



PACIFIC REGION TECHNICAL NOTES

81-022

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OPERATIONAL ASSESSMENT OF
NWP USING THE VORTICITY - CLOUD
EDGE DEFORMATION ZONE RELATIONSHIP

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INTRODUCTION

PWC Satellite meteorologists have been looking at the deformation concept to evaluate the initial vorticity analysis over the eastern Pacific and also in producing medium range cloud forecasts from forecast fields. (For background information see Pacific Regional Technical Notes 80-038B, 80-039B, 81-013). The accompanying case studies illustrate some of the more recent findings of this study.

TWO CASE STUDIES

Case I (See Figure 1)

Figure 1(a) shows the relationship of a deformation zone on satellite imagery to those depicted on the vorticity analysis of three NWP packages received at PWC. The fit is poor with all model solutions showing more curvature than the actual cloud zone.

Figure 1(b) is interesting in that it shows how on the next analysis the LFM has been pulled in line with the U.S. Spectral solution. (The T + 12 hour spectral is used as the first guess field for the LFM). Otherwise the lagging and curvature problems persist through Figure 1(c).

Figures 1(d) through 1(f) show how the models converge towards a singular solution as the zone crosses the coastal observational grid.

Case II (See Figure 2)

Although the fit between cloud and the vorticity analysis fields are poor Figure 2(a), the error can be applied to the prognosis. In this case, the bias of both the LFM and CMC spectral towards being too slow and cyclonically curved can be followed from analysis into the prognosis package. (Characteristically, the CMC spectral vorticity field tends to become non definitive with centers and features in the 36 to 48 hour period.

CONCLUDING REMARKS

1. Given a poor initial correlation between the vorticity-cloud deformation zones over the data sparse Pacific, the bias or error will tend to show up on subsequent Pacific analyses. The analyses (CMC, LFM, U.W. Spectrals) tend towards a singular solution and "good fit" as the deformation zone is picked up by the coastal observation system. (See case 1).
2. By recognizing a fit problem between the initial vorticity and cloud deformation zones, one can adjust the analysis and associated prognosis package to produce a better cloud forecast. (See case 2).
3. The CMC vorticity analysis even when good initially tends to become vague on progged features by 36 - 48 hours. LFM and U.S. Spectral can handle centres better on longer range progs.

References:

- FUNK, L. PRTN 80-038B Satellite Observed Cloud Fields and Their Relationships to Flow Patterns - Part A.
- PRTN 80-039B Satellite Observed Cloud Fields and Their Relationship to Flow Patterns - Part B.
- PRTN 81-013 Utilization of Satellite Imagery Deformation Zone Concept in Refining Medium Range Cloud Forecasts,

