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Satellite Photograph Catalog
CHARACTERISTICS OF SUMMER SEASON
CLOUD PATTERNS OVER THE UNITED STATES
TIROS VI and TIROS VII

Walter A. Bohan

FINAL REPORT
Contract Cwb 10984

JUNE 1966

Prepared for
NATIONAL ENVIRONMENTAL SATELLITE CENTER
ENVIRONMENTAL SCIENCE SERVICES ADMINISTRATION
Washington, D.C.

THE WALTER A. BOHAN COMPANY
911 Busse Highway Park Ridge, Illinois

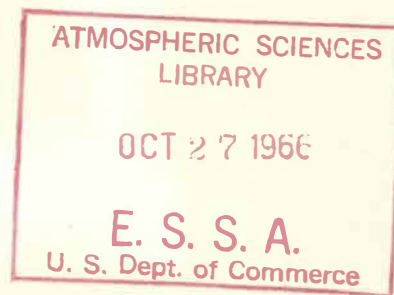
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Bohan, Walter A., Park Ridge, Ill.

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ABSTRACT

A comprehensive catalog of satellite viewed cloud cover related to summer season (June - July - August 1963) synoptic situations over the United States has been prepared and is presented in a series of five volumes. The data display format consists of a two page layout showing TIROS cloud cover photographs and related surface and upper air charts, radar charts, and nephanalyses. Color transparencies are used to enhance composite viewing of meteorological data and cloud cover patterns depicted by the nephanalyses. The catalogs represent a first historical series which provide radar echo coverage on a synoptic-scale for comparison with TIROS cloud cover photography.

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I. INTRODUCTION

The successive launchings of TIROS satellites are providing meteorologists with large numbers of photographs of cloud cover on a nearly continuous and world-wide basis. As a result, it has been possible to view the changing structure and patterns of clouds under a variety of synoptic situations. In this regard, historical series compilations of TIROS photography and related meteorological observational data are useful for developing synoptic weather models for research and weather forecasting purposes.

Under a previous program (Bohan, 1964)*, a historical series was developed for TIROS photography in frontal zone areas of the Northern Hemisphere for the late winter and spring season (February, March, April, and May) of 1962. The synoptic-scale features of frontal cloud cover patterns were emphasized in the data display format. For this program, a similar historical series for the summer season of 1963 has been prepared; however, the geographical area is restricted to the continental United States and meso-scale cloud features of the TIROS photography are emphasized. In particular, radar charts are used to portray the characteristics of radar echo patterns in the TIROS pass area under various synoptic weather situations.

Bohan, W. A., 1964: An Investigation of Frontal Cloud Patterns in the Atmosphere. The Walter A. Bohan Company. Park Ridge, Illinois. Final Report under Contract Cwb 10870.

2. SELECTION OF DATA

The summer season historical series prepared under this program is based on TIROS satellite and meteorological data from June, July, and August 1963.

Films and data used included:

- a. TIROS VI and VII cloud photography film series.
- b. Nephanalyses, prepared at the National Environmental Satellite Center. Map scale, 1:20,000,000.
- c. Surface charts, NMC North American Analysis. Map scale, 1:10,000,000.
- d. 850 mb charts, NMC North American Analysis. Map scale, 1:20,000,000.
- e. 200 mb charts, NMC North American Analysis. Map scale, 1:20,000,000.
- f. Radar charts, Kansas City Hourly Radar and Development Unit (RADU) Radar Echo Plotting Charts, United States Analysis. Map scale, 1:7,500,000.

The TIROS VI and VII nephanalyses for June, July, and August 1963 were examined for passes over the continental United States. From a total of 240 nephanalyses, 162 were selected for inclusion in the historical series. A total of 170 mosaic prints are used to display the cloud cover patterns corresponding to the nephanalyses.

Following the procedure used in the winter-spring historical series, the nephanalyses are collated chronologically according to date and pass time in 12-hour groups centered on 0000 GMT and 1200 GMT. The corresponding

12-hourly NMC surface and upper air charts are then selected for presentation of the related meteorological data. In this way, vertical continuity in the meteorological data is preserved for more convenient comparison with the cloud patterns revealed on the nephanalyses.

Since RADU charts were available for the period under consideration on an hourly basis, the chart nearest in time to the mid-time of each nephanalysis was used for radar echo presentation. For the historical series purposes, the complete radar echo plot of each RADU chart is also used to provide synoptic-scale features in addition to the details in the nephanalysis area.

