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CLOUD SYSTEM PROGNOSIS PROGRAM

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INTRODUCTION

Briefly, the analysis and prognosis cycle at PWC is as follows:

1. A surface pressure analysis is constructed valid at the main synoptic hours 00Z, 06Z, 12Z, 18Z.

2. An 18 hour and 30 hour surface pressure prognosis is constructed and issued to the field offices. Also included are such feature as "classical" frontal positions, "middle" cloud areas, precipitation types and spot temperatures. Examples are shown in figures 2 and 4.

The current procedure is adequate to support public, marine and other special forecasts. Unfortunately, the same conclusion (by the author) cannot be drawn with respect to aviation forecasts.

USE OF PWC PROGNOSIS CHARTS TO SUPPORT AVIATION FORECASTS AND SERVICES

The current procedure suffers from two major deficiencies that render the prognosis charts less than useful for aviation purposes. They are as follows:

1. The current analysis and prognosis cycles have large time penalties compared to the aviation forecast periods;

2. There is usually insufficient detail on the prognosis charts to adequately support aviation forecasts.

CLOUD PROGNOSIS CHART

Since the operational use of GOES imagery and film loops (or animated video sequences) the emphasis in operational analysis and prognosis programs has began to shift away from the overwhelming preoccupation with the surface pressure field. The growing tendency is to combine the satellite cloud patterns with the upper wind field for analysis purposes and then infer the future cloud patterns from the prognostic upper wind field (Weldon, 1979).

A proposed new approach to support aviation forecasts is to construct an eighteen hour cloud system prognosis (A twelve hour cloud system prognosis is shown in figures 1b and 3b).

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1. ANALYSIS AND PROGNOSIS CYCLES

(a) Current Prognosis Procedures

The prognostician-analyst constructs a Pacific analysis valid at the main synoptic hours, say To. Because of the time needed for automated plotting and the mechanics of hand drawn analysis, the PWC surface pressure analysis is not ready for issue until To + 3 hours.

An 18 hour and 30 hour MSL pressure prognoses are constructed and issued at To + 7. The FT forecasts are issued at To + 4½ and To + 10½ hours after the main synoptic hours. Because of this procedure, data at To does not systematically impact on aviation forecasts until To + 11 hours (See figure 5a).

During periods of rapidly moving subsynoptic scale systems, aviation forecasts breakdown is common in an 11 hour period. Ranahan (1980) has shown that the average FT forecast has no skill after six hours.

(b) Proposed Procedure - 18 hour cloud prognosis chart

If an operational 18 hour cloud prognosis chart program was initiated, the analysis and prognosis cycle would resemble the depiction in figure 5b.

GOES imagery and animated loops would be available until To - ¼. The imagery is available at PWC about ½ hour after the valid time. The cloud analysis chart can be ready for issue in about ¾ of an hour (To + 1 hour). Then, the 18 hour cloud prognosis chart can easily be issued by To + 2½ hours. This leaves the aviation forecaster and briefers a full two hours lead time to incorporate the cloud prognosis data into the set of terminal forecasts valid at To + 5 hours (See figure 5b).

In summary, the cloud prognosis approach can support the FT forecasts issued 6 hours earlier.

2. DETAIL

Many bands of cloud and weather are never recognized on the "official" analysis. Consequently, they are ignored or "broad brushed" on the prognoses. This effectively renders them less than useful for aviation forecast and briefing purposes. This problem arises because of the established depiction procedure. Models do not exist that adequately "describe" most cloud systems. As a consequence, many are ignored by default. Compare figures 1b and 2, 3b and 4.

A cloud prognosis approach eliminates the above problem. If a cloud band is delineated on the cloud analysis (figures 1a, 3a) it will be treated on the cloud prognosis.

In summary, a prognosis based on satellite imagery will allow much more detail. This should greatly improve support to aviation services.

CONCLUDING REMARKS

A satellite cloud prognosis approach will drastically decrease the prognosis "response time" needed to support aviation forecasts and services. At the same time, it will greatly increase the amount of detail provided to aviation forecasters and briefers.

