PACIFIC REGION TECHNICAL NOTES

80-004
January 22, 1980

Update on Stability Indicies for B.C. (1980)

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INTRODUCTION

A number of stability indicies were calculated daily at a number of stations at the Pacific Weather Centre during the 1979 summer season. Indicies along with upper air data from soundings at Prince George, Vernon, Spokane, Quillayute, Port Hardy and Annette were stored in the PWC computer. At the end of the season these were compared to reports of convective activity as reported by AES weather reports at and near the soundings along with lightning reports from BCFS stations. The data was analysed as in past years to confirm or improve previous results. In addition an attempt was made to correlate the convective activity at Castlegar with both the data from Spokane and Vernon.

RESULTS

1. For YXS the SLY index again outperformed the K-index with results very similar to that obtained on the 1978 data. 500mb HTS were a good secondary discriminator with 500mb wind direction a third separator. The SLY index computed from 2100 GMT data was better than that from 0000 GMT data. Results are summarized in Fig. 1.

2. At YVK the SLY index also appeared a better indicator of convection than the K-index. 500mb HTS were a good secondary discriminator. Results are summarized in Fig. 2.

3. YCG convection correlated well with the SLY index at Spokane, which was superior to both the K-index and the totals index. The indicies were also correlated to the 500mb wind direction from 130 to 250 degrees. The correlation is not as good as with indicies and convection at YXS or YVK. As expected there was little or no correlation of convection to the indicies at Vernon even considering wind directions. Results for the SLY index are shown in Fig. 3.

4. At UIL both the totals and the SLY index were good primary indicators of convection, similar to 1978 results. However, the totals index appeared to have a slight edge. 500mb HTS and 700mb wind direction were good secondary discriminators. Unlike 1978 data there was a

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fair correlation of the boyden index with convection in the 1979 data. Results are summarized in Fig. 4.

5. Port Hardy results were very similar to 1978 analysis. The totals index was a good primary discriminator of convection with 500mb HTS and 700mb wind direction secondary separators. There was some correlation with the SLY index but none with the boyden index. Results are summarized in Fig. 5.

6. Indicies at Annette were correlated with reports from Terrace. The boyden index again correlated well with convection although not as highly as in the 1978 data. The totals index appeared as a good discriminator of convection in the 1979 data with results very similar to the 1978. 500mb HTS were again a good secondary discriminator with 500mb wind direction a further separator. Results are shown in Fig. 6.

CONCLUSION

Results at most stations are very similar to the results obtained in the 1978 data indicating good stability for discriminators chosen. The Spokane sounding shows some correlation to convective activity in the Castlegar area but care should be used here as the correlation is not that good.

REFERENCES

1. H.W. Raynor, Update on Stability Indicies for Interior B.C. Stations, Pacific Region Technical Note #79-006, Feb. 1979.

2. H.W. Raynor, Update on Stability Indicies for Coastal B.C. Stations, Pacific Region Technical Note # 79-009, Mar. 1979.

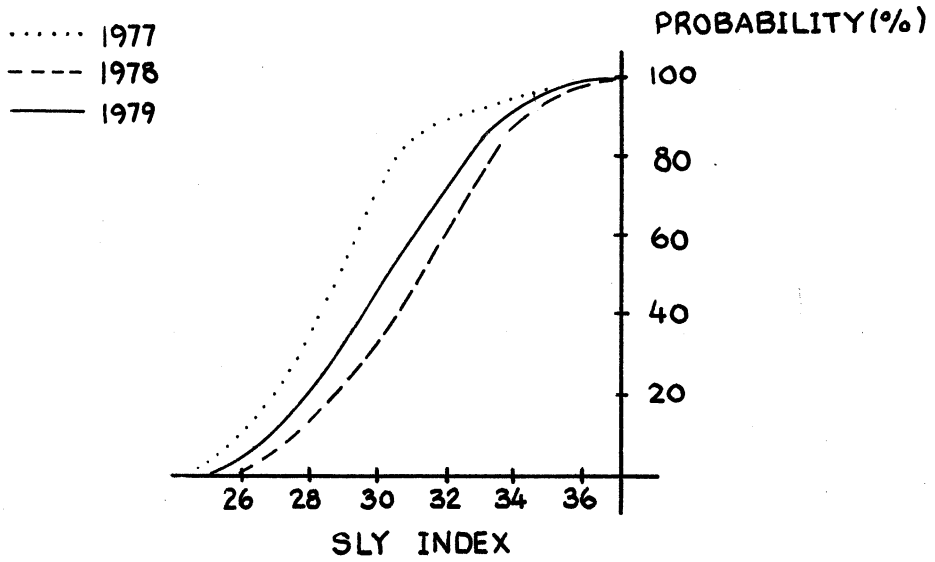
3. M. Horita, Stability Index Criteria for Coastal B.C. Stations, Pacific Region Technical Note # 78-012, May 1978.

