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The Remua fault in the Aiguilles Rouges massif (France): evidence for an active normal fault NW of the Mont Blanc ?

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Examination of historical seismograms and macroseismic data of the two 1905 Chamonix moderate sized earthquakes, together with a close inspection of a fault that follows the southeastern flank of the Aiguilles Rouges massif and continues northward through the Vallorcine valley for 10 km, suggest that the southern part of this fault - a normal left-lateral fault - may be active. These results question recent geological surveys and geochronological data from the Mont-Blanc and Aiguilles Rouges massifs suggesting that the relative uplift between both massifs separated by the main thrust zone of the Chamonix valley became inactive around 4 millions years ago (*Leloup et al.*, 2005).

Among the two earthquakes occurring in the immediate vicinity of the Chamonix and Vallorcine valleys in 1905, only the first one (magnitude Mw=5.5 on April 29) is large enough to have possibly caused surface fault breaks. Direct evidence of activity on the fault are: 1) a fresh, steep and linear topographic scarp, 2) fine striations over at least 3 m height at the bottom of the fault scarp, and 3) compatibility between the focal mechanism inferred from the striations and a record made in Goettingen, Germany, of the 1905 earthquake. The observed striations most probably postdate the retreat of the northern branch of the Mont Blanc glacier which disappeared there around 8 000 - 11 000 years ago according to cosmogenic Be^{10} data of glacially polished rocks. A georadar survey of a pond located at 2060 m elevation at the base of the fault scarp may suggest progressive deepening of about 2 m since the glacier stopped eroding the crystalline outcrop of this area.

Our observations support the idea that the fault may be active with a normal slip rate on the order of 0,3 mm/year, and a recurrence time for Mw=5.5 earthquakes around 300 years. Extrapolating to 4 million years, a differential height of the Aiguilles Rouges massif with respect to the eastern side of the fault, could reach about 800 m, explaining the relative elevation difference of the top of the crystalline basement observed in the area.

Leloup et al., *Tectonics*, 24, TC4002, doi: 10.1029/2004TC001676, 2005.