PACIFIC REGION TECHNICAL NOTES

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Characteristics of Precipitation Occurrence Over B.C.

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INTRODUCTION

Pacific Region Technical Note 83-013 "Verification of 3-5 Day Forecasts" suggested that the precipitation regimes (occurrence of precipitation) are not homogeneous over the province. This also implies that the method of verification is quite important and that meaningful verification requires knowledgeable interpretation. In the above mentioned study before a precipitation event was defined, 2 stations in an area required measurable precipitation. This leads to the question: "What if one or three or four stations had been required to report precipitation to determine a precipitation event would the results have changed?" Also, should the variability that exists in the occurrence of precipitation over a forecast area be considered when writing forecasts or when using probability of precipitation statements?

PROCEDURE

1. Similar to Pacific Region Technical Note 83-013, the following stations were used in this investigation:

    South Coast - Vancouver, Victoria, Abbotsford, Comox.
    North Coast - Sandspit, Prince Rupert, Terrace.
    Southern Interior - Kamloops, Penticton, Kelowna, Castlegar.
    Central Interior - Williams Lake, Quesnel, Prince George, Smithers.

2. For each area (South coast, North coast, etc.) the number of days with occurrence of precipitation was tabulated by months for 1981.

3. It was assumed that the timing of the occurrence of precipitation over an area would have the most influence on the data if only one station was used. In other words precipitation may occur just at the end of climate day or just at the beginning of the climate day and might only be reported by one station (i.e. a weather system entering or leaving an area). Using this reasoning the variance in the occurrence of precipitation between 2 stations and 4 stations (or in the case of the North Coast between 2 and 3 stations) was determined. The percentage variance was computed in the following manner:

    $$\% \text{ variance} = \frac{\text{variance between using 2 stations and 4 stations}}{\text{mean of using 2, 3, and 4 stations (rounded to the nearest whole number)}} \times 100$$

    (except mean of using 2 and 3 stations for North Coast)

    The results of these analyses are displayed on Tables 1-4.

4. PWC Technical Note 83-013 suggested that there was no appreciable, consistent improvement from Day-5 to Day-3 in forecasting the occurrence of precipitation. In order to investigate the effect of using a different number of stations to define a rain event, the number of correct forecasts for Days 3, 4, and 5 were averaged and the total number of correct forecasts for each month and each area were tabulated in Tables 5-8 to illustrate the effect if different criteria are used to define a precipitation event. The percentage variation was computed in the following manner:

> % variation =   difference between the highest percentage
>   and lowest percentage of correct forecasts.

The results were also tabulated in Tables 5-8.

COMMENTS

1. For B.C. the character of precipitation occurrence is not uniform over the province.

2. The verification figures of areal occurrence of precipitation for British Columbia are influenced by the choice of criteria used to define the precipitation event.

3. Knowing the character of the precipitation occurrence should influence both the wording of public forecasts and the POP (Probability of Precipitation) statements that are issued.

Table 1

South Coast

	Number of days with occurrence of precipitation with:				Variance between using 2 and 4 stations	% Variance
	1 Station	2 Stations	3 Stations	4 Stations		
January	17	17	14	13	4	27
February	18	15	12	11	4	31
March	15	12	11	10	2	18
April	23	21	18	18	3	16
May	26	21	20	14	7	39
June	24	21	19	12	9	53
July	14	10	6	3	7	117
August	7	7	5	1	6	150
September	17	16	13	12	4	29
October	18	16	15	13	3	20
November	21	20	19	19	1	5
December	28	27	25	23	4	16
					Average yearly:	44

Table 2

North Coast

	Number of days with occurrence of precipitation with:				Variance between using 2 and 4 stations	% Variance
	1 Station	2 Stations	3 Stations	4 Stations		
January	26	21	17		4	21
February	17	15	10		5	38
March	24	20	16		4	22
April	29	25	16		9	43
May	23	20	14		6	35
June	26	22	17		5	26
July	13	12	5		7	78
August	16	10	6		4	50
September	26	22	17		5	26
October	26	22	16		6	32
November	28	27	25		2	8
December	30	25	19		6	27
					Average yearly:	34

