

Interactive comment on “The mass and energy balance of ice within the Eisriesenwelt cave, Austria” by F. Obleitner and Ch. Spötl

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General Comments ——— - the paper is well structured and scientifically sound - I'm impressed about how accurate you could determine your energy balance components in view of the quite difficult conditions in the cave (dust, humidity) and the small gradients in temperature and humidity involved. Consequently, your term dE/dt , which is calculated from the energy balance if I well understood, also includes the measuring errors from the other energy balance components. You should mention this, although this error might be small in your case - How could you prevent condensation and rime accretion on the infrared radiometers under the very humid cave conditions? Where they ventilated? Heated? If not, can you quantify the error on the longwave radiation measurement? - Point out more clearly the motivation for and significance of the

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present paper: should it mainly be a process study, a contribution to climate change detection and monitoring or should it also document the touristic impact on the ice cave? - Give topographic heights as m a.s.l. - Does permafrost occur in the surrounding bedrock? This could have a major influence on the amount and the temporal occurrence of seepage water -> discuss - Section 9. Summary: why don't you call this section 'conclusions and perspectives' what it actually is? A short summary is normally given in the abstract. This section 9 is far too long and repeats too many obvious points. Concentrate on the really essential findings of the paper. - The usefulness of cave ice (thickness) as a climate signal or for climate monitoring sounds a bit doubtful to me. The availability of seepage water at the right time seems to be crucial for the mass balance and by far dominates the air temperature signal in the cave. The influence of the local meteorological/synoptic and (hydro)geological conditions on both seepage water and cave air temperature should be better investigated

Specific Comments ——— - p. 1741, l. 4: 'feature', use 'reflect' - p. 1741, l. 6: 'determined' not 'predetermined' - p. 1741, l. 14: 'These results' -> what results? Explain - p. 1741, l. 15: What reliability do the sensitivity studies prove? - p. 1742, l. 27: I guess you want to say '... occurs 700 m behind or after the lower entrance...' Section 3. Measurements - did you control the position of the weather station (levelling) to avoid possible tilting of the instruments with time? - Pity, that only 2 ice temperature sensors were installed. If one sensor fails your gradient is gone... was the broken sensor replaced? If not, how did you derive the gradients? - Fig. 6a: how is the absolute scale in m you use here defined? You mentioned that the ice thickness is 3.3 m at the investigation site. This does not correspond to your scale here - p. 1750, l. 26: what type of 'thermometers' did you use? NTC thermistors, PT100? - p. 1751, l. 8: as your paper actually deals with an energy balance over cold ice you could mention: Suter, S., Hoelzle, M. and Ohmura, A. (2004): Energy balance at a cold Alpine firn saddle, Seserjoch, Monte Rosa. International Journal of Climatology 24, 1423-1442. - p. 1751, l. 18: what are 'these fluxes'? Explain - Fig. 7: mention that 'total energy balance' equals dE/dt - p. 1752, l. 7: what is 'the atmospheric at the surface'? Explain

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- p. 1753, l. 5-6: shouldn't Ohata's NR be larger than 0.22 as you speak of a stronger radiation input afterwards? - p. 1753, l. 20: is it 1.1 or 1.0 W/m² as in Table 2? - Table 2: give the units in the left column - p. 1756, l. 1 and 5: what should I see in Fig. 3? Explain - p. 1756, l. 6: here you give 2 cm/yr; in table 2 it is only 1 cm/yr... - Table 2: indicate the amount of seepage water of 0.05 mm/h in the table too - Fig. 9: shouldn't it be: 'The effect on the mass balance is calculated in terms of monthly changes in ice thickness compared to the reference run'? - p. 1757, l. 21: why anthropogenic? How? Explain - p. 1759, l.16: better 'The meteorological data reflect the basic...' - p. 1760, l. 19: should be '...which progress beyond the ice-rock interface...' - p. 1761, l. 10: point out more clearly: how would the air flow influence the cave ice chemistry? Or what would ice chemistry analysis tell about the airflow?

Interactive comment on The Cryosphere Discuss., 4, 1741, 2010.

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