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Report

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Facts and fallacies related to dimmerfoehn

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1. Introduction

In international literature, the definition of "dimmerfoehn" is incomplete, sometimes even wrong. The aim of this document is to provide the basis for a new version replacing the WMO definition. Based on this document and on individual views, the revised version was elaborated by members of the group "Foehn climatology in Switzerland (FKch)" and the "Alpine Research Group Foehn Rhine Valley/Lake Constance (AGF)".

2. History

It is not clear when the term "dimmerfoehn" was first used. In a travel report by Meisner (1823) one finds after the description of a "normal" foehn the following text:

Öder, es versetzen sich, während der föhn heftig wüthet, in höhern Regionen der Athmosphäre viele Dünste, ganze Gewitterwolken bilden sich, die sich denn öfters in warme, starke Regen, und im Sommer zuweilen, jedoch selten, in Gewitter auflösen, die gewöhnlich sehr heftig sind; dabei fährt der föhn fort mehr oder weniger zu wüthen; oft geschieht jenes schon, ehe der föhn auf die Erde kömmt, und wenn er dann erst mit dem Regen eintritt, so wird er hier in der Gegend von Altdorf Dimmer-föhn genannt.

[Or, there are, while the foehn rages, in higher regions of the atmosphere many vapors, thunderstorm clouds are formed, which often resolve themselves in warm, strong rain, and in summer, however seldom, in thunderstorms which usually are very intense; during this time, the foehn continues to rage more or less strongly; often the former happens before foehn touches the ground, and when it appears only together with the rain, then here in the region of Altdorf it is called Dimmer-Föhn.]

Hence, people distinguished between "normal Föhn" and "Dimmerföhn" - often also called "Timmerföhn" - long before the phenomenon foehn was scientifically investigated.

Gehler (1820) mentions "Demmer-Föhn" in his huge (eleven volumes) physics compendium. He describes foehn under the heading "Sirocco", supposing that foehn might just be a continuation of a sirocco originating in the Sahara Desert. The different types and phases of the winds (including dimmerfoehn) are portrayed in a very detailed and accurate way, however, the article does not go beyond a purely descriptive narrative.

3. Etymology

According to the Swiss German Dictionary Idiotikon, the name "Dimmerföhn" is derived from the Swiss German adjectives "timbrig" or "dimmrig" meaning hazy, obscure, dark, cloudy. Already in medieval times, the adjective "timmerig" was widely used for hazy, foggy, and/or cloudy weather in Switzerland. The combination of "timmerig" with "fön" to "timmer-fön" was quite natural. The expression could (and still can) be found in the regions of Uri, Glarus, the Grisons and the Bernese Oberland (www.idiotikon.ch).

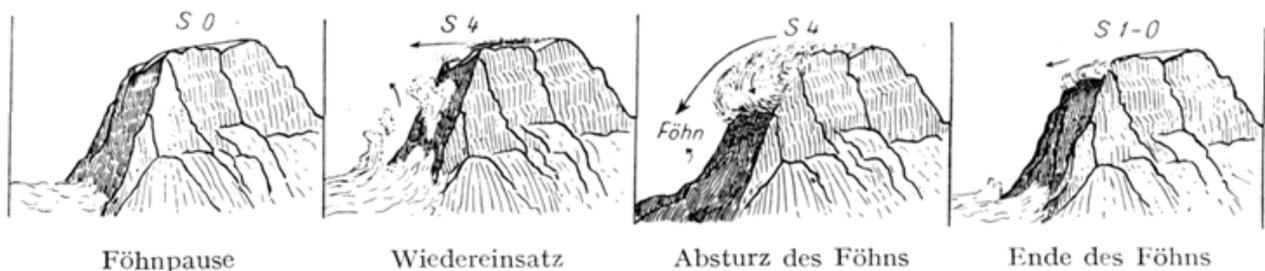
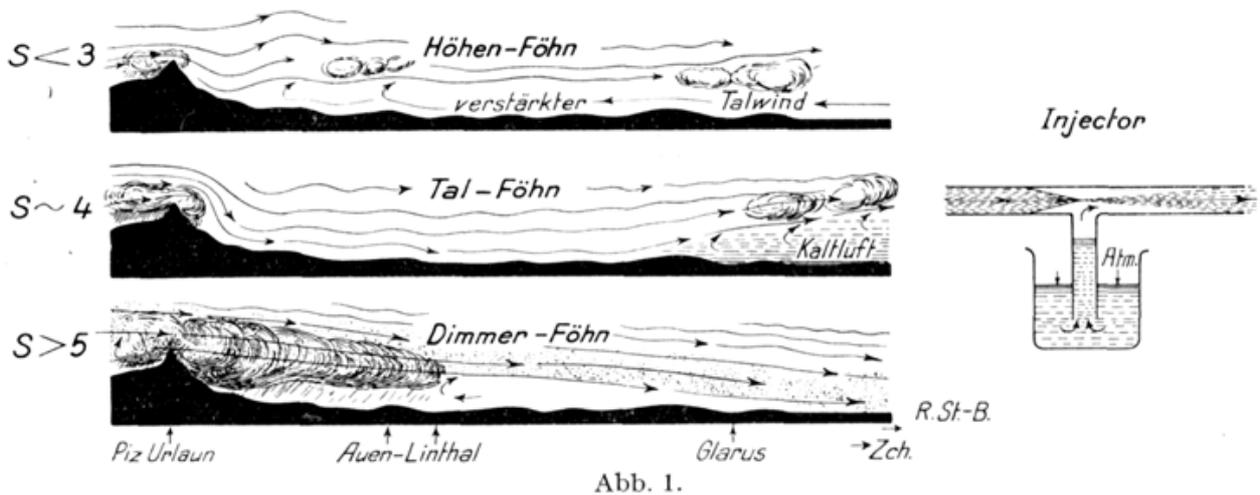
4. Scientific description of dimmerfoehn

It seems that Streiff-Becker (1933) made the first attempt to identify the meteorological mechanism leading to dimmerfoehn and to describe the phenomenon scientifically. He did so when he applied

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Wild's aspiration theory, i.e., one of the several concepts that should explain why foehn descends into the valleys after crossing the mountain ridge. Streiff-Becker lived and worked in the Glarus Alps, which led to the erroneous conclusion that the term dimmerfoehn originated here, and that Streiff-Becker coined it.



