# PACIFIC REGION TECHNICAL NOTES

80-011
April 17, 1980

## Weather System Analysis Procedures
## Part I

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### INTRODUCTION

The weather system depiction analysis procedures in common use seem to be outdated and need review. Some of the problem situations that arise frequently are:

1. Weather producing cloud systems are born and evolve through their entire life cycle without being officially recognized on a surface analysis;

2. Cloud systems are represented by certain models that bear little resemblance to reality. Frequently the actual system evolution diverges markedly from the modeled system evolution;

3. At other times very deformed weather producing systems are "dropped" from the analysis even though they remain present and significant from a weather producing point of view. Conversely, a frontal system will continue to be "carried" on an analysis for historical reasons, even though its presence is virtually meaningless.

The meteorological synoptic situations resulting in depiction problems form an entire spectrum of cases. However, there seems to be three major problem areas. They are associated with:

I the TROWAL
II Comma cloud systems
III Deformation Zone clouds.

Because of the editor's space limitations, only one of these cases will be discussed per Technical Note. This Note will discuss the "TROWAL" case. The other cases will be discussed in subsequent Technical Notes.

### THE "TROWAL"

Having observed (and taken part) in the analysis program at PWC, I have concluded that the TROWAL may depict a wide variety (and sometimes totally unrelated) atmospheric features. The only common denominator seems to be the "hope" that cloud and some weather occurs near this line.

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Sometimes the TROWAL is placed where the conditions best fit the model. Unfortunately no clouds and weather will occur near this line. At other times, the TROWAL is placed with the cloud system and weather but the atmospheric structure near the cloud system does not resemble the model.

In short, the "TROWAL" represents whatever the analyst wants it to represent. It is sort of an all purpose "tool" that must be used on surface charts so that the analysis looks finished. Unfortunately, the TROWAL is designed to depict only one generalized type of frontal structure i.e., that depicted in figure 5. The GOES satellite provides only an aggregate view of cloud patterns from above, however, by using IR and VIS imagery it is possible to infer the three dimensional structure of cloud systems. It has become obvious that many cloud systems depicted as TROWALS simply do not have TROWAL like structures.

As an example, consider the satellite images in figures 1, 2 and 3. These figures demonstrate the sequence of events as a cloud system moved over British Columbia on May 10th, 1979. The back edge of the cirrus boundary is already "further east" of lower cloud boundary by 0845Z (See figure 1). If a frontal surface with airmass characteristics can be defined, it would have a slope as shown in figure 4a. Figure 2 indicates that the slope has increased by 1145Z (See figure 4b for a schematic representation). Similarly, figure 3 "shows" even more of a slope by 1515Z (See figure 4c).

Almost always these types of cloud systems are analyzed as TROWALS by the analysts of PWC and CMC (See figure 6). Comparison of the structures of figures 4 and 5 reveals the marked difference between the classical TROWAL structure and the structure of this system.

This is more of a problem than unrealistic modeling of the atmosphere. The TROWAL is usually placed with the pressure tendency discontinuity line. This line usually moves with the cirrus cloud. The weather producing low cloud and surface wind shift line "hangs back". Very often the "TROWAL" with only cirrus cloud associated with it moves rapidly eastward. However, the weather remains along the B.C. coast. To further aggravate the problem, the weather changes abruptly with the passage of the lower cloud system but there is no "line" on the surface analysis to "explain" this effect.