3. PRESENTATION OF DATA

The summer season historical series is presented in a set of five volumes. A two page layout case technique is used to display the TIROS photography and related meteorological charts. Each case consists of the following items:

- a. Surface chart, showing synoptic weather data, fronts, and contour lines (4 mb intervals).
- b. 850 mb winds.
- c. 200 mb contour chart (tens of meters), including winds and jet stream axes.
- d. RADU chart, showing outlines of radar echo areas, echo height, and direction of movement.
- e. Nephanalyses of TIROS passes.
- f. Selected photograph mosaics of TIROS passes.

The first page of each case consists of a piece of heavy-duty card stock which serves as the base sheet for mounting the line drawing reproductions of the meteorological charts and nephanalyses. The mosaic prints are displayed on the second page of the two page layout, and the picture sequences are positioned across the page in the same general orientation as the nephanalyses appear on the meteorological charts. Where there is more than one mosaic print in a case, the base sheet is hinged at the top to a second sheet of card stock. Successive mosaics can then be studied individually by turning the top one viewed under the hinged card stock.

The surface charts cover the same geographical area for each case and are reproduced to a full page size. This chart is fastened to the base sheet heavy-duty card stock described above. The other line drawings (200 mb, RADU, and nephanalyses) are reproduced in different colors on transparent mylar sheets, except for the 850 mb winds, to the surface chart map scale. To keep the number of transparencies to a minimum, the 850 mb winds are overprinted in color on the surface chart. The 200 mb, RADU, and nephanalyses transparencies are fastened to the base sheet card stock in such a manner that they can be interleaved for composite study or separated for individual viewing purposes.

The TIROS passes selected for presentation in the summer season catalog are listed in Table 1, Table 2, and Table 3. A total of five volumes comprise the catalog, with one volume for June and two volumes each for July and August 1963.

The cases are arranged in chronological order for each month, with 12-hour (0000 GMT and 1200 GMT) synoptic chart continuity between cases. There are breaks in the 12-hour continuity when TIROS photographs were not taken over the United States or when picture quality was unsatisfactory for reproduction purposes. The series terminates on August 18, 1963 since hourly RADU charts were not available beyond this date.

Descriptions of cloud cover characteristics have not been prepared for the case histories produced under this program. The primary objective of the program was the accumulation of data for presentation in catalog form.

4. AVAILABILITY OF CATALOGS

It is not feasible to distribute copies of the summer season satellite photograph catalog without charge. Considerable expense and work is involved in producing the catalog, since individual color transparency overlays and high quality half-tone mosaic prints are used. Organizations interested in purchasing copies of the catalog should contact:

THE WALTER A. BOHAN COMPANY
911 Busse Highway
Park Ridge, Illinois 60068
Attn: Walter A. Bohan

Telephone: 825 - 3677
Area Code 312

TABLE I
List of Passes Presented
TIROS VI & TIROS VII, June 1963 Catalog

CASE	Date	Time (GMT)	TIROS	Orbit Number, Camera Mode and Number, Readout Station
1	19 June	1827	VII	005 D1W
	19 June	1830	VII	005 D1W
	19 June	2002	VII	006 D1P
2	20 June	1850	VII	020 D1W
3	21 June	1549	VII	033 D2W
	21 June	1733	VII	034 D2W
4	22 June	1618	VII	048 D2W
	22 June	1756	VII	049 D1W
	22 June	1805	VII	050 T1P
5	22 June	1932	VII	050 D1P
6	23 June	1639	VII	063 D1W
	23 June	1952	VII	065 D1P
7	24 June	1516	VII	077 D1W
	24 June	1658	VII	078 D1W
8	24 June	1833	VII	079 D1P
	24 June	1849	VII	080 R/O 079 T1P
	24 June	2019	VII	080 D1P
9	25 June	1543	VII	092 D2W
	25 June	1724	VII	093 D1W
10	25 June	1802	VI	4090 D1W
	25 June	1857	VII	094 D1P
	25 June	1937	VI	4092 R/O 4090 T1P
	25 June	2120	VI	095 D1P
11	26 June	1607	VII	107 D2W
12	26 June	1846	VI	4105 D1W
	26 June	1920	VII	109 D1P
	26 June	2021	VI	4106 D1P
13	27 June	1629	VII	122 D1W
	27 June	1748	VI	4119 D1W
	27 June	1801	VII	123 D1P
14	27 June	1919	VI	4121 R/O 4119 T1P
	27 June	2102	VI	4121 D1P

TABLE 1 - (Continued)
 List of Passes Presented
 TIROS VI & TIROS VII, June 1963 Catalog

