

# FEEDBACK OF SEVERAL YEARS OF OPERATIONAL USE OF SYNERGIE

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## 1. INTRODUCTION

When we began the Synergie project in 1989 , the user specifications were roughly « we want to see any type of data we need and manipulate them as we want » . It seemed clear then that the users didn't know clearly what they could expect from a machine. We hadn't many experience of X-Window ourselves so it was non realistic to pretend to make exhaustive specifications.

We then decided to develop progressively, beginning with a prototype and improving it regularly by cycles. The main difficulty there, is of course to define an architecture able to support a growing software and stable states to propose operational releases each six to nine months.

More or less when Synergie began to be operational in 1993, we created a user committee called the GOP (standing for the French "Groupe des Outils de la Prévision" or "Forecaster's tools Group"). This group was composed of experimented forecasters from the National Forecast Department but also from all the different Regional Centers and from the National Meteorological School. It also includes two project managers. Its interests became very soon larger than just the Synergie system but they play a major role into the improvement process of this system. They define the priorities in the development list which is always very long, they build accurate specifications which integrate the expertise of different profiles of forecasters, they define new forecasting methods, ...

The experience shows that thanks to this project management choice, and to the fruitful cooperation with the users, Synergie is becoming a really efficient system.

We will use two simple examples.

## 2. ENHANCING INFORMATION

The very first specifications included of course the possibility of overlaying different types of datas. It could be useful for instance to display a Water Vapor Image overlaid with a Wind field , the geopotential field at 300 hpa and the tropopause geopotential. Such a combination should be useful to

study the synoptical dynamics in upper levels forecasted by the model and compared with reality through the water vapor image.(see picture 1).

This image is classic but quite interesting and many experimented forecasters could probably be happy with such a display. Nevertheless it just displays data and the information the forecaster will find there will depend strongly on his own experience and his personal skills. He will loose time in reading the data in order to identify the kernels and gradients he is looking for and he will need a strong concentration to compare the different datas.

The idea was then to try to enhance the meaningful information in order to help all the forecasters to find faster what they were looking for. We gave the possibility to the user to configure very easily different visualization options like the colors, the minimum and maximum values ... This let them transform the picture 1 into picture 2 . Such a display enhances much more the 3D dynamics of the atmosphere : The forecaster doesn't need anymore to read all the winds plots to find out the jetstreams. (black arrows)

The meaningful information into the tropopause geopotential is into the low values kernel locations and the strong gradients around them..(black isolines)

The geopotential at 300 hPa gives a good indication of the global circulation at a large scale and lets the jetstream evident.(very light gray isolines)

The watervapor structures depend on the dynamic circulation and as a consequence of the jetstreams and the tropopause geopotential. It is significant of what happens over 500 hPa. The dark areas are correspond to downward movements, white areas to upward movements. If the model is fine, the low kernels of the tropopause geopotential field should fit with dark areas.

The GOP insisted then to be able to save these options into the macro commands in order to capitalize the time they could invest in defining sophisticated visualization options. They then considered that these options could vehiculate themselves some expertise, and asked us to enrich the software with simple tools that would help them exchange the relevant macro commands.

These possibilities are all available since the last summer and should help the users develop, communicate and propagate tips and hints and may be new forecasting methods.

### 3. ANNOTATIONS

The aim of Synergie is to become a complete forecaster workshop and since the very first specifications to make tools for production.

Nevertheless, when a full set of visualization tools began to be operational, the GOP asked for a feature of « annotations ». The purpose was there to enhance and memorize the presence of a specific phenomenon or the result of an intermediate step in the long process of building a complete forecast. This tool was developed as a working mode of the mouse. These working modes are deep into the kernel of the system. This make them available into any type of window. As a consequence the user will be able to annotate any line or contouring into any visualization window like the jet on figure 3. This will be made at any stage of the « understanding phase ».Then , the user will export these annotations into the production window where dedicated editors will help him specify which meteorological objects they are. These objects will then be saved as the result of the forecaster expertise.

This easy to use feature may help synthesize a big amount of information in a way that follows the cognitive process of the operational forecaster.

