



## **The initiation of deep convection by convergence lines: A case study from COPS**

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During the ‘Convective and Orographically-induced Precipitation Study’ (COPS) performed in summer 2007, deep convection developed on July 15, although convective available potential energy was only moderate and convective inhibition was high. Convection was restricted to an area east of the Black Forest crest.

Data analysis revealed that the convection was triggered by different mechanisms. Due to a surface high which was situated east of the Black Forest and a surface low which approached the investigation area from the west, a mesoscale convergence zone was established between the two regions and moved eastwards. Secondly, high insolation favoured the development of slope and valley winds and high evapotranspiration resulted in an increase of moisture in the planetary boundary layer (PBL). The thermally driven circulation systems formed a convergence zone along the mountain crest. When the synoptically induced mesoscale convergence zone reached the Black Forest, the different convergence zones superimposed optimally, such that strong updraughts were observed above the mountain. These updraughts penetrated the PBL-capping inversion and nearly reached the level of free convection. About 15 min after the convergence zone had passed the Black Forest crest, first clouds developed east of it. While moving further eastwards, the convergence zone intensified and became visible as a north-south oriented cloud line in the satellite images. Some deep convective cells with precipitation formed within the cloud line.

The dense COPS network allowed the capture of the position and characteristics of the convergence zone and explains why convection developed in some restricted areas only.