PACIFIC REGION TECHNICAL NOTES

No. 79-001

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SURPRISE SNOWFALL AT PRINCE RUPERT - BOXING DAY 1978

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Introduction

On Christmas Day 1978 a low pressure area developed in the eastern Pacific. The low deepened quickly and tracked rapidly eastward dumping 16 cm of snow on Prince Rupert. The low development was generally not predicted well by the numerical models. The main exception to that statment was the 7LPE Relative Humidity/Vertical Velocity prog which indicated increasing moisture and vertical velocity over the North Coast as early as 48 hours in advance. An attempt is made here to document the low development.

Background

On December 24 there was a cutoff low located near 41N 165W. A broad band of frontal cloud stretched northeastward. See Figure 1. There were basically two streams - one rounding the low and then turning northward and then eastward. The northern stream came across the Aleutians merging with the southern stream just north of the weather ship.

The Development

At 24/1745z we can see a comma cloud in the northern stream just entering Bristol Bay (Figure 1.) This comma cloud was denoted on the 500mb charts as a shortwave.

By 25/1145z (Figures 2 and 3) the comma was well into western Alaska and there appeared to be significant advection of the cloud band across the Gulf of Alaska. There was also some thinning of the cloud band near 52N 154W which would support the idea of a breakaway frontal wave.

By 25/2345z (Figure 4) it was obvious that a frontal wave had broken away. We now see the frontal clouds on the North Coast. The shortwave in the northern stream has moved to central Alaska and is evidenced by the brighter bands of cloud approaching the Yukon border. The surface analysis for 26/0000z indicated the formation of a low pressure area situated northeast of the weather ship.

By 26/0615z (Figure 5) the higher clouds from the system had spread rapidly eastward across the central interior. The surface map for this time showed falling pressures along the coast and a low pressure area rapidly approaching the Charlottes. (Figure 6)

Subsequent satellite pictures and corresponding surface analyses (Figures 7,8,9 and 10) show the system tracking rapidly southeastward across the BC interior.

Summary and Points of Interest

1) The low pressure area developed rapidly and unexpectedly. The system produced snowfall at several BC communities. Prince Rupert received the highest amount - 16 cm.

2) The development resulted from the phasing of a weak system in the southern stream with a shortwave in the northern stream. This was likely the triggering mechanism and should be watched in future situations.

3) The satellite pictures did indicate a breakaway wave well in advance. The problem was to determine how strong it would be by the time it reached the coast.

4) With the strong westnorthwest flow present one would expect rapid movement of the system downstream.

5) The numerical progs did not handle the development well and tended to "yo-yo" on a development in the area. In looking over the numerical progs for Christmas night and Boxing Day however, one stood out. The 7LPE RH/VV progs did consistently indicate moisture spreading into the North Coast even on the 48 hour prog valid for 26/12z. Although the prog was a little slow on the timing it did give the correct trend. See Figures 11 and 12.

Conclusion

The main clue to development in this case was the satellite pictures. Phasing of waves in different streams should also be watched closely. Although the progs were not the greatest they did hint at development of a breakaway wave. Perhaps the 7LPE RH/VV progs deserve a closer look in this type of situation.

