0	21.5	-34.5	-33.3	6.8	6.7
8	1635	1647	59.9	34.0	18.4	-32.9	-31.7	7.3	7.2
9	1650	1642	59.6	33.9	18.5	-32.9	-31.7	7.4	4.2
13	1653	1648	60.0	"	"	"	"	"	"
14	1668	1667	61.1	"	"	"	"	"	"
15	1716	1714	63.9	36.9	19.7	-36.0	-34.7	6.3	6.3
16	1754	1747	65.8	40.1	22.4	-39.6	-38.2	5.2	5.2
17	1797	1791	68.3	43.7	25.5	-43.7	-42.2	4.0	4.2
18	1823	1801	68.8	47.7	28.5	-48.1	-46.5	2.9	3.1
19	1835	1811	69.4	51.5	31.4	-52.3	-50.5	2.1	2.3
23	1872	1828	70.4	65.3	44.7	-67.7	-65.5	0.3	0.4
24	1848	1835	70.7	66.5	45.9	-69.0	-66.7	0.2	0.3
25	1856	1830	70.5	65.8	42.2	-67.6	-65.3	0.3	0.4

Date	Counts/4hr ÷ 16		ln $I_{PW}$ (%)	$\psi$	$\lambda$	$\phi$	$\phi^*$	$P_D$	$P_E$		
	$I_P$	$I_{PW}$									
Dec.	26	1882	1838	70.9	66.5	40.6	-67.9	-65.5	0.3	0.4	
	27	1831	1797	68.6	66.3	40.3	-67.7	-65.3	0.3	0.4	
	28	1822	1762	66.7	66.3	40.3	-67.7	-65.3	0.3	0.4	
	29	1813	1780	67.7	65.8	40.3	-67.3	-64.9	0.3	0.5	
	30	1809	1790	68.3	65.9	43.0	-67.9	-65.6	0.3	0.4	
	31	1814	1763	66.7	66.0	42.7	-67.9	-65.6	0.3	0.4	
Jan.	24	1862	1779	67.6	67.6	34.0	-67.6	-65.0	0.3	0.4	
	25	1866	1777	67.5	67.7	34.0	-67.7	-65.1	0.3	0.4	
	26	1862	1773	67.3	67.8	33.6	-67.7	-65.1	0.3	0.4	
	27	1842	1747	65.8	67.9	32.8	-67.6	-65.0	0.3	0.4	
	28	1844	1786	68.0	67.9	32.3	-67.5	-64.9	0.3	0.5	
	29	1844	1775	67.4	67.9	31.6	-67.4	-64.8	0.3	0.5	
	30	1838	1761	66.6	67.8	31.3	-67.3	-64.6	0.3	0.5	
	31	1851	1780	67.7	67.6	31.6	-67.1	-64.5	0.3	0.5	
	Feb.	1	1866	1797	68.6	67.5	31.7	-67.1	-64.5	0.3	0.5
		2	1871	1785	68.0	67.3	36.8	-67.9	-65.4	0.3	0.4
		3	1873	1791	68.3	67.7	40.1	-68.9	-66.4	0.3	0.4
		4	1861	1783	67.8	67.8	39.9	-68.9	-66.4	0.2	0.4
5		1812	1793	68.4	67.8	39.5	-68.8	-66.3	0.3	0.4	
6		1806	1804	69.0	67.8	39.3	-68.8	-66.3	0.3	0.4	
7		1792	1778	67.5	67.8	39.1	-68.8	-66.3	0.3	0.4	
8		1806	1788	68.1	67.8	38.8	-68.7	-66.2	0.3	0.4	
	12	1847	1816	69.7	67.8	35.7	-68.1	-65.5	0.3	0.4	
	13	1844	1816	69.7	67.8	35.3	-68.0	-65.4	0.3	0.4	
	14	1854	1823	70.1	67.7	35.1	-67.9	-65.3	0.3	0.4	
	15	1830	1811	69.4	67.7	34.9	-67.9	-65.3	0.3	0.4	
	16	1840	1807	69.2	65.9	33.3	-66.0	-63.5	0.4	0.6	
	17	1824	1784	67.9	62.8	31.5	-62.9	-60.5	0.6	0.8	
	18	1815	1798	68.7	60.0	30.2	-60.0	-57.8	0.9	1.1	
	19	1810	1800	68.8	57.5	28.8	-57.5	-56.3	1.2	1.5	
	24	1735	1769	67.1	40.8	20.8	-40.0	-38.5	5.1	5.2	
	25	1697	1715	64.0	36.5	19.3	-35.5	-34.2	6.5	6.4	
26	1644	1657	60.5	33.9	18.5	-32.9	-31.7	7.4	7.2		
27	1632	1646	59.9	"	"	"	"	"	"		
Mar.	5	1662	1674	61.6	33.9	18.5	"	"	"	"	
	6	1670	1682	62.0	"	"	"	"	"	"	
	7	1679	1688	62.4	34.5	23.1	-34.3	-33.2	6.9	6.8	
	8	1691	1701	63.2	33.6	27.5	-34.3	-33.3	6.9	6.8	

