



Generation of free convection in a valley due to changes of the local circulation system

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During the experiment COPS, which took place in the Black Forest (Germany) from June 1 to August 31, 2007 and investigated the generation of convection over hills, the University of Bayreuth investigated in the Kinzig valley the turbulent fluxes of momentum, sensible and latent at two agricultural sites and two grassland sites as well as the structure of the of the atmospheric boundary layer with a sodar/RASS system. These measurements were combined with radiation and ground heat flux measurements to investigate the full energy balance. The stations were situated in the valley over areas of typical land use, with the locations dependent on the valley width.

It was found that a typical local circulation system was present in the valley, with downflow in the night up to 8 UTC and upflow in daytime up to 20 UTC. This effect was found for all days with low synoptically generated winds. When wind direction changed for short periods, very low wind velocities were registered at the moment that the change occurred.. Therefore the shearing term in the TKE equation was significantly lower than the buoyancy term, which means that z/L (z : height, L : Obukhov length) was lower than -1 . These are the conditions for the generation of free convection.

In a further experiment in the foothills of the German Alps it was found that under these conditions polluted air masses from the valley can be transported into the up-per part of the boundary layer. This will be also investigated for the Kinzig valley during

further studies.