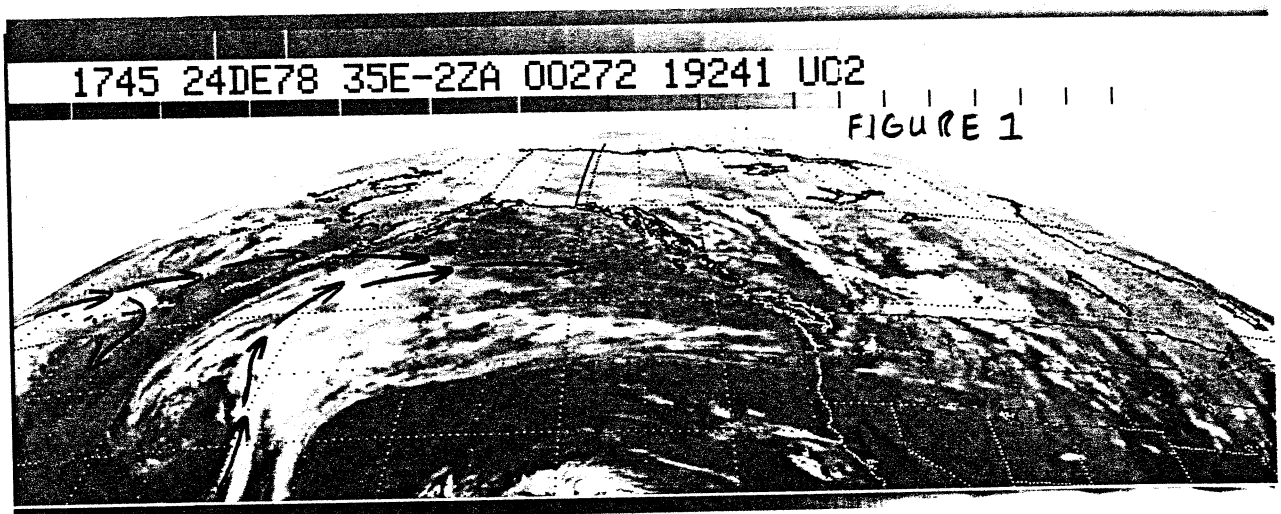


FIGURE 1

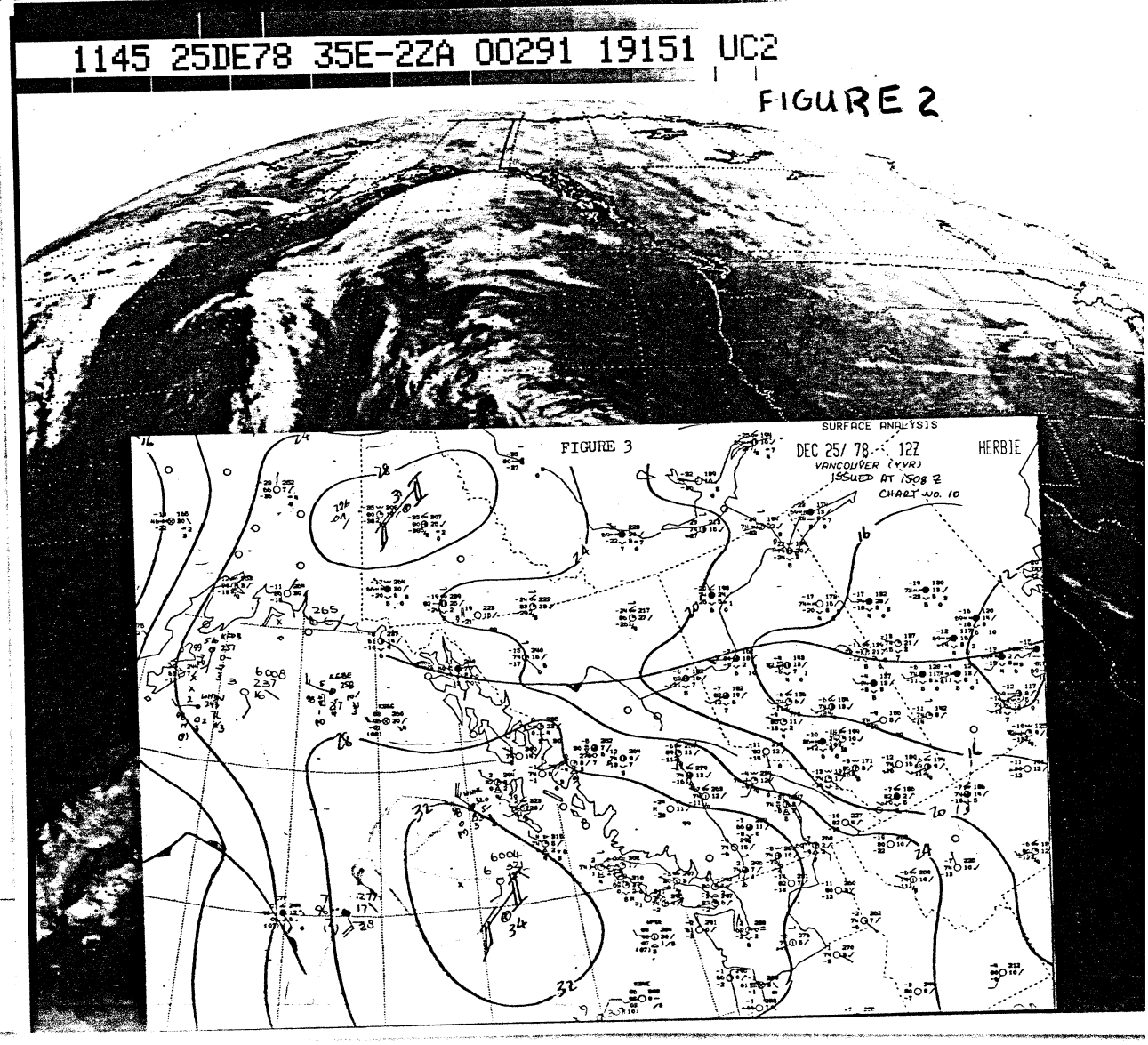


FIGURE 2

FIGURE 3

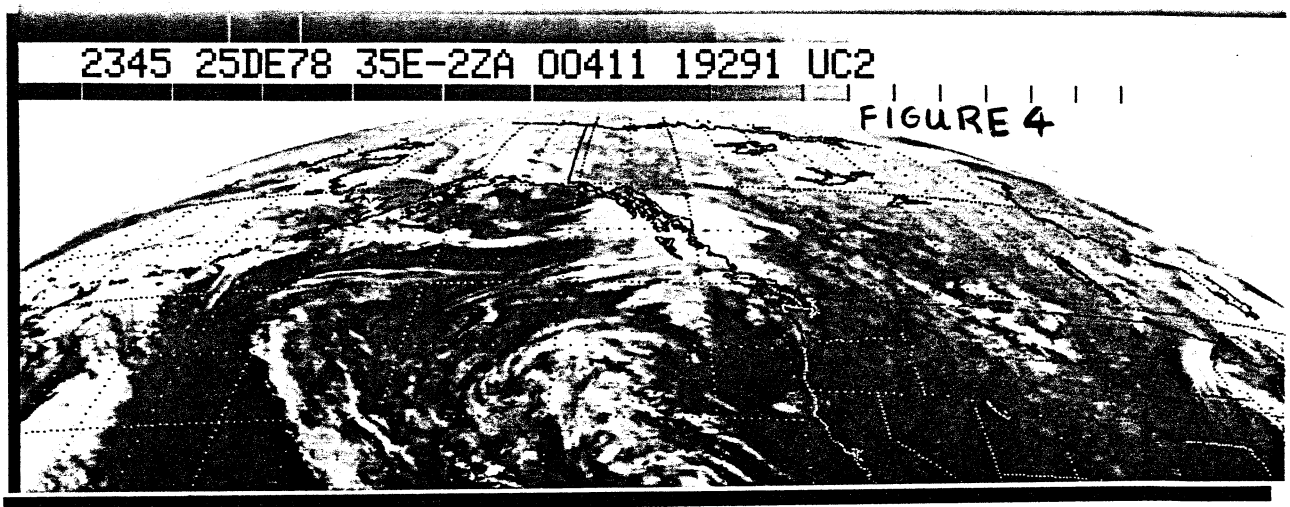


FIGURE 4

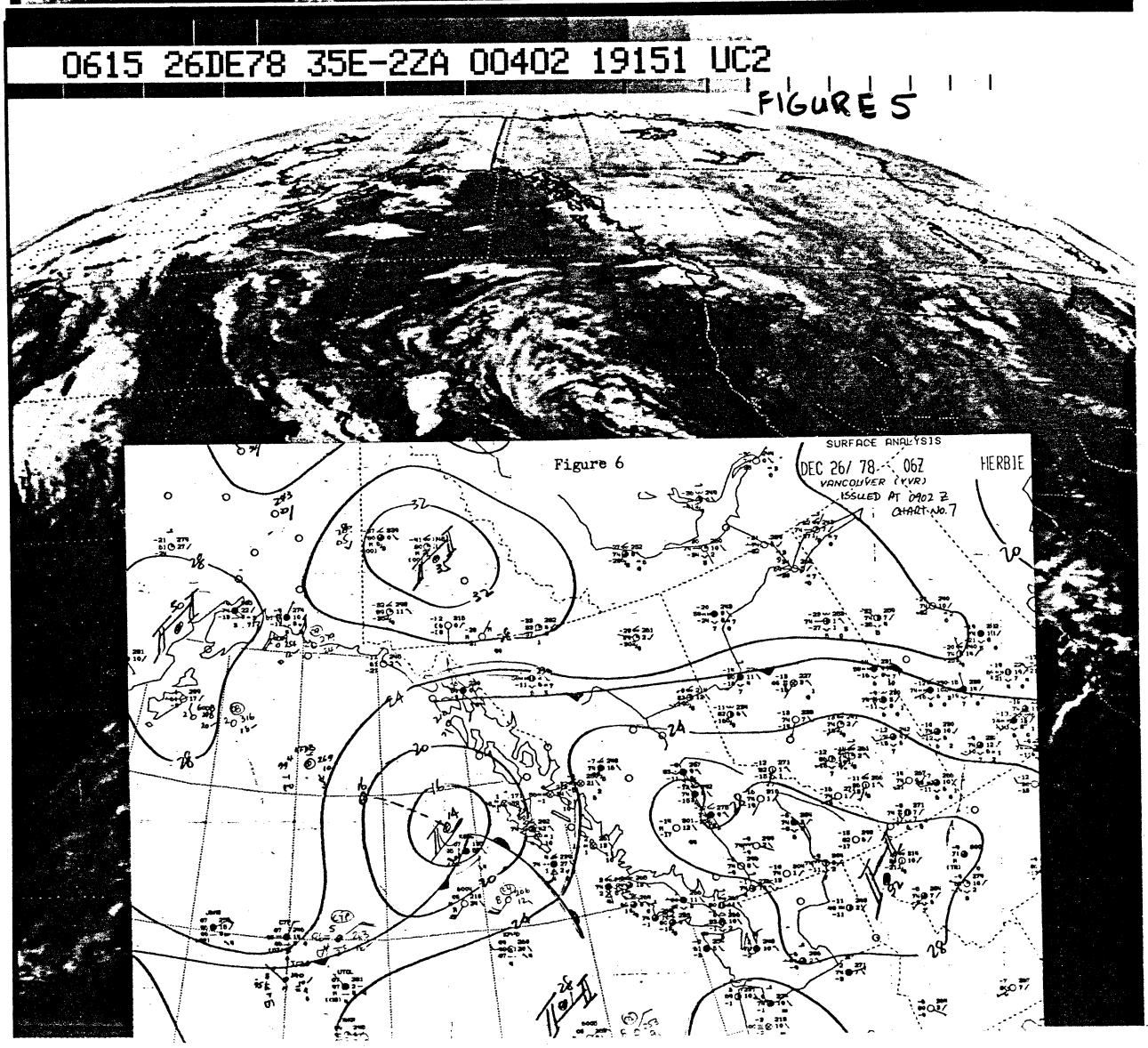


FIGURE 5

Figure 6