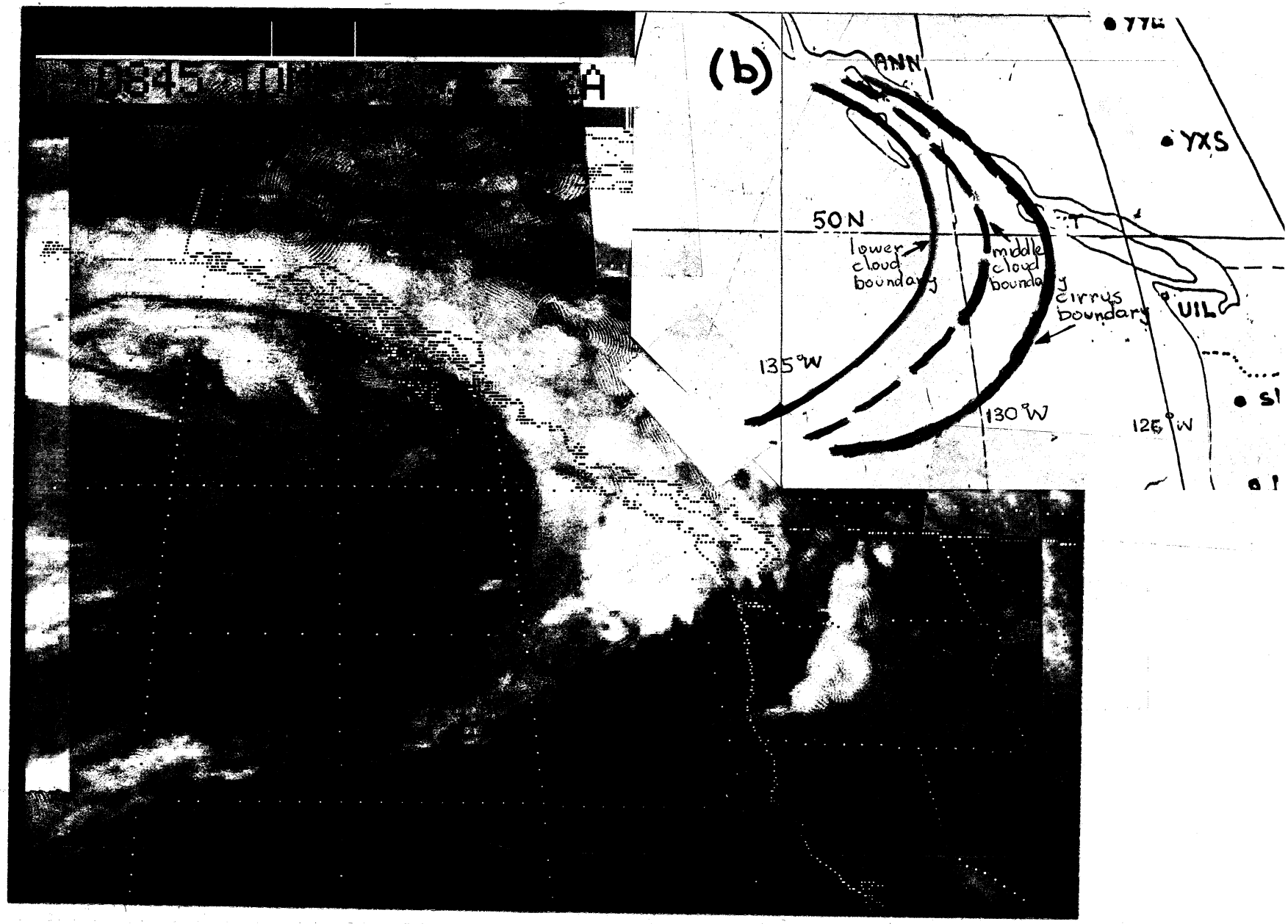


Figure 1 (a) IR Satellite Image, 0845Z, May 10th, 1979
(b) Cloud Boundary depiction.