Streiff-Becker's sketch of his first scientific observation of dimmerfoehn made on September 12, 1933 in the Glarus Alps. His observation point was the Geissbützstock; the mountain depicted is the Tödi. The figure is published in Streiff-Becker (1947), a similar, slightly simpler version is found in his original paper Streiff-Becker (1933).

Outside Switzerland, researchers did not deal with dimmerfoehn until the second half of the 20th century; before that, the term cannot be found in scientific publications. Rossmann (1950) mentions dimmerfoehn very briefly, insinuating that it occurs only in the Glarus Alps. Kuhn (1989) mentions dimmerfoehn several times, but only in reprints relating to Switzerland. In his introduction, he implies that the term dimmerfoehn is not used outside Switzerland.

In Bavaria (Germany), dimmerfoehn is not an issue. According to Hoinka (2014), dimmerfoehn is regarded as an inner-Alpine phenomenon. In the New Zealand Alps, dimmerfoehn is observed "quite often" according to Sturman (2014). However, presently there is no scientific activity related to the phenomenon. In Innsbruck (a historical stronghold for foehn research!), on the other hand, dimmerfoehn does not only occur but is scientifically studied.

5. Current descriptions and definitions

In Austria, i.e., basically in the research group at Innsbruck, dimmerfoehn is defined as:

Foehn with precipitation on the leeside of the obstacle.

It is the clear physical process of precipitation (which can be easily verified) that distinguishes dimmerfoehn from "normal" foehn (Mayr, 2014).

The former definition used by WMO read:

Rare form of foehn where a pressure difference of 12 mb or more exists between the S and N sides of the Alps.

Comment:

The definition is rather incomplete. Dimmerfoehn can occur at pressure differences lower than 12 hPa. Truog (1987) lists dimmerfoehn occurrences with pressure

differences as low as 8 hPa. On the other hand, a large pressure gradient across the mountain ridge is a necessary, but not a sufficient condition for dimmerfoehn. Obviously, the figure 12 hPa was taken from Frey (1950). It is just one value found in a case study in the Swiss Alps which cannot be transferred to other places. The most important property of the phenomenon, the obscure air in the lee of the Alps, is not mentioned. Also, there is no reason to limit dimmerfoehn to the Alpine region.

In its 1959 edition of Glossary of Meteorology, the American Meteorological Society AMS defined dimmerfoehn with the wording:

A rare form of foehn where, during a very strong upper wind from the south, a pressure difference of 12 mb or more exists between the south and north sides of the Alps. A stormy foehn wind then over leaps the upper valleys in the northern slopes reaches the ground in the lower parts of the valleys, and enters the foreground as a very strong wind. The foehn wall and the precipitation area extend beyond the crest across the almost calm surface area in the upper valleys.

For the current AMS on-line definition, this text was slightly changed and expanded to:

A rare and strong south foehn in the Alps, in which the strong foehn winds reach the ground only in the lower parts of the valleys and the plain or foreland.

Under these conditions the sea level pressure difference between the south and north side of the Alps is greater than 12 mb. In the upper portions of the valleys, the surface winds are light and variable, as the strong winds do not penetrate to the ground. This effect has been attributed to the persistence of a cold-air layer in the upper valleys, decoupling the surface winds from the flow aloft and making the flow unable to follow the terrain in this region, or to the position of this region with respect to the long mountain wave that may accompany this foehn. The foehn wall and the precipitation area extend beyond the crest across the almost calm surface region in the upper valleys. This condition "is known as 'dimmer-foehn,' meaning blocked or dammed-up foehn."

Barry, R. G. 1992. Mountain Weather and Climate. 2nd ed., Routledge, London, p. 325.

Comment:

Also here, the issue with the 12 hPa is found (see comment above). The last sentence in the above definition is incorrect: the word dimmerfoehn has no etymological relation to words like "blocked" (see section 3), and the statement itself is misleading. If "blocked" or "dammed-up" refers to the air right in the lee of the obstacle, then it is not the foehn which is blocked but the stagnant air. If however, it does refer to the foehn itself then it should read the opposite, namely unblocked, unhindered, unimpeded. In later editions of Barry (1992) the topic dimmerfoehn disappeared.

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 "dimmgrig" [Swiss German] means dim, obscure). In rare cases, there is no precipitation but it is very hazy due to Saharan dust.

6. Conclusions

Unfortunately, it is impossible to correct the misinterpretations and misunderstandings related to the phenomenon dimmerfoehn in already printed literature. In particular, the restriction to Switzerland and the inadequate explanations of the name are unfortunate.

However, the primary aim of the members of AGF and FKch was to initiate a modification of the unsatisfactory definition of dimmerfoehn in the METEOTERM database run by WMO. In a rather long and tedious process they agreed on a concise characterization which is generally applicable to any mountain massif and which avoids restricting statements. After circulating the new version

among foehn experts outside the two groups, it was slightly revised. Then the Swiss Federal Office for Meteorology and Climatology proposed a revision to WMO suggesting the following wording:

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

WMO accepted this definition in May 2015, translated it to Chinese, French, and Spanish and introduced it as record 7077 into its METEOTERM, thus replacing the former entry.

7. Acknowledgments

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