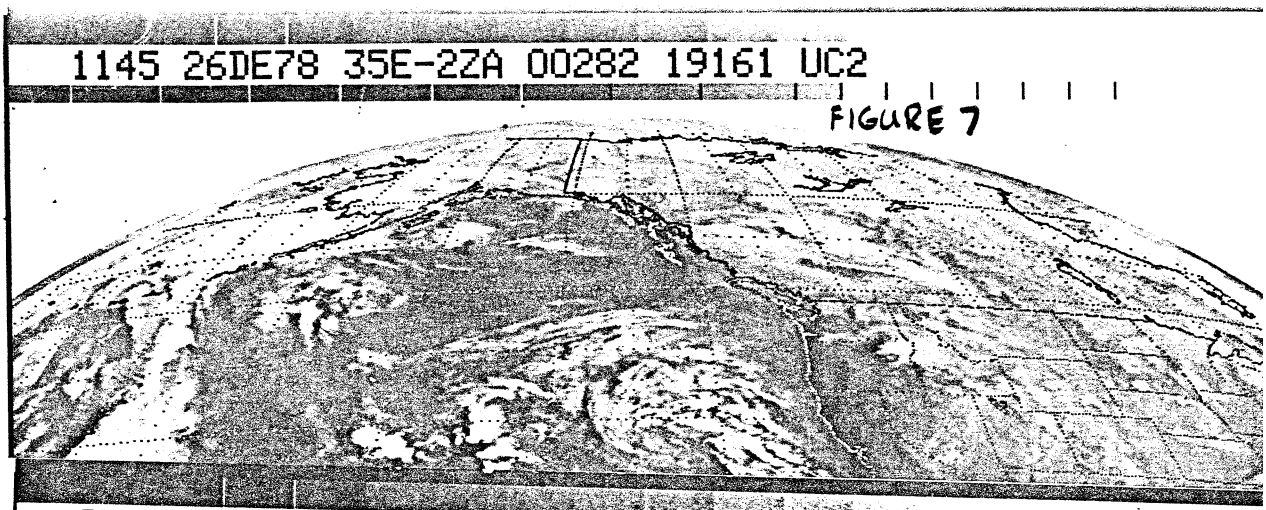


FIGURE 7

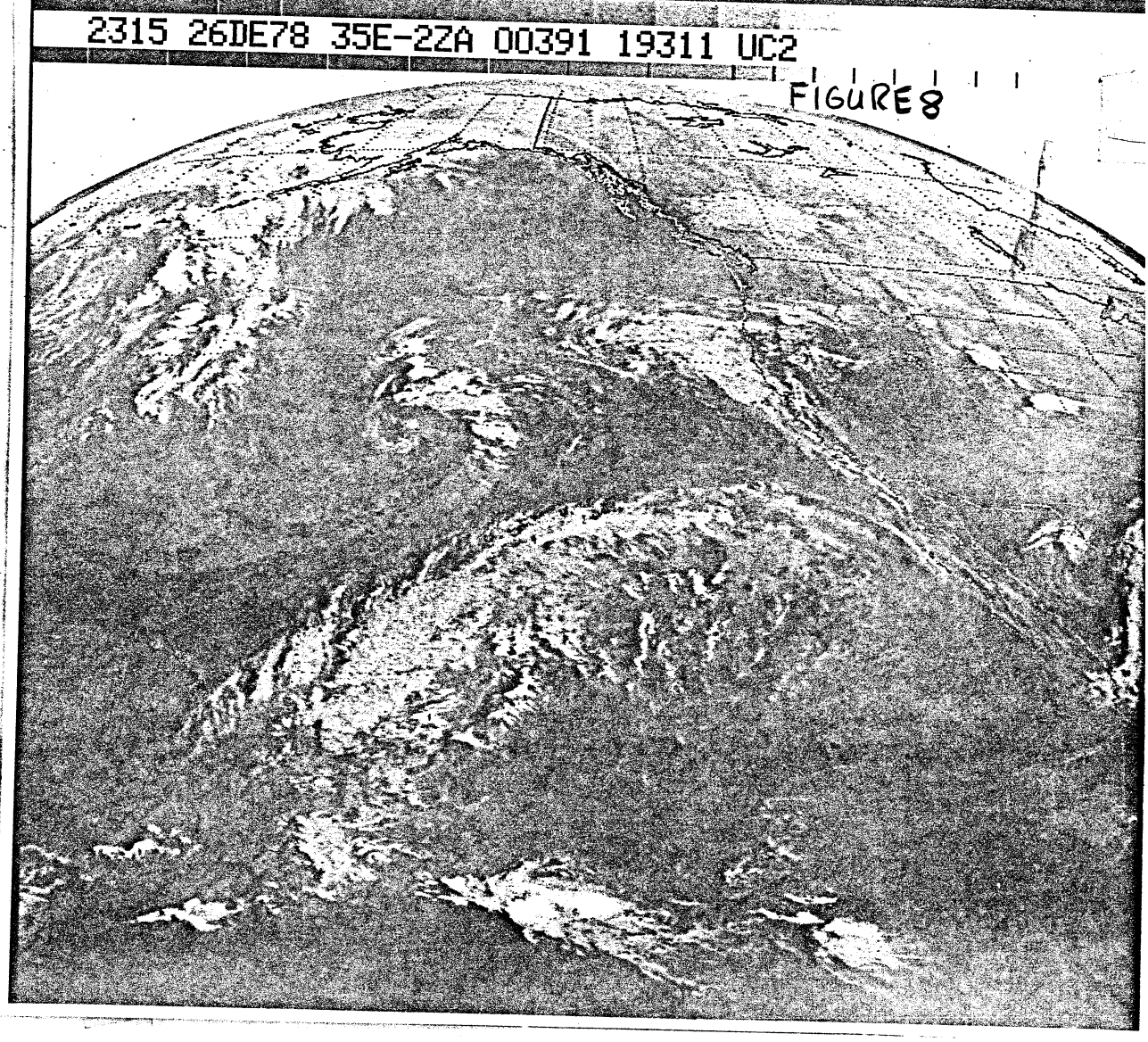


FIGURE 8

FIGURE 9

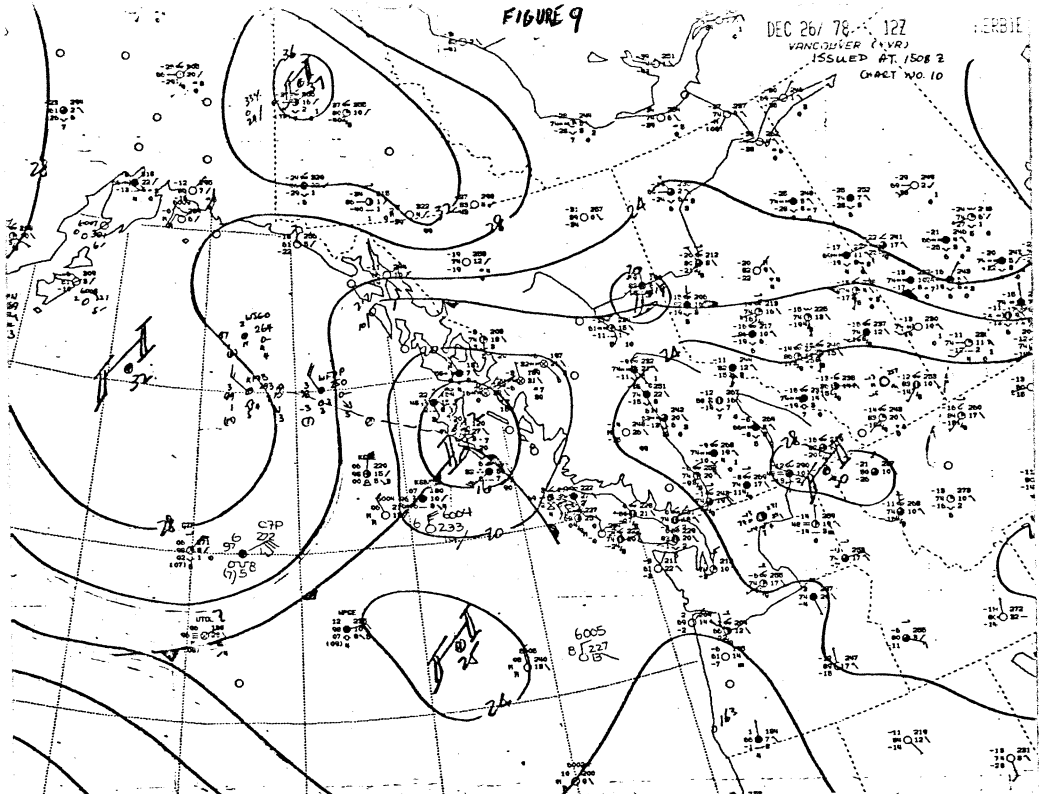
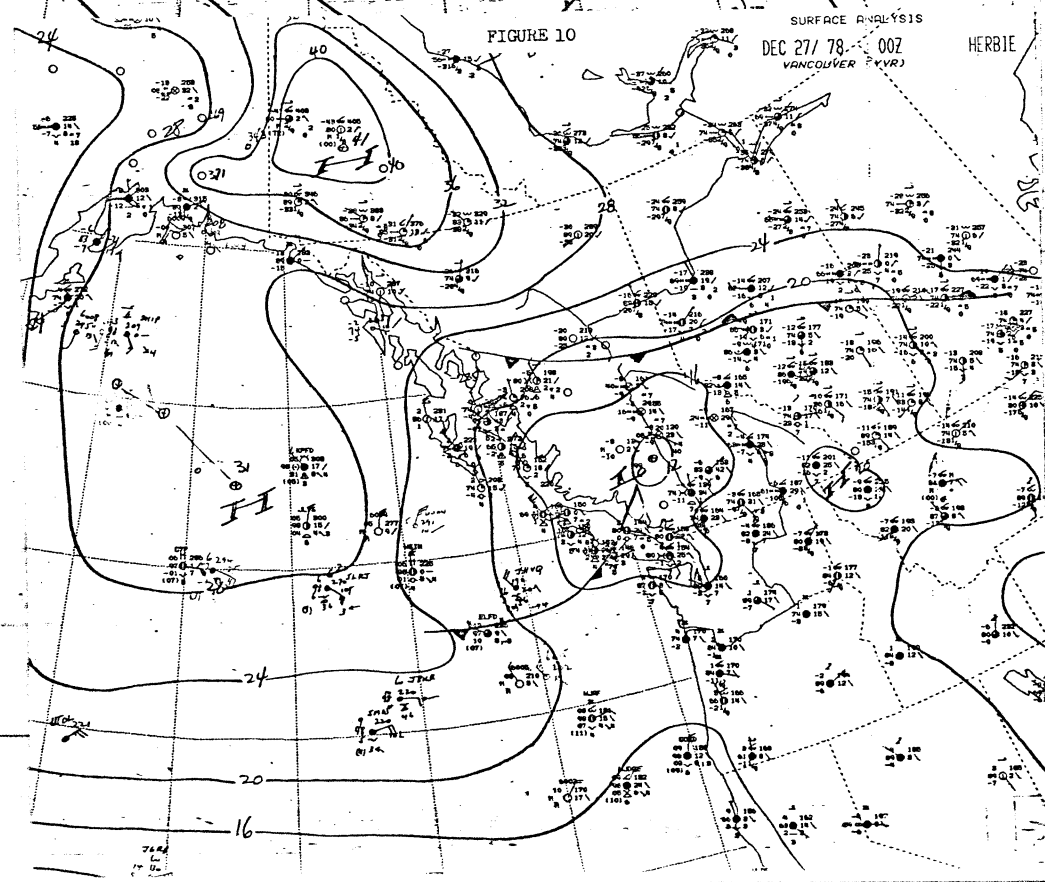
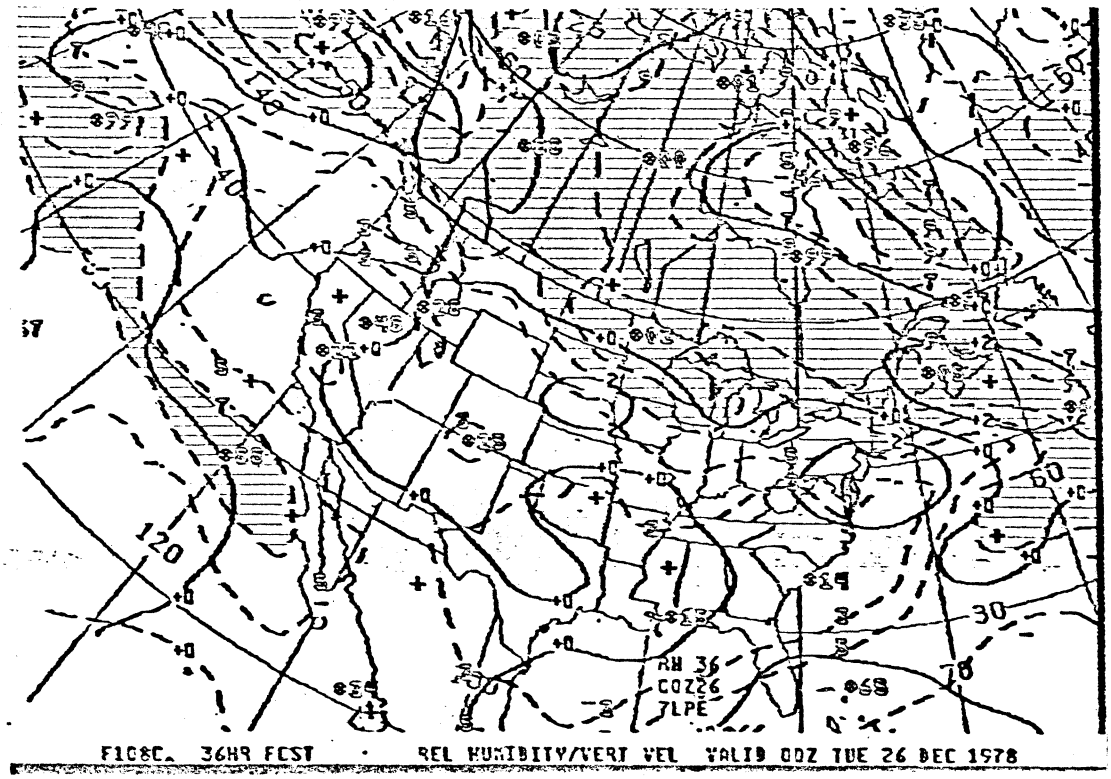