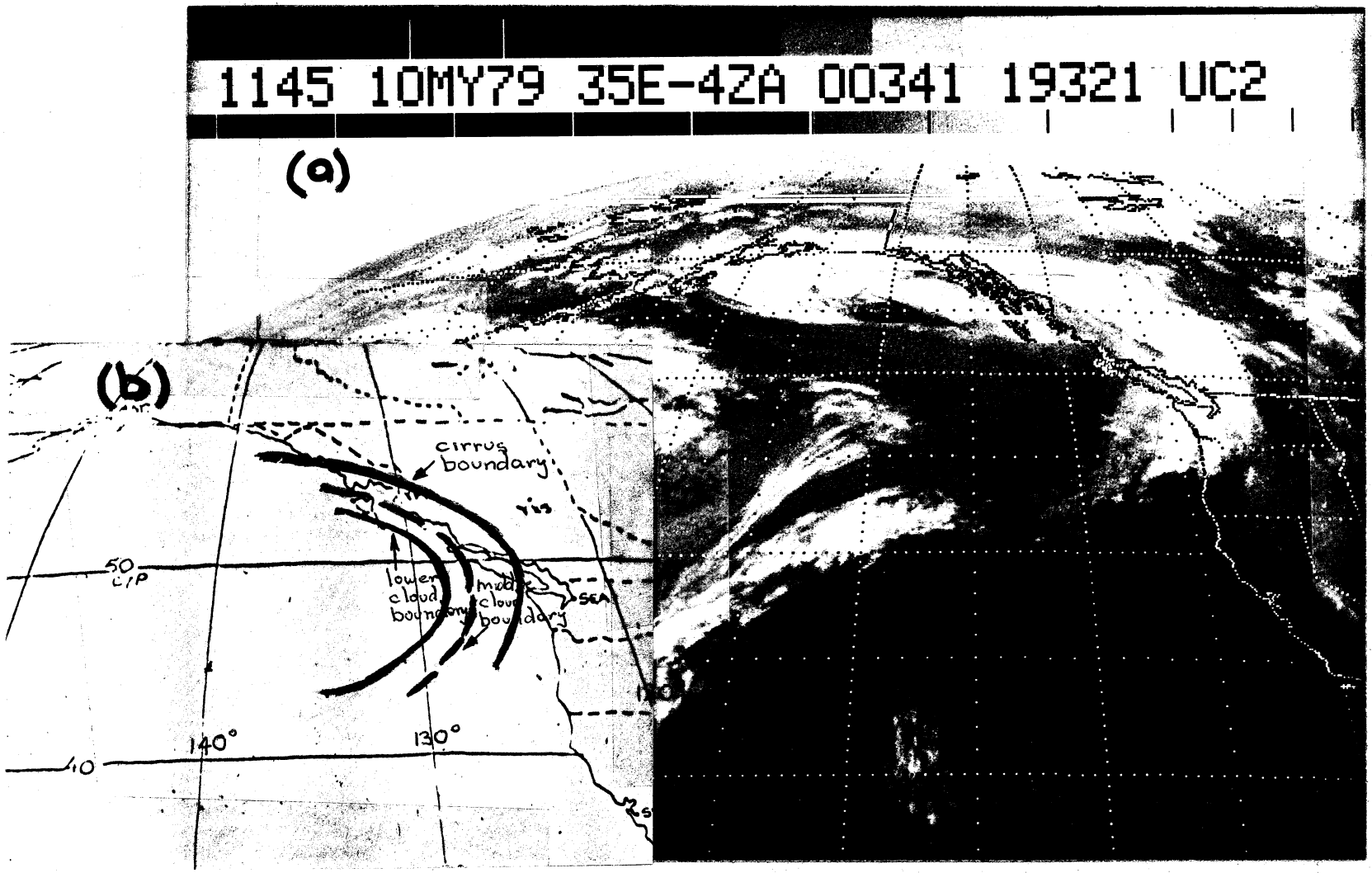


Figure 2 (a) IR Satellite Image 1145Z, May 10th, 1979
(b) Cloud boundary depiction