An experimental 12 hour cloud prognosis issued by the Satellite Meteorologists was given tacit approval. This product will become the starting point for the cloud prognosis program.

The program will begin as soon as possible. Comments from the briefing offices will be appreciated. For now, this program has to be regarded as "experimental" and the product "unofficial". Any cases of conflict between the satellite cloud prognosis and the "official" prognosis will be resolved by ignoring the former.

Weldon, R., 1979 - Satellite Training Course Notes, Applications Division, AES.

Ranahan, L., 1980 - Remote VS on-site Forecasting, CFWD, Comox.

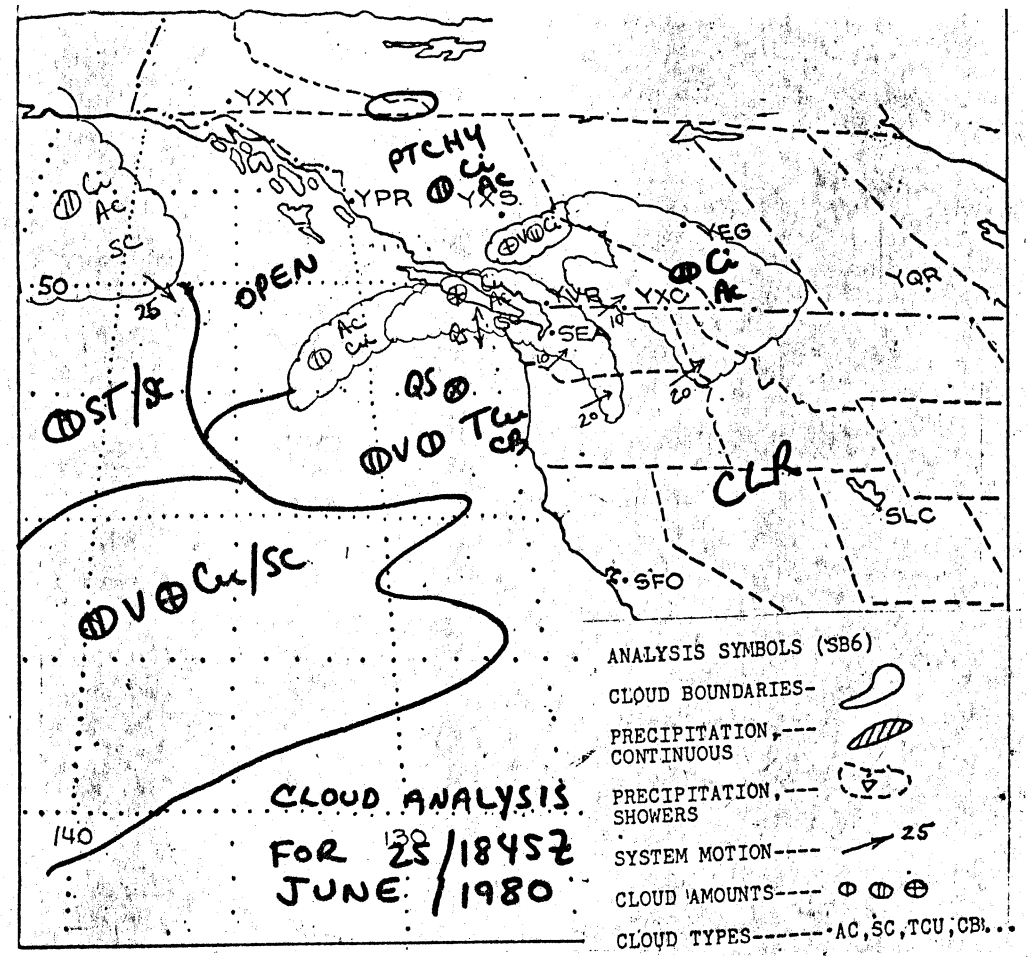


Figure 1(a) Cloud Analysis based on GOES imagery June 25, 1845Z

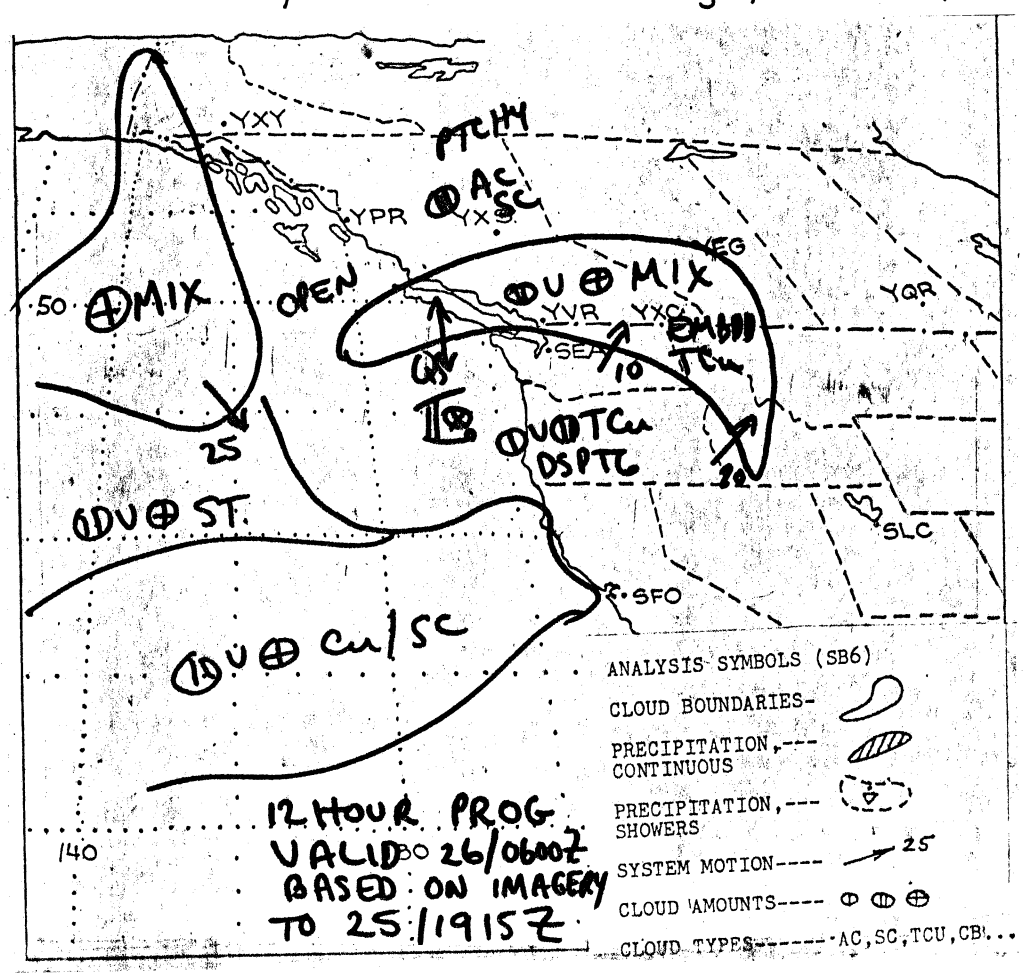


Figure 1(b) Cloud Prognosis Chart (about 12 hours) based on imagery to June 25, 1915Z

