PACIFIC REGION TECHNICAL NOTES

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A LOOK AT A MESOSCALE PRECIPITATION CASE: THE LAST GASP FROM TROPICAL STORM BEATRIZ

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INTRODUCTION

Early in July of this year, remnants of dissipating Tropical Storm (TS) Beatriz were circulating aimlessly off the California Coast. An increasing southerly jet along the coast on July 4th and 5th, led to a fairly rapid northward spread of the high level moisture. This moisture reached southern B.C. on the morning of July 5th. Considerable high and mid-level cloud moved in, but precipitation was restricted to a narrow short-lived line affecting the Vancouver area, as well as afternoon showers across the southern interior.

THE SYNOPTIC SITUATION

The 500 mb chart (Figure 1a) at 12Z of 5th July shows a major trough off the coast and a fairly flat ridge along the continental divide. A fairly strong southwesterly flow exists across southern B.C. Satellite pictures (Figure 2) show the northward progression of the remains of TS Beatriz reaching Washington State by the evening of the 4th of July, and into southern B.C. by the morning of the 5th.

THE PRECIPITATION REPORTS

Several reports from the travelling public (including PWC staff members) driving through Richmond around 7 a.m. PDT indicated the presence of a sharply defined precipitation area oriented in a SW-NE line across Lulu Island. Figure 3 depicts the northern and southern boundaries, as well as the apparent orientation of the precipitation area.

Of the surface reporting stations in the area, Vancouver International Airport reported the only significant precipitation. A YVR special indicated the beginning of rain at 1412Z. At 15Z, a moderate rain shower was occurring. This decreased to a very light shower at 1523Z, and by 16Z no further precipitation was reported. Total rainfall amounted to 2.6 mm.

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On Vancouver Island, Patricia Bay received a trace of precipitation at 16Z. The remaining stations on the island remained dry. On the mainland Alta Lake reported 0.2 mm of precipitation. No other sites received any rainfall, though reports of virga were logged at Abbotsford.

RADAR REPORTS

The Aldergrove radar provided a graphic display of the nature of the precipitation. First returns appeared at near 10Z as a narrow band from near Squamish to Cape Flattery and southwestward. The line lengthened and widened slightly during the next few hours, extending northeastward to near Lytton by 15Z. Returns at the less than common 7km level were seen. Maximum intensity (2 mm/hr precipitation rate) occurred between 12 and 15Z. Beyond 15Z the echoes began to weaken, and by 17Z none remained. A sequence of radar returns is included as Figure 5. During this period an eastward drift of less than 5 knots was apparent.

On an SA2 satellite sector (Figure 6), a thin line of brighter/colder tops is just discernible.

THE RAOBS

The radiosonde ascents at Quillayute (see Figure 4) showed a moist unstable layer between 600 and 520 mb at 05/00Z. By 05/12Z, this layer had expanded downward to 700 mb. The 06/00Z trace shows only a shallow wet layer (580-530 mb). A near 5 degree cooling is seen at all levels during this period.

SUMMARY

A mesoscale precipitation occurance, associated with advection of high level moisture from the south, is seen from time to time over southern B.C. On the south coast under these conditions, precipitation (accompanied at times with thunder), tends to occur most often during the early morning hours. This coincides with increased instability due to maximum cloud-top cooling.

In this particular case, it being a weekend with the afternoon predominantly sunny, few people in the Vancouver area were even aware that precipitation had occurred. Yet 2.6 mm were recorded at the airport.

It seems unlikely that a forecast other than "cloudy with a few showers" would be prepared with the available data. Indeed, such a forecast was extant for this day. Bearing in mind that some complaints about the mention of "showers" were received, perhaps some cognizance of the diurnal nature of this phenomena could be taken in the future.

