

D. Description of present operational systems in Sweden

1. Introduction

In Sweden, since the last sixties, two different schemes are used for operational interpretation of numerical weather charts. One of them, and that is the system in which I have personally been involved, deals with interpretation of surface prognostic charts for the first 36 hours.

The other system gives an interpretation of the 500 mb charts produced at our own Centre as well as those received from other Centres (Offenbach, Washington) valid from 2 to 5 days.

I shall here concentrate on a description of the first system.

2. The available interpretation climatology

Fig. D 1 shows how Sweden is covered by ten overlapping diamond-shaped sub-areas for the purpose of synoptic climatology and thus for weather-type interpretation.

For the area over the Swedish West Coast the pressure gradients are measured between the stations Oslo (Norway), Hanstholm (Denmark), Karlsborg and Malmö. The pressure itself and the thickness used within this diamond is the value reported in Göteborg.

The stations given in the figure are those for which synoptic climatology is available. Wind climatology is available for 19 coastal stations. Unfortunately many of these stations have since been closed, and the program goes on predicting the wind at these stations although no verification can be obtained any longer. Climatology for precipitation is available at 43 places and for temperature at 17 places.

Since the diamond areas are overlapping, most of these stations fall within more than one area. Therefore one of the tasks was to find out where the best description was obtained. A large number of combinations of classifications of predictors was tried individually for each station in order to find an optimum combination. In some cases there were different solutions found for different times of the day and of the year. But in the operational system, finally chosen, some standardisation in this respect was introduced in order to facilitate programming.

In the operational program the following information is stored for each predictand and for each station :

- The diamond to be used (that is which stations to use for computing the gradients)
- The predictors to be used
- The class limits (varying throughout the year)
- The values to be used in each box (varying throughout the year).

In some cases monthly values are stored ; in most cases though only 4 values, namely for January, April, July and October.

The values to be used at any particular day are obtained by third degree interpolation.

3. Presentation of forecast values

For the presentation of the values obtained by the interpretation, the main output is tables. For precipitation, however, I have used instead small line-printer produced maps of Sweden with the forecast precipitation amounts inserted at the right geographic locations. Such charts are printed for each one of the 12-hour periods covered by the forecast.

As to the table presentation, I used at first the following format:

<u>TEMPERATURE</u>	<u>FORECAST</u>	<u>NORMAL</u>	PROBABILITY FOR				
			<u>MA</u>	<u>A</u>	<u>N</u>	<u>B</u>	<u>MB</u>
GÖTEBORG							
MIN TODAY	-7	-2	0	5	9	41	45
MAX TODAY	0	+2	0	9	23	45	23
MIN TOMORROW	-5	-2	0	6	24	53	17
MAX TOMORROW	-1	+2	0	0	18	59	23
MALMÖ							
etc.							

In order to save paper, or rather to make it easier for the forecaster on duty, the presentation soon was changed to the following format:

<u>TEMPERATURE</u>	<u>06</u>	<u>12</u>	<u>18</u>	<u>00</u>	<u>06</u>	<u>12</u>
GÖTEBORG	-6	0	-1	-3	-4	-1
MALMÖ
etc.						

which means that the available probability statistics for temperature, precipitation and gale are no longer used.

4. Presentation of forecasts in worded form

Based on the forecast tables where values are given for particular stations it is possible to compute average values representative for the ordinary forecast areas used in public weather forecasting in Sweden. After that it is possible - although it means some tricky programming work - to produce a forecast text that describes in words as accurately as possible the area mean values and how they will vary during the 36 hours covered by the forecast.

It is also possible to let the computer produce a text that describes the weather situation in words, in particular the positions and movements of Highs, Lows and air masses.

A worded forecast is presented in Fig. D2. The text-composing flow diagram in Fig. D3 is used for the description of positions and movements of low pressure centres.

The flow diagram in Fig. D4 demonstrates how the sentence on the wind conditions is composed. Note, that in both these diagrams, a lot of programming work is needed to decide which way to proceed through the flow diagram. A decision is needed at each branching point.