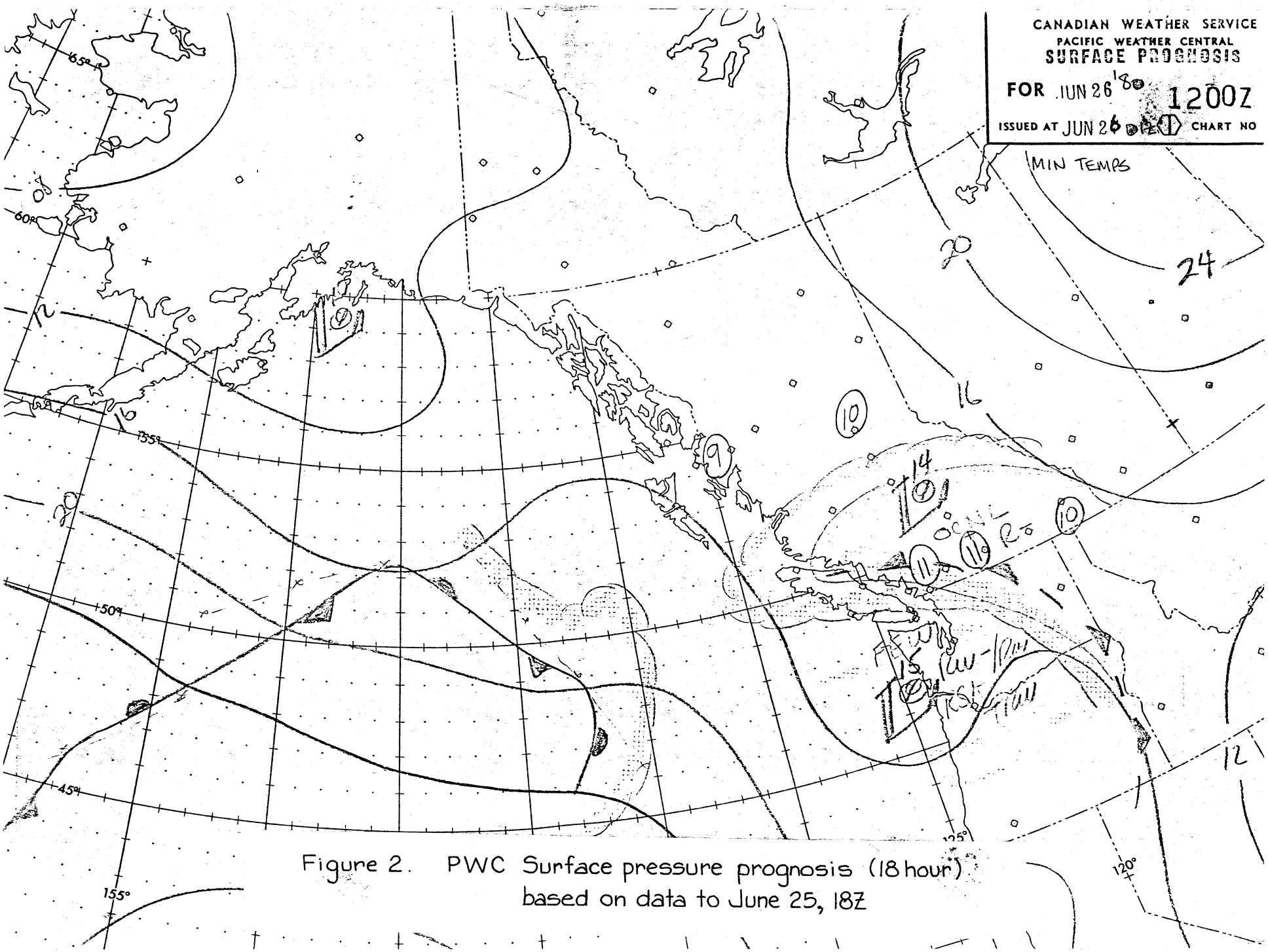


Figure 2. PWC Surface pressure prognosis (18 hour) based on data to June 25, 18Z