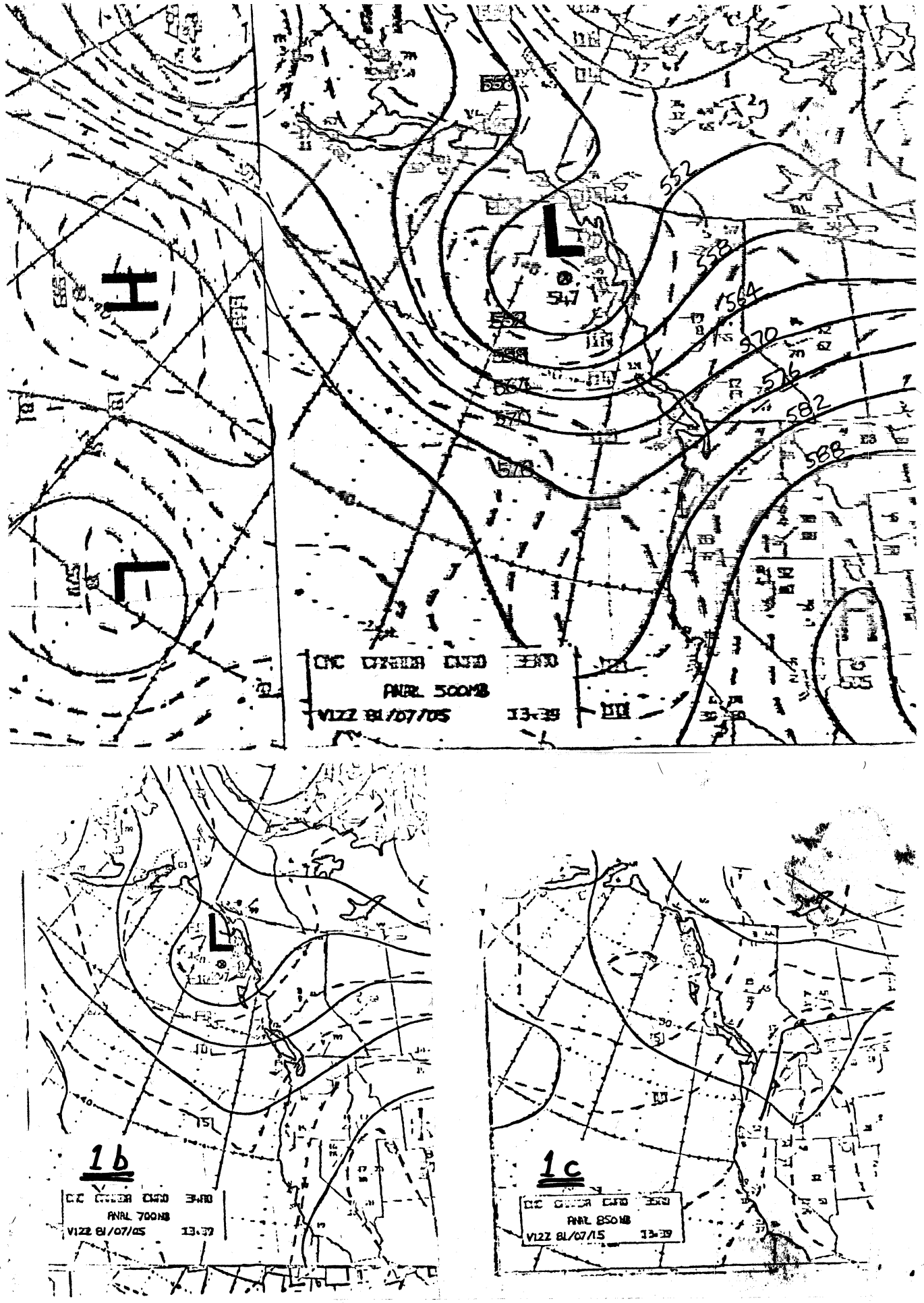

Figure 1. (a) 500mb (b) 700mb (c) 850mb Upper air charts 12Z July 5,1981

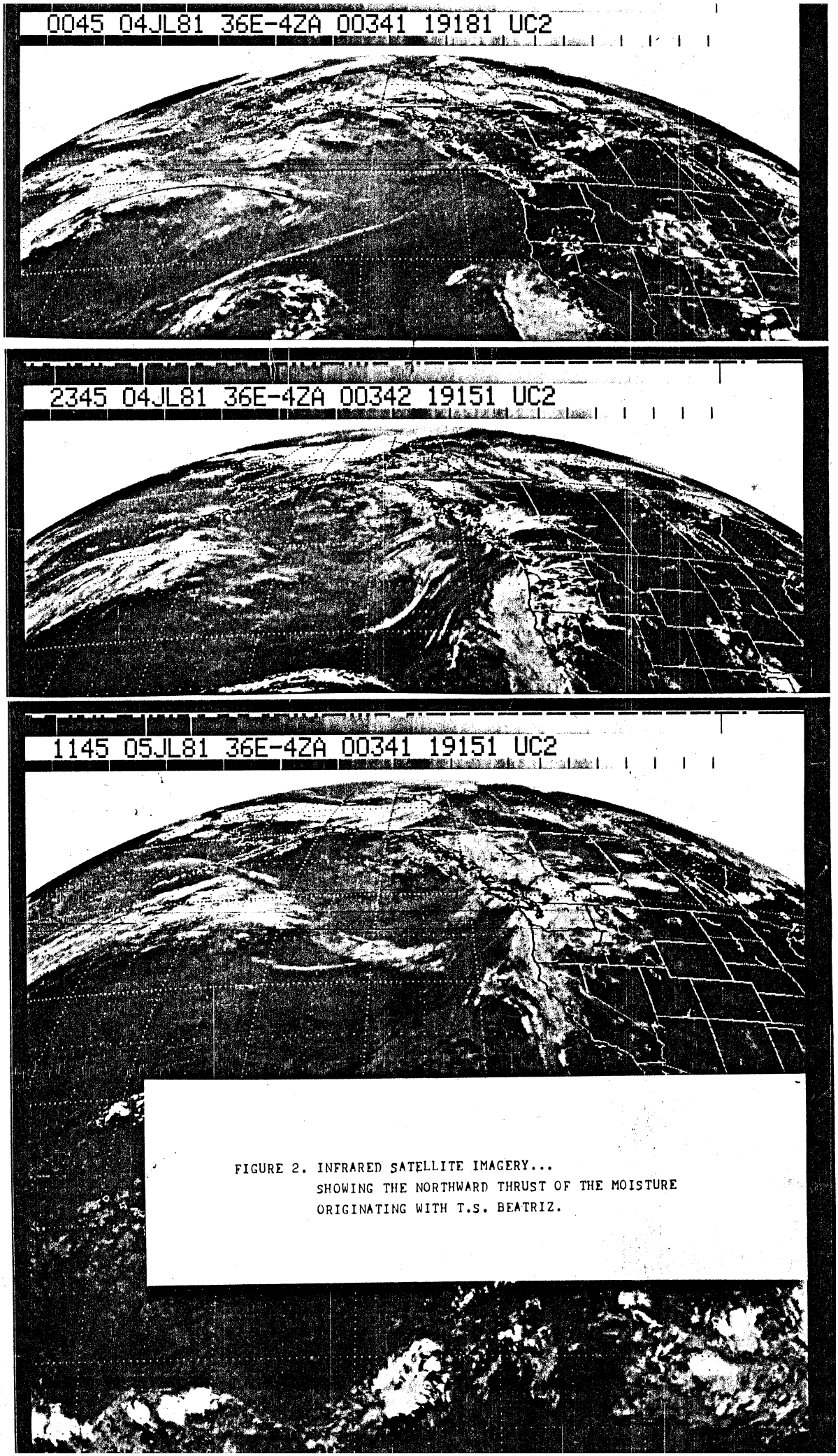

FIGURE 2. INFRARED SATELLITE IMAGERY...