FIGURE 10





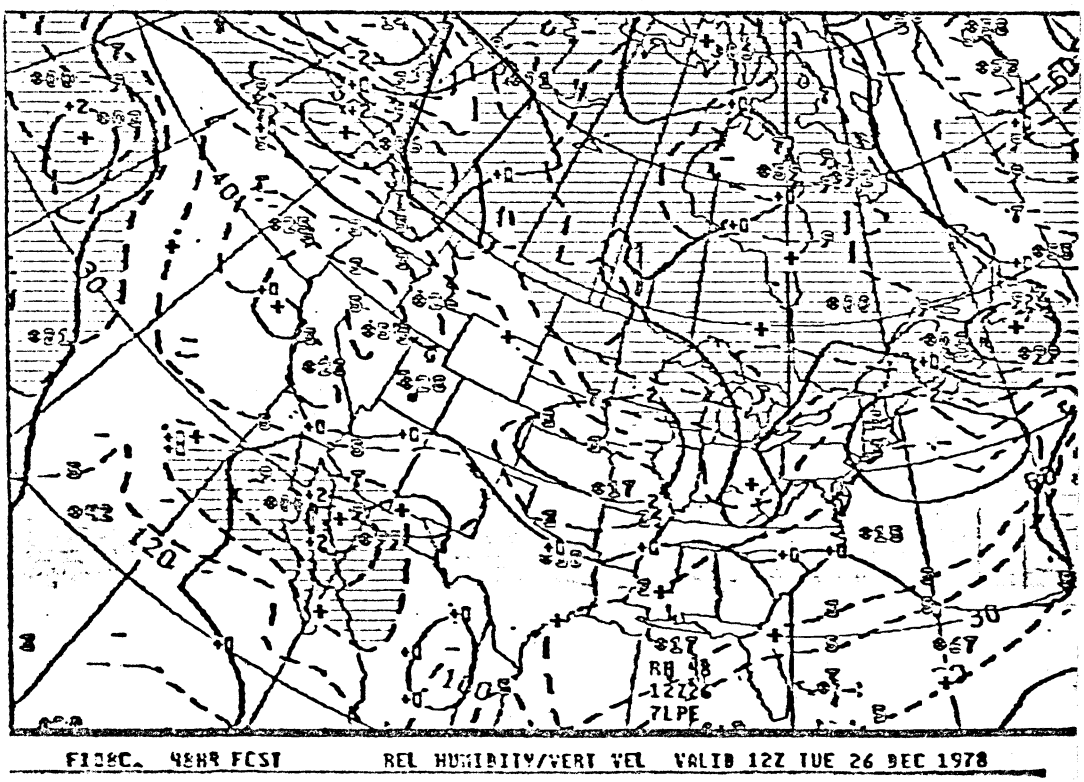


FIGURE 11

(Based on 24/12z data)

