

Dimmerfoehn in the Alps

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Introduction and Abstract

Internationally, the technical term "dimmerfoehn" is often defined incompletely, sometimes even wrongly.

The ad-hoc research group "Foehn climatology in Switzerland (FKch)" and the AGF elaborated a new definition. Members of these two groups from Austria, Germany, and Switzerland were directly involved in a draft version which was subsequently refined together with additional foehn experts in Germany (Prof. Hoinka), Austria (Prof. Mayr), and New Zealand (Prof. Sturman).

This poster offers some overviews, facts and new insights in order to illustrate the new WMO-definition which was introduced into TERMDAT in May 2015.

The New WMO-Definition (May 2015)

Dimmerfoehn: A form of foehn in which humid air extends across the mountain ridge causing precipitation and poor visibility unusually far to the leeside.

Case Study: 4–5 November 2014 Comparison of Stations

In the late afternoon of November 4th an ongoing foehn turned into a short period of dimmerfoehn. First it hit **Altdorf** (ALT, from 4/11/14 18:00 to 5/11/14 00:20), then **Chur** (CHU, 4/11/14 21:00 to 5/11/14 04:30) and finally **Vaduz** (VAD, 5/11/14 00:40 to 02:30) as figures 2–4 show. The automatic model by Dürr seems to work quite well. In the figures the dimmerfoehn is marked with 'o'. Tests on dozens other cases have shown that his model is very realistic.

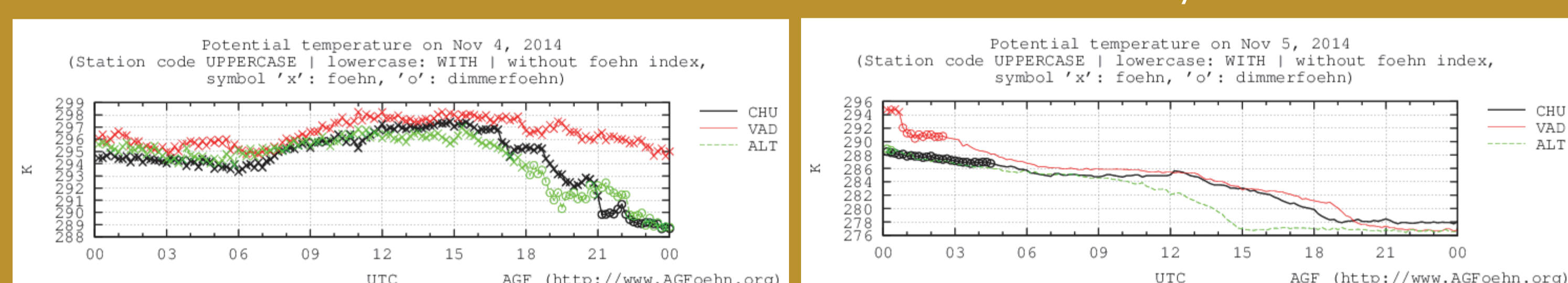


Fig. 2: Potential Temperature, Altdorf (ALT), Chur (CHU), Vaduz (VAD); 4+5/11/2014

Figure 2 shows the typical decrease of the potential temperature at the beginning of dimmerfoehn. While the dimmerfoehn starts in Altdorf (ALT) already at 18:00, it takes three hours more to reach Chur (CHU); and even another 4 hours for Vaduz (VAD).