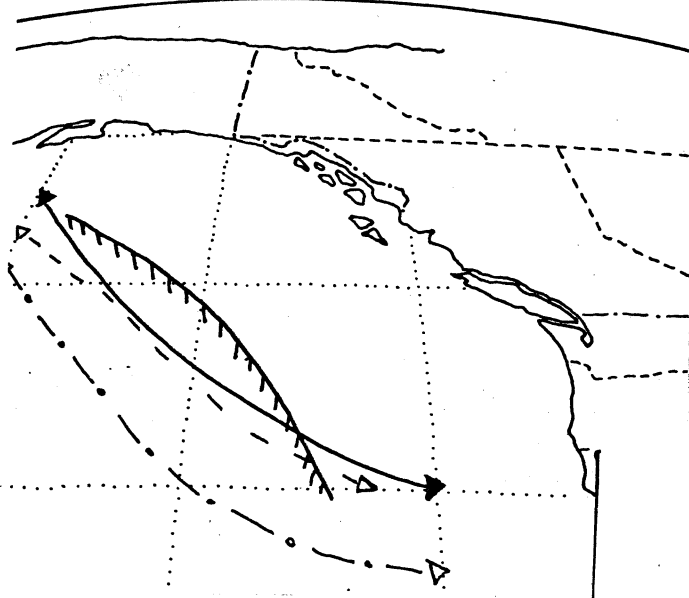


FIGURE 1a 00Z 25 SEPT 1981

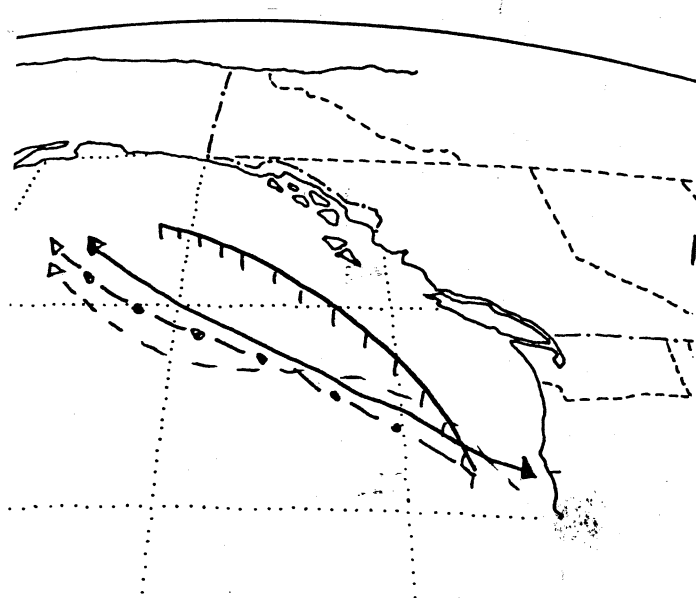


FIGURE 1b 12Z 25 SEPT 1981

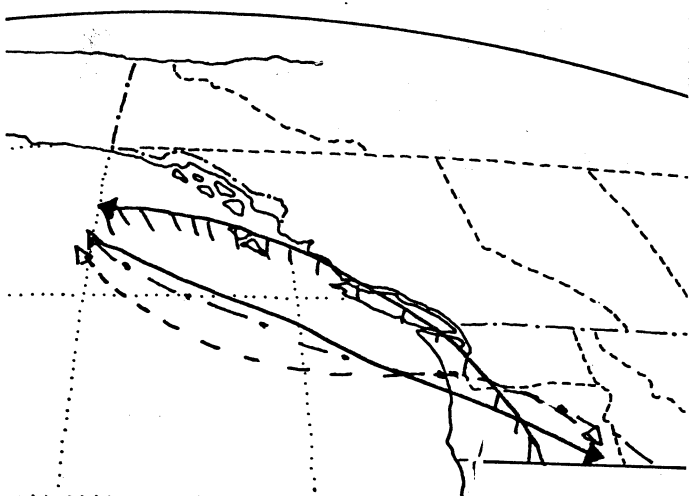


FIGURE 1c 00Z 26 SEPT 1981

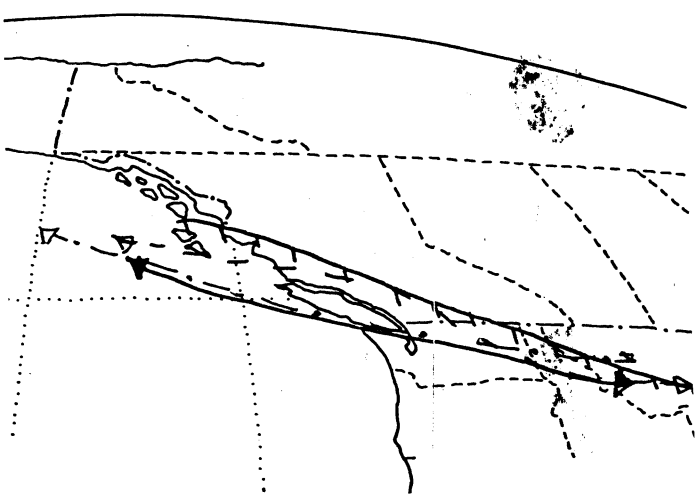


FIGURE 1d 12Z 25 SEPT 1981

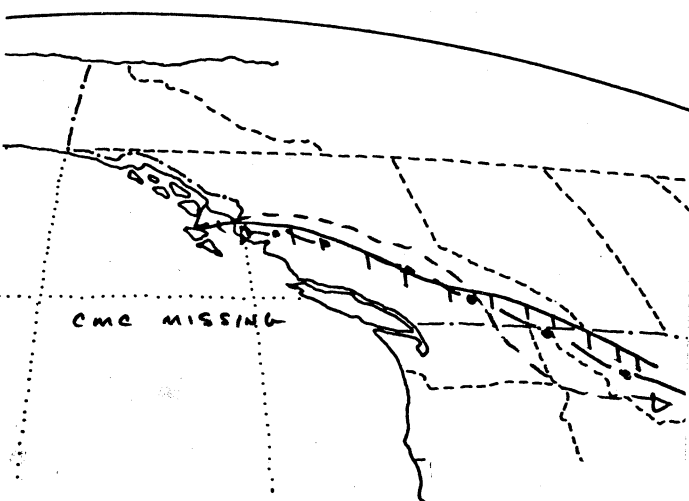


FIGURE 1e 00Z 27 SEPT 1981

