Geophysical Research Abstracts,
Vol. 10, EGU2008-A-03362, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-03362
EGU General Assembly 2008

An updated LIA glacier length record for the central and western European Alps based on historical data

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There are many high-quality records of glacier fluctuations going far back in time for the European Alps. However, direct determinations of glacier changes did not start with increasing accuracy before the end of the 19^{th} century. Here we present the use of historical methods to determine glacier fluctuations in the central and western European Alps for the Little Ice Age (LIA). Length changes can be determined by the interpretation of historical pictorial documents such as drawings, paintings, prints, photographs and maps, as well as written sources. A rigorous selection of the documentary data is necessary in order to get reliable information. Besides, other evidence such as moraine findings, fossil trees in the glacier foreland and archaeological findings complete the task. The glacier record includes glaciers in the central and western Swiss Alps (Lower and Upper Grindelwald, Rosenlaui, Unteraar, Rhone Glaciers, Glacier de la Plaine Morte) and in the French Mont Blanc area (Mer de Glace, Glacier des Bossons). The compilation shows major glacier advances around 1850, 1820, 1780 and in the first half of the 17^{th} century. However, depending on the glacier's type and its geographical setting, regional differences occur (e.g. Nussbaumer *et al.* 2007), which allows assessing the spatial distribution of glacier fluctuations in the studied Alpine areas during the last few centuries. In combination with climate reconstructions for the European Alps, this can give a better understanding of the influence of the European climate dynamics on glaciers in the Alps during the last half millennium.

Nussbaumer, S. U., Zumbühl, H. J., and Steiner, D., 2007: Fluctuations of the "Mer de Glace" (Mont Blanc area, France) AD 1500–2050: an interdisciplinary approach using new historical data and neural network simulations. *Zeitschrift für Gletscherkunde und*

Glazialgeologie, 40, 1–183.