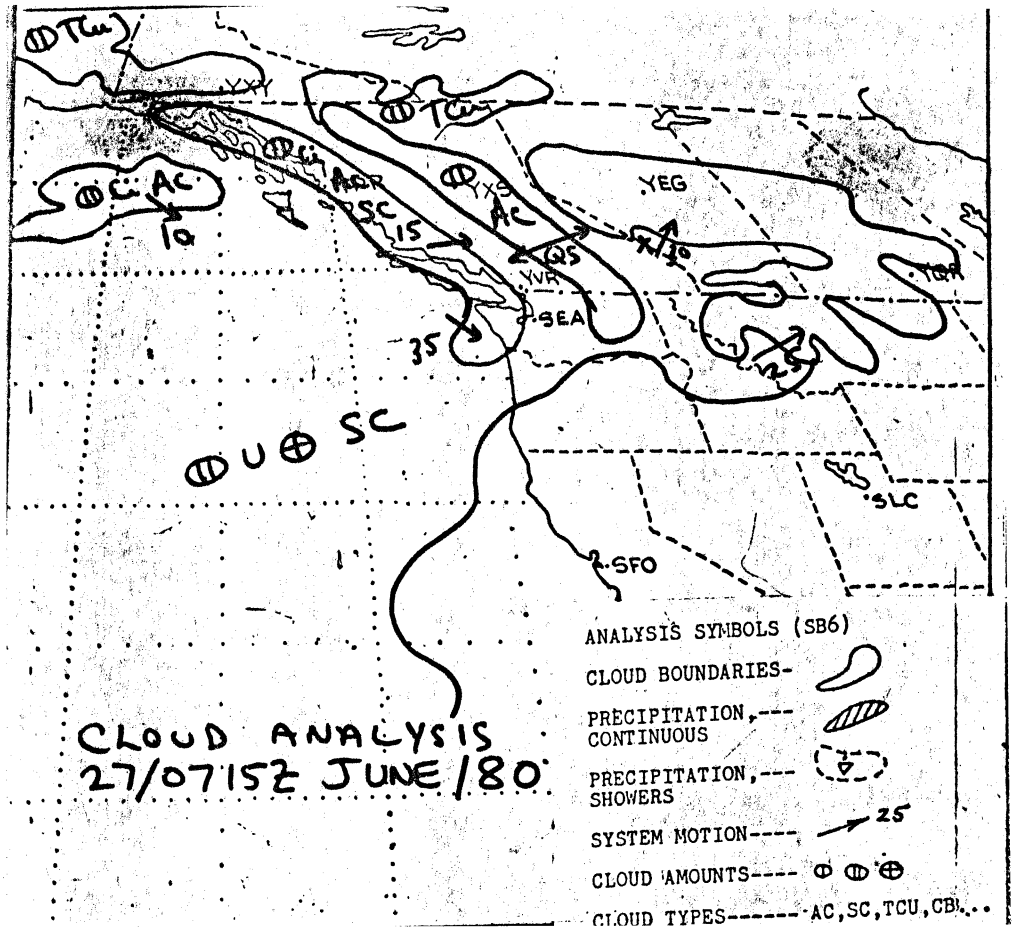


Figure 3(a) Cloud Analysis based on GOES imagery June 27, 0715Z