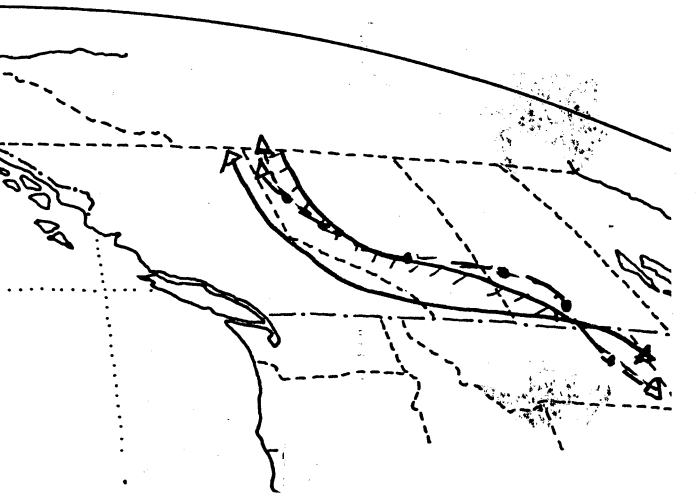


FIGURE 1f 12Z 27 SEPT 1981

DEFORMATION ZONES
 CMC SPECTRAL ANALYSIS
 US SPECTRAL ANALYSIS
 US LFM
 ACTUAL FROM IMAGERY

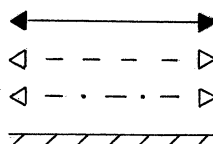


FIGURE 1

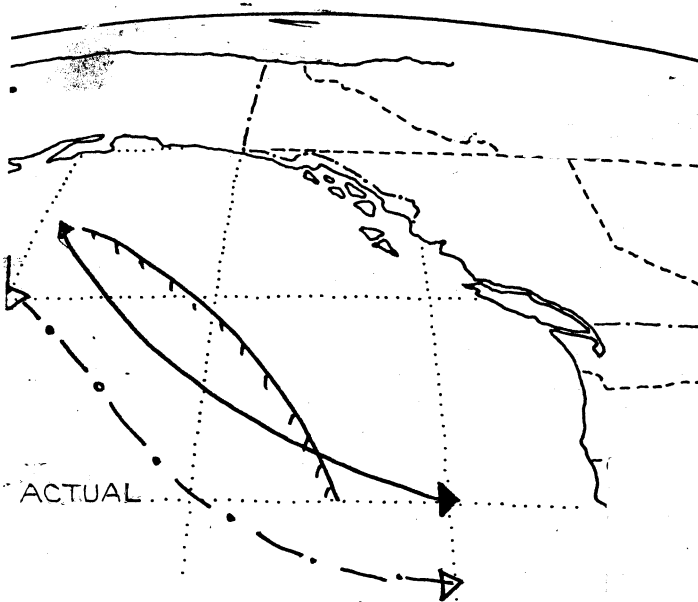


FIGURE 2a 00Z 25 SEPT 1981

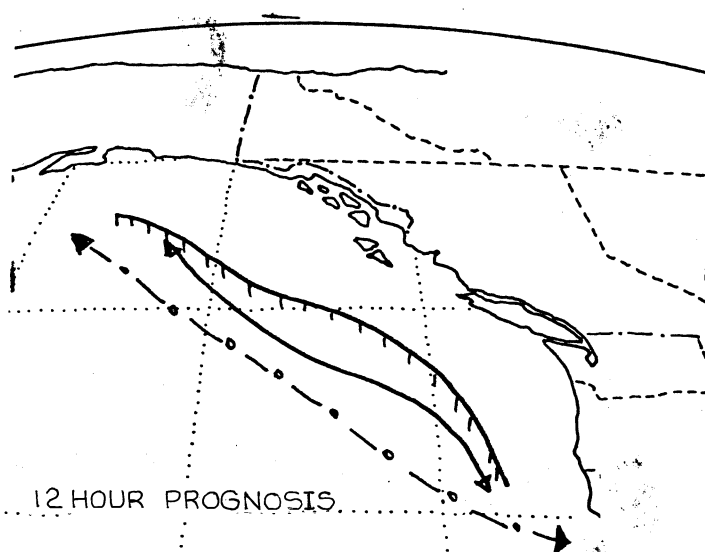


FIGURE 2b 12Z 25 SEPT 1981