SHOWING THE NORTHWARD THRUST OF THE MOISTURE
ORIGINATING WITH T.S. BEATRIZ.

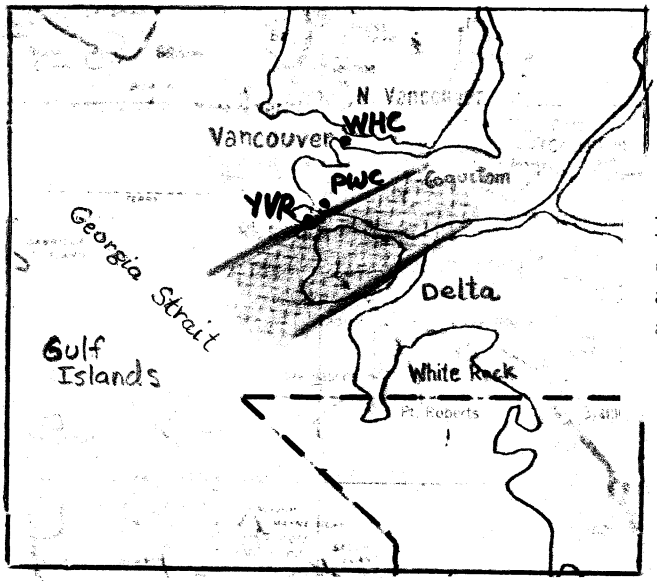

Figure 3.
Sharply defined precipitation area from public reports around 7am PDT, 5 July 1981.