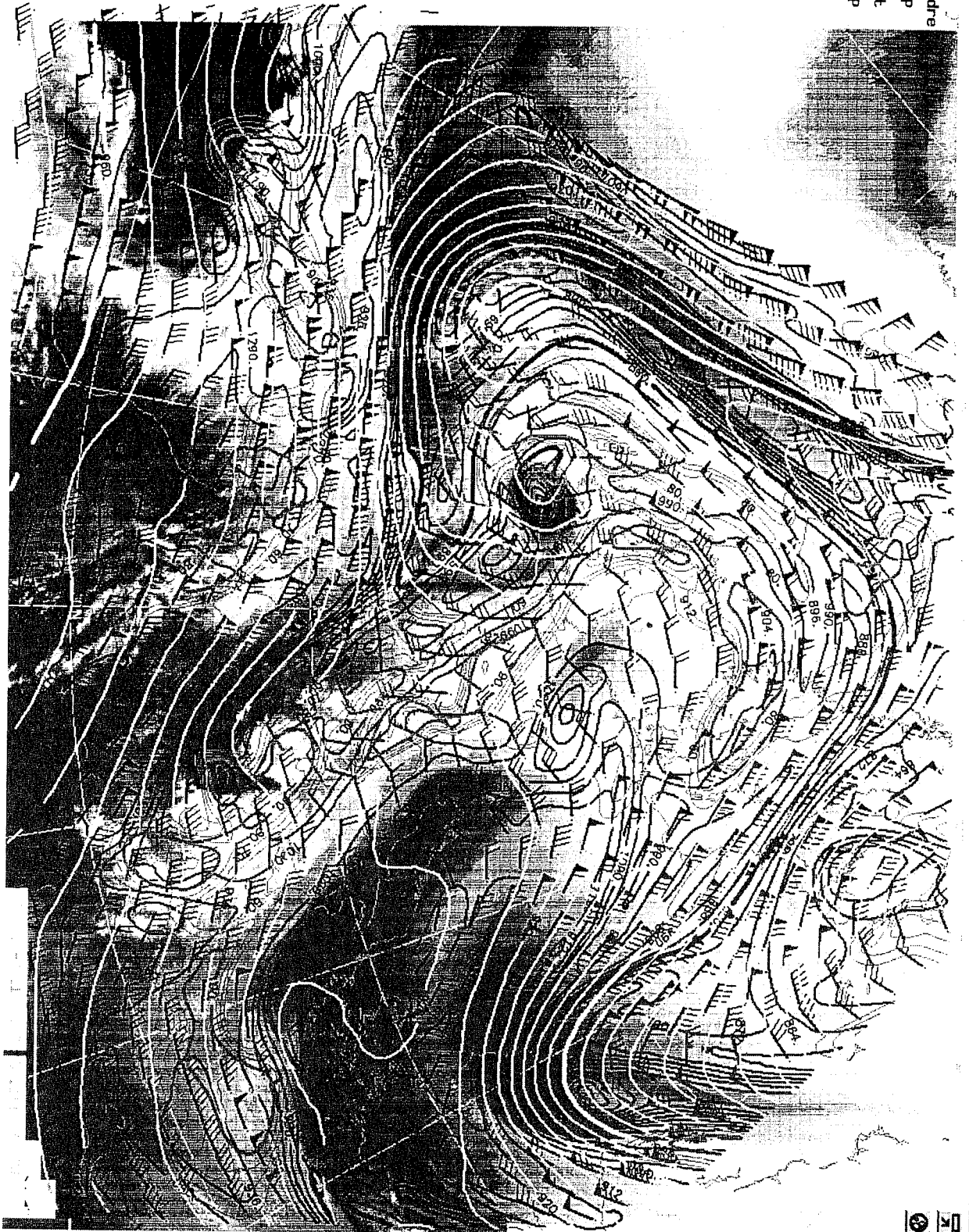
#### 4. CONCLUSION

These two examples prove clearly that with a first guess of specifications, the developments will usually offer the main features and constraints. But it is necessary to keep a permanent dialog with a motivated group of users to find out the improvements that will raise the system to its top in term of usability and ergonomics.

These improvements are compulsory to take out the best of the software, the data and the forecasters. Isn't this the real aim of all our investment ?

Picture 1

- Foudre
- Geop
- Vent
- Geop
- HU



Q

Picture 2.

- Foudre
- Geop
- Vent
- Geop
- HU

