

## ***Interactive comment on “Rapid changes of the ice mass configuration in the dynamic Diablotins ice cave – Fribourg Prealps, Switzerland” by S. Morard et al.***

**Anonymous Referee #1**

Received and published: 23 September 2010

### **General Comments**

This is a very interesting and useful paper that addresses important questions concerning the rapid changes in the ice mass of Diablotins ice cave. The study uses a combination of short time field measurements and longtime field observations and makes some interesting conclusions of the climatic processes. The period of measurements of just one year is pretty short in comparison to the long time observations of the ice mass. The changes of the ice mass from year to year show a very high dynamic climatology of the cave and it would be nice to have a longer time of good measurements but after all the information is very interesting and useful and gives us a first view to the

C823

dynamics of the cave.

In general the work is fairly solid. The data are adequately presented; the paper is up-to-date regarding the state of knowledge in the field and, on the whole, is well written. I am happy to recommend its publication highly.

### **Specific comments**

In the second sentence of the abstract the passage “... the entrance zone ...” should be changed in “... the lower entrance zone...”.

The position of the arrows in fig. 1d suggests a laminated flow structure (floor/ceiling) or an air circulation which does not really exist (and is not intended to be shown in the figure). It would help to add to the title of the figure (“Airflow direction and velocity pattern”) the information that these data were taken by hand on different dates.

Under 3.1 only one position for airflow measurement is mentioned but in fig. 1d there is one entry “Airflow temperature” near the lower entrance and one “Airflow temperature and relative humidity” at the ice plug. Was airflow measured there? Then, or if this relates to a mobile measurement, it should be stated in 3.1 and changed to “Airflow, temperature ...” in the figure. If airflow was not measured it should be changed into “Air temperature” in the figure. Also there is an entry “Airflow velocity and direction” in the figure near the ice plug – was this measured with a data logger? Please clarify this in 3.1. And finally the figure notes “External air temperature” near the lower entrance. When you refer to the external temperature in the text you normally mean the temperature at Moléson summit or not? Maybe you should change the text in figure 1d from “External air temperature” to “Air temperature” only.

It becomes confusing when you refer to external temperature in the text (title of table 2; section 3.2.2 “external air temperature crosses a threshold ...”) whether you mean the temperature at the lower cave entrance or at Moléson summit. This is also true for the “Conclusions” where you mention the threshold of 2°C – please specify whether this

C824

is the temperature measured at the lower entrance or at Moléson summit.

Again: The airflow velocity and direction data shown in 5c was measured at the ice plug? Please mention this measurement point in 3.1.

Photographs of the two cave entrances would be very nice.

Fig 1d: an additional scale for this figure would be good to quickly illustrate the dimensions of the displayed parts of the cave

Fig 3: the individual photos are very (too) small

Fig. 4: a second figure showing only the winter phase (Nov-May) in higher resolution (time wise) would be good

Fig 5b: the graphs for relative humidity are displayed with line signature and symbols, please leave out the symbols.

Fig 5c: switch the position of the negative and positive y-axis for the airflow velocity (- at the bottom, + on top); use „inflow“ as in other figures and tables instead of aspiration; the color of the zero-line is very similar to the color of the airflow velocity graph, please choose a different color for the airflow velocity.

#### **Technical comments**

Tables and figures: the use of capital and small letters in the titles and texts of figures and tables is not constant (e.g. Fig.2 ..”(A): the ice plug . . . . (D): Ice well . . . ) Please change this.

Table 1: a strictly numerical date format would support readability

Fig. 1c: please explain the different colored signatures (grey, darkblue, lightblue) in a legend

Figures 4 & 5: please add units to the x-axes (e.g. month.year)

References: under "Arenson ..." it should be "Sea to Sky..." instead of "See to Sky...".

C825

Please also note the supplement to this comment:

<http://www.the-cryosphere-discuss.net/4/C823/2010/tcd-4-C823-2010-supplement.pdf>

Interactive comment on The Cryosphere Discuss., 4, 1035, 2010.