CASE	Date	Time (GMT)	TIROS	Orbit Number Camera Mode and Number, Readout Station
15	28 June	1506	VII	136 D1W
	28 June	1651	VII	146 R/O 137 T1W
16	28 June	1822	VI	4135 R/O 4133 T1P
	28 June	2004	VI	4135 D1P
17	29 June	1400	VII	151 R/O 150 T1W
	29 June	1540	VII	152 R/O 151 T1P
	29 June	1710	VII	152 D1P
	29 June	1729	VI	4148 D1W
18	30 June	1423	VII	166 R/O 165 T2W
	30 June	1604	VII	167 R/O 166 T2P
	30 June	1730	VII	167 D1P

TABLE 2
List of Passes Presented
TIROS VI & TIROS VII, July 1963 Catalog

CASE	Date	Time (GMT)	TIROS	Orbit Number, Camera Mode and Number, Readout Station
1	30 Jun	1802	VI	4163 R/O 4162 T1W
	30 Jun	1814	VI	4163 D1W
2	01 Jul	1444	VII	181 R/O 180 T1P
	01 Jul	1713	VI	4177 D1W
3	01 Jul	1851	VI	4178 D1P
4	02 Jul	1317	VII	194 D2W
	02 Jul	1508	VII	205 T2W
	02 Jul	1614	VI	4191 D1W
5	03 Jul	1656	VII	211 D1P
6	03 Jul	1834	VI	4207 D1P
	03 Jul	2015	VI	4208 D1P
7	04 Jul	1557	VI	4220 D1W
8	04 Jul	1919	VI	4222 D1P
9	05 Jul	1435	VII	240 R/O 239 T1P
	05 Jul	1641	VI	4235 D1W
10	05 Jul	1819	VI	4236 D1P
	05 Jul	1955	VI	4237 R/O 4236 T1P
11	06 Jul	1317	VII	254 R/O 253 T2P
12	07 Jul	1331	VII	268 D1W
	07 Jul	1441	VI	4263 D1W
	07 Jul	1626	VI	4264 D1W
	07 Jul	1614	VI	4264 R/O 4263 T1W
13	09 Jul	1237	VII	297 D1W
	09 Jul	1424	VI	4292 D1W
	09 Jul	1558	VI	4293 R/O 4292 T1W
	09 Jul	1609	VI	4293 D1W
14	10 Jul	1502	VI	4308 R/O 4307 T1P
	10 Jul	1642	VI	4308 D1P
15	11 Jul	1408	VI	4321 D1W
	11 Jul	1550	VI	4323 R/O 4322 T1P
	11 Jul	1729	VI	4323 D1P

TABLE 2 - (Continued)
 List of Passes Presented
 TIROS VI & TIROS VII, July 1963 Catalog

CASE	Date	Time (GMT)	TIROS	Orbit Number, Camera Mode and Number, Readout Station
16	12 Jul	1449	VI	4337 R/O 4336 T1P
	12 Jul	1625	VI	4337 D1P
17	13 Jul	1351	VI	4350 D1W
	13 Jul	1530	VI	4352 R/O 4351 T1P
	13 Jul	1709	VI	4352 D1P
18	14 Jul	1252	VI	4364 D1W
19	15 Jul	1151	VI	4378 D1W
	15 Jul	1157	VI	4378 D1W
	15 Jul	1337	VI	4380 R/O 4379 T1P
20	16 Jul	1238	VI	4393 D1W
	16 Jul	1419	VI	4395 R/O 4394 T1P
21	17 Jul	1144	VI	4408 R/O 4407 T1W
	17 Jul	1456	VI	4409 D1P
22	18 Jul	1221	VI	4422 D1W
	18 Jul	1405	VI	4424 R/O 4423 T1P
	18 Jul	1539	VI	4424 D1P
23	19 Jul	1122	VI	4436 D1W
	19 Jul	1303	VI	4437 D1W
24	20 Jul	1205	VI	4451 D1W
25	20 Jul	1848	VI	4455 D1W
26	21 Jul	1107	VI	4465 D1W
27	26 Jul	2251	VII	555 R/O 554 T2W
	27 Jul	0034	VII	556 D2P
28	27 Jul	2026	VI	4565 R/O 4558 T1W
	27 Jul	2142	VII	569 D1W
29	28 Jul	2205	VII	584 D2W
	29 Jul	0120	VII	586 D2P
30	29 Jul	2046	VII	598 D1W
	29 Jul	2227	VII	599 D1W
31	30 Jul	2109	VII	613 D1W

