

SURFACE OBSERVATIONS DURING GAUDEX 2003

Stephen Mobbs, H. Lewis, M. Lehning et al.

Abstract: The GAUDEX experiment took place in summer 2003 on the Gaudergrat, a ridge close to Davos in Switzerland. The ridge was chosen for its very simple topography: it has a triangular cross-section with up to 45 degrees slope on each side, 200 m altitude, and 1 km length. The experiment aimed to improve the modelling of flow separation from a sharp crest by making mean flow and turbulence measurements to high resolution. Surface-based instrumentation consisted of 27 automatic weather stations and 6 turbulence sites. Three of the turbulence sites, situated at the crest and on the steepest parts of the slope on each side of the crest, included 3 axis sonic anemometer measurements at 7.5 m and 15m. Doppler Sodars were operated at the foot of the ridge on each side, giving flow and turbulence data up to about 500 m. Results from the surface-based instrumentation will be presented for 3 distinct (but related) flow phenomena:

1. Separation from the ridge crest, associated with an attached eddy with a horizontal axis in the lee;
2. Separation from the end of the ridge, associated with an attached eddy with a vertical axis (similar to a trailing vortex from a wing);
3. A new PHENOMENON IN WHICH THE FLOW IS ALONG THE RIDGE EVERYWHERE EXCEPT CLOSE (WITHIN 50M) TO THE CREST WHERE THERE IS A STRONGER cross-ridge flow.

Each of the flow phenomena will be interpreted in term of then potential temperature and turbulence structure and the pressure gradients driving the flow. In particular, we have established that the cross-ridge flow (3 above) is driven by pressure differences across the crest associated with along-valley flows on the two sides of the ridge.