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Icy Discoveries

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An Icy Look Back to the Future

Martina Bauchrowitz, Editor

Imagine you have arranged to meet some friends at a cinema. You are delayed unexpectedly and don't arrive till an hour after the film has started. Just as you are getting comfortable in your seat and getting into the story, the film tears, and the screening has to be cancelled. You are very disappointed, since you would love to know how the film turns out. What can you do? You could perhaps try to guess how the story continues on the basis of the short snippet you have seen yourself, extended by what your friends can remember. Of course, the descriptions of your friends are nowhere near as detailed as your own experience, but have the advantage that they cover a far longer part of the film. In any case, your prediction of how the film continues is just a guess.

This is how it is for scientists when they attempt to piece together via computer models a picture of how the earth's climate might develop in the future. The more information that is available to put into the model, the more reliable the predictions will be. Climate researchers can fall back on databases of climate-relevant factors accumulated from a broad range of precise recent observations and instrumental measurements. These include air temperatures, the exact timing of the break-up of lake ice in spring, solar activity, and the degree of glaciation of the earth. Two articles in this edition of EAWAG news analyze historical records of lake ice cover, such as those that have been kept for the Lej da San Murezzan (the Lake of St. Moritz) since 1832. In terms of our film, these recent climate markers correspond to the part of the film you saw in person.

In addition, climate researchers also examine the various natural archives that have been left behind as silent witnesses to the beginnings of the history of our climate. In particular, the polar ice caps contain valuable information on thousands of years of past climate conditions. In the international "Greenland Ice Core Project", in which EAWAG participated, a 3-km-long ice core, 10 cm in diameter, was drilled out of the Arctic ice shield between 1990 and 1992. It contains precipitation from the last 100 000 years. Meter for meter and ice layer for ice layer, these ice cores have been carefully examined over the past 12 years. EAWAG alone has worked on thousands of ice core samples. Some of the results you will find in this current issue of EAWAG news.

A further factor which climate researchers might find relevant is the behavior of methane hydrate. This ice-like compound, which is found, for instance, in deep sea sediments, is composed of water and methane and is formed at low temperatures and high pressure. It is estimated that around 10 000 billion tonnes of methane in the form of this gas hydrate are sitting on the beds of the world's oceans. Given this enormous quantity, concern is growing that "frozen" methane will escape, enter the atmosphere, add to the greenhouse effect, and thereby accelerate climate change. An EAWAG research group is therefore also involved in investigating the behavior of methane hydrate on the seabed.

Ice in various forms therefore supplies much valuable information about present and past environmental conditions. Our only chance of obtaining reasonably reliable predictions of the climate of the future depends on our success in using this information to reconstruct the beginning of the climate film.