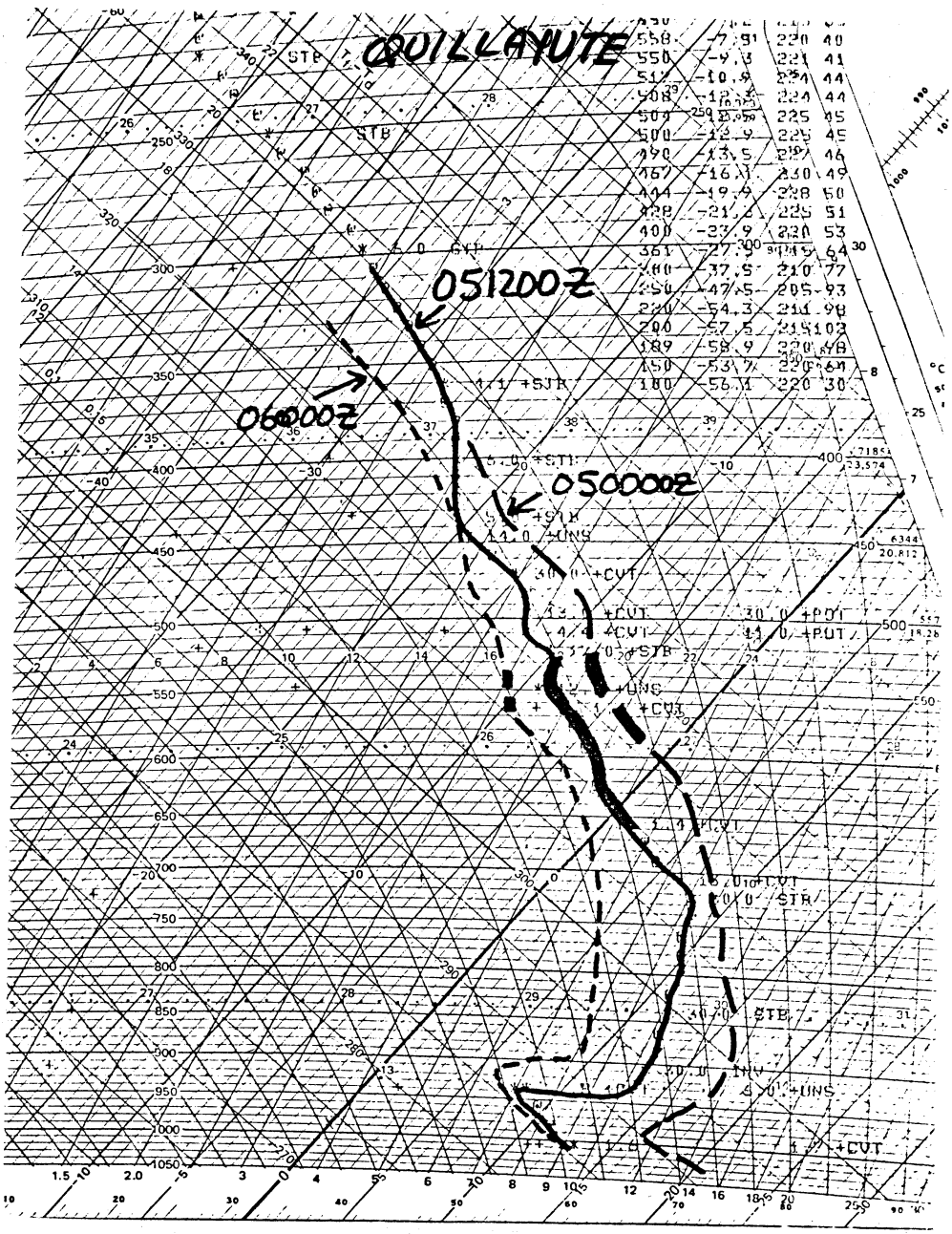

Fig. 4. Drybulb curves from radiosonde ascents at Quillayute 00Z July 5 to 00Z July 6, 1981. Bold portion of the curves indicates saturation.

