PACIFIC REGION TECHNICAL NOTES

No. 79-007

February 26, 1979

Analysis of Prince George Summer 1978 Sly Index Program

Mert Horita, ODIT Meteorologist PWC
Peter Madison, Meteorological Presentation YXS
Earl Zilkie, OIC WO4 Prince George

Introduction

During the summer of 1978 the Prince George Fire Weather Forestry Office undertook a program to forecast the occurrence of significant convective activity as manifested by TCU and CB development. The method used was based upon the Sly index as described in the Pacific Region Technical Note 78-032. Basically, a forecast Sly index was calculated for the afternoon using the morning 12Z analyses and upper air prognoses charts. Interpretation of the calculated values was made based upon a Sly index cutoff of 31. Indices equal to and higher than 31 were considered as definite "yes" forecasts for convective development. Indices between 26 and 31 were assessed on the prevailing conditions using meteorological parameters not expressly defined in the Sly index. Some subjectivity was exercised by the staff in these cases. Sly indices less than or equal to 26 were judged as "no" forecasts of convective development.

The program was begun June 26,1978 and continued on a fairly regular basis through to Sept 19,1978. During this period 55 days of results were tabulated. Data gathered were the calculated Sly indices, 500mb heights whether greater or less than 570 dm, 500mb flow whether northwesterly, the forecast (yes, no) for convective development and the verification of convective development (yes, no). Actual Pacific Weather Centre computed Sly index values were appended to assist in the analysis of the data.

Analysis of Data

A contingency table was made showing the verification distribution of the forecasts. See figure 1. The results of the contingency table demonstrate the effectiveness of the program. A 78% success rate was indicated. Distribution of the incorrect forecasts shows a tendency for underforecasting the event of convective development however this conclusion is subject to statistical uncertainty due to the small sample of 12 incorrect forecasts.

Figure 2 presents a frequency or probability of convective occurrence versus Sly index value analysis similiar to those presented in the Pacific Region Technical Note 78-005. It is difficult to clearly interpret this analysis since the Sly index values are forecast values and not necessarily the correct or actual values which occurred. The use of the PWC actual Sly index values during this assessment will negate some of this criticism. Nevertheless this is typical of an operational situation and some effort will now be given to interpret these results. From the analysis in figure 2 it appears that forecasts for convective activity based on values of 31 or greater will given an 80% or greater chance of success. Values between 26 and 31 will amount to an approximate 60% chance of success. Values of Sly below 26 would indicate a non-occurrence of the convective event.

An analysis of a scatter diagram of these forecasted Sly values between 26 and 31 with reference to 500mb heights greater or less than 570dm and 500mb flow northwesterly or otherwise shows that a fairly successful screening can be made based on the following criteria:

-for the indeterminate range of forecast Sly index values between 26 and 31 :

if: 1. 500mb flow is northwesterly and heights are greater than 570dm then occurrence is unlikely

2. 500mb flow is not northwesterly and heights are less than or equal to 570dm then occurrence is likely.

These results are summarized in the table on figure 2.

Summary

The very encouraging results verified by the 78% rate of forecasting the occurrence or non-occurrence of convective development demonstrates the potential usefulness of the Prince George Sly index program. A further analysis of this method is required to determine a more refined objective method of discerning the probability of convective activity when Sly indices are in the range between 26 and 31. In spite of the lack of this objective method during the summer of 1978, the subjective assessments made by the staff have indicated a reliable skill of integrating the objective Sly index with other meteorological parameters not incorporated into this simple index.