Table 3

Southern Interior

	Number of days with occurrence of precipitation with:				Variance between using 2 and 4 stations	% Variance
	1 Station	2 Stations	3 Stations	4 Stations		
January	12	9	7	4	5	71
February	15	12	9	6	6	67
March	12	10	6	3	7	117
April	20	11	6	3	8	114
May	24	18	11	8	10	83
June	26	22	14	6	16	145
July	20	10	7	5	5	71
August	10	5	4	0	5	167
September	14	11	5	3	8	133
October	16	15	12	5	10	91
November	17	12	7	5	7	82
December	24	19	13	6	13	100
					Average yearly:	104

Table 4

Central Interior

	Number of days with occurrence of precipitation with:				Variance between using 2 and 4 stations	% Variance
	1 Station	2 Stations	3 Stations	4 Stations		
January	18	7	4	2	5	125
February	17	10	6	5	5	71
March	16	9	7	3	6	100
April	23	20	10	8	12	92
May	24	18	9	5	13	118
June	25	23	18	11	12	71
July	22	14	6	2	12	171
August	15	8	6	4	4	67
September	22	15	12	6	9	82
October	23	20	14	8	12	86
November	24	18	13	11	7	50
December	23	18	16	10	8	53
					Average yearly:	91

Table 5

South Coast

Number of Correct Forecasts Per Month Using Different
Criteria to Define a Precipitation Event

	1 Station	2 Stations	3 Stations	4 Stations	% Variation
January	18	18	18	17	3
February	17	19	18	19	4
March	16	18	19	19	9
April	16	16	15	15	3
May	14	15	16	20	4
June	15	15	15	16	3
July	15	18	22	25	33
August	25	25	25	21	13
September	22	22	20	19	10
October	24	22	23	23	6
November	24	24	23	22	7
December	25	24	22	20	16
Total for year	231	236	236	236	111
					Average: 9

Table 6

North Coast

Number of Correct Forecasts Per Month Using Different
Criteria to Define a Precipitation Event

	1 Station	2 Stations	3 Stations	4 Stations	% Variation
January	26	22	19		27
February	19	21	20		7
March	16	16	14		7
April	22	25	19		20
May	22	24	20		12
June	23	20	17		20
July	21	21	18		10
August	25	22	18		23
September	21	21	19		7
October	19	19	15		13
November	27	26	24		10
December	28	23	19		29
Total for year	269	260	222		181
					Average: 15

Table 7

<u>Southern Interior</u>

Number of Correct Forecasts Per Month Using Different
Criteria to Define a Precipitation Event

	1 Station	2 Stations	3 Stations	4 Stations	% Variation
January	16	19	21	21	16
February	15	16	19	19	14
March	22	22	26	26	13
April	13	16	20	21	25
May	11	15	19	20	36
June	15	15	20	22	23
July	14	14	14	16	7
August	17	13	13	11	20
September	21	19	14	14	23
October	23	24	24	20	12
November	17	15	17	18	10
December	22	18	14	10	39
Total for year	206	206	221	218	238
					Average: 20

Table 8

<u>Central Interior</u>

Number of Correct Forecasts Per Month Using Different
Criteria to Define a Precipitation Event

	1 Station	2 Stations	3 Stations	4 Stations	% Variation
January	15	20	21	23	26
February	20	19	19	14	3
March	16	21	23	26	32
April	14	13	17	17	14
May	8	11	17	17	29
June	16	14	10	11	20
July	16	15	14	15	7
August	18	17	15	13	16
September	22	14	18	18	11
October	20	17	14	14	20
November	20	14	13	11	30
December	21	16	15	10	36
Total for year	206	196	196	194	244
					Average: 20