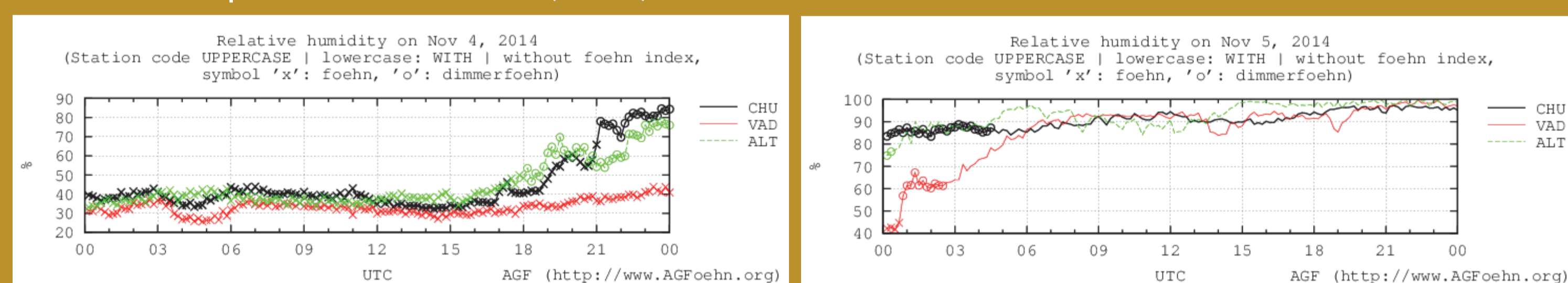


Fig. 3: Relative Humidity, Altdorf (ALT), Chur (CHU), Vaduz (VAD); 4+5/11/2014

While the relative humidity (fig. 3) increases shortly before the beginning of dimmerfoehn, the precipitation (fig. 4) starts right after it. Figure 4 shows also that Vaduz still is in the normal foehn, while it already rains in Altdorf and Chur.

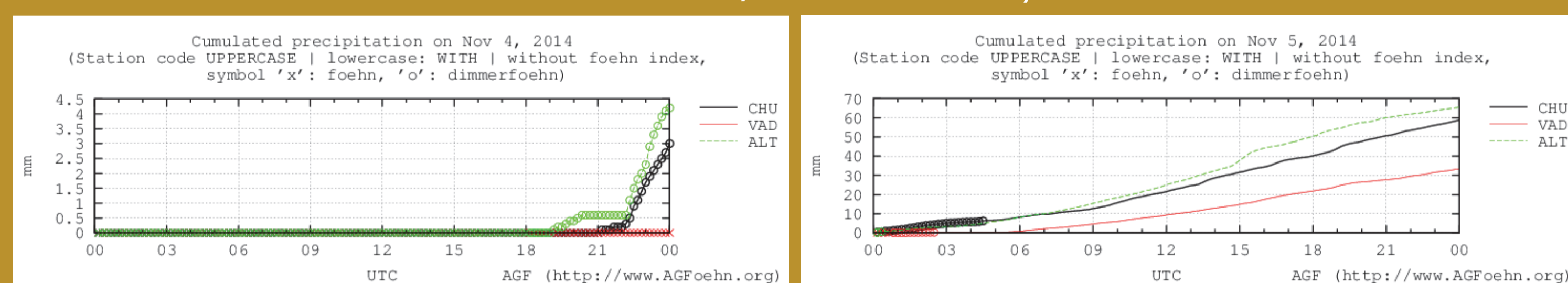


Fig. 4: Precipitation, Altdorf (ALT), Chur (CHU), Vaduz (VAD); 4+5/11/2014

Conclusion

Dimmerfoehn is a rarely occurring kind of foehn. Nevertheless it is an interesting variation as it has in an average lower wind speed – i.e. less damage potential – but, on the other hand, it brings precipitation to the leeward side of the Alpine ridge which – in heavy cases – can result in flooding. Hence the automatic model is very useful to detect dimmerfoehn quickly and reliably. Dürr's model is still in a stage of testing and improving. This will be certainly one of the focuses of AGF's further researches.

A Brief Historical Outline

It is not clear when the term "dimmerfoehn" was first used. In a travel report by Meisner (1823) there is after the description of a "normal" foehn the following text: "... und wenn er dann erst mit dem Regen eintritt, so wird er hier in der Gegend von Altdorf Dimmer-Föhn genannt." [... and when it finally appears together with the rain, then here in the region of Altdorf it is called dimmer-foehn. (translated by AGF)].

According to the Swiss German Dictionary Idiotikon, the name "Dimmerföhn" is derived from the Swiss German adjectives "timdrig" or "dimdrig" meaning hazy, obscure, dark, cloudy.

