# Forecast Verification at MeteoSwiss

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**Abstract:**
Since 2008, MeteoSwiss has performed an automatic verification of the quality of its forecasts. In 2013, a new verification system was designated both for administrative purposes and for personal verifications of the forecaster. The former (COMFORT) is used as a communication tool, aiming to provide a broad panel of non-specialists with an overall measurement of the quality of general deterministic forecasts provided by MeteoSwiss. The latter is addressed specifically to forecasters in order to compare his or her score to the models for various ranges, parameters and weather situations. A uniform global score was designed for these two purposes.

## Forecast Editor:

An interface was designed to enable the MeteoSwiss forecasters to issue his or her forecast. The data are fed from this editor into various products such as postcode forecasts on the internet. A forecast is elaborated for various regions up to 7 days in advance and for several parameters. These values are thereafter used to compute both COMFORT and personal verification scores.

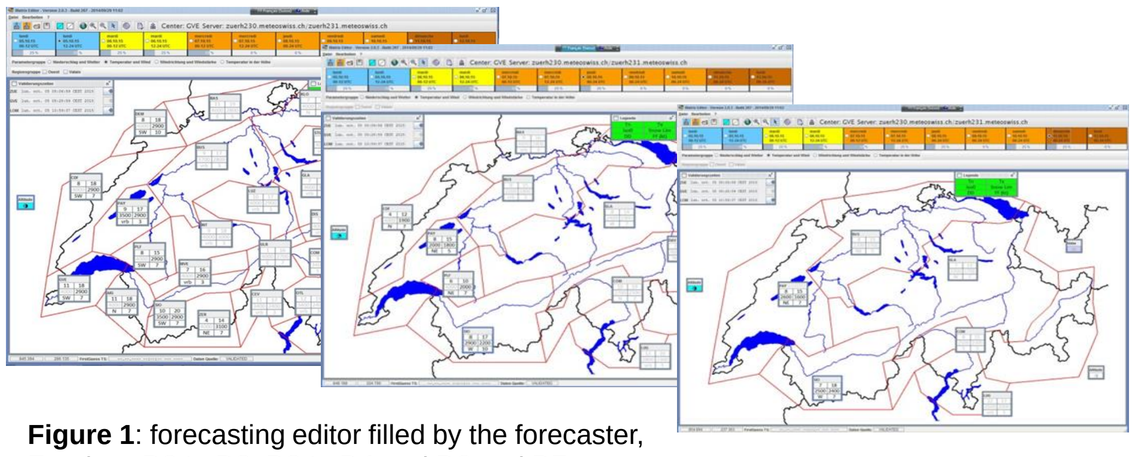


**Figure 1**: forecasting editor filled by the forecaster, For days D0 to D2, D3 to D4 and D6 and D7.

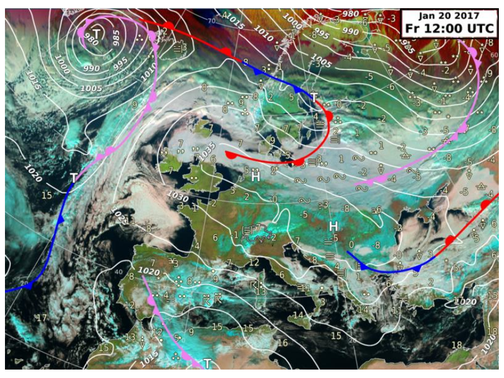
According to the range of the forecast, the number of regions varied. For forecasts up to day 2, 27 regions are detailed, from day 3 to day 5, 11 regions and for days 5 and 6, only 6 regions.

## Added value of the forecaster

The editor is initialised by various sources; COSMO model for short ranges, IFS for medium ranges, MOSMIX for temperature etc. It is crucial to estimate the added value of the forecaster in order to define whether parameters, which range or situation, model data should be altered. The internal verification browser is a helpful tool to approach this aspect since the same scheme is used to calculate both model and forecaster data.

### Case of the 20.1.2017

A large anticyclone was lying in the centre of Europe, generating many low level clouds and fog, especially in the Swiss low land. On the satellite picture a large area of low cloud spread from Lyon to Austria. The top of the cloud layer was situated at about 1000 meters in Switzerland. The red circle represents Payerne, where the verification is based.