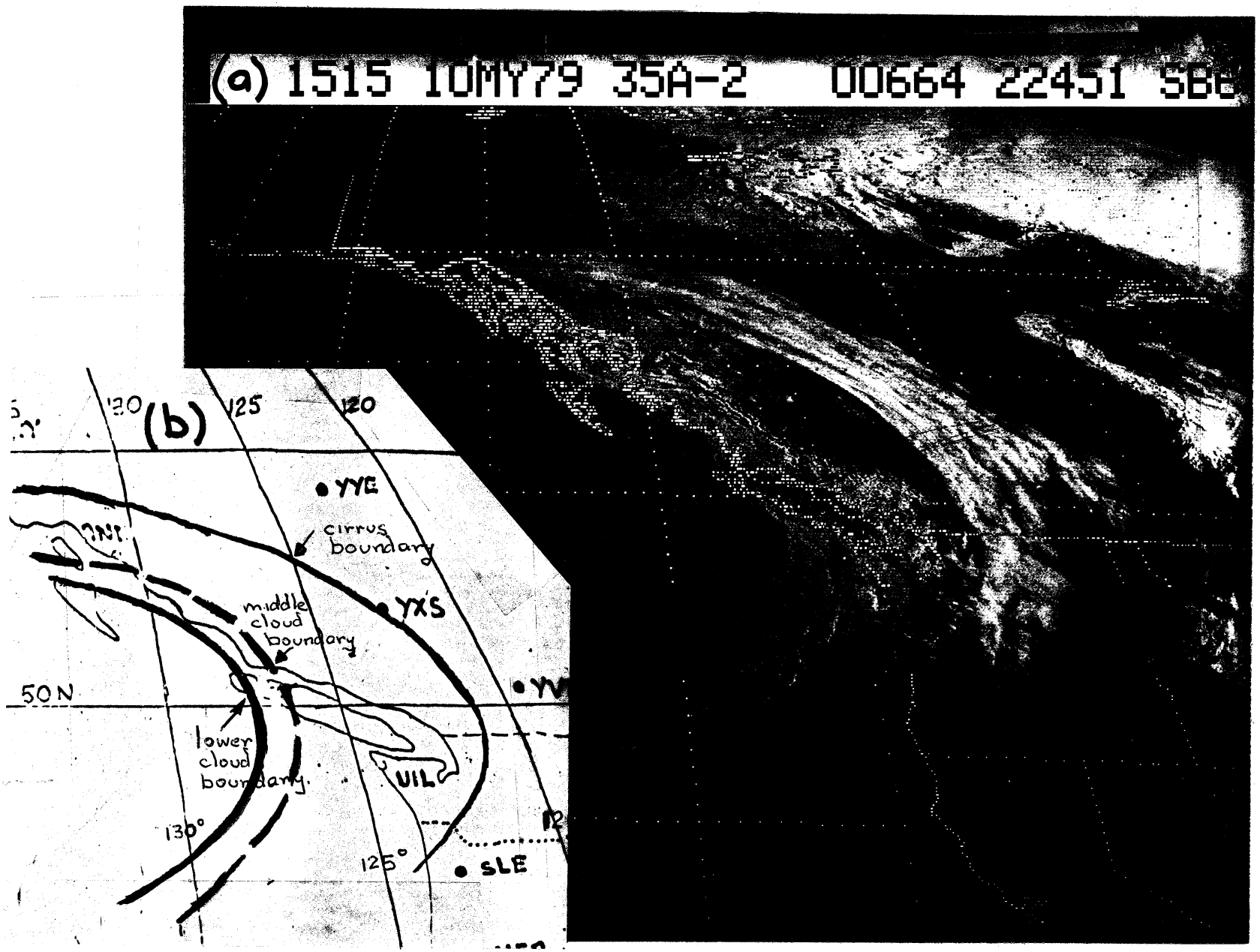


Figure 3 (a) Visual Satellite Image, 1515Z, May 10th, 1979
(b) Cloud boundary depiction.