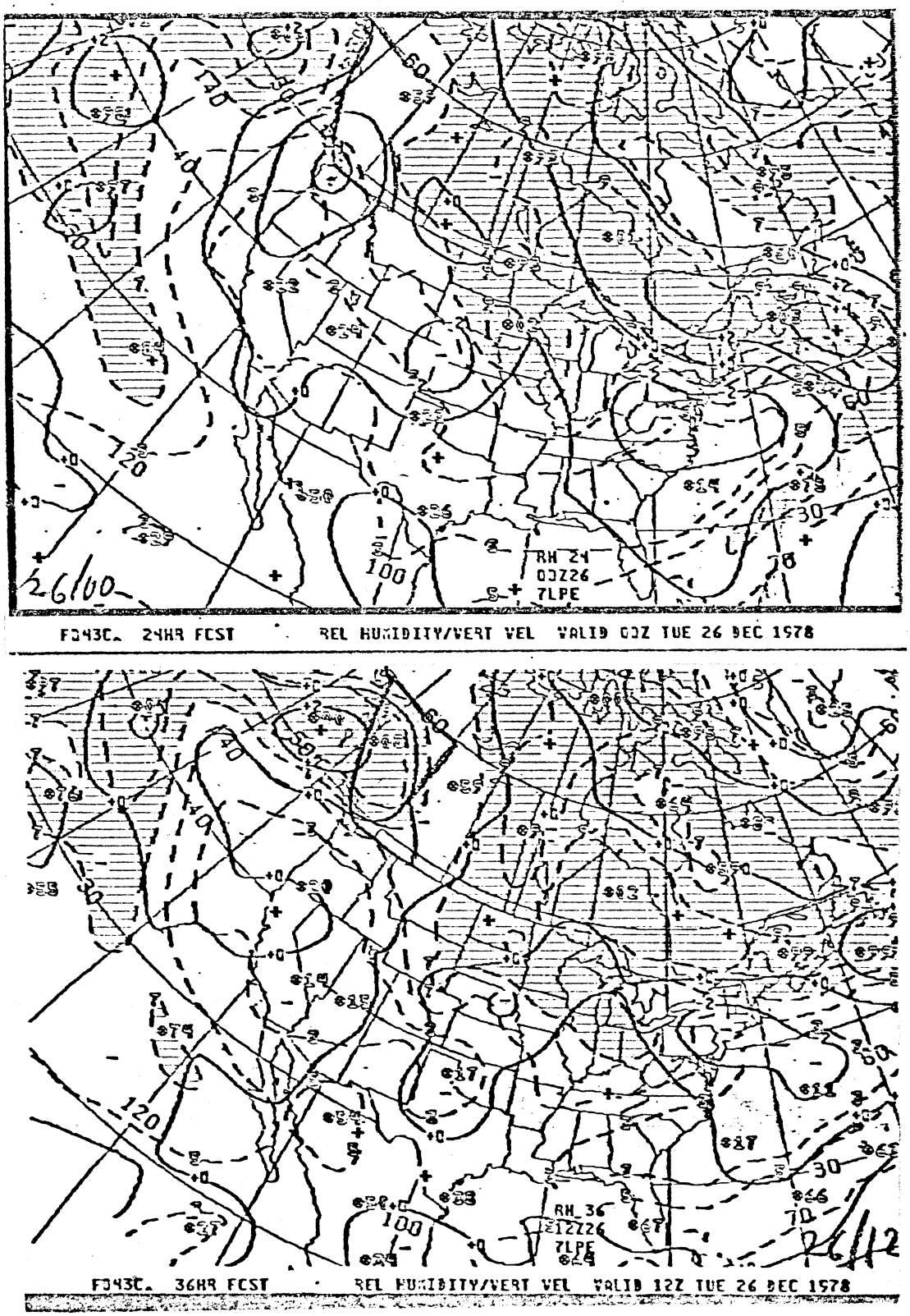
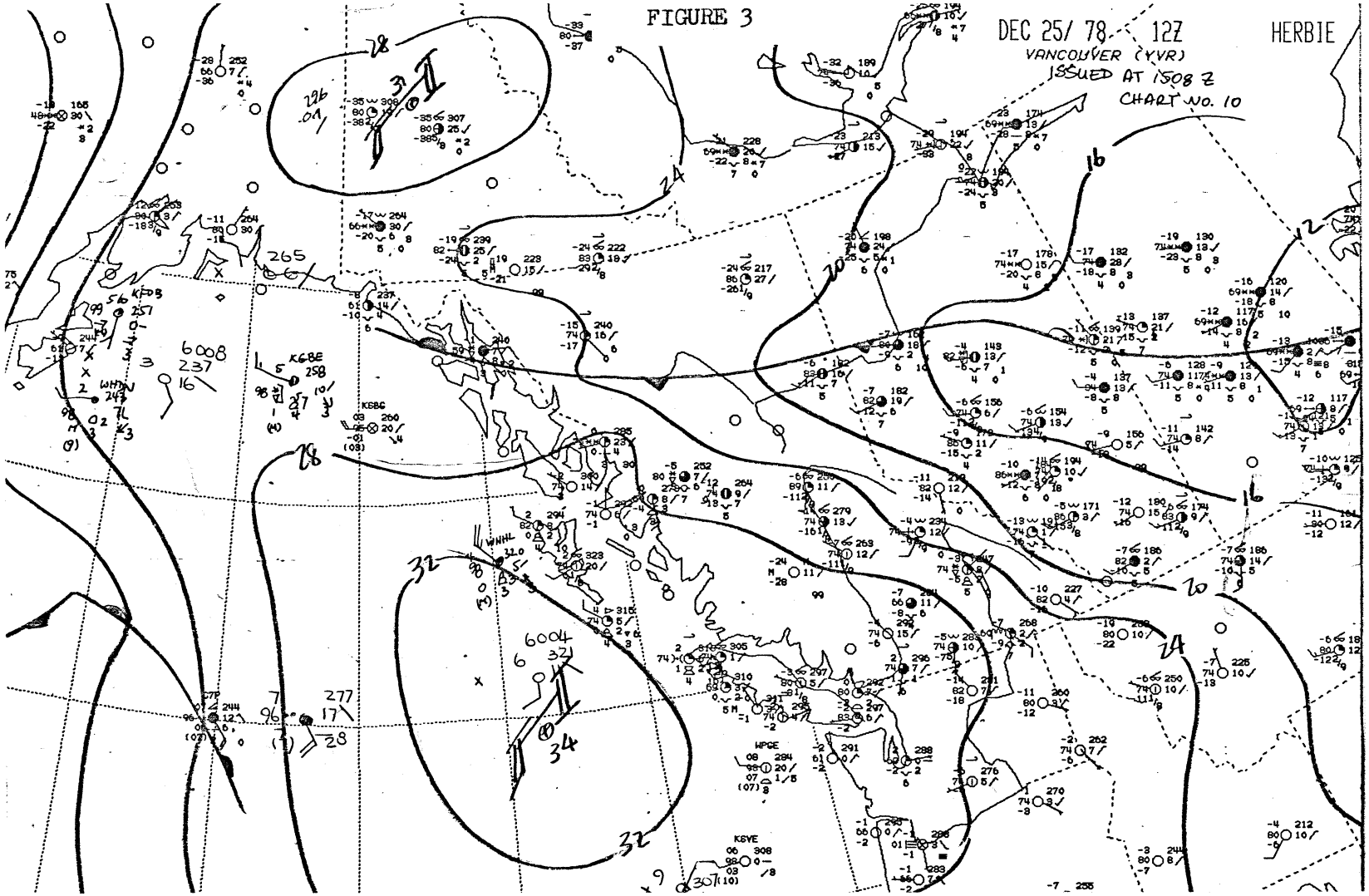


FIGURE 12

(Based on 25/00z data)

FIGURE 3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HERBIE
VANCOUVER (YVR)
ISSUED AT 1508 Z
CHART NO. 10

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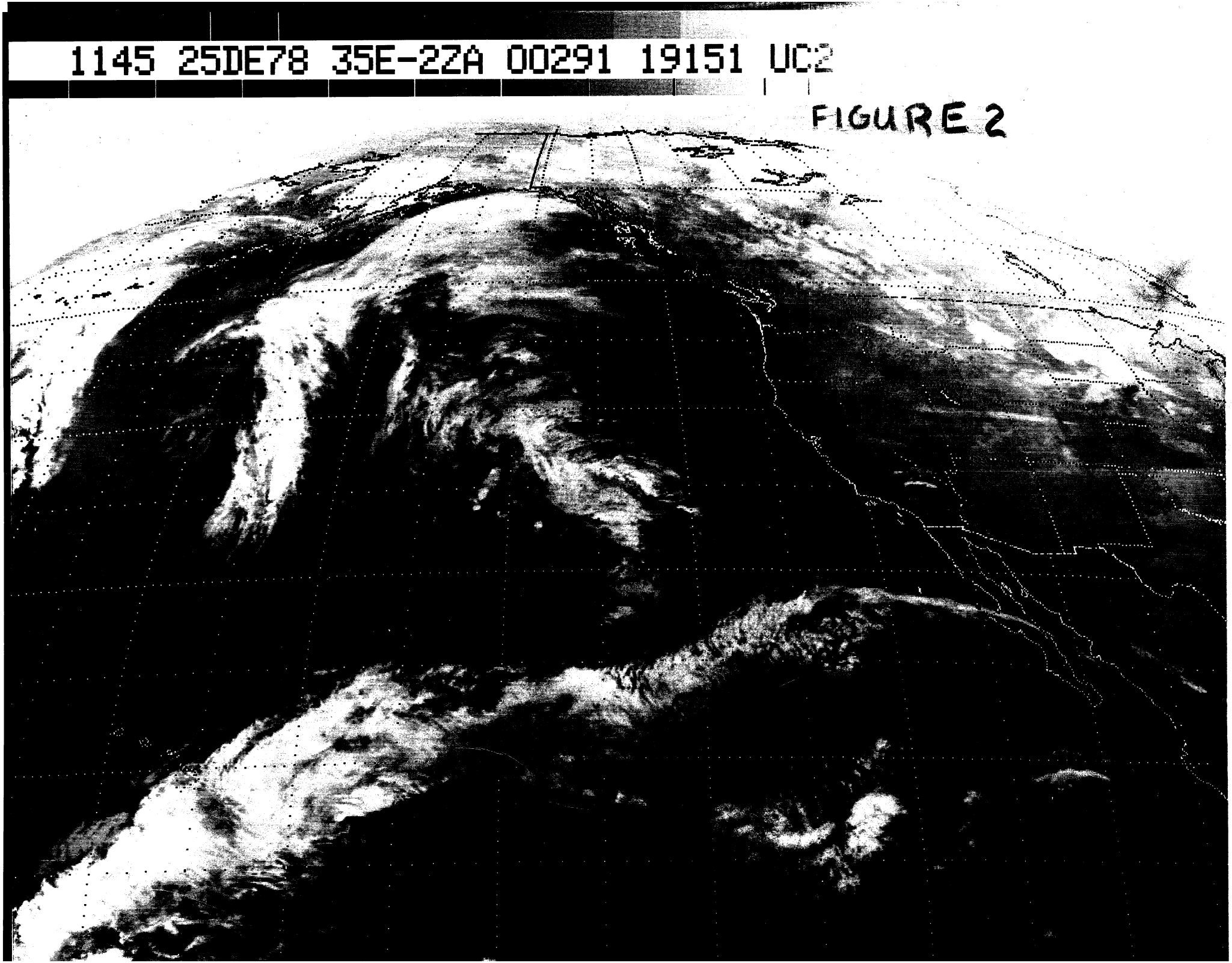
FIGURE 2



