PACIFIC REGION TECHNICAL NOTES

81-024

November 6, 1981

HEAVY RAINFALL OVER GREATER VANCOUVER
OCTOBER 30 - NOVEMBER 1, 1981

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INTRIDUCTION

On Halloween weekend, Friday October 30 - Sunday November 1, 1981, the Greater Vancouver area received its heaviest rainfall to that date for the current year. Rainfall accumulations for the three day period of 83.0 mm, 105.6 mm, 91.2 mm and 57.3 mm were recorded at Vancouver International Airport, Vancouver Harbour, Alta Lake and Abbotsford Airport respectively. Unofficial reports of rainfall amounts in the order of 200 mm at higher elevations over the Squamish River basin and the Vancouver North Shore Mountains were also received. The heaviest rainfall of the three day period occurred on Saturday October 31, this was reflected in Vancouver Intarnational Airports 24 hour reading of 57.2 mm.

Although these rainfall amounts were not "all time" record breaking, they were well above average and as a result caused extensive flooding and resultant flood damage.

METEOROLOGICAL EVENTS

The early morning analyses on Friday October 30, 1981 (1200Z) indicated a broad southwesterly flow at 500 mb (figure 1). The flow supported a rapidly approaching frontal wave (figure 2). More importantly, was the presence of an area of tropical moisture centered near 140°W, 35°N (see GOES-W image, figure 3b). The relative high moisture content of this area was corroborated by the polar orbiting satellite precipitable water estimates. Examining the satellite images, figures 3a through 3c, it can be seen that the source of this area of tropical moisture was in the vicinity of Hawaii. As the southwesterly flow maintaining the frontal wave swung southward over the eastern Pacific it enhanced and entrained the tropical moisture.

The leading edge of the frontal cloud reached the Greater Vancouver area at approximately 0900Z October 30. Light rain was recorded at Vancouver International Airport at 1500Z October 30. Heavy rain was observed over the Greater Vancouver area between 0900Z October 31 to 0900Z November 1. The following table summarizes the duration of precipitation statistics.

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RAINFALL DURATION AND TIME OF HEAVIEST RAIN

FOR THE GREATER VANCOUVER AREA

LOCATION	RAIN BEGAN	HEAVIEST RAIN (R,R+)	RAIN ENDED
YVR	Oct. 30 1500Z	{310900Z - 311200Z} {311700Z - 010200Z}	Nov. 011800Z
WHC	Oct. 30 1535Z	311700Z - 010100Z	Nov. 011926Z
WAE	Oct. 30 1600Z	311700Z - 312000Z	Nov. 011600Z
YXX	Oct. 30 1700Z	010300Z, 010900Z	Nov. 011500Z

* WHC - closed between 04Z-14Z
* WAE - closed between 08Z-13Z

An examination of the PWC GOES-W animation loops and the half hourly still pictures show that the reports of heaviest rain (R and R+) coincide with the passage of the entrained tropical moisture (see figure 3a - 3f). It also appears, from the Quillayute and Salem tephigrams, that this area of tropical moisture also had large scale convective instability qualities that would have contributed to the heavy rain.

THE FORECASTS

Appendix A presents an abstract of the Greater Vancouver Public Forecasts issued prior to and during the rain storm. Rain was forecast for Friday afternoon on the Thursday morning 5:00 a.m. forecast. The Thursday afternoon 4:00 p.m. forecast extended the forecast of rain into Saturday.

Since the front was approaching a little more quickly than expected the timing of the rain was moved up to Friday morning on the amended Friday morning 6:30 a.m. forecast. The first forecast of heavy rains for Saturday was made with the Friday afternoon 4:00 p.m. forecast. This was followed by a weather warning at 2:00 a.m. Saturday morning. The warning was for rainfall accumulations to exceed 50 millimeters. This heavy rainfall warning was continued throughout Saturday and ended with the Sunday 3:00 a.m. and 5:00 a.m. forecasts.

CONCLUDING REMARKS

Why the heavy rains? What made this front different in terms of rainfall accumulations from other similar fronts? It appears from this investigation that the injection of unstable tropical moisture into what would have been a normal frontal system and the production of an uneventful amount of precipitation was the primary cause of the heavy rainfall.