Date	Counts/4hr ÷ 16		$\ln I_{PW}$ (%)	$\psi$	$\lambda$	$\phi$	$\phi^*$	$P_D$	$P_E$
	$I_P$	$I_{PW}$							
Mar. 9	1663	1664	61.0	32.3	30.8	-33.7	-32.8	7.1	7.0
10	1627	1624	58.5	30.9	34.8	-33.1	-32.3	7.3	7.2
11	1568	1570	55.1	28.8	38.9	-31.9	-31.2	7.7	7.6
12	1509	1511	51.3	26.9	42.9	-30.8	-30.3	8.1	7.9
13	1471	1465	48.2	25.8	46.4	-30.4	-30.0	8.2	8.1
14	1475	1461	47.9	24.2	49.6	-29.4	-29.1	8.5	8.4
15	1406	1401	43.7	22.5	53.4	-28.4	-28.3	8.9	8.8
16	1332	1336	39.0	21.0	57.2	-27.6	-27.6	9.1	9.1
17	1277	1273	34.2	18.8	60.5	-25.9	-26.1	9.7	9.7
18	1219	1219	29.8	16.4	63.7	-24.1	-24.3	10.3	10.3
21	1072	1075	17.2	9.3	74.0	-18.4	-18.9	12.0	12.3
22	1050	1049	14.8	7.0	76.9	-16.5	-17.0	12.5	12.9
23	1031	1023	12.3	4.6	80.5	-14.5	-15.1	13.0	13.6
24	999	990	9.0	2.0 S	84.1	-12.2	-12.9	13.5	14.3
25	989	985	8.5	0.5 N	87.6	-10.0	-10.7	13.9	14.9
26	971	970	7.0	3.0	91.0	- 7.8	- 8.4	14.3	15.4
27	959	963	6.2	5.5	94.3	- 5.5	- 6.0	14.5	15.8
28	—	—	—	5.0	98.1	- 6.2	- 6.8	14.5	15.8
29	987	986	9.6	2.6	101.4	- 8.7	- 9.4	14.1	15.5
30	984	976	7.6	1.3	103.9	-10.0	-10.8	13.9	15.2
31	982	985	8.5	"	"	"	"	"	"
Apr. 1	988	981	8.1	"	"	"	"	"	"
2	971	991	9.1	"	"	"	"	"	"
3	961	976	7.6	"	"	"	"	"	"
4	972	966	6.5	"	"	"	"	"	"
5	972	972	7.2	4.7	106.8	- 6.7	- 7.4	14.4	15.9
6	963	966	6.5	7.7	109.5	- 3.7	- 4.3	14.7	16.4
7	974	973	7.3	10.8	112.2	- 0.6	- 1.0	14.8	16.6
8	983	984	8.4	14.0	115.1	+ 2.6	+ 2.4	14.7	16.6
9	—	—	—	17.0	118.0	5.7	5.6	14.5	16.4
10	(981)	(980)	(8.0)	19.9	120.6	8.7	8.8	14.1	16.0
11	1039	1035	13.4	22.3	123.5	11.2	11.4	13.7	15.5
12	1075	1068	16.6	25.1	126.8	14.2	14.6	13.1	14.7
13	—	—	—	28.1	130.1	17.3	18.0	12.3	13.7
14	1169	1162	25.0	30.7	132.5	20.1	20.9	11.5	12.8
15	1232	1213	29.3	33.8	137.5	23.6	24.6	10.5	11.4
16	1270	1274	34.2	34.7	138.3	24.5	25.7	10.1	11.1