4. M. Horita, Stability Index Criteria for Interior B.C. Stations, Pacific Region Technical Note # 78-005, March 1978.

FIGURE 1

PROBABILITY OF AFTERNOON CONVECTIVE CLOUD*

VS SLY - INDEX AT YXS



-the indeterminate range sly 28 - 32 (28-31 in '78)

use secondary criteria

1. 500 mb hts 573 No Convection

569 Convection

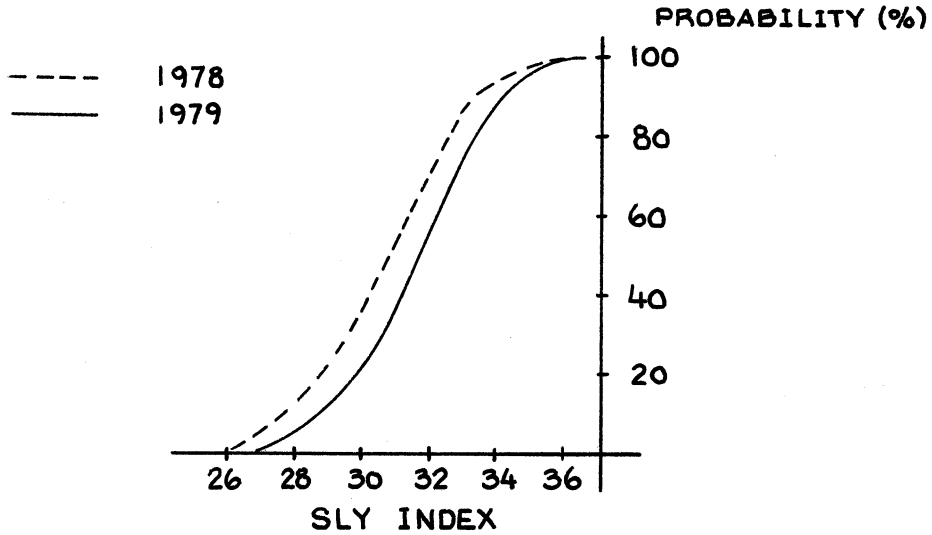
2. 500 mb hts 569 - 573

500 mb wind dirc. 280-360 no convection

*Probability derived from frequency of occurrence convective cloud = occurrence of CB or substantial TCU or ACC

FIGURE 2

PROBABILITY OF AFTERNOON CONVECTIVE CLOUD*
VS K INDEX AND SLY INDEX AT YVK



- the indeterminate range for Sly index 28-34 use as secondary criteria

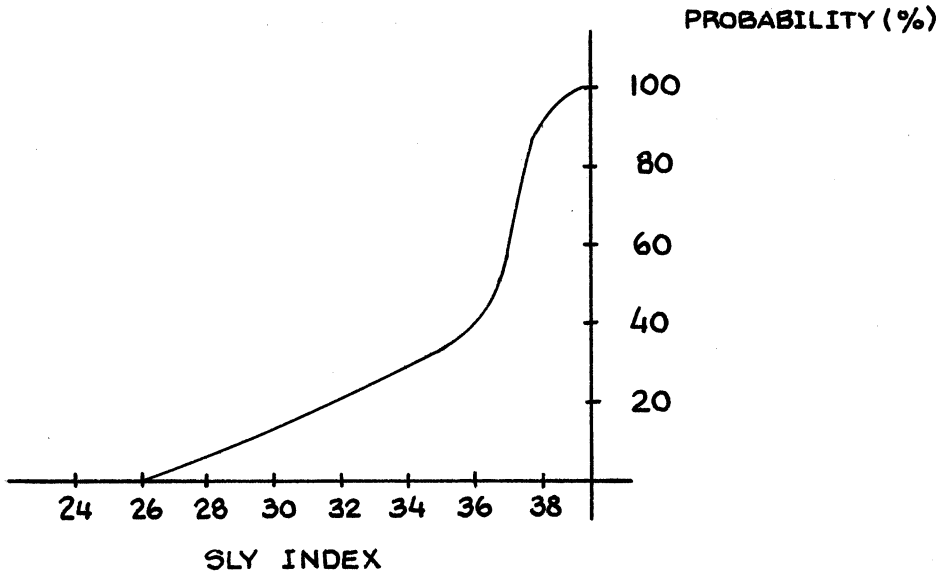
500 mb hts ⩾ 570	no convection
500 mb hts < 570	no convection if 500 mb wind speed >33 kts