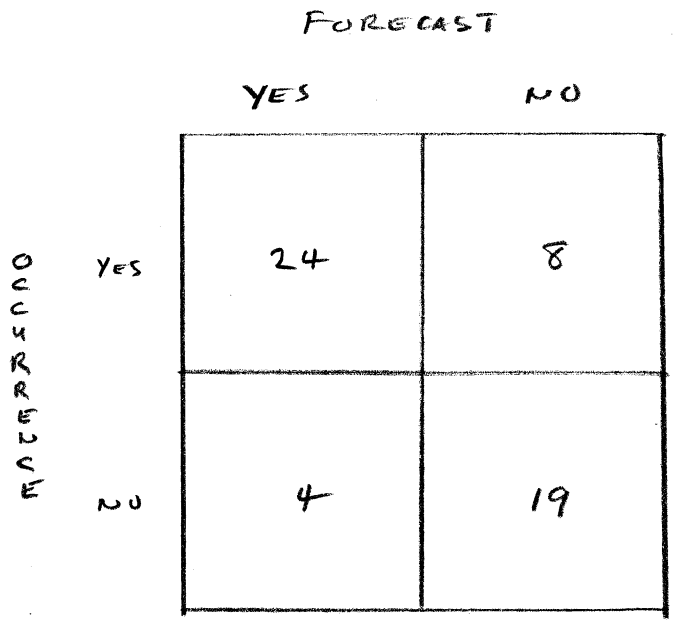
A factor which has not been considered explicitly is the temporal change of the meteorological parameters during the forecast period. An attempt to examine the magnitude of the

500mb height falls or rises or the change in the Sly index over the forecast period is required; Thus considering factors other than the static or instantaneous nature of the Sly index.

Consideration of continuing this program through the summer of 1979 is now being made. Hopefully a second years sample of data will reveal a more significant relationship between the meteorological parameters and the Sly index for use in forecasting the occurrence of convective activity in the Prince George area.

FIGURE 1

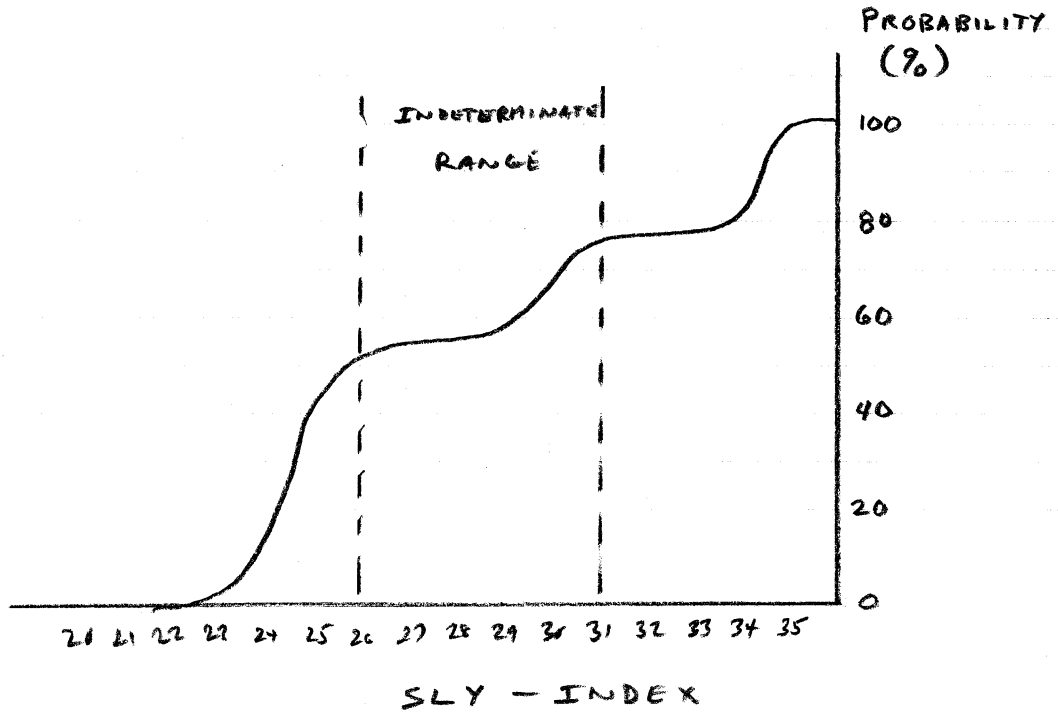
CONTINGENCY TABLE OF FORECASTS AGAINST THE ACTUAL OCCURRENCE OF CONVECTIVE ACTIVITY



% CORRECT FORECASTS = $^{43}/_{55}$ X100 = 78 %

FIGURE 2.

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



FOR INDETERMINATE RANGE

	500 MB ≤ 570	500 MB > 570
NW FLOW	?	NO
NOT NW FLOW	YES	?

* PROBABILITY DERIVED FROM FREQUENCY OF OCCURRENCE CONVECTIVE CLOUD = OCCURRENCE OF CB OR SUBSTANTIAL TCU OR ACC