## (II) Meson Component

## The first survey

Date	$I_P$	Date	$I_P$	Date	$I_P$
Nov. 8	1033	Dec. 1	109	—	—
9	963	2	172	30	1207
10	688	3	234	31	1262
11	561	4	319	Jan. 1	1435
12	277	5	390	2	1562
13	247	6	462	3	1566
14	146	7	636	4	1933
15	101	8	798	5	1890
16	92	9	949	6	1921
—	—	10	999	7	1896
23	45	11	1172	No observation on home- ward voyage	
24	82	12	1316		
25	88	13	1394		
26	128	14	1441		
27	87	15	1453		
28	77	16	1468		
29	56	17	1479		
30	—	18	1463		

## The fourth survey

Date	$I_P$	Date	$I_P$	Date	$I_P$	Date	$I_P$
Nov. 11	1314	28	—	15	1688	2	2136
12	1157	29	656	16	1768	3	2269
13	1023	30	673	17	1686	4	2297
14	1023	Dec. 1	689	18	1861	5	2277
15	786	2	633	19	1888	6	2263
16	686	3	717	20	1872	7	2210
17	657	4	683	21	1887	Mar. 8	2271
18	391	5	898	22	1940	9	2264
19	493	6	898	23	1858	10	2135
20	—	7	1008	24	1830	11	2051
21	491	8	—	25	1863	12	2033
22	544	9	1107	26	—	13	1989
23	496	10	1153	27	1679	14	1923
24	566	11	1375	28	1772	15	2001
25	534	12	1564	29	1869	16	2045
26	545	13	1613	30	—	17	2049
27	603	14	1653	Jan. 1	1971	18	2038



Date	$I_P$	Date	$I_P$	Date	$I_P$	Date	$I_P$
Mar. 19	1893	31	1583	12	600	24	621
20	1833	Apr. 1	1594	13	498	25	694
21	1906	2	1610	14	526	26	711
22	1965	3	1433	15	638	27	877
23	1898	4	1464	16	558	28	932
24	1842	5	1260	17	601	29	1085
25	1856	6	1128	18	—	30	1096
26	1774	7	990	19	594	May 1	1252
27	1792	8	858	20	600	2	1420
28	1739	9	831	21	593	3	1463
29	1702	10	728	22	713		
30	1588	11	650	23	660		

## The fifth survey

Date	$I_P$	Date	$I_P$	Date	$I_P$	Date	$I_P$
Oct. 24	1598	18	585	Dec. 13	2037	2	1858
25	1756	19	517	14	1996	3	1760
26	1698	20	662	15	2000	4	1867
27	1532	21	709	15	2052	5	1892
28	1487	22	725	17	2079	6	1958
29	—	23	767	18	2220	7	2008
30	1445	24	903	19	2373	8	1994
31	1333	25	988	20	2400	9	1957
Nov. 1	1175	26	1127	21	2333	10	1908
2	1065	27	1314	22	2390	11	1909
3	951	28	1418	Feb. 15	2524	12	1779
4	892	29	1589	16	2464	13	1753
5	753	30	1518	17	2458	14	1786
6	755	Dec. 1	1734	18	2403	15	1666
7	696	2	1665	19	2293	16	1638
8	573	3	1834	20	2283	17	1533
9	667	4	1869	21	2313	18	1446
10	657	5	1905	22	2228	19	1273
11	607	6	1902	23	2007	20	1148
12	704	7	1895	24	2013	21	—
13	668	8	1878	25	1963	22	—
14	710	9	1893	26	1758	23	793
15	703	10	1831	27	1711	24	607
16	593	11	1977	28	1689	25	713
17	592	12	1849	Mar. 1	—	26	606

Date	$I_P$	Date	$I_P$	Date	$I_P$	Date	$I_P$
Mar. 27	669	2	739	8	678	14	1294
28	656	3	732	9	605	15	1459
29	674	4	788	10	753		
30	695	5	660	11	876		
31	727	6	620	12	965		
Apr. 1	748	7	565	13	1166		