TABLE 3
List of Passes Presented
TIROS VI & TIROS VII, August 1963 Catalog

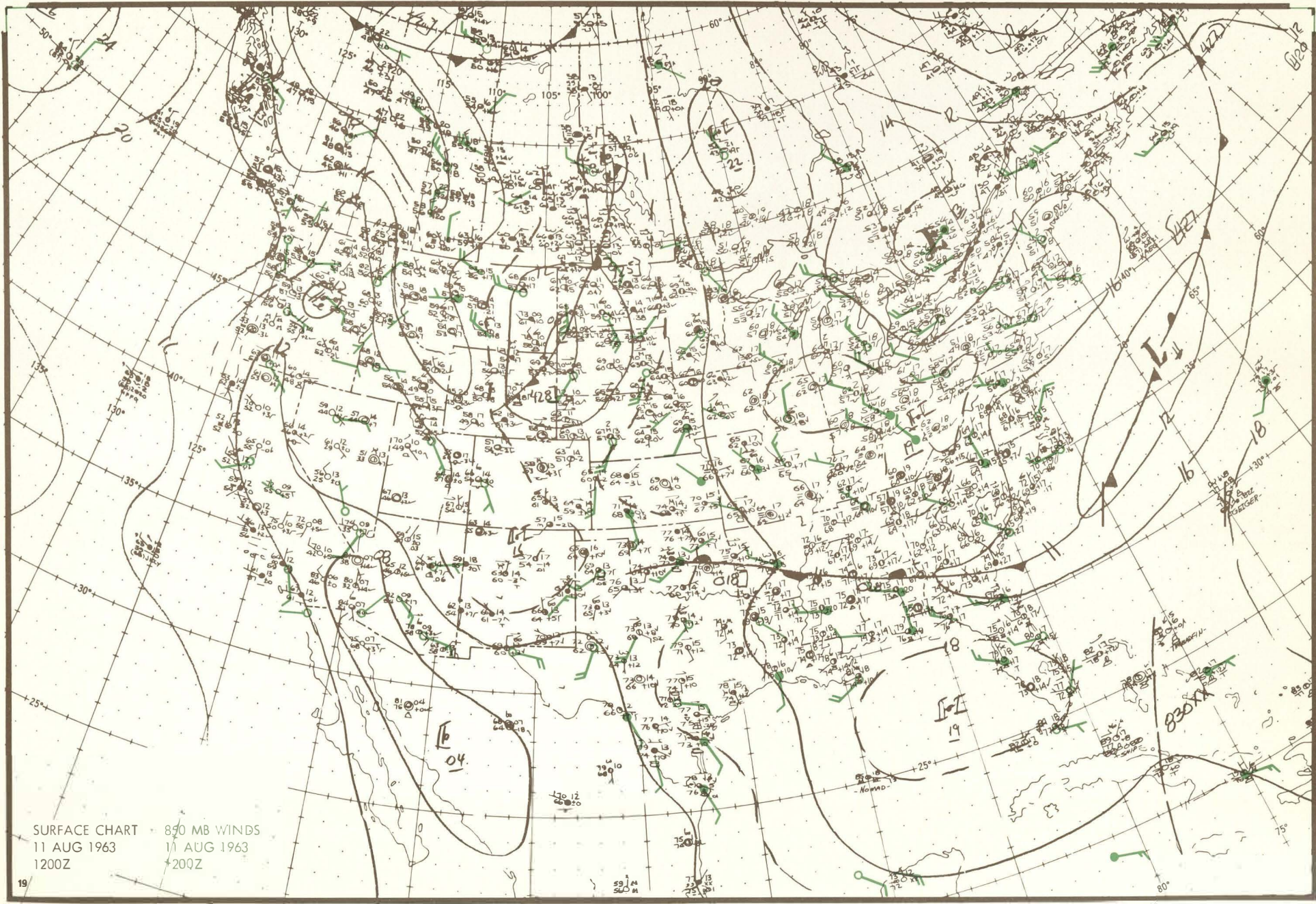
CASE	Date	Time (GMT)	TIROS	Orbit Number, Camera Mode and Number, Readout Station
1	31 Jul	1950	VII	627 D2W
	31 Jul	2131	VII	628 D2W
2	01 Aug	2012	VII	642 D1W
3	02 Aug	1446	VI	4643 R/O 4642 T1W
	02 Aug	1619	VI	4643 D1W
4	03 Aug	1523	VI	4657 D1W
5	03 Aug	2058	VII	672 D2W
6	04 Aug	1422	VI	4671 D1W
	04 Aug	1604	VI	4672 D1W
	04 Aug	1740	VI	4673 D1P
7	04 Aug	1940	VII	686 D2W
8	05 Aug	1324	VI	4685 D1W
	05 Aug	1506	VI	4686 D1W
	05 Aug	1643	VI	4687 D1P
9	05 Aug	2005	VII	701 D1W
10	06 Aug	1406	VI	4700 D1W
11	06 Aug	1843	VII	715 D2W
	06 Aug	2027	VII	716 D1W
12	07 Aug	1307	VI	4714 D1W
	07 Aug	1448	VI	4715 D1W
	07 Aug	1623	VI	4716 D1P
13	08 Aug	1206	VI	4728 D1W
	08 Aug	1350	VI	4729 D1W
	08 Aug	1749	VII	744 D1W
14	08 Aug	1918	VII	745 R/O 744 T1W
	08 Aug	2105	VII	746 D1P
	08 Aug	2241	VII	748 R/O 747 T1W