* Probability derived from frequency of occurrence of convective cloud = occurrence of CB or substantial TCU or ACC

FIGURE 3

PROBABILITY OF AFTERNOON CONVECTIVE CLOUD*

AT YCG VS SLY INDEX AT GEG



GEG 500 mb wind direction 130 - 250 degrees

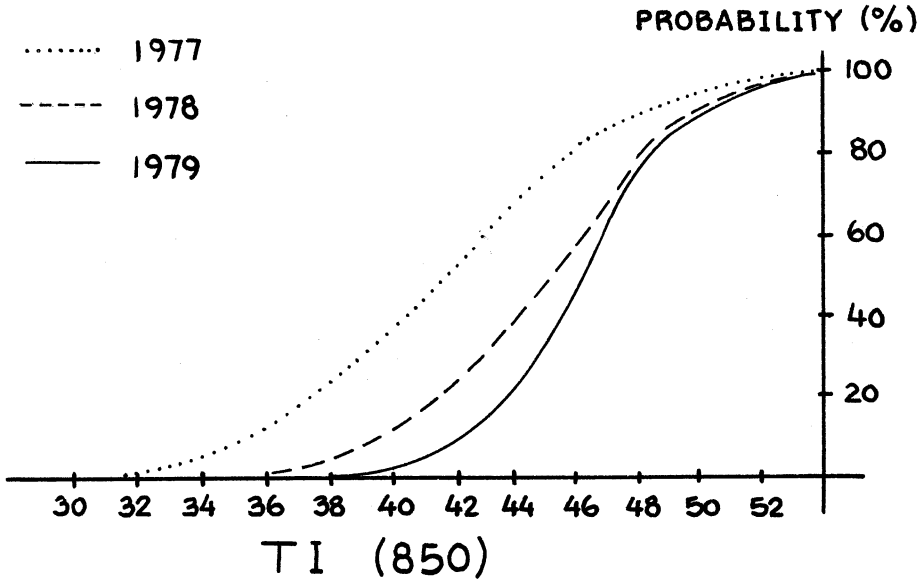
- indeterminate range for Sly Index 28 - 33

500 mb hts > 575 no convection

* Probability derived from frequency of occurrence of convective cloud = occurrence of CB or substantial TCU or ACC.

FIGURE 4

PROBABILITY OF AFTERNOON CONVECTIVE CLOUD*
AT UIL VS TI(850) AT UIL



- for indeterminate range 38 - 48 use:

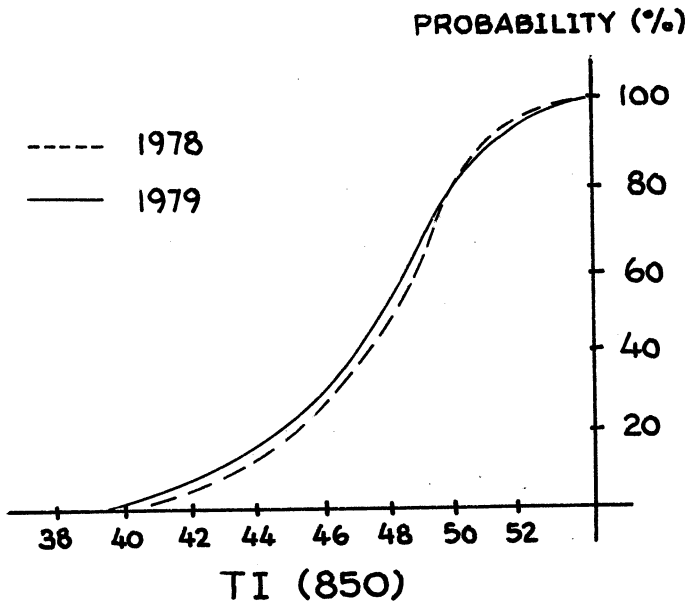
1. 500mb hts > 574 no convective cloud
2. 700mb wind direction

290-210 convective cloud unlikely
210-290 indeterminate

* Probability derived from frequency of occurrence convective cloud = occurrence of CB or substantial TCU or ACC