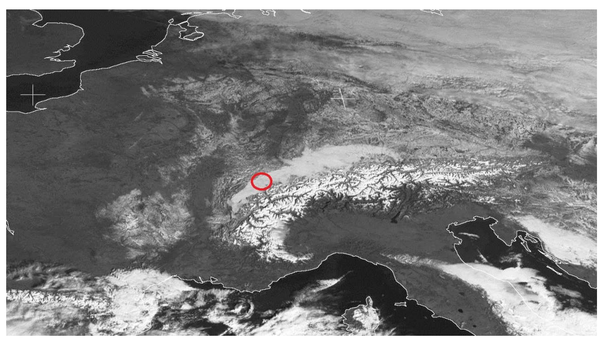
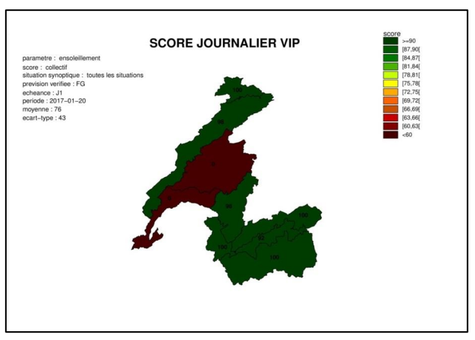
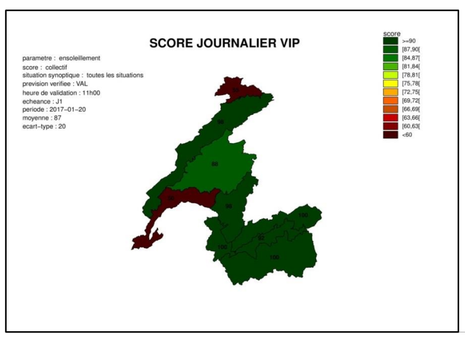
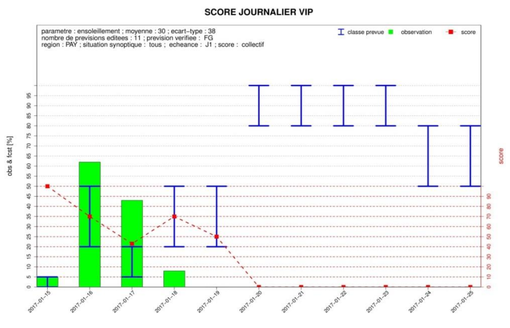



**Figure 2:** Synoptic chart of the 20.1.2017 at 12z and visible satellite picture the 20.1.2017 at 10z



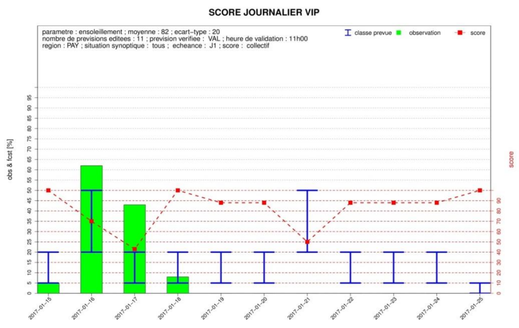




**Figure 3:** verification of relative sunshine duration, initialization (left), forecaster value (right). Map representation 20.1.2017,(top). Temporal verification (bottom). The green lines are the observations; the blue brackets, the forecast by classes. In this case, the forecaster has improved the model forecast.

## Reference:

[1] D. Cattani, A. Faes, M. Giroud Gaillard and M. Matter. COMFORT: Continuous MeteoSwiss forecast quality score. *Scientific Report MeteoSwiss*, 99:45 pp, 2015.

## External verification

The COMFORT (Continuous Meteoswiss Forecast qualiTy score) score is used to provide a synthetic overview of a forecast's accuracy (figure 4). This score has been developed mainly for administrative purpose. It is calculated using measured and verified data, providing a daily, monthly and yearly scores. The score calculation is based on accuracy and includes two thresholds, a tolerance interval and a maximum error, beyond which the forecast is invalid [1].

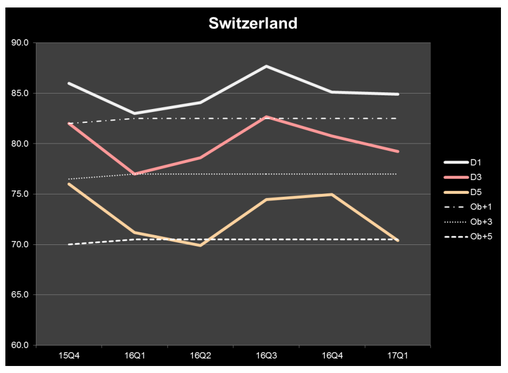



**Figure 4:** Sample of a report on MeteoSwiss forecast quality addressed to governmental authorities. The dash/dot, dot and dash lines represent the goal quality set by the authorities for respectively day 1, day 3 and day 5.