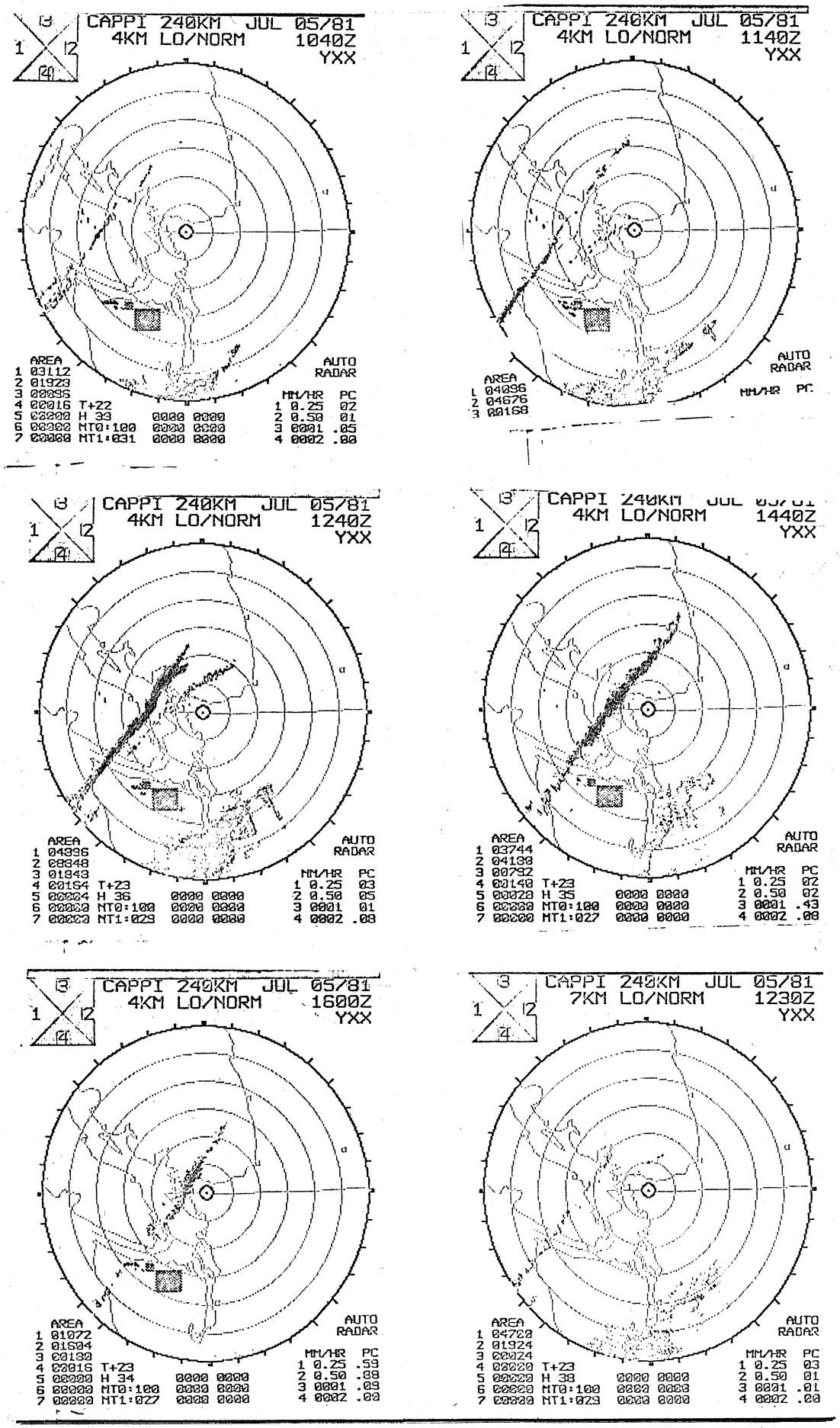

Figure 5. Sequence of 4km radar images 1040z to 1600z plus the 7km return at 1230z.