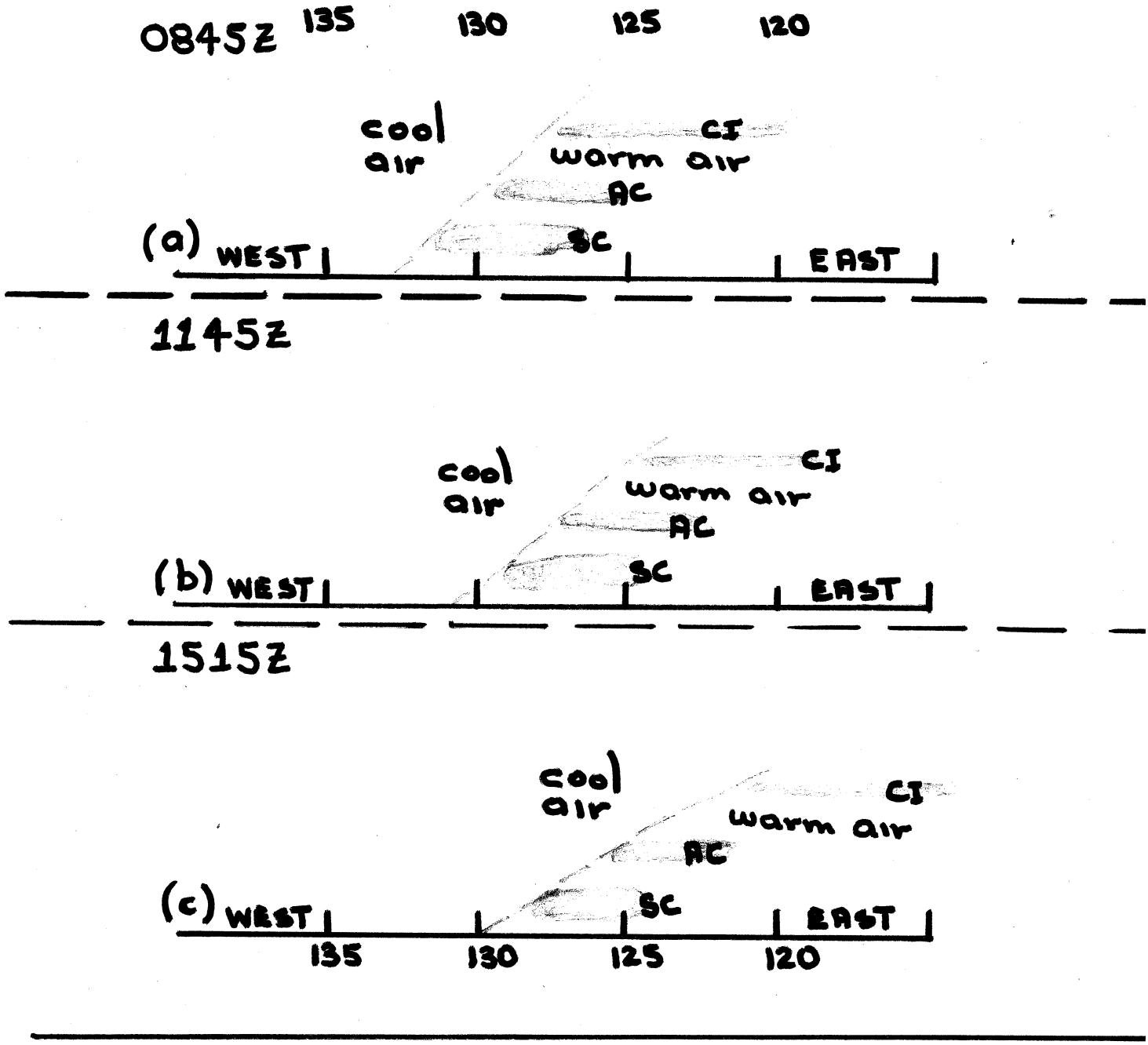


Figure 4 Schematic Cross-Section of the Cloud system at
(a) 0845Z
(b) 1145Z
(c) 1515Z

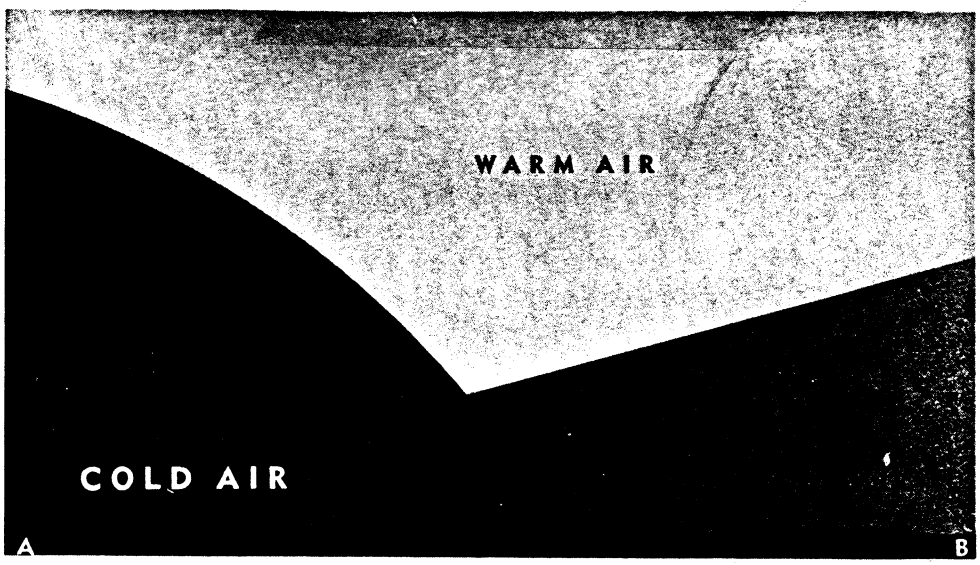


*Figure 9(h) — The trowal — vertical cross-section along base line "A" to "B" of figure 9(g)*

Figure 5 Classical structure of a TROWAL as taken from Weather Ways.

