

UPPER-LEVEL FLOW FEATURES AND THE ALPS: AN OVERVIEW

Klaus-Peter Hoinka, H.C. Davies

Abstract: One focus of the Mesoscale Alpine Programme (MAP) was the study of upper-level features that take the form of narrow meridionally elongated troughs called 'PV streamers'. One motivation was the recognition that the passage of such a streamer toward and over the Alps during autumn is often accompanied by the sequential occurrence of most of the major flow phenomena considered in the MAP - such as föhn, free-atmosphere turbulence, and heavy precipitation on the Alpine southside. It was therefore resolved within the framework of the MAP to : determine the synoptic-climatology (including the spatial pattern, frequency and variability) of ULF's; develop appropriate instrumentation for, and undertake a measurement programme to, better ascertain their three-dimensional structure; study both their intrinsic dynamics and their modification by the Alps; examine their role in trans-tropopause exchange; investigate their origin and their relationship to Alpine precipitation; and perform model experiments to examine their significance for NWP. Here an overview account is given of the considerable progress that has been made toward achieving each of these objectives. In particular it is shown that the ULFs are ubiquitous; have a rich meso-scale sub-structure that can be examined with novel DIAL instrumentation; constitute an identifiable precursor of, and contribute seminally to heavy precipitation events; and their accurate representation is a critical pre-requisite for mesoscale rainfall prediction.