5. System description

The following table shows the size of the interpretation programme, and the time needed on a SAAB D22 computer (memory speed ~ 0.2 MIPS , word length 24 bits)

The text-producing part is no longer used operationally.

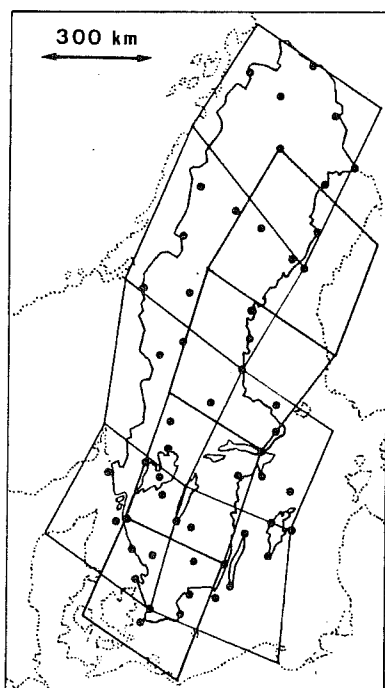
System for routine forecast-chart interpretation.

Program No.	Function	Computer time (sec)	Number of words for		
			Instructions*	Constants**	Texts***
1	Interpolation of constants applicable the actual day	8	2,200	11,100	20
2	Interpretation and printing of forecast tables	77	6,600	10,400	390
3	Composing and printing of worded forecasts	8	5,800	1,400	830
	Total	93	14,600	22,900	1,240

* Subroutines available in the general master program are not included.

** Buffer areas are not included.

*** Three letters can be stored in each text word.



Overlapping diamond-shaped sub-areas into which Sweden is divided for the purpose of synoptic climatology and weather-type interpretation. Within each diamond, relationships have been established between certain predictors—thickness, pressure, pressure gradient, relative vorticity—and surface winds, precipitation, and temperature at particular stations identified by black dots.

Fig. D1

SAMMANFATTNING OCH TOLKNING AV DE NUMERISKA PROGNOSEKARTORNA

VÄDERLÄGE DEN 6 . 5 . 1968 KL. 1 3PM

INGET HÖGTRYCKSCENTRUM I NÄRHETEN AV SKANDINAVIEN.

ETT LAGTRYCK MED CENTRUM ÖVER NORRA NORDSJÖN UTFYLLES.
ETT ANNAT LAGTRYCK ÖVER SÖDRA NORRLAND DRAR INATT BORT
ÖVER VITA HAVET. ETT NYTT LAGTRYCK BILDAS INATT ÖVER
KATTEGATT.

ETT UPPVINDSOMRADE MED CENTRUM ÖVER HAVET SÖDER OM POLAR-
FRONT UPPHÖR. ETT ANNAT UPPVINDSOMRADE INTRÄNGER IDAG PÅ
MORNINGEN ÖVER SÖDRA POLEN FÖRSTÄRKES OCH RÖR SIG MOT VÄNER-
OMRADET. KRAFTIG UPPVIND INTRÄNGER IKVÄLL ÖVER HOLLAND
OCH RÖR SIG MOT VÄNEROMRADET.

SUBSIDENSEN MED CENTRUM ÖVER SÖDRA ÖSTERSJÖN DRAR IKVÄLL
BORT ÖVER SÖDRA FINLAND. ETT ANNAT SUBSIDENSOMRADE ÖVER
NORDSJÖN DRAR I MORNINGEN BITTI BORT ÖVER SHETLANDSKARNA.
ETT TREDJE SUBSIDENSOMRADE INTRÄNGER IKVÄLL ÖVER HAVET
ÖSTER OM JAN MAYEN.

UTSIKTER FÖR LANDDISTRIKT.

SÖDRA GÖTALAND: MÄTLIG VIND, FÖRST ÖSTSYDÖSTLIG, FRÅN I
MORNING MIDDAG SYDVÄSTLIG. NEDERBÖRD. IDAG PLUS
13 GRADER, INATT PLUS 8, I MORNING OFÖRÄNDRADE TEM-
PERATURFÖRHÅLLANDEN.