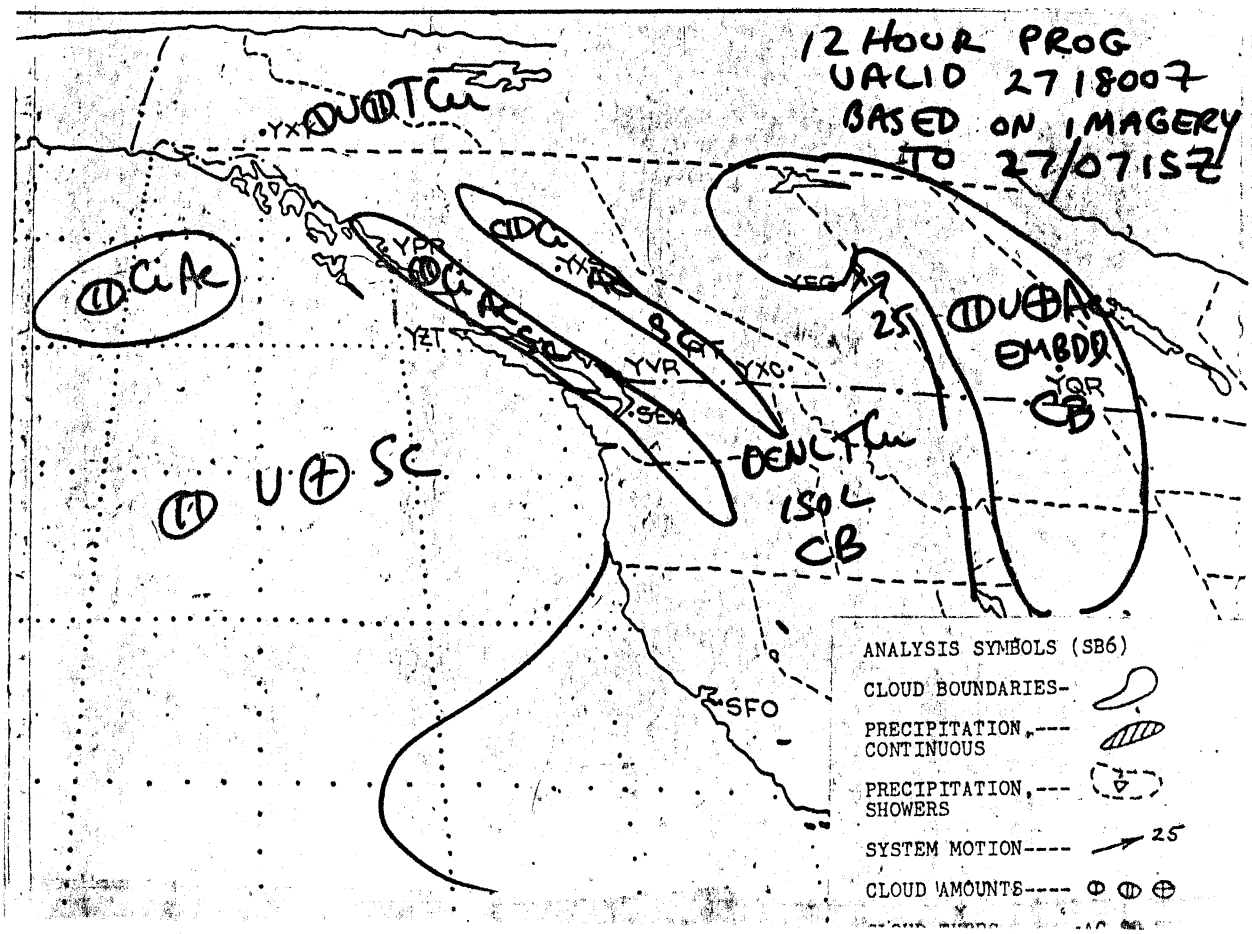


Figure 3(b) Cloud Prognosis Chart (about 12 hours) based on imagery to June 27, 0715Z