FIGURE 5

PROBABILITY OF AFTERNOON CONVECTIVE CLOUD*
VS TI (850) AT YZT



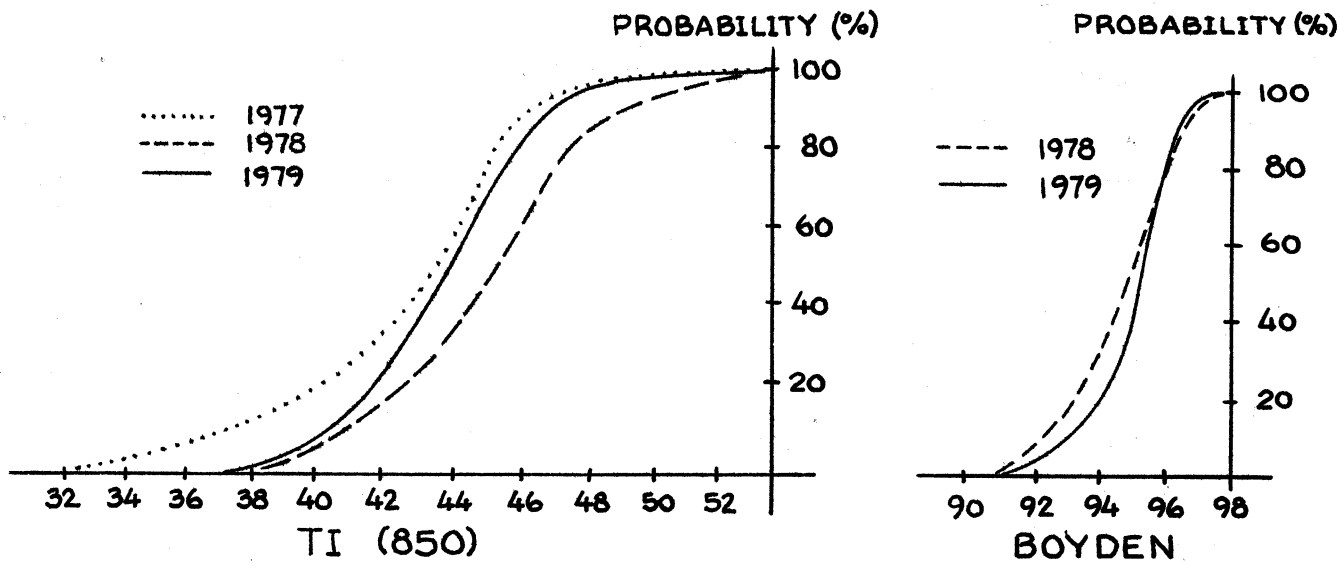
- for indeterminate range TI(850), 42 - 50 use:

1. 700 mb wind direction
   - 350-120 no convective cloud
   - 120-200 use TI = 49 as cutoff
   - 200-350 use TI = 45 as cutoff
2. 500mb hts < 560 convective cloud
   500mb hts > 574 no convective cloud

* Probability derived from frequency of occurrence convective cloud = occurrence of CB or substantial TCU or ACC

FIGURE 6

PROBABILITY OF AFTERNOON CONVECTIVE CLOUD* AT YXT VS TI (850) AND BOYDEN INDEX COMPUTED AT ANNETTE



For Boyden Index:

- indeterminate range 94 - 95

500 mb hts > 571 no convection

For Totals Index:

- indeterminate range 40 - 49

1. 700mb wind direction

340-100	no convective cloud
100-180	use TI = 45 as cutoff
180-250	use TI = 40 as cutoff
250-300	use TI = 49 as cutoff
300-340	use TI = 43 as cutoff

2. 500mb hts > 579 no convective cloud

*Probability derived from frequency of occurrence convective cloud = occurrence of CB or substantial TCU or ACC.

APPENDIX A

(Addendum to Pacific Region Technical Note 80-004)

SLY INDEX = $1.6\,\theta_w\,(21\,M) - T_{500} - 11$

K INDEX = $(T_{850} - T_{500}) + Td_{850} - (T_{700} - Td_{700})$

BOYDEN INDEX = $H_{1000-700} - T_{700} - 200$

where:

T_{850} = 850 mb temperature at 00Z

T_{700} = 700 mb temperature at 00Z

T_{500} = 500 mb temperature at 00Z

Td_{850} = 850 mb dewpoint temperature at 00Z

Td_{700} = 700 mb dewpoint temperature at 00Z

θ_w = wet bulb potential temperature computed from expected maximum surface temperature, and representative afternoon dewpoint (21Z).

$H_{1000-700}$ = 1000-700 mb thickness