In terms of forecasting these events, it seems some difficulty is encountered by upper air analyses over the Pacific to parameterize these areas of organized convection; and because of the lack of symbolism, for surface analyses to depict these features. Therefore the prognoses of the influence of organized areas of convection relies on detection by satellite images. The transmitted PWC satellite analyses by at least one of the satellite meteorologists identified and depicted the area of tropical moisture.

APPENDIX A

ABSTRACT OF THE PUBLIC FORECASTS
FOR GREATER VANCOUVER DURING THE
RAINSTORM OF OCTOBER 30 - NOVEMBER 1, 1981

ISSUED	FORECAST
FPCN 11 291300 (Thurs. 5:00 a.m.)	Friday. Cloudy with occasional sunny breaks in the morning. Rain beginning in the afternoon.
FPCN 11 291800 (Thurs. 10:00 a.m.)	Friday. Cloudy with occasional sunny breaks in the morning. Rain beginning in the afternoon.
FPCN11 300000Z (Thurs. 4:00 p.m.)	Tonight cloudy with clear periods. Isolated showers this evening. Friday increasing clouds with rain beginning late in the day. Outlook for Saturday periods of rain.
FPCN 11 300400Z and (Thurs. 8:00 p.m.)	Tonight clear with cloudy periods. A few fog patches. Friday cloudy. Rain beginning late in the day. Outlook for Saturday periods of rain.
FPCN 11 301300Z (Friday 5:00 a.m.)	Today Cloudy. Rain beginning this afternoon. Saturday. Periods of rain or drizzle. Windy along the coast.
FPCN11 301430Z and (Friday 6:30 a.m.)	Today cloudy. Occasional light showers this morning. Rain this afternoon. Windy along the coast. Saturday. Periods of rain or drizzle, continuing windy.
FPCN11 301800 (Friday 10:00 a.m.)	Today. Cloudy with rain. Tonight and Saturday. Cloudy with periods of light rain or drizzle.
FPCN 11 310000Z (Friday 4:00 p.m.)	Weather Advisory. Tonight and Saturday rain at times heavy with amounts of up to 40 millimetres expected during the next 24 hours. Outlook for Sunday periods of rain.
WWCN1 311000Z (Saturday 2:00 a.m.)	A rainfall warning is issued accumulative rainfall totals are expected to surpass 100 millimeters in the outer coast and 50 millimeters along the inner coast

APPENDIX A - Cont'd.

ISSUED	FORECAST
FPCN 11 311300 (Saturday 5:00 a.m.)	Heavy rainfall warning in effect. Today and Sunday Overcast with frequent periods of rain and locally gusty winds. Rain at times heavy today.
WWCN1 311700 (Saturday 9:00 a.m.)	Rain warning continued .... periods of rain at times heavy to portions of the southwest coast today with a further 20 to 30 mm expected.
WWCN1 312300 (Saturday 3:00 p.m.)	Rain warning continued ... steady rain to most of the south coast of B.C. A further 30 to 30 mm can be expected in the next 24 to 36 hours.
WWCN1 312300 COR (Saturday 3:00 p.m.)	Rain warning continued ... steady rain to most of the south coast of B.C. A further 20 to 30mm can be expected in the next 24 to 36 hours.
FPCN11 010000 (Saturday 4:00 p.m.)	Heavy rainfall warning in effect. Tonight Overcast. Rain mostly light tonight. Locally gusty winds. Sunday Rain continuing. outlook for Monday little change.
WWCN1 010500 (Sunday 9:00 p.m.)	Rain Warning Continued ... rain will be fairly light tonight but more heavy rain is anticipated Sunday. Further 20 to 35 millimeters can be expected in the next 24 to 36 hours.
WWCN1 011100 (Sunday 3:00 a.m.)	.... with the storm track moving north the heavy rain warnings have ended for the southern coastal regions.
FPCN 11 011300 (Sunday 5:00 a.m.)	Heavy rain warning ended. Today cloudy. Occasional rain or drizzle. Occasionally windy near the straits. Monday rain.