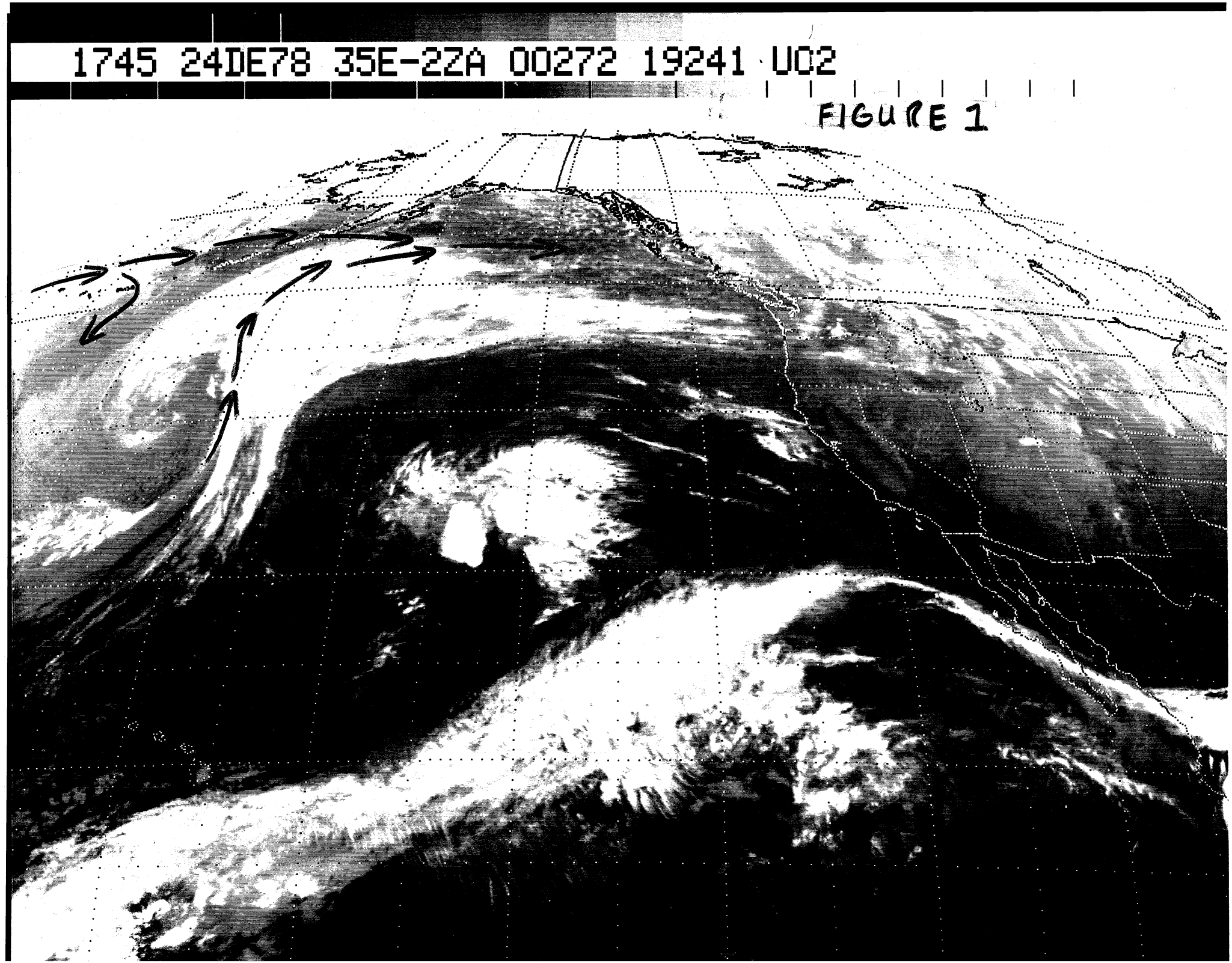
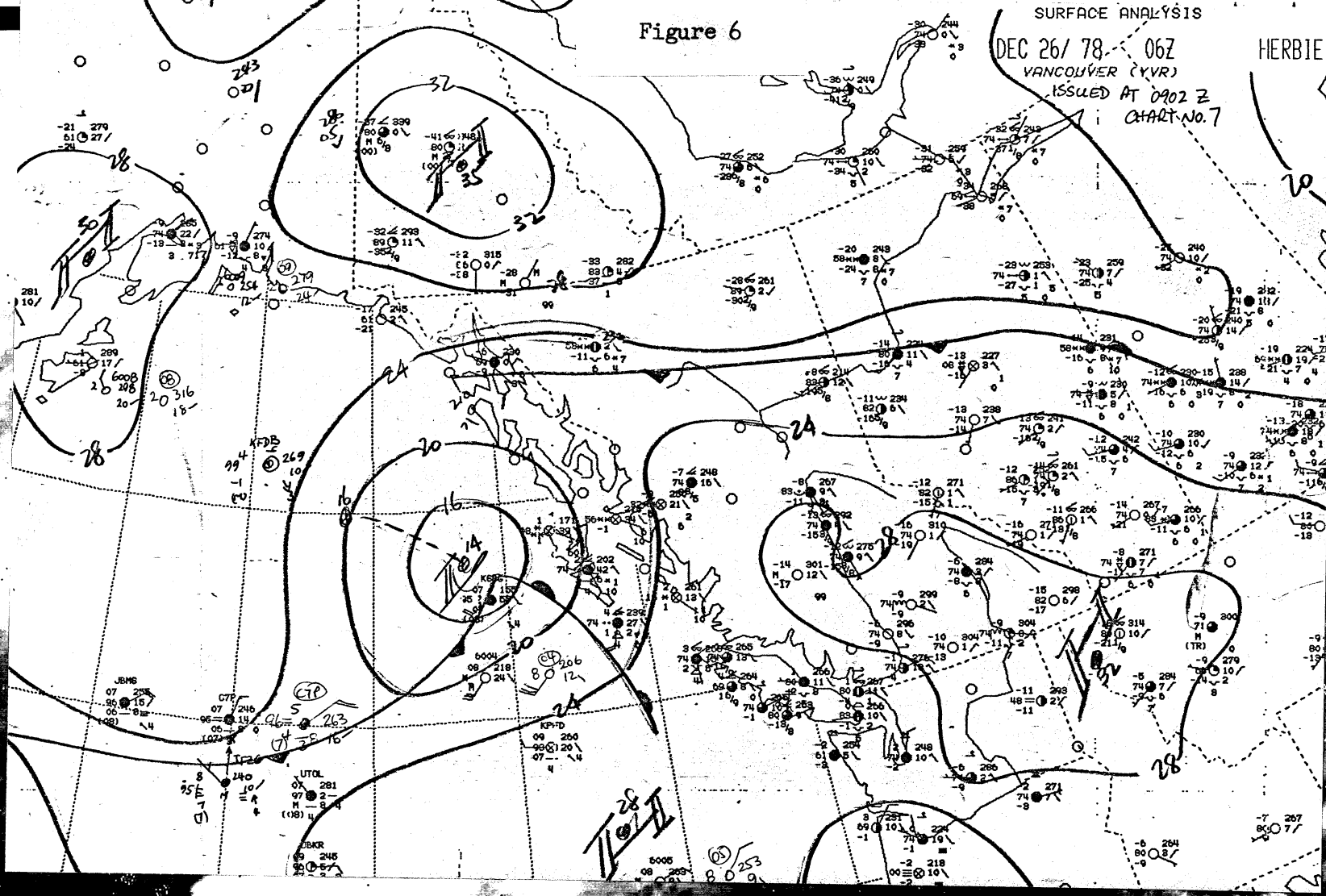


