



The dynamics of heat lows in a uniform flow

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Heat Lows are an important synoptic feature of dry subtropical regions, where they have a significant effect on the local weather and climate. Previous studies on heat low dynamics in quiescent and simple background flows have focused mostly on the structure and diurnal variation of the low-level cyclonic circulation, which is found to be highly ageostrophic.

The three-dimensional, hydrostatic numerical model for a heat low developed by the authors is here used to examine the effects of different uniform background easterly flow on the structure and diurnal cycle of a heat low over a sub-continental scale circular island surrounded by sea. Of particular interest is the effect of the background flow on the depth and strength of the heat low itself and on the anticyclone that surmounts it.

It is shown that, as the strength of the basic flow is increased, the heat low is progressively weakened. Further, the depth of the mixed layer over land and the maximum potential temperature of this layer are reduced. The upper level anticyclone is weakened also and its vertical development is reduced. Beyond a certain background wind strength, the anticyclone has the form of a downstream ridge. The study completes a foundation for understanding the structure of heat lows in nature.