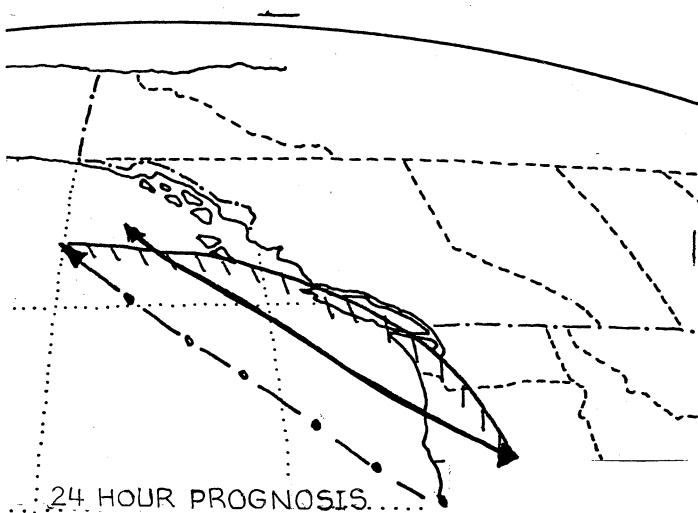


FIGURE 2c 00Z 26 SEPT 1981

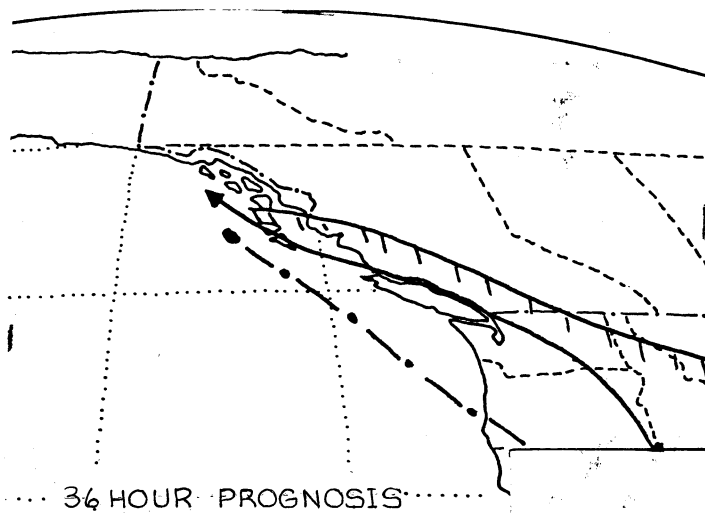


FIGURE 2d 12Z 26 SEPT 1981

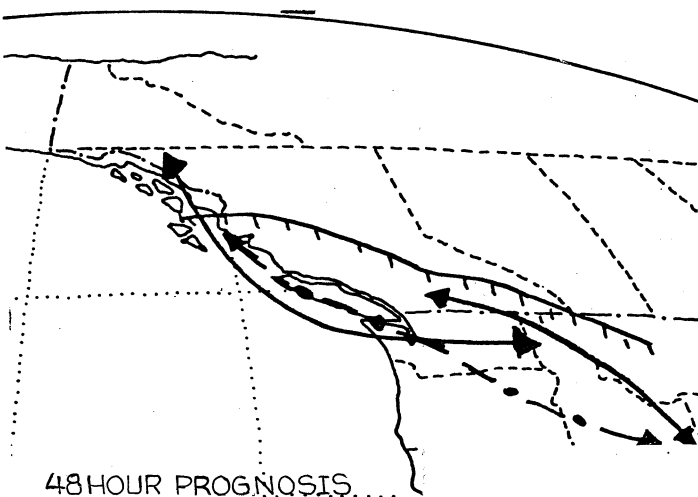


FIGURE 2e 00Z 27 SEPT 1981

DEFORMATION ZONES

CMC SPECTRAL

US SPECTRAL

US LFM

ACTUAL FROM IMAGERY

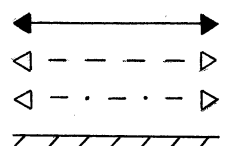


FIGURE 2