FIGURE 1

Figure 6



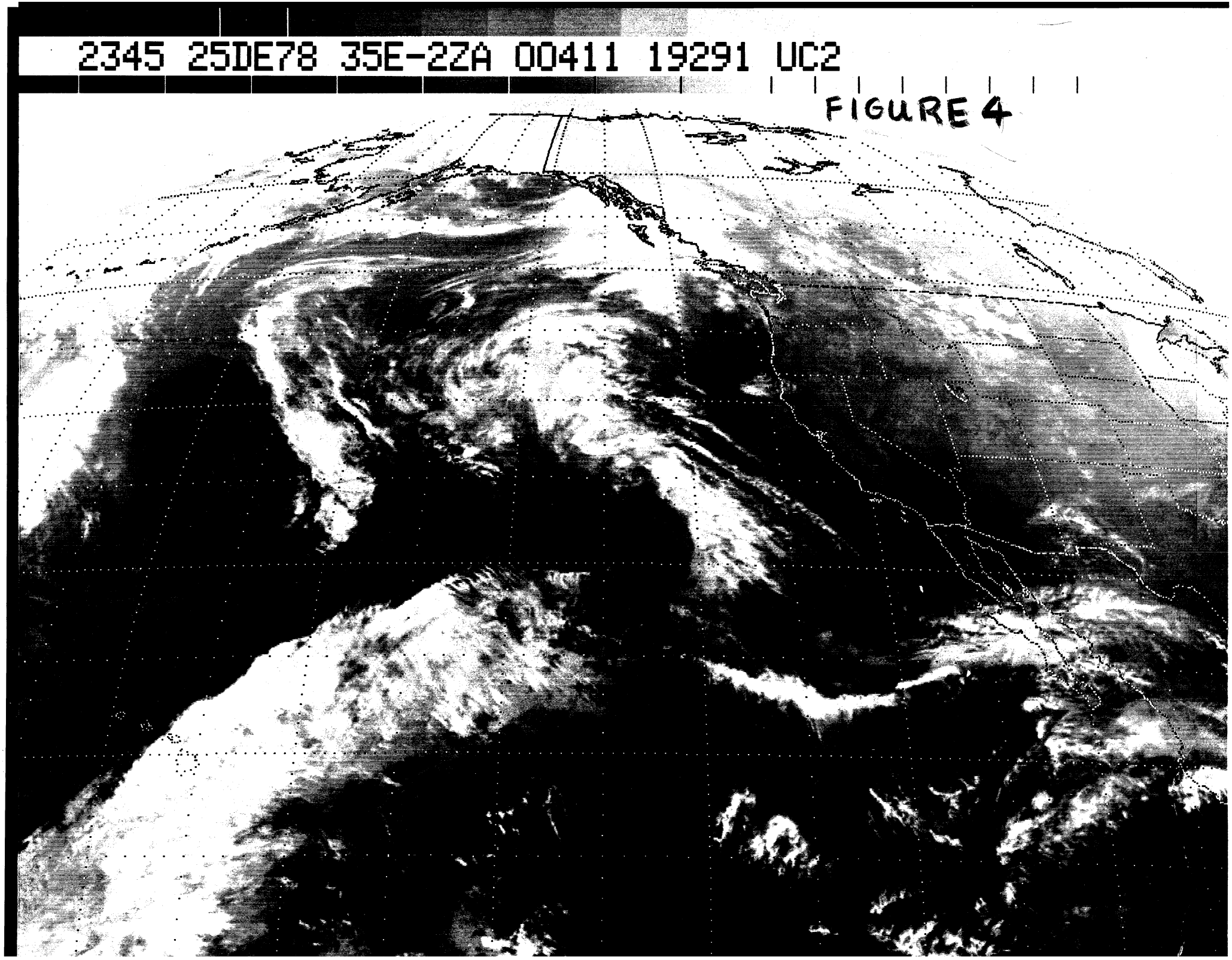
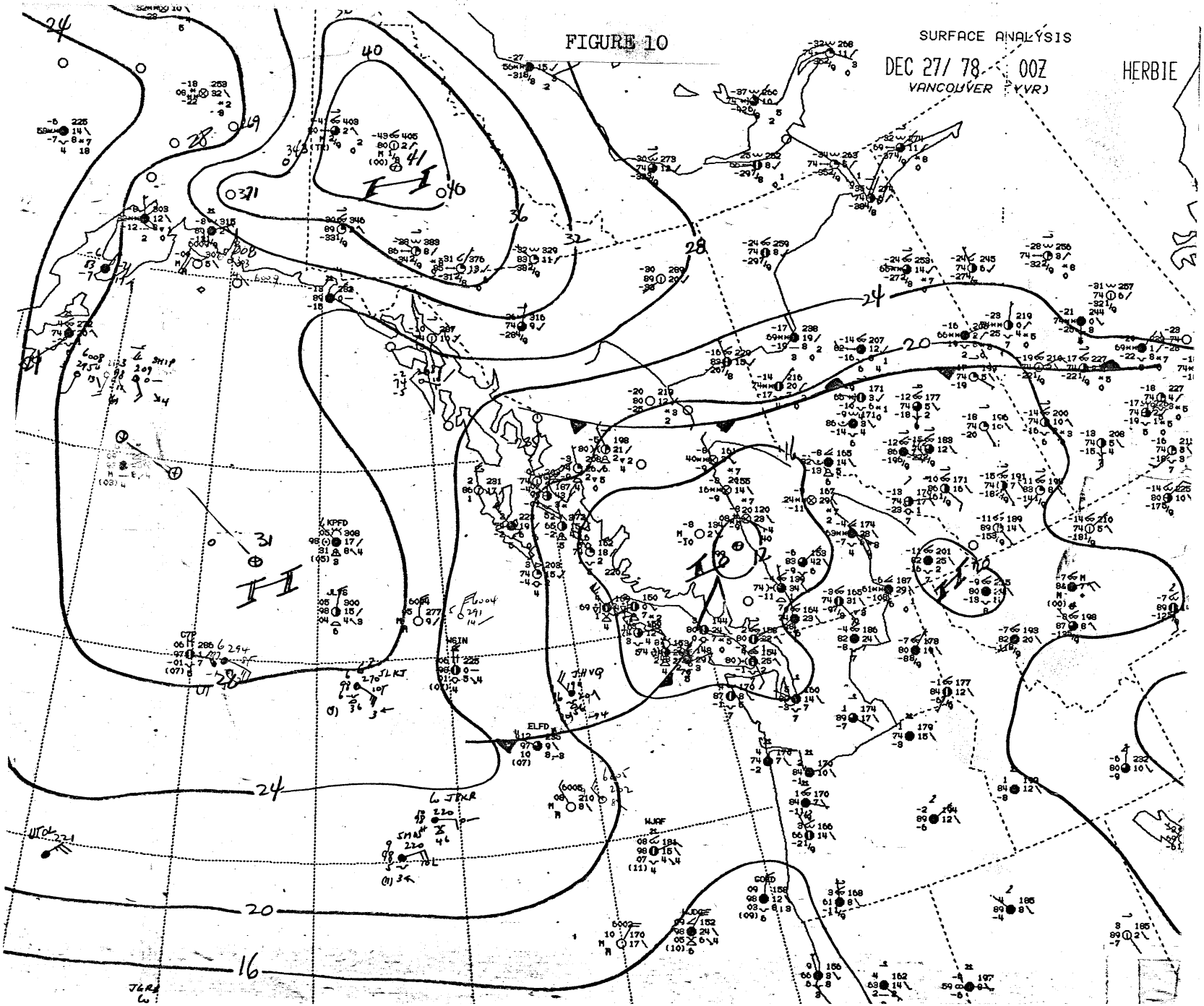


