

LOW FORMATION ON THE BACK END OF ANTICYCLONES

DAVID SAPIANE Bsc, 8/19/22

Many cruisers have noted that when a large and intense Anticyclone, or High as we commonly refer to it, moves eastward, a small Depression often forms on the left shoulder of the High. Much of this depends on the shape of the back end of the High. This phenomenon is more apt to occur if the High has a notable ridge on the left side, so that the air flow makes a relatively abrupt turn from moving westward then suddenly turning southward. Some key ideas must be noted. First we must accept that as an airstream makes a turn counter-clockwise in the southern hemisphere it speeds up. This is because of the Coriolis force which is a function of the earth's rotation. In other words, wind speeds up going around a ridge and slows down when going around a trough. This is why when you estimate wind speed using geostrophic spacing you have to adjust downward or upward depending on whether flow is around a ridge or trough. If isobars are straight no adjustment is needed.

If we were able to mark air parcels with a dye of some sort this effect would be clearly noticeable. Once the air parcels make the turn and then resume a relatively straight line the parcels must slow down or in this mode bump into the parcel in front of it. Much the same as a line of cars on a motorway; if the first few cars abruptly slow the ones behind bunch up very quickly, sometimes not quickly enough. Substitute cars for air parcels and what happens is also a bunch up but as the air has nowhere to go, it simply goes up. When the air goes far enough where the temperature lowers to the dew point, cloud forms and precipitation may follow. Now, this is not quite enough to form a Depression but it's the start of one.

Let's shift our thoughts to what follows the departing High. Usually it's the next High in the progression of weather circling the globe. The departing High has wind flow going southward, but the new High has wind flow going northward. The air parcels of each High are vastly different in density. The southbound air is warm and moist, while the northbound air is cool with less moisture. Air parcels of different densities do not mix - they clash. Air going south clashes with air going north and spin is initiated. The spin is clockwise, the same direction that a depression spins. Now we have rising air creating cloud and rain and in addition we have cyclonic spin and so we've just created a depression. This in a nut shell is how we find Low formation on the back end of Anticyclones.

Now to sustain this small depression we must have a way to vent the rising air and a way to encourage it to continue. Therefore we need an upper level short wave sandwiched in between two upper level ridges which maintain our High. If such a short wave is present then the Depression develops. If there is no short wave it doesn't and all that happens is a brief period of cloud, rain, heavy squalls seemingly coming from nowhere and often not picked up on synoptic charts. If we're unlucky enough to be under all this we get some miserable seemingly unexplained weather, and as the next High moves in it all goes away.

One other feature can be present on the left shoulder and it's called a **polar dip**. Picture someone pushing down on the isobars at the left shoulder. Wind makes a sharp turn in a polar direction, then bends a bit and turns back toward the equator then joins the original counter-clockwise isobars. This abrupt turning of the wind is in a cyclonic manner. If upper levels support this movement we have the potential start of a Depression. This is a very common occurrence in large Highs and one to take note of. The lesson is not all Highs are benevolent.

This is a general explanation of depression formation on the back side of a High. Only basics but hopefully it will serve well.