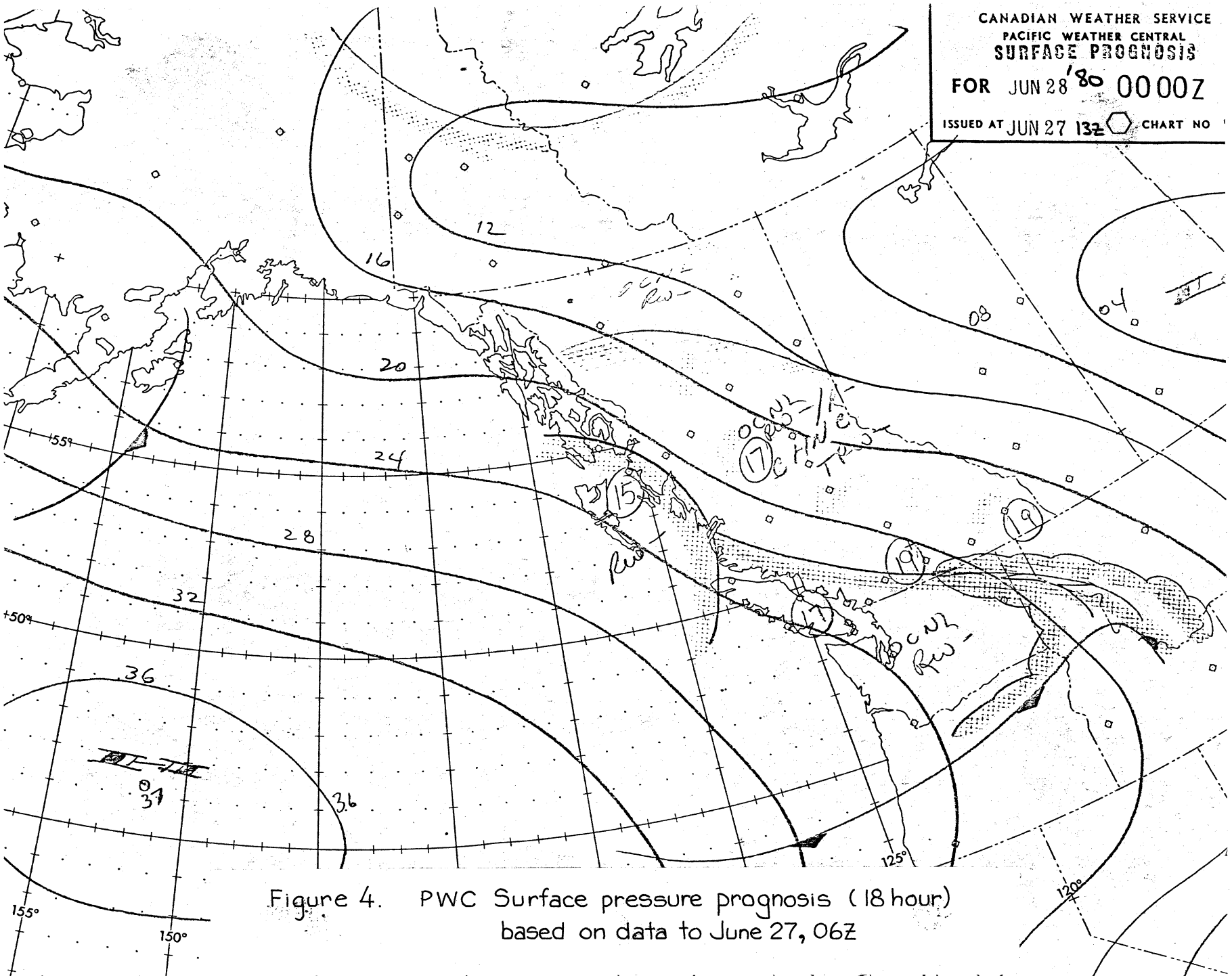
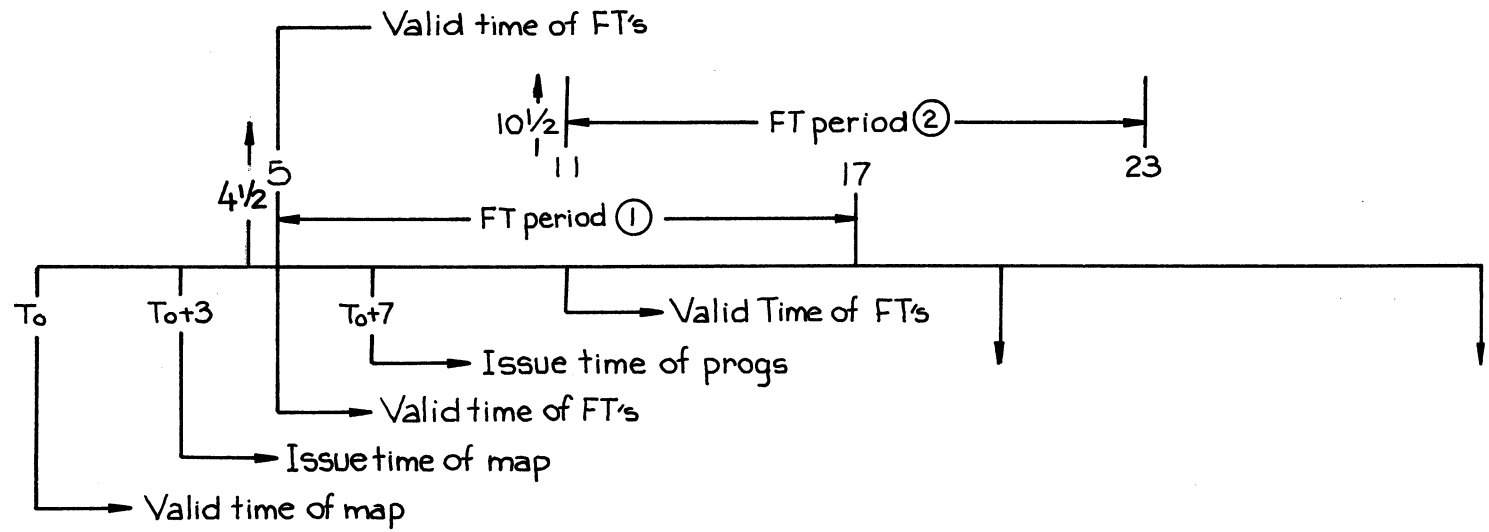