FIGURE 4

FIGURE 10



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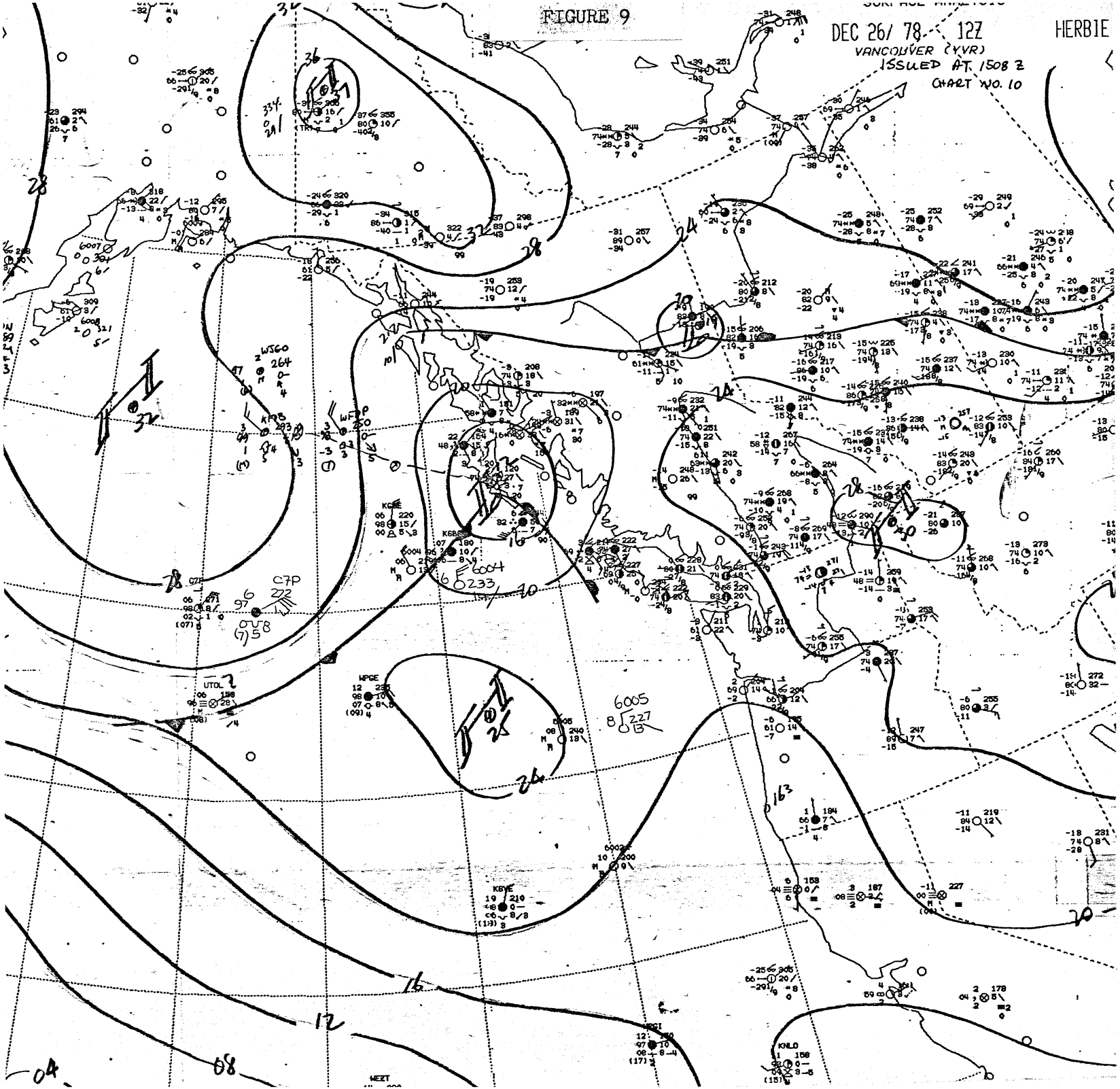
DEC 26/ 78 12Z
HERBIE
VANCOUVER (YVR)
ISSUED AT 1508 Z
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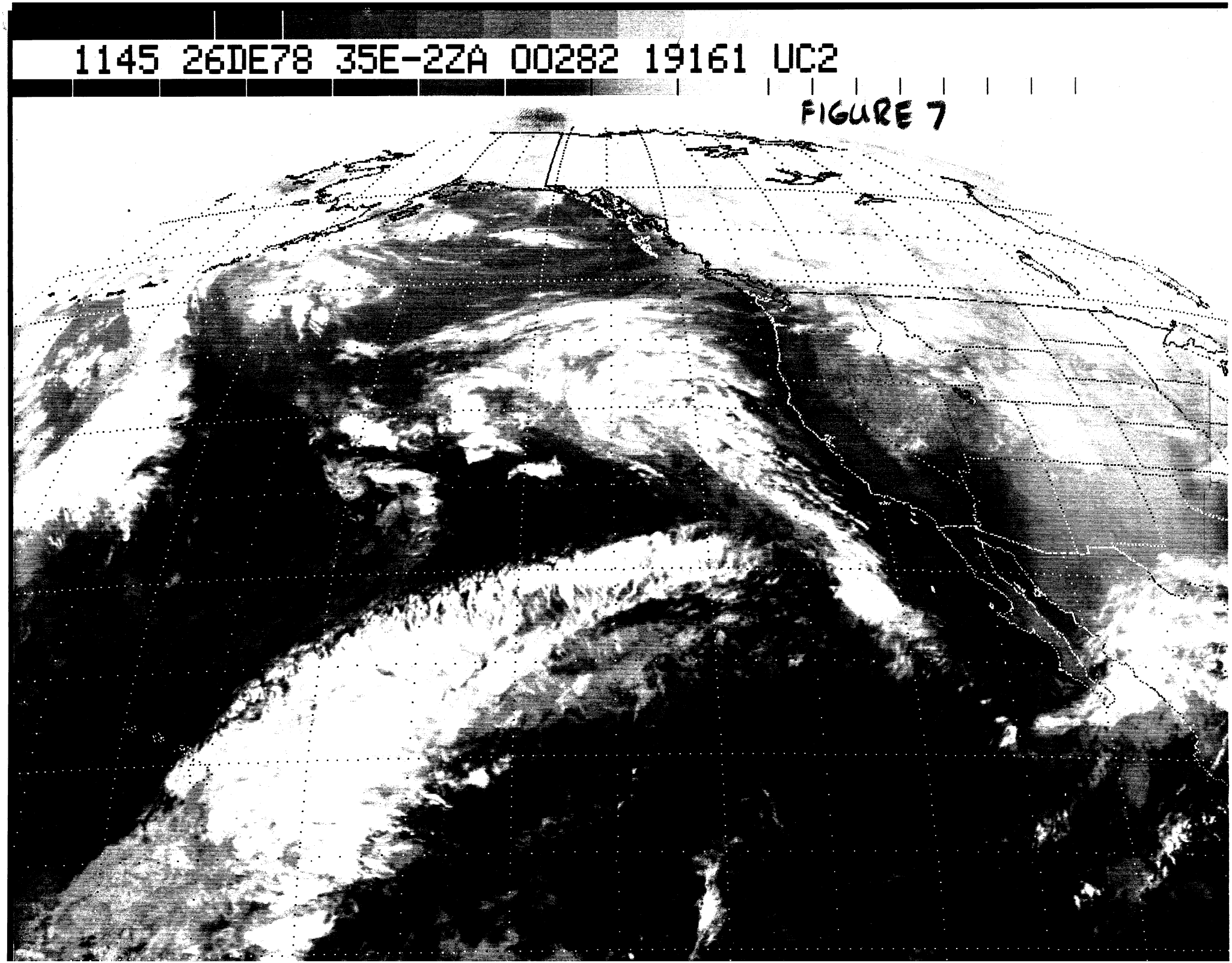

FIGURE 7

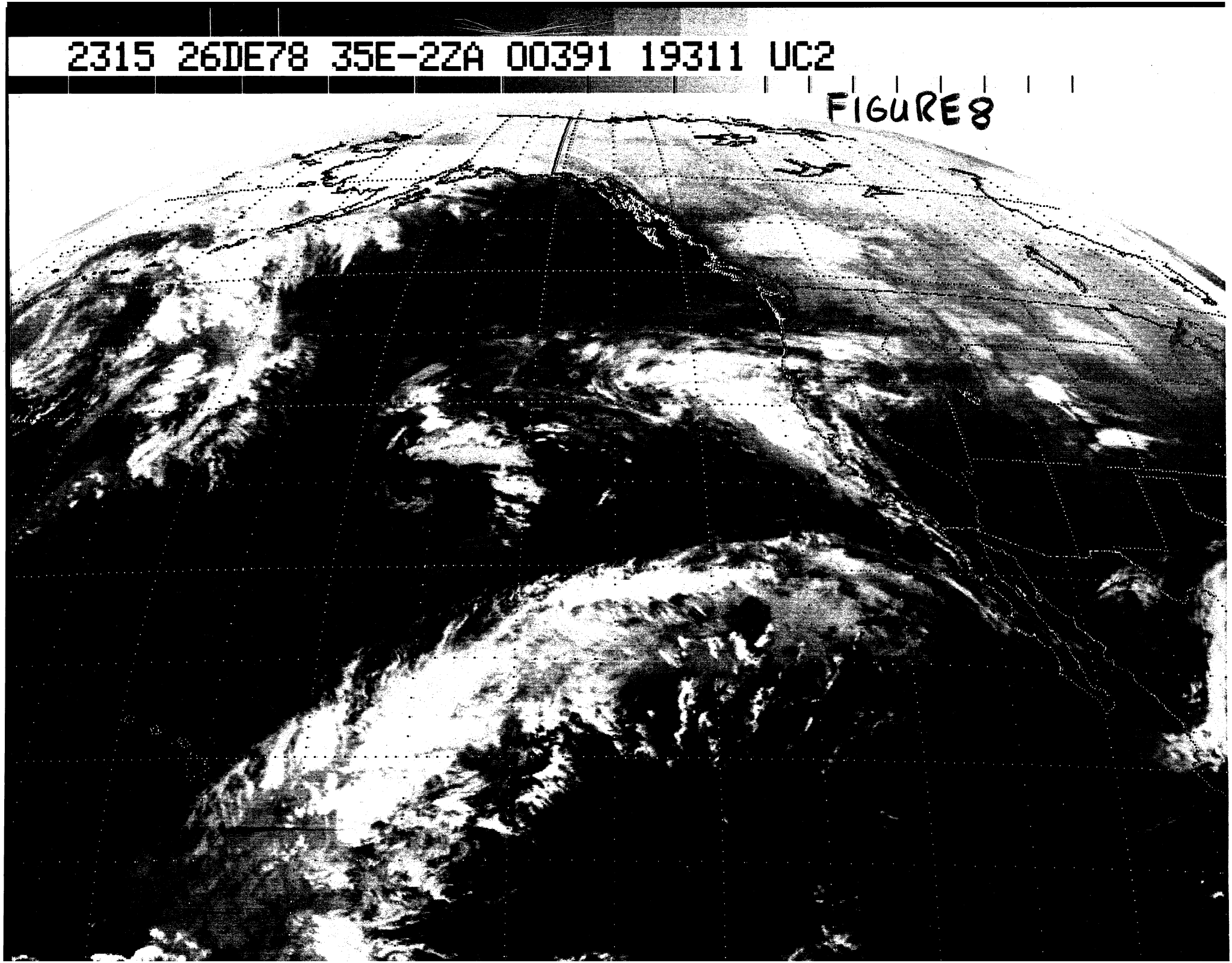

FIGURE 8