It seems that Streiff-Becker (1933) made the first attempt to identify the meteorological mechanism leading to dimmerfoehn and to describe the phenomenon scientifically. His sketch (fig. 1) of his first scientific observation of dimmerfoehn made on September 12, 1933 in the Glarus Alps was first published in Streiff-Becker (1947).

Finally Richner und Hächler (2012) described dimmerfoehn as follows: "A south foehn which does not immediately follow the topography in the lee, but touches the surface further downwind. The mountain ridge is in clouds that extend downwind. The comparatively calm area right downwind of the ridge is dark due to heavy clouds, hence the name ("dimmerig" or "dimdrig" [Swiss German] means dim, obscure). In rare cases, there is no precipitation but it is very hazy due to Saharan dust."

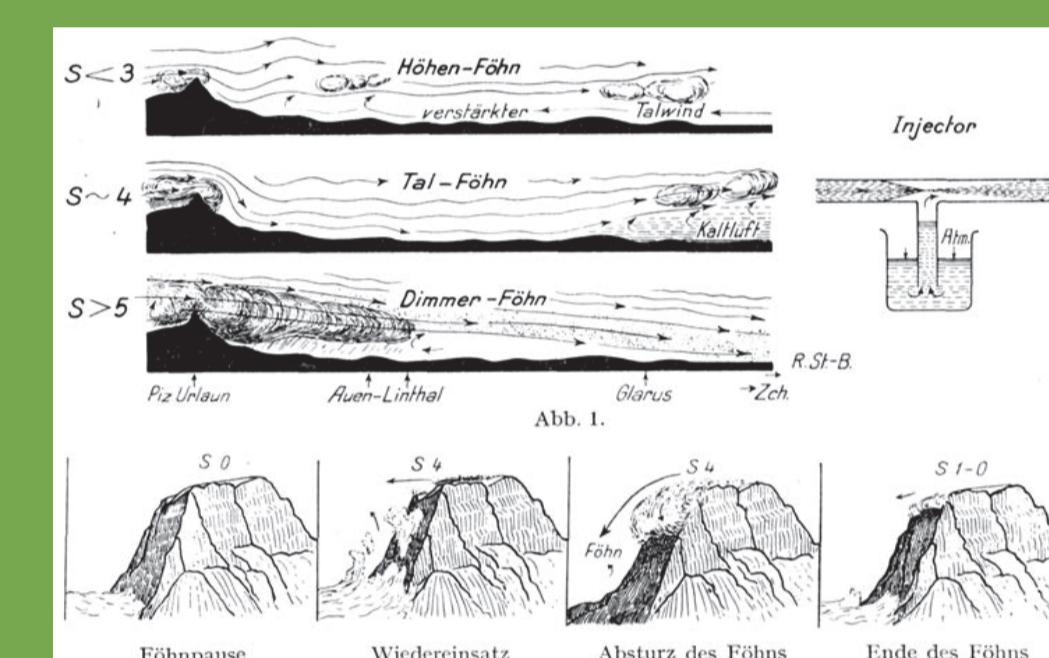


Fig. 1: Streiff-Becker's sketch of dimmerfoehn over the Tödi (Glarus, Switzerland)

Case Study: 4–5 November 2014 Precipitation

The figures 5–8 show how the frontal precipitation (in the west) is closing in the precipitation area of the orographic foehn (over the Alpine ridge and leeward).

