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An orographic flow diagramme

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Elevated temperature inversions are recognised to potentially have a significant impact on flow over and around mountains. In this study, we devise a new flow diagram for flow over mountains in the presence of such an inversion using a suite of numerical simulations. The simulations are carried out with the WRF model and open boundary conditions are applied. A neutral boundary layer is capped by a 10K inversion, of which the height varies. The mountain is 1 km high and the upstream wind speeds are 10, 15, 20, 25 or 30 m/s. The surface has zo=0.1m. Vortices, vortex shedding, lee waves and hydraulic jump are detected and related to values of the height of the inversion and the shallow water Froude number. Cases of real flow are compared to the idealized results.