## Internal verification

The Internal Verification products are designed in order for the forecaster to provide an individual, regular and immediate feedback about the quality of the forecast whilst the weather situation is still fresh in the forecaster's memory.

This verification is available through two channels, each of them using the same score calculation method:

### E-mail sent daily to the forecaster.

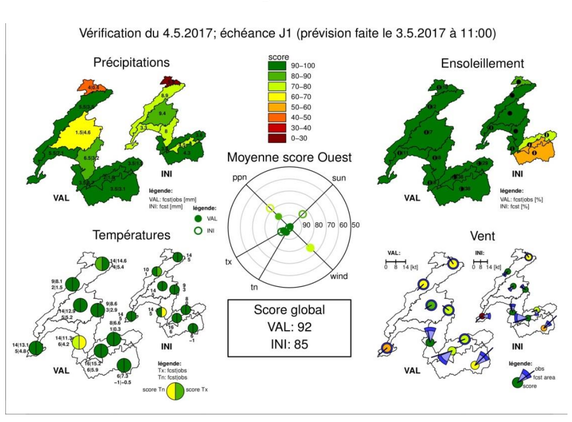



**Figure 5:** Example of daily bulletin addressed to forecasters. Precipitation, sunshine duration, wind and min/max temperature and global scores are shown for both values from the forecaster (VAL) and the initialization (INI).

### Browser.

The verification browser has been developed to allow a variety of MeteoSwiss staff to produce maps and temporal graphs of the scores. For example, types of situation, time of validity, measuring station, granularity and period can be chosen. The objectives are to issue recommendations in order to improve the forecast and to analyse more finely specific weather situations.

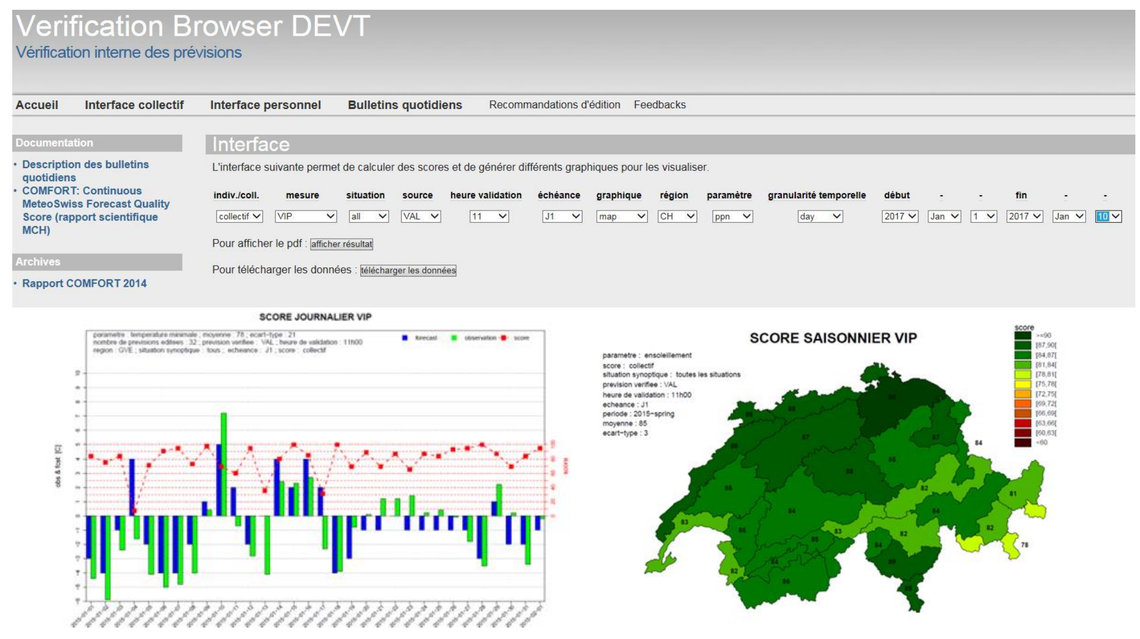



**Figure 6:** browser interface and examples of maps and temporal scores graphs.

The main difference between the external and internal verification is that the former is a uniformed score for each range, whereas the later verifies exactly what the forecaster predicted using the forecaster editor tool.

## Conclusion

External and internal verifications provide uniformed scores aimed respectively for communication and detailed analysis of forecasts. The verification browser is a very powerful tool to analyse in details forecasts and the added value by the forecaster. It is widely used by the forecasters and the regular feedback is much appreciated. It also provides a base for forecast recommendations. In the near future, the scores will be published regularly on the MeteoSwiss web site.

MeteoSwiss