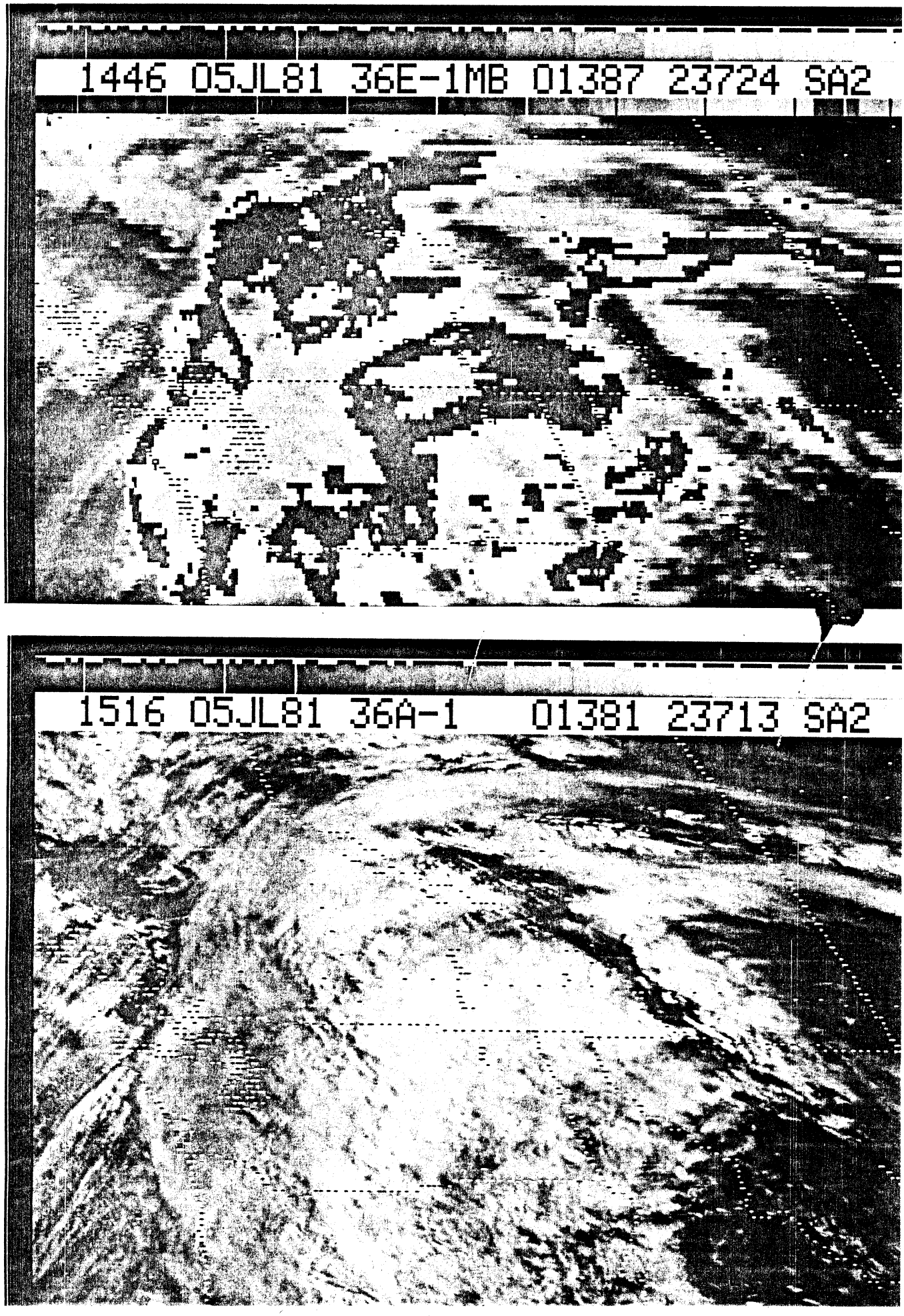
1446 05JL81 36E-1MB 01387 23724 SA2
1516 05JL81 36A-1 01381 23713 SA2

FIGURE 6.