Geophysical Research Abstracts, Vol. 8, 10673, 2006
SRef-ID: 1607-7962/gra/EGU06-A-10673

Thermally driven winds in the exit region of the Lech Valley (Bavarian Alps) observed during the field experiment AllgEx 2005

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The field experiment AllgEx (Allgäu Experiment) was conducted in summer 2005 in the south German Alpine foreland near the town of Füssen, to examine the flow properties and dynamics of a specific wind phenomenon well known to the local residents.

The phenomenon occurs during the whole summer season from April until September and is characterized by a spontaneous onset of winds from the NNE during the late morning. These winds cannot only be initiated by the thermal wind circulation of the nearby Lech Valley due to their time and nature of occurrence.

Seven automatic weather stations were deployed along the Lech Valley and in the Alpine foreland. Together with pilot-balloon soundings and vertical temperature/humidity profiles obtained by the measuring system KALI (remotely piloted aircraft), a three-dimensional picture of the circulation was acquired. For selected cases, high-resolution numerical simulations were conducted with MM5.

The results suggest that part of the spontaneous character of the flow can be attributed to a blocking by the nearby orography during the morning hours. As heating proceeds, a pressure gradient builds up forcing motion to the SSW. The phenomenon is even more pronounced if a background easterly flow provides an additional pressure gradient forcing toward the south.