



## **A glacial or fluvial origin for Alpine valleys: How personality, politics, and war killed one of the great debates in geomorphology**

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The debate as to whether major valleys in the European Alps formed as a result of progressive glacial erosion through repeated cycles of Pleistocene glaciation, or alternatively, were carved during an early period of major glacial erosion and have subsequently seen major modification only by fluvial processes was a source of great disagreement amongst leading Earth scientists at the turn of the 20th century. Publications from the great Swiss geologist Albert Heim (1849 – 1937), Albrecht Penck (1858 – 1945) who first coined the term ‘geomorphology’, the founder of modern French geography Paul Vidal de La Blache (1845 – 1918), and the heads of Geography at the University of Paris, Emmanuel de Martonne (1873 – 1955), and Grenoble, Raoul Blanchard (1877 – 1965) firmly (and often colorfully) argued either side of the debate for a period of over 50 years.

While the discussion regarding a glacial or fluvial origin was perhaps most vigorous prior to WWI, it was perpetuated with a number of important studies published during the interwar period, before falling almost entirely by the wayside as the arguably more intuitive model of progressive glacial erosion gained favor following WWII. Although to this day there is no thermochronometric or sedimentological data to constrain the degree of Alpine valley erosion through a single glacial cycle (perhaps the minimum requirement to conclusively settle the debate), only a handful of publications arguing the alternative have surfaced since 1945. Pre-publication reviews of a recent paper supporting the fluvial modification hypothesis (Leith et al. 2018) described the concept ‘a significant departure from conventional wisdom’, and a ‘provocative, potentially revolutionary (if correct) analysis’, reflecting the widely held view that the debate is not only dead, but also forgotten.

Understanding the principal drivers of alpine landscape evolution is key to assessing the response of these landscapes to climatic fluctuations, and may open the door to a wide range of research into long-term mechanical, biological, and chemical systems within similar environments. In this contribution, we provide insight into the political, social, and personal factors that led a hotly contested scientific debate to give way to intuition and conventional wisdom.

Leith, K., Fox, M., Moore, J.R., 2018. Signatures of Late Pleistocene fluvial incision in an Alpine landscape. *Earth and Planetary Science Letters* 483, 13-28.