TABLE 3 - (Continued)
 List of Passes Presented
 TIROS VI & TIROS VII, August 1963 Catalog

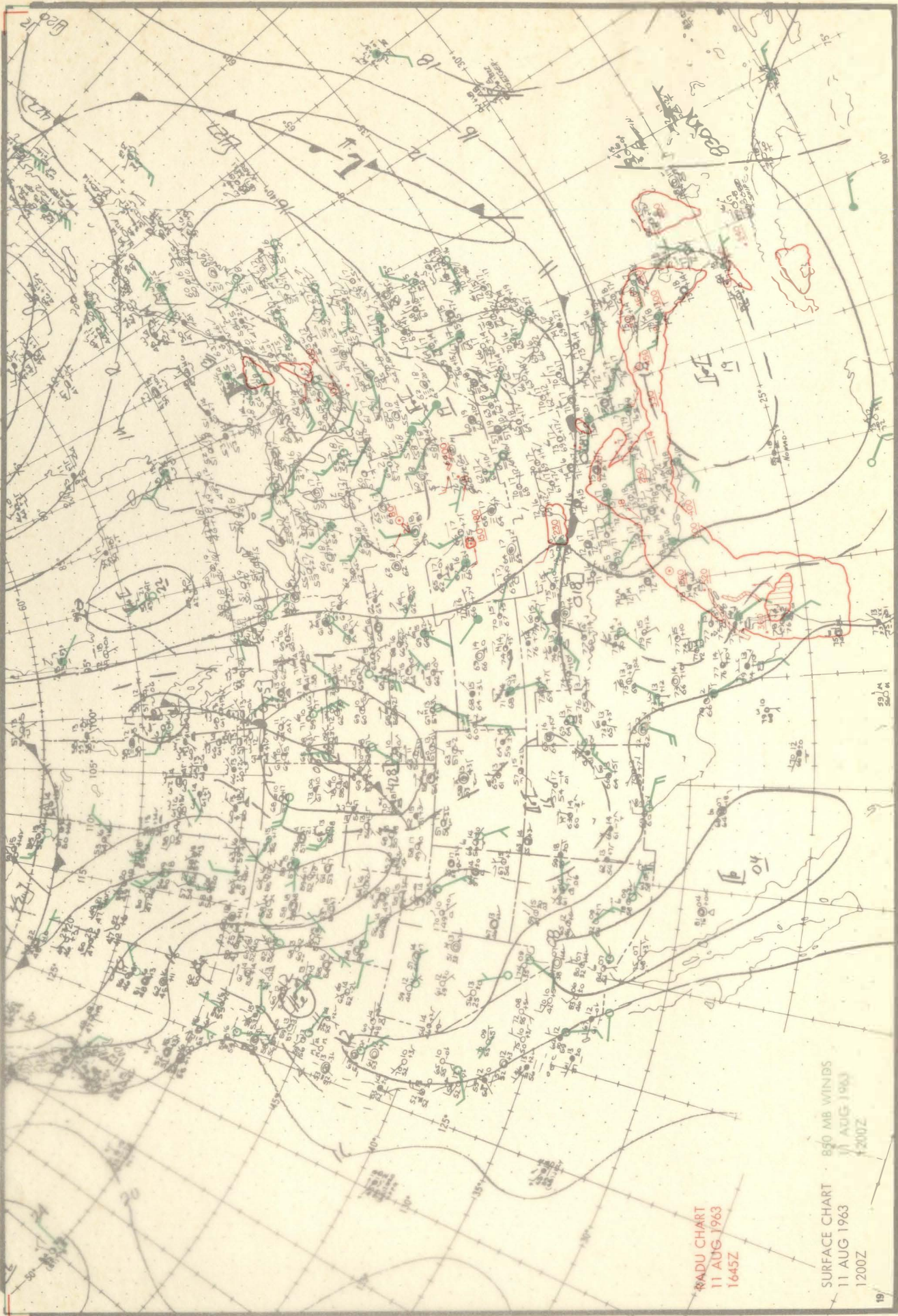
CASE	Date	Time (GMT)	TIROS	Orbit Number, Camera Mode and Number, Readout Station
15	09 Aug	1250	VI	4743 D1W
	09 Aug	1432	VI	4744 D1W
	09 Aug	1607	VI	4745 D1P
16	09 Aug	1812	VII	759 D2W
17	10 Aug	1151	VI	4757 D1W
	10 Aug	1333	VI	4758 D1W
	10 Aug	1510	VI	4759 D1P
	10 Aug	1520	VI	4760 R/O 4759 T1P
	10 Aug	1652	VI	4760 D1P
18	10 Aug	1833	VII	774 D2W
19	11 Aug	1234	VI	4772 D1W
	11 Aug	1714	VII	788 D2W
20	11 Aug	1857	VII	789 D1W
	11 Aug	2032	VII	790 D1P
	11 Aug	2205	VII	792 R/O 791 T2W
21	12 Aug	1135	VI	4786 D1W
	12 Aug	1316	VI	4787 D1W
	12 Aug	1454	VI	4788 D1P
	12 Aug	1738	VII	803 D1W
22	13 Aug	1217	VI	4801 D1W
	13 Aug	1625	VII	817 D2W
	13 Aug	1753	VII	818 R/O 817 T2W
23	15 Aug	1201	VI	4830 D1W
	15 Aug	1524	VII	846 D2W
	15 Aug	1705	VII	847 D1W
24	16 Aug	1547	VII	861 D2W
25	17 Aug	1428	VII	875 D2W
	17 Aug	1606	VII	876 R/O 875 T2W
	17 Aug	1742	VII	877 T2P
26	18 Aug	1450	VII	890 D1W
	18 Aug	1625	VII	892 R/O 890 T2P