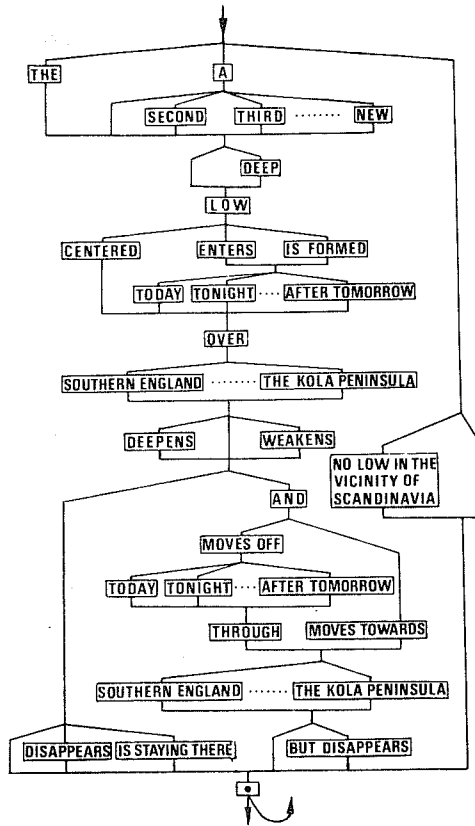
VÄSTKUSTOMRADET: MÄTLIG, FRÅN I MORNING BITTI AVTAGANDE
SYDSYDÖSTLIG VIND. NEDERBÖRD, TEMPERATUREN OM-
KRING PLUS 10, I MORNING NAGOT VARMARE.

VÄNEROMRADET: MÄTLIG VIND, FÖRST SYDVÄSTLIG TILL SYDÖST-
LIG, FRÅN I MORNING MIDDAG SYDÖSTLIG. NEDERBÖRD.
IDAG PLUS 12 GRADER, INATT PLUS 7, I MORNING NA-
GOT MILDARE.

NORDÖSTRA GÖTALAND OCH GOTLAND: SVAG, FRÅN INATT MÄTT-
LIG SYDÖSTLIG VIND. NEDERBÖRD. IDAG PLUS 12 GRA-
DER, INATT PLUS 7, I MORNING OFÖRÄNDRADE TEMPERA-
TURFÖRHÅLLANDEN.

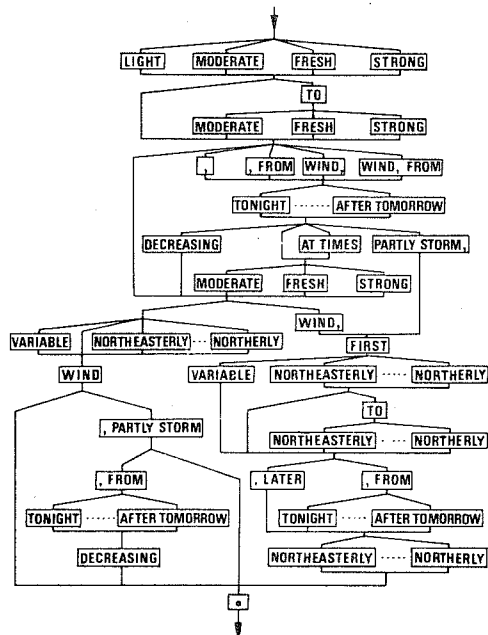
GOTLAND: MÄTLIG, I MORNING BITTI TIDVIS FRISK VIND, FÖRST
VÄXLANDE, SENARE SYDSYDÖSTLIG, FRÅN I KVÄLL NEDER-
BÖRD. TEMPERATUREN OMKRING PLUS 9, I MORNING NA-
GOT VARMARE.

Fig. D2 : A worded forecast as produced operationally
in Sweden.



Text-composing flow diagram for the description of positions and movements of low pressure centers. (The original text is in Swedish. Translation is literal and disregards possible differences in Swedish and English syntax.)

Fig. D3



As in D3 except for district forecasts of surface wind.

Fig. D4

References

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