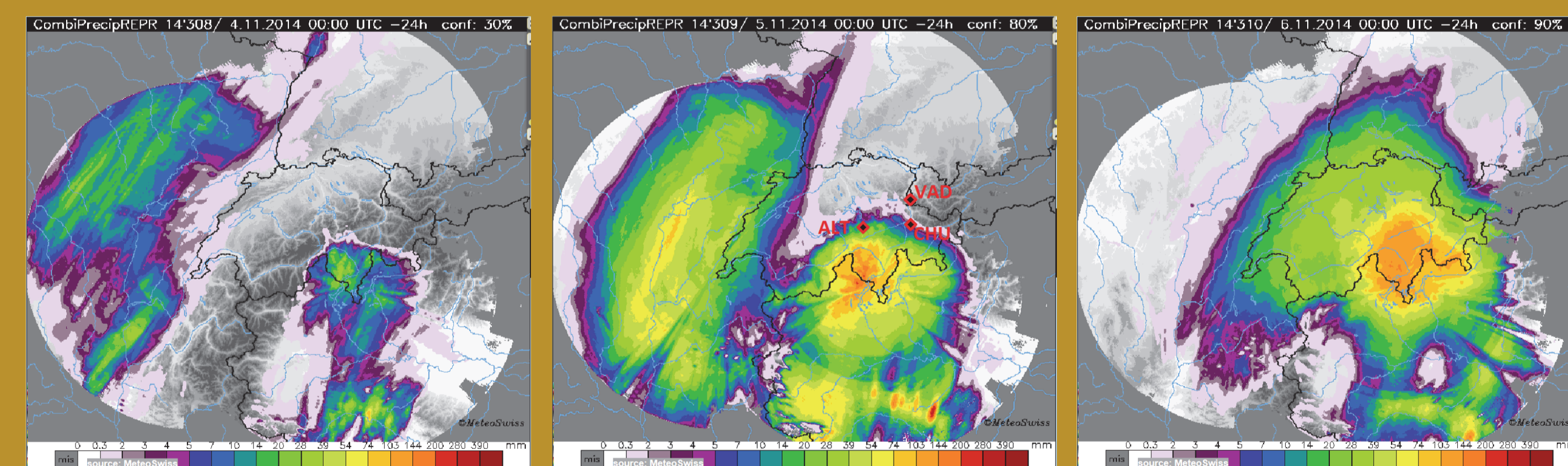


Fig. 5: Radarcomposites (total of the past 24 hours) of the 4–6/11/2014 (00:00 UTC); while all three stations (marked in the middle figure) are still in dry foehn air at midnight of the 4th November, Altdorf and Chur (70 km apart) are already in the precipitation area by midnight of the 5th while Vaduz (30 km north of CHU) is then still dry.

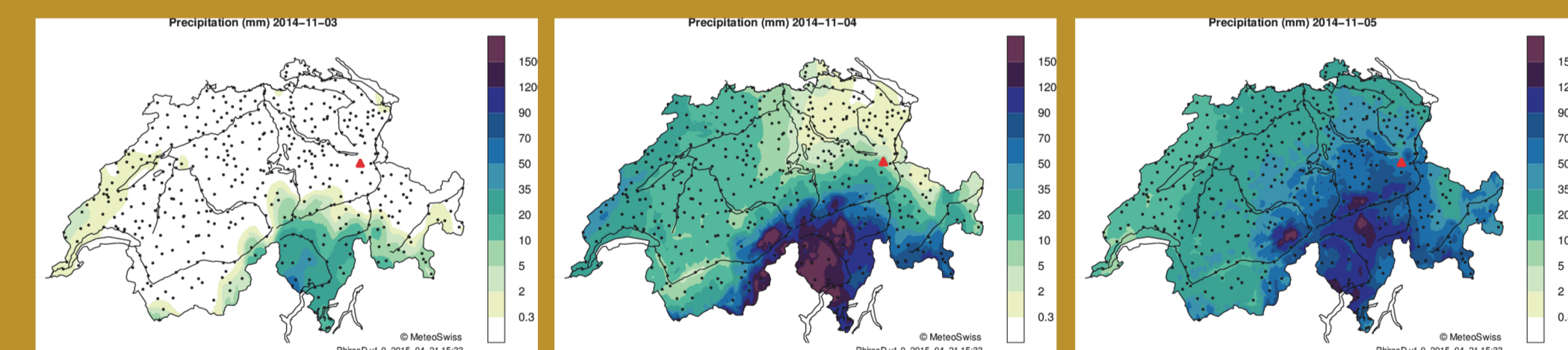


Fig. 6: Precipitation (total in 24 hours) of the 3rd, 4th and 5th November 2014; Pizol is marked with a red triangle