FIGURE I

ILLUSTRATIVE EXAMPLE
SUMMER SEASON CLOUD COVER CHARACTERISTICS
CASE 19. August 11, 1963

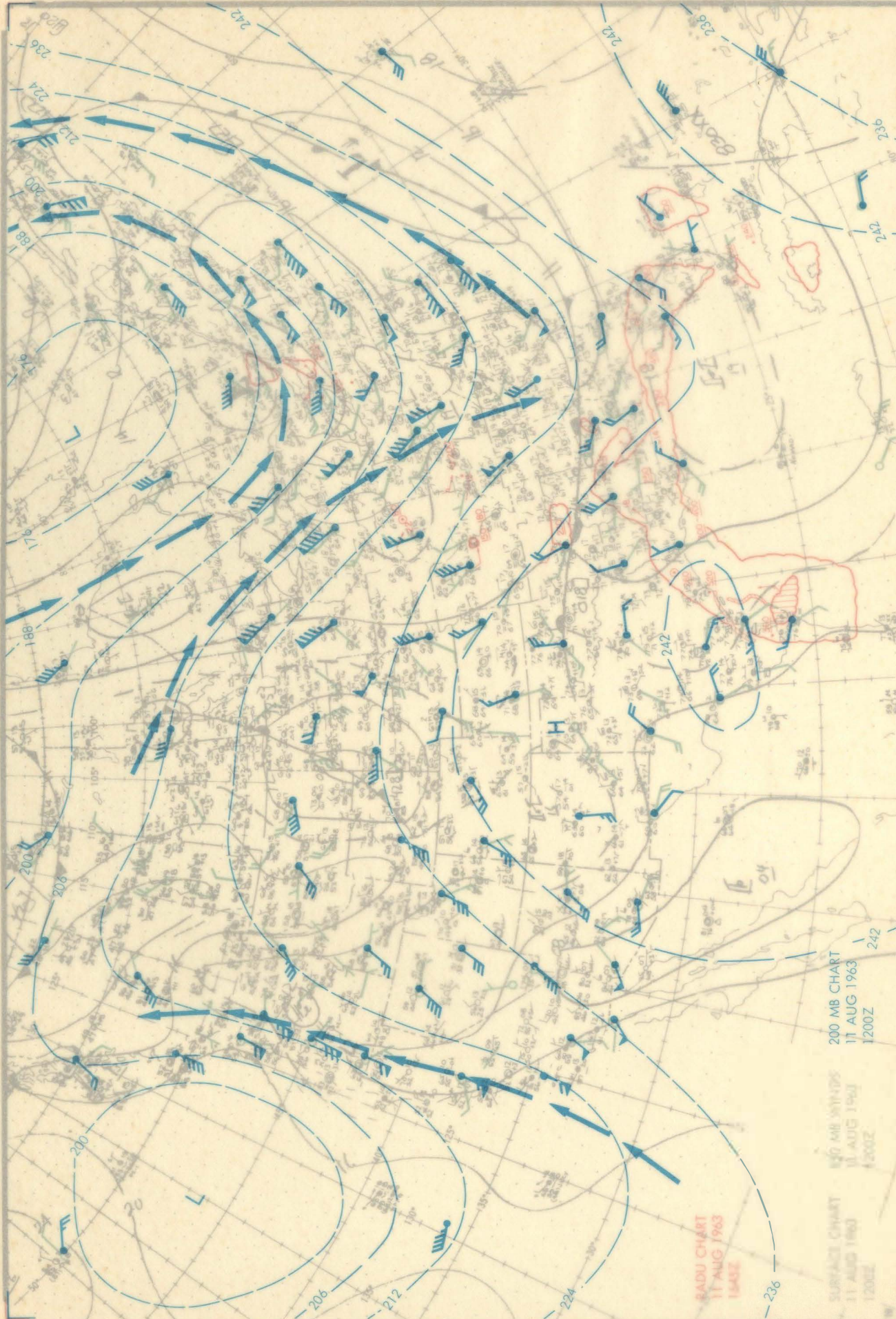


SURFACE CHART 850 MB WINDS
 11 AUG 1963 11 AUG 1963
