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UNITED STATES AIR FORCE  
ROOM 421, FIRST NAT'L BANK BLDG  
COLORADO SPRINGS, COLORADO



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AN OBJECTIVE AID FOR FORECASTING  
STRONG AND GUSTY SURFACE WINDS

at

Stead AFB, Nevada

March 1962

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## INTRODUCTION

Forecasting the occurrence of operationally critical values of strong surface winds with accompanying gusts presents a major problem at Stead AFB, Nevada. This investigation was conducted to develop an objective aid for forecasting such critical values.

## THE PROBLEM

The problem concerns the forecasting of strong surface winds with gusts of 30 knots or greater during the months of February through April.

1. Observation times from which forecasts are made: 0000Z and 1200Z.
2. Valid period of forecast: 12 to 18 hours after each forecast is made.

## PERIOD OF DATA AND ANALYSIS CONDUCTED

The data used in this study included the months February through April, 1956 through 1958. (See Comments) The criteria to be met and the attached diagrams are self-explanatory and their use is discussed under "Procedure".

## EVALUATION OF THE SYSTEM

Two randomly chosen months were set aside for use as an independent sample. The following contingency tables show the performance of the technique as measured on both the dependent and independent data:

		Dependent data -		
		Occurrences	<u>FORECAST</u>	
	Non-occurrences			
Observed	Occurrences	42	5	47
	Non-occurrences	13	297	310
	TOTAL	55	302	357

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Skill Score .79  
Percent Correct 95

Independent data -		FORECAST		Total
		Occurrences	Non-occurrences	
Observed	Occurrences	20	1	21
	Non-occurrences	6	76	82
	TOTAL	26	77	103

Skill Score .80  
Percent Correct 93

### COMMENTS

1. Lack of data for the months January, May and June prevented their inclusion in this study. Therefore, it is suggested that this aid be tested on these months to determine how well they may apply.

2. Since a limited amount of data were issued in the preparation of this technique, it may or may not prove to contain a representative sample. It rests with the user continually to add current data and refinements through experience to increase its accuracy and usability.

3. In order to prepare properly an objective method of this type, it is necessary to work with an exact statement of the problem. This must contain definitely established meteorological and time limits. However, the final product is not so sensitive that it will always cut on and off exactly within the limits specified. We observed on several occasions that the method gave "near misses" which were sufficiently close to be of value to the operational forecast. Information, other than that evidenced by a statistical verification, can be obtained through the forecaster's interpretation of the results of this type of study; i.e., it is recommended that the main role of this objective aid be that of a guide and that it be modified by the forecaster in those cases where he has information other than that used by the technique.

FORECAST CHECKLIST - FEB THROUGH APRIL

DATE \_\_\_\_\_

DATA REQUIRED

- (a) MFR (Medford) sea-level pressure \_\_\_\_\_
- (b) SUU (Travis) sea-level pressure \_\_\_\_\_
- (c) Item (a) minus item (b) \_\_\_\_\_
- (d) RAA (Stead) sea-level pressure \_\_\_\_\_
- (e) MFR 24 hr pressure change ( $\Delta P$ ) \_\_\_\_\_
- (f) BOI (Boise) 24 hr pressure change ( $\Delta P$ ) \_\_\_\_\_
- (g) RAA 24 hr pressure change ( $\Delta P$ ) \_\_\_\_\_
- (h) Item (f) minus item (g) \_\_\_\_\_
- (i) BOI sea-level pressure \_\_\_\_\_
- (j) Item (i) minus item (d) \_\_\_\_\_
- (k) Item (c) plus item (j) \_\_\_\_\_
- (l) MSO (Missoula) sea-level pressure \_\_\_\_\_
- (m) Item (l) minus item (i) \_\_\_\_\_

PROCEDURE

The steps in this procedure are sequential and must be followed in the order listed.

Step No.

- 1. If item (c)  $\geq +1.5$ mb, forecast "no" and stop \_\_\_\_\_
- 2. If item (d)  $\geq 1021.0$ mb forecast "no" and stop \_\_\_\_\_
- 3. If item (e)  $\geq +1.0$ mb forecast "no" and stop \_\_\_\_\_
- 4. If none of the above criteria are satisfied, use Diagram I.  
Enter with items (h) and (k). If case falls in Area "A", forecast "yes".  
If it falls in Area "B", use Diagram II. \_\_\_\_\_

5. Enter with items (m) and (k). If case falls in Area "C", forecast "yes", otherwise "no".

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Note: If strong winds are present at the time of the 0000Z observation, there is a 56% probability that they will cease within 6 hours or less. If they are present at the time of the 1200Z observation, there is a 79% probability that they will last for 10 to 12 hours or longer.



(MFR-SUU)pp PLUS (BOI-RAA)pp (in M&W)

(MSO-BOI)pp (in M&W)

