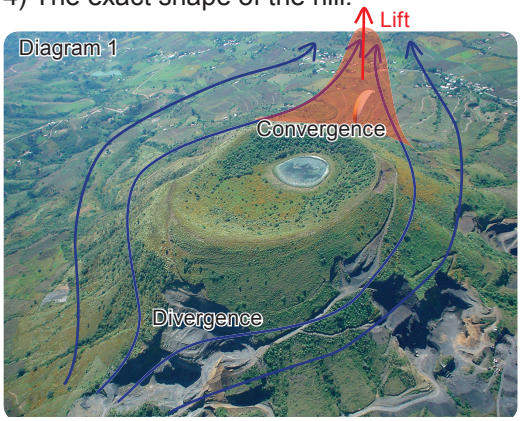
Conical Hill Convergence

When air flows around an isolated hill or mountain, the air devides on the upwind side of the hill and then flows together again on the downwind side of the hill. The area in front of the hill is therefore an area of divergence and the area behind the hill is an area of convergence. Therefore where the air is converging it can produce lift especially if there is some thermial activity as well that helps to produce some upward movement in the air when the air converges. If the air is not going up due to thermal activity it may be falling just as strongly as it could be lifting.

Diagram 1 shows how classical Conical Hill convergence works. The diagrams show how you can get an area of lift downwind from a hill rather than an area of rotor which is normally what you would expect, as is shown in diagram 2. There are many different factors that can mean that you will get lift behind a hill rather than a rotor.

Factors that will help you get lifet are:

1) The size of the hill, the bigger the better.
2) Heating from the sun on the downwind side of the hill.
3) The stability of the air. If the air is unstable it may flow over the top of the hill instead of around the side, meaning that the air will come crashing down in an area of descent behind the hill. So a layer of stable air to stop the air displacing vertically in front of the hill can help.
4) The exact shape of the hill.



Behind the conical hill could be lift or a rotor!

Summary:

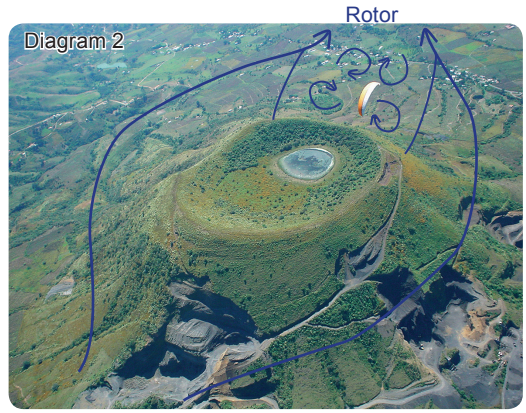
The main factors to consider in flying in a lee are:

1) Wind strