



PACIFIC REGION TECHNICAL NOTES

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STABILITY INDEX CRITERIA FOR INTERIOR B.C. STATIONS

Mert Horita, ODIT Meteorologist
Pacific Weather Centre, Vancouver

INTRODUCTION

IN AN EARLIER TECHNICAL NOTE (78-003), THE REVIEW OF STABILITY INDICES WAS ACCOMPANIED BY TABLES GIVING GENERAL INDEX CRITERIA FOR CONVECTIVE ACTIVITY. THESE TABLES WERE EITHER ARRIVED AT THEORETICALLY AND/OR EMPIRICALLY FROM VARIOUS LOCATIONS IN NORTH AMERICA OUTSIDE B.C. AT THE PACIFIC WEATHER CENTRE RESEARCH HAS BEEN PROCEEDING TO DETERMINE THE BEST INDEX FOR SPECIFIC AREAS OF B.C. THE AIM IS TO THEN LOCALIZE THE INDEX SCALES TO THE PROBABILITY OF CONVECTIVE CLOUD OCCURENCE. DYNAMIC PARAMETERS SUCH AS CONTOUR HEIGHTS, WIND SPEED AND DIRECTION WERE ALSO EXAMINED FOR THEIR INFLUENCE UPON THE OCCURENCE OF CONVECTIVE CLOUD.

METHOD

THE RESULTS OF THIS REPORT ARE BASED ON THE COMPUTER ANALYSIS OF DATA FROM THE UPPER AIR STATIONS YXS, YVK AND GEG. EACH STATION'S DATA SET CONTAINS UP TO 93 DAILY OBSERVATIONS TAKEN OVER THE PERIOD JUNE 15 - SEPT 15, 1977.

THE FOLLOWING STABILITY INDICES WERE COMPUTED FOR EACH DAY AT EACH STATION.

TOTALS INDEX(850)	TI(850) = TD850+T700-2T500
TOTALS INDEX(700)	TI(700) = TD700+T700-2T500
K-INDEX	K = (T850-T500)+TD850-(T700-TD700)
SLY INDEX	Y = 1.6θW(21M)-T500-11

WHERE:

- T850 = 850MB TEMP AT 00Z
- T700 = 700MB TEMP AT 00Z
- T500 = 500MB TEMP AT 00Z
- TD850 = 850MB DEWPT. AT 00Z
- TD700 = 700MB DEWPT. AT 00Z
- θW(21M) = WET BULB POTENTIAL TEMP COMPUTED FROM MAX TEMP AND REPRESENTATIVE AFTERNOON DEWPT (21Z)

THE FOLLOWING DYNAMIC PARAMETERS WERE EXAMINED FOR EACH DAY AT EACH STATION

- 500MB HEIGHTS
- 500MB WIND SPEED AND DIRECTION
- 700MB WIND SPEED AND DIRECTION
- 850MB WIND SPEED AND DIRECTION

FOR EACH DAY AT EACH STATION THE COMPUTED INDICES AND DYNAMIC PARAMETERS WERE COMPARED WITH THE OCCURRENCES OF AFTERNOON CB, SUBSTANTIAL TCU OR ACC; ALSO THE OCCURRENCE OF R-, RW- AND TRW- OVER AN AREA SURROUNDING THE STATION

RESULTS

A. GENERAL COMMENTS

1. ALL INDICES SHOWED SOME ABILITY TO SEPARATE CONVECTIVE CLOUD DAYS FROM NON CONVECTIVE CLOUD DAYS
2. DYNAMIC PARAMETERS WERE NOT AS GOOD AS THE INDICES IN SEPARATING CONVECTIVE CLOUD DAYS FROM NON CONVECTIVE CLOUD DAYS
3. BOTH INDICES AND DYNAMIC PARAMETERS WERE UNABLE TO DISTINGUISH CB DAYS FROM TCU DAYS
4. IT WAS FOUND THAT THE STABILITY INDICES MADE RELIABLE PRIMARY INDICATORS. THE DYNAMIC PARAMETERS MADE GOOD SECONDARY INDICATORS OVER THE RANGE WHERE THE PRIMARY INDICATORS WERE INDETERMINATE.

B. RESULTS FOR YXS

THE BEST INDEX WAS THE SLY INDEX. THE K-INDEX WAS A CLOSE SECOND. THE TWO BEST DYNAMIC PREDICTORS WERE 500MB HEIGHTS AND 500MB WIND DIRECTION. FIGURE 1 SUMMARIZES THE RESULTS.

C. RESULTS FOR YVK

THE BEST INDEX WAS THE K-INDEX. THE SECOND BEST WAS THE TOTALS INDEX TI(850). A USEFUL DYNAMIC PREDICTOR WAS THE 500MB WIND SPEED. THE 700MB WIND SPEED ALSO HAD SOME MERIT. THE RESULTS ARE SUMMARIZED IN FIGURE 2.

D. RESULTS FOR GEG

BEST INDEX OF CONVECTIVE CLOUD OCCURRENCE WAS THE SLY INDEX. THE TI(850) SHOWED SOME MERIT. DYNAMIC PARAMETERS CHOSEN WERE 500MB HEIGHT AND 500MB WIND DIRECTION. RESULTS ARE SUMMARIZED IN FIGURE 3.

CONCLUDING REMARKS

THE RESULTS OF THIS STUDY ARE BASED ON ONE YEARS DATA AND THEREFORE SHOULD BE USED CAUTIOUSLY. THE RESULTS FOR SPOKANE MAY NOT BE REPRESENTATIVE OF SOUTHEASTERN B.C. RESULTS FOR PRINCE GEORGE COULD BE EXTENDED AS FAR SOUTH AS QUESNEL AND NORTH TO MACKENZIE. RESULTS FOR VERNON ARE FELT TO BE REPRESENTATIVE OF THE OKANAGAN AND KAMLOOPS AREAS

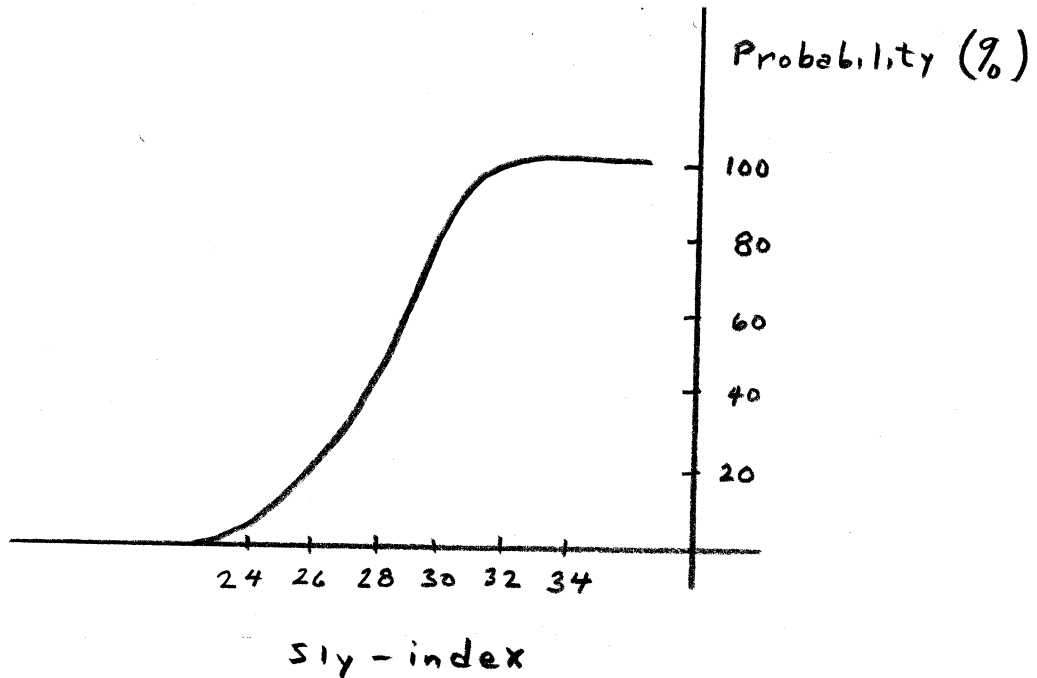
THE STABILITY INDEX ANALYSIS PROGRAM WILL BE EXPANDED AND CONTINUED THIS SUMMER THROUGH THE FORESTRY SEASON. ANALYSIS OF THIS SUMMERS DATA SHOULD PROVIDE MORE STATISTICALLY SIGNIFICANT RESULTS FOR THE 1979 SUMMMER SEASON.

ACKNOWLEDGEMENT

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FIGURE 1

PROBABILITY OF AFTERNOON CONVECTIVE CLOUD*
VS. SLY-INDEX AT YXS



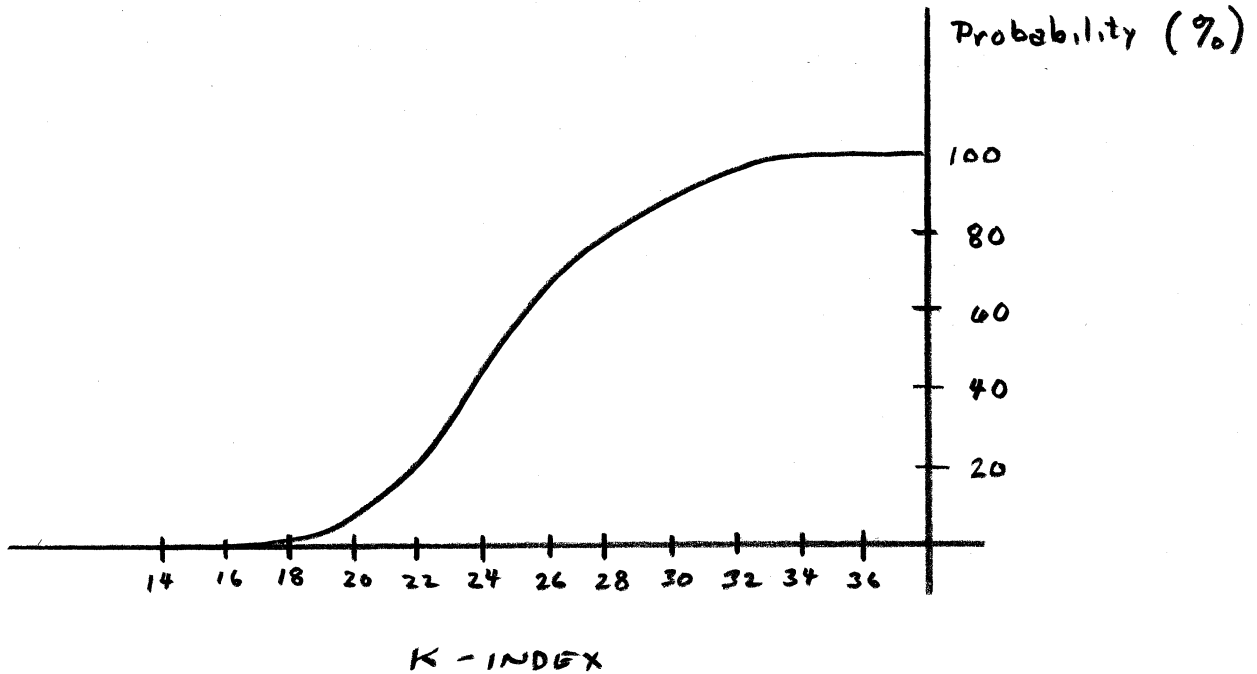
- for indeterminate range (sly: 26-29) use secondary criteria

1. 500mb hts < 570 Convective cloud
> 573 No convective cloud
2. 500mb Wind Direction 000°-280° convective cloud

* 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 AT YVK

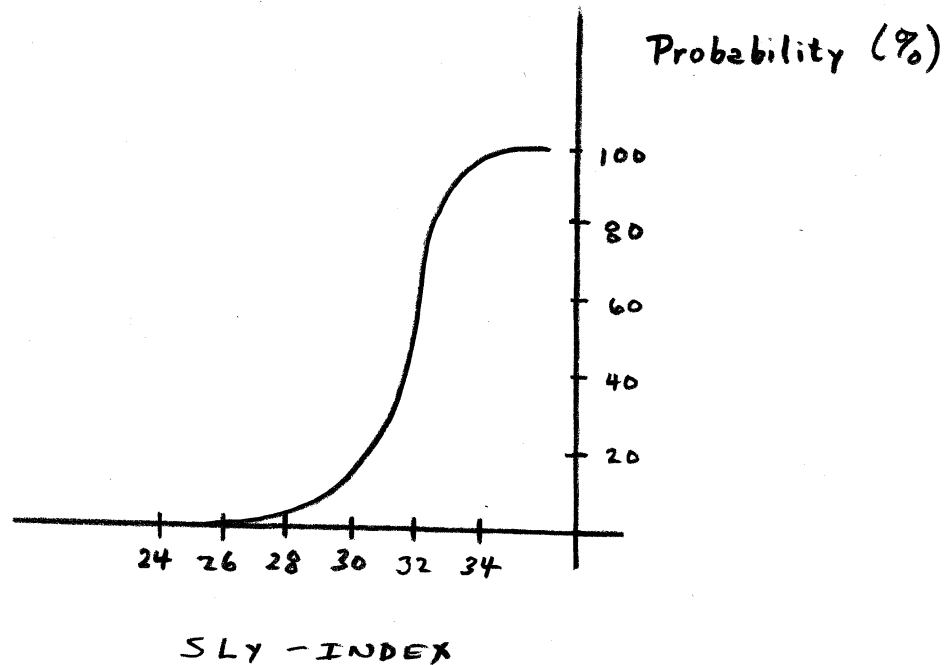


- for indeterminate range (K-INDEX: 22-28) use secondary criteria
1. 500 mb wind speeds > 36 kts No Convective Cloud

* Probability derived from frequency of occurrence
Convective Cloud = occurrence of CB or substantial TCU or Acc

FIGURE 3

PROBABILITY OF AFTERNOON CONVECTIVE CLOUD*
VS. SLY-INDEX AT GEG



- for indeterminate range (SLY: 30-32) use secondary criteria

1. 500mb hts. > 575 No Convective Cloud
2. 500mb Wind Direction 290°-360° No Convective Cloud

* Probability derived from frequency of occurrence
Convective Cloud = occurrence of CB or substantial TCU or Acc