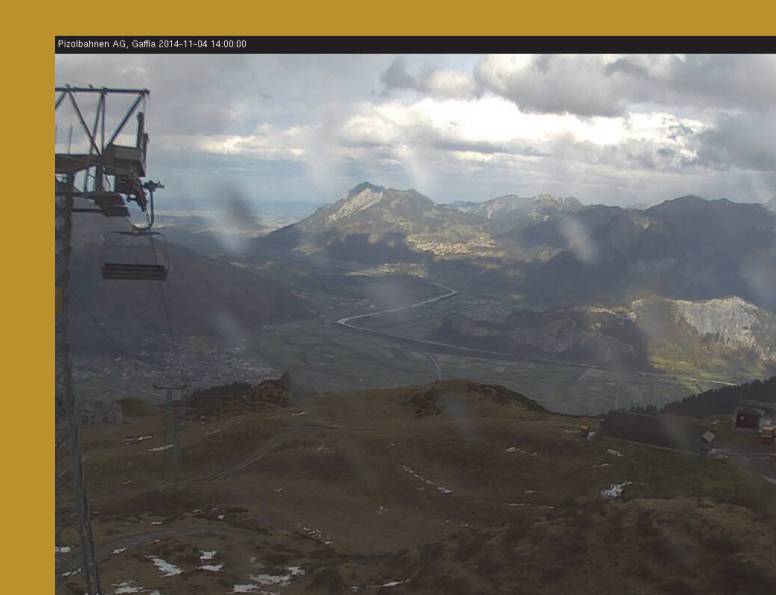


Fig. 7 (left): The webcam on Pizol shows first rain drops on its lens by the 4/11/2014, 14:00 UTC

Fig. 8 (right): The rain in the night (5/11/14, 01:00 UTC; picture below right) shows rain drops and clearly less visibility than in the picture above right (5/11/14; 00:00 UTC)



Sources:

AGF (figures) | Barry, R. G. 1992. Mountain Weather and Climate. 2nd ed., Routledge, London, p. 325. | Frey, K., 1950: Der Dimmerföhn vom 18. Dezember 1945. Pure Appl. Geoph., Vol. 17, 167-182. | Gehler, J.S.T., Brandes, H.W., Gmelin, L., Horner, J.C., Littrow, K.L. 1820-1845: Johann Samuel Traugott | Gehler's Physikalisches Wörterbuch. Vol. 10, p. 1915. | Hoinka, K.P. (2014): private communication. | Kuhn, M. (Herausg.), 1989: Föhnstudien. Wiss. Buchges. Darmstadt, 504 pp. | Mayr, G., 2014: private communication. | Meisner, K.F.A., 1823: Kleine Reisen in der Schweiz. Burgdorfer, Bern, p. 128/129. | MeteoSwiss (figures) | Richner, H., P. Hächler, 2012: Understanding and forecasting Alpine Foehn. In: F.K. Chow, S.F.J. de Wekker, B.J. Snyder (Eds.): Mountain Weather Research and Forecasting: Recent Progress and Current Challenges. Springer, Berlin, 219-260. | Rossmann, F., 1950: Über das Absteigen des Föhns in die Täler. Ber. Deutsch. Wetterd. in der US-Zone, 12, 94-98. | Streiff-Becker, R., 1933: Die Föhnwinde. Vierteljahrsschr. Naturf. Ges. Zürich, Jahrg. 78, 66-82. | Streiff-Becker, R., 1947: Der Dimmerföhn. Vierteljahrsschr. Naturf. Ges. Zürich, Jahrg. 92, 195-198. | Sturman, A., 2014: private communication. | Truog, G. 1987: Dimmerföhnfälle 1984 - 1987. Available from www.AGFoehn.org, 1 p. | www.pizol.com (webcam pictures)