 1200Z 200Z



RADU CHART
 11 AUG 1963
 1645Z

SURFACE CHART · 850 MB WINDS
 11 AUG 1963
 1200Z

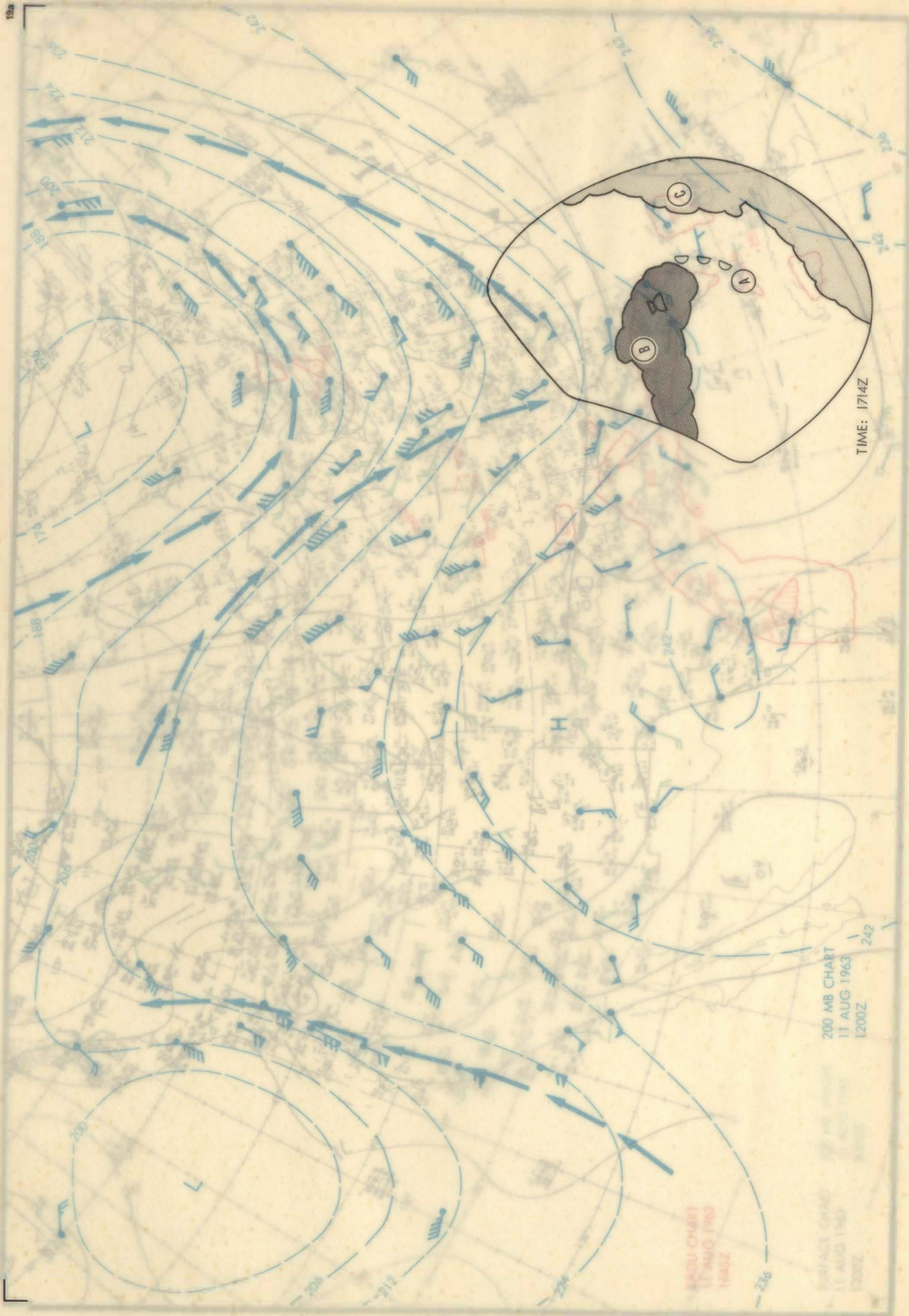


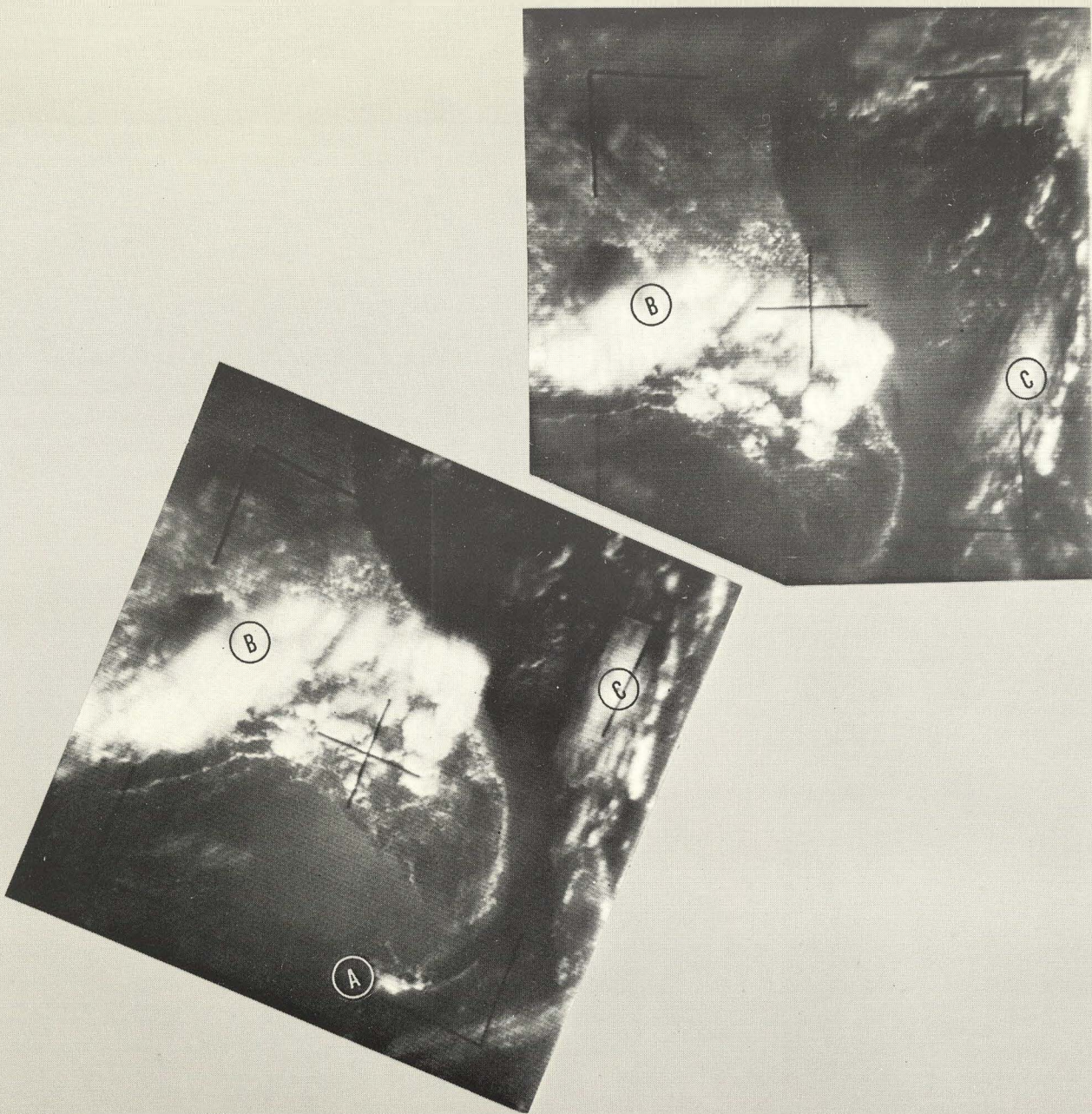
200 MB CHART
11 AUG 1963
1200Z

500 MB CHART
11 AUG 1963
1200Z

SURFACE CHART
11 AUG 1963
1200Z

SAO CHART
11 AUG 1963
1545Z





CASE 19
TIME: 1714Z
11 AUG 1963
VII 788 D2W