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**Autor:** [s.n.]  
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World Glacier Monitoring Service at the ETH in Zurich

## When glaciers sweat...

*The most recent observations made by the ETH Zurich show that the trend of the 1900's continues: Most of the world's glaciers are shrinking. This is also true of Switzerland's glaciers.*

«The climate has been becoming milder since the beginning of the century, chiefly in the polar regions» explains Dr. Wilfried Häberli, Director of the World Glacier Monitoring Service at the ETH (Swiss Federal Institute of Technology) in Zurich. And indeed it is true that a worldwide shrinkage of alpine glaciers has taken place. This shrinkage was at its most apparent in the '40s. It has however become less uniform over the past 15 years. Some glaciers are growing and advancing. This is especially true of glaciers in humid areas and those situated close to the sea, where the weather provides them with enough «nourishment» in the form of rain and snow. However glacier shrinkage continues in those regions having a dry climate. The Lewis glacier on Mount Kenya may be taken as a typical example of the general tendency, its size having decreased by one half between 1963 and 1983.

### Delaying effect

The size and formation of a glacier determines the delaying effect which changes in climate may have on a glacier. The smaller a glacier is, the shorter the period of time in which its ice-mass grows or shrinks and its «tip» advances or retreats. The Trient glacier in the Valais, at present 4500 metres long, has for example like most of the glaciers in the Alps increased in mass since the 1960's. By 1985 its tip had advanced simultaneously by more than 300 metres. In comparison to this the Aletsch glacier, more than average in size stretching for almost 25 km, is on the retreat, although it has amassed in volume over the past 20 years. Whether or not the tip of a glacier advances or retreats is not determined by the growth or reduction of its mass alone. Amongst the many other determining factors are the gradient and relief of its bed.

### Disaster Scenarios

Scientists are not only interested in glacial behaviour and its relationship to climatic development. They are also interested in glacial behaviour as a means of determining

ecological and economical consequences. An example: During the 1950's and 1960's reservoirs were built throughout Europe for the production of electricity in hydro power stations. These have subsequently proved to have been too large. Whilst these reservoirs were in the planning stages, glacial shrinkage and the flow of melting water from these was at a peak – however this shrinkage has decelerated since then, the consequence being that certain reservoirs have only been filled to an insufficient level or have experienced difficulties in reaching capacity. This has led to a reduction in power production causing considerable losses for those electricity companies involved.

Switzerland has generally been saved such awkward situations, thanks chiefly to the research institute for hydroconstruction, hydrology and glaciology (VAW), which has been in existence since 1930 at the ETH in Zurich.

The researchers at the VAW are also involved with climatic disasters. It can be as-

sumed that large amounts of fossil energy producers will continue to be burnt, and that the increasing CO<sub>2</sub> content in the earth's atmosphere – the so-called «glass-house effect» – will increase thus creating a general increase in temperature. An increase of 2° C in the average temperature would lead to a fundamental change in the climate and would cause a large proportion of alpine glaciers worldwide to start melting. The consequences of this would be bad – not only would the sea-level rise, flooding fertile areas. In the long term it would also lead to a lack of drinking water in those regions, who presently rely on the melting ice coming from glaciers during the warm season for their water supply.

### Swiss Speciality

There is a good reason why the WGMS has its office at the ETH in Zurich. Glacier research has a very long tradition in Switzerland: Professor F.A. Forel began the systematic observation of glaciers in 1880. A dispute between the cantons of Vaud and Geneva was partly responsible for the establishment. These two cantons wanted to clarify the reason why Lake Geneva on occasions burst its banks: Was the guilty party the excessive inflow of water (coming amongst others from the Rhone glacier situated in the canton of Valais) or did the fault lie in the construction of locks and weirs in Geneva, which were preventing the water from escaping? CEDOS

*The Fee glacier (Valais) pictured here is one of the hundreds of glaciers kept under observation by glaciologists. (Foto: ETH/VAW)*

