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The Cryosphere Discussions

Interactive comment on "Age of the Mt. Ortles ice cores, the Tyrolean Iceman and glaciation of the highest summit of South Tyrol since the Northern Hemisphere Climatic Optimum" *by* P. Gabrielli et al.

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Interactive comment on "Age of the Mt. Ortles ice cores, the Tyrolean Iceman and glaciation of the highest summit of South Tyrol since the Northern Hemisphere Climatic Optimum" by Gabrielli et al.

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The glacier Alto dell' Ortles is an exceptional site for drilling into the Holocene history in the Eastern Alps. Its value and uniqueness were recognized in the Ortles Project (www.ortles.org) which produced three ice cores at 3859 m elevation that go back to

about 7000 years and were analyzed by a large team of authors and laboratories who ensured the competent representation of the various disciplines involved in paleoclimate research. Analysis of ice cores requires them to be cold or polythermal, to have minimum annual accumulation and to have a flat topography that reduces the outflow of ice and conserves it in place for millennia. These conditions are not met by many mountains in the Eastern Alps. Suter and others (2001) modelled the firn temperature in the Alps and found from altitude and exposition that cold firn should exist above 3400 m in northerly aspect and above 4150 on south slopes. In the Eastern Alps this would include the peaks of Disgrazia, Bernina, Adamello, Ortles, Cevedale, Ötztal, Stubai, Zillertal, Venediger and Goßglockner. The second condition, that there should be flat glacier tops, ruled out most of these mountains. Topographically suitable candidates like Adamello at 3539 or Weißseespitze at 3510 m in the Ötztal Alps, however, turned temperate in the 1990s. Other peaks like Wildspitze 3768 m, and Venediger 3666 m may still be cold but their steep slopes do not keep ice in place for long. Alto dell' Ortles was timely chosen as research site. The lowermost meters of the Ortles ice cores are difficult to interpret, as is the slope of the internal layers detected by ground penetrating radar. They may reflect wind drift of snow, ablation or ice flow, all of which may have individual histories on a centennial time scale and may act on a very local scale as indicated by the bedrock contours in Fig. 6. As the paper refers to the Tyrolean Iceman – he too was found in a shallow bedrock depression, protected from shearing ice motion. But shear must have occurred above at a vertical distance comparable to the horizontal scale of bedrock roughness, and such shear could be one explanation of a possible hiatus in ice core layering. This paper is of high current interest and deserves publication with minor changes as suggested by two previous comments. I recommend numbering the profiles in Fig. 5 and entering them into Fig. 6. On page 2 / line 2 write Geologist instead of Geologin. 2/4: ENEA instead of Enea. 2/10 Prove Materiali. Best wishes, Michael Kuhn

Sutter S, Laternser M, Haeberli W, Frauenfelder R, Hoelzle M 2001 Cold firn and ice of high-altitude glaciers in the Alps: measurements and distribution modelling. J Glac 47

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