

Unusual surface low development over the British Isles.
8th to 9th March 2016

The main cause for the rapid fall in pressure and development of a vigorous low over the English Channel, 8th/9th March 2016, has been examined using upper air charts from the University of Wyoming,

www.weather.uwyo.edu/upperair/

The thickness budget over the low centre was ascertained from the charts, and is shown in Table 1. All values are in decametres (dam).

Table 1

Date	1000 mbar ht	thick	500 mbar ht	thick	300 mbar ht	thick	100 mbar ht	above 100	Net
8/12	11	548	559	358	917	690	1607		
Change	-18	-3		-5		+16		+10	+18
9/00	-7	545	538	353	891	706	1597		
Change	-4	-8		+2		+9		+1	+4
9/12	-11	537	526	355	881	715	1596		

During the rapid deepening phase, 8/12 to 9/00, the 1000 mbar height at the centre of the low fell from +11 dam to -7 dam, a fall of 18 dam. The atmospheric levels that contributed most can be seen from Table 1 to be above the 300 mbar level. Positive thickness change, in the row marked 'change', indicates a lowering of pressure below the change. Thus the contribution to the 1000 mbar height change of -18 dam consists of a warming of 16 dam over the centre in the 100 to 300 mbar level, and a 10 dam warming above 100 mbar due to the surface low crossing the 100 mbar contours to lower values, together enough to counter the combined cooling over the low centre in the troposphere up to 300 mbar of 8 dam.

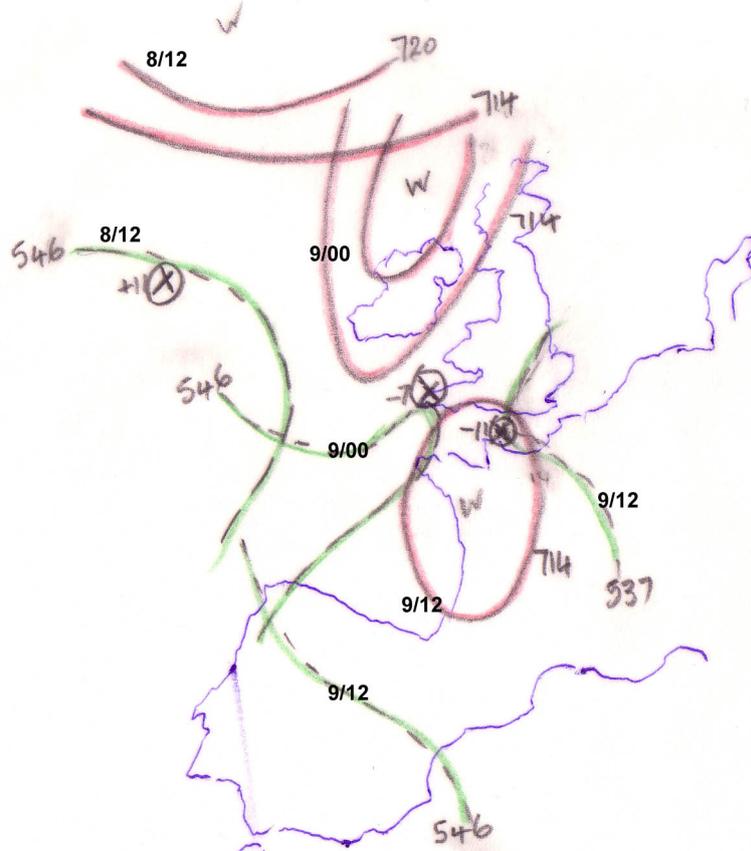
During the next 12 hours the low became almost stationary with the fall in central pressure halted, the change in 1000 mbar height in this period being only -4 dam. Here we see that the contribution to the slight deepening was mainly in the 100 to 300 mbar level where a further warming of 9 dam had taken place, just enough to counter the 8 dam cooling in the 500 to 1000 mbar level.

In figure 1, I have sketched the selected thickness contours in the 100 to 300 mbar level (red) and 500 to 1000 level (green) at 12 hours intervals, with the position of the surface low shown with a circled X.

Here it can be seen that the movement of the positive thermal anomaly in the lower stratosphere with its attendant isobaric trough below (approximately at the 300 mbar level in this case), which engaged with the pre-existing tropospheric baroclinic zone, pulling out a plume of high thickness value air, arrived over the plume by 9/00. It is evident from the changes in the area enclosed by the 714 dam thickness contour that the thermal anomaly in the 100 to 300 mbar level was cooling throughout the 24 hour period, and it is evident that the surface low development could have been much more dramatic had dynamic in this layer been increasing thickness values at this time.

The lower tropospheric thickness values (green) can be seen to deform markedly in the 1st 12 hours as the low winds up, then cool generally as the warm plume occludes out in the last 12 hours.

Thickness contours 500-1000 (green) and 100 to 300 (red)
8Mar16 1200 to 9Mar16 1200, 12 hour steps.



Position of surface low is shown with a circled X, with the minimum 1000 mbar height on the left