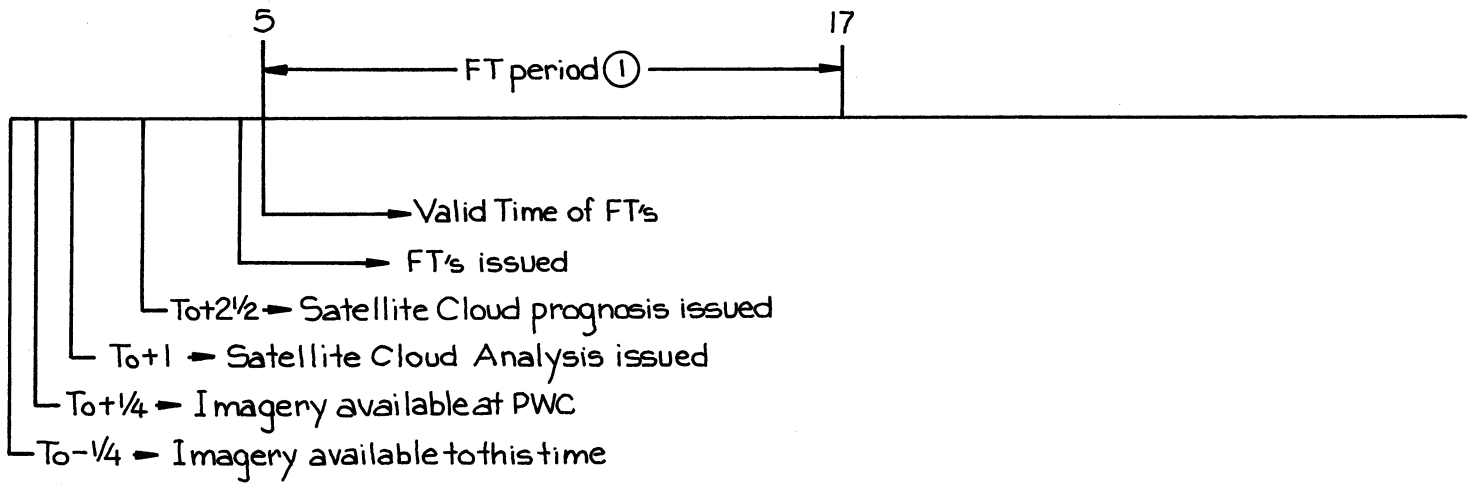
Figure 4. PWC Surface pressure prognosis (18 hour) based on data to June 27, 06Z

(a)



5(a) Current Analysis and Prognosis Cycle

(b)



5 (b) Proposed Analysis and Prognosis Cycle for FT forecasts