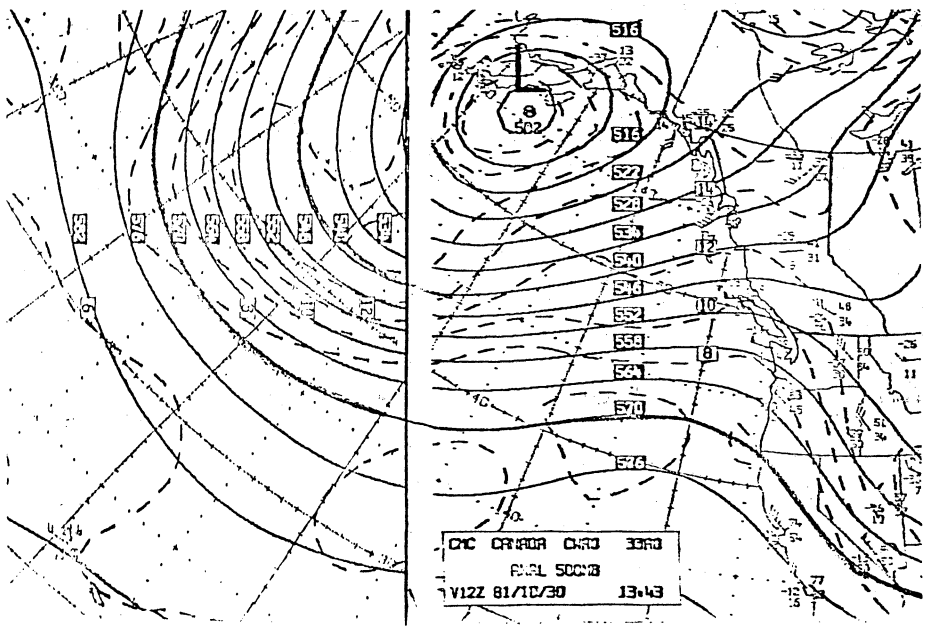

FIGURE 1.
500MB ANALYSIS OCTOBER 30 1981, 1200Z

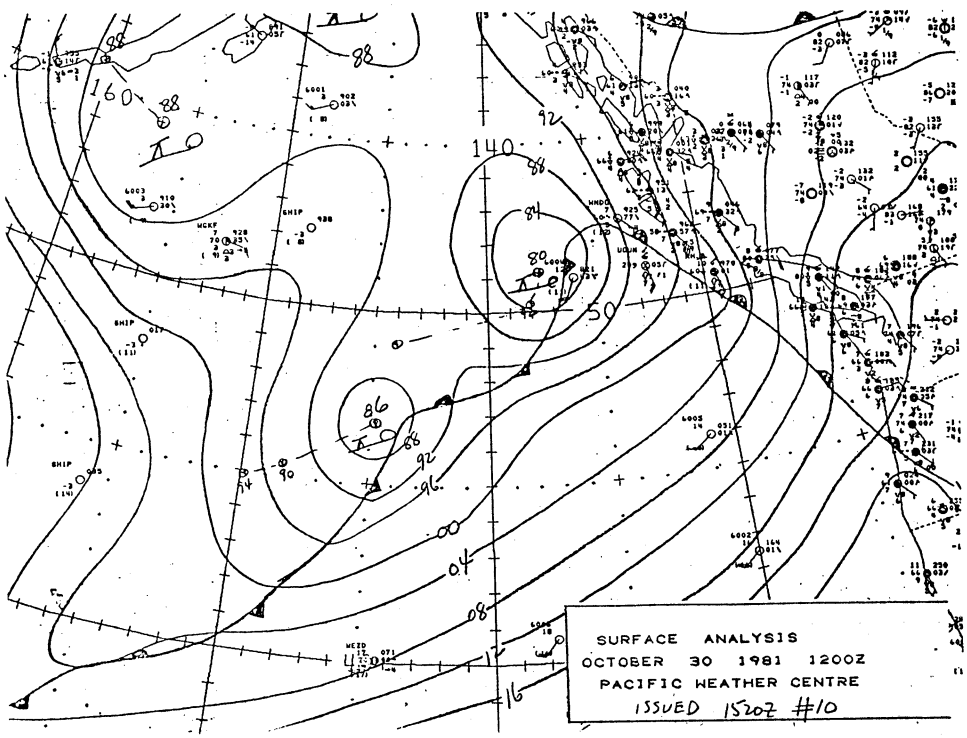

FIGURE 2.
SURFACE ANALYSIS OCTOBER 30 1981, 1200Z

NOTE : —

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