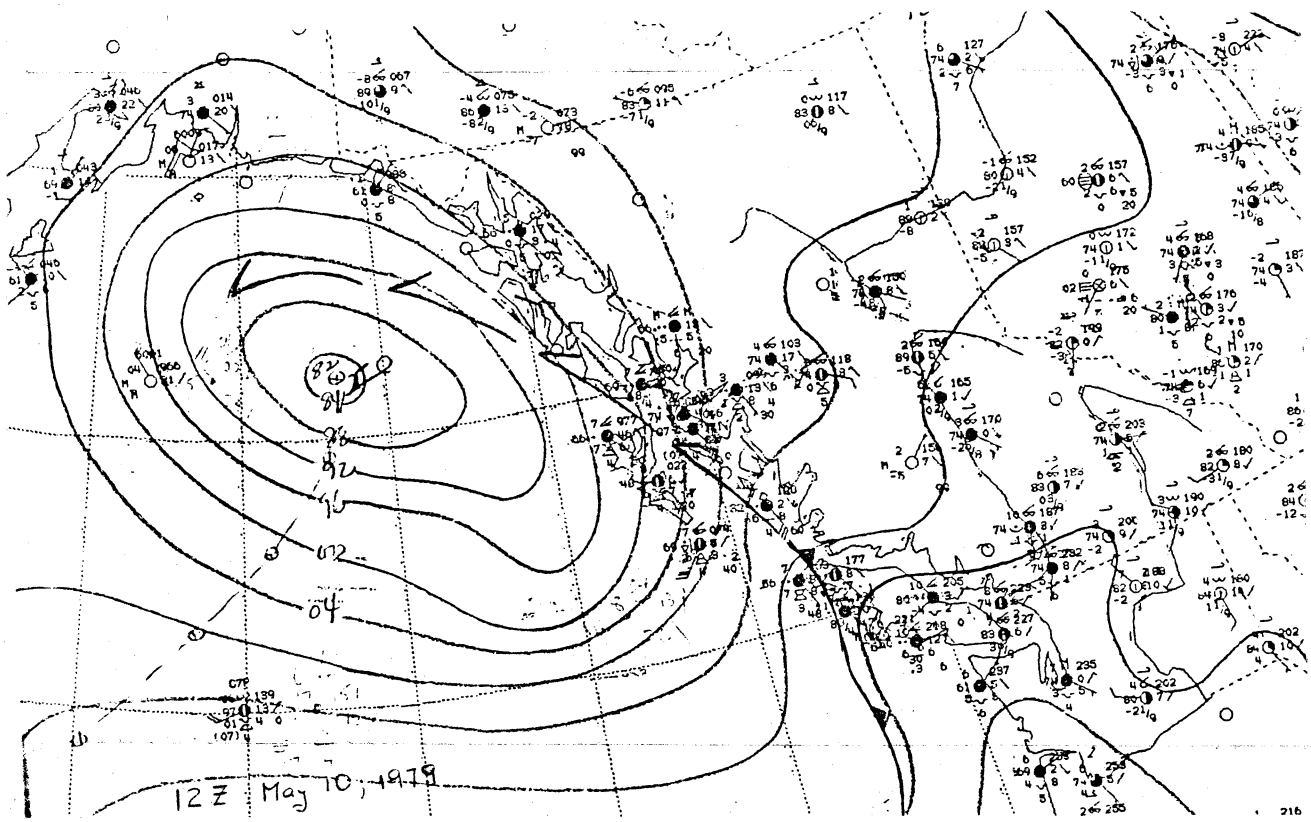


Figure 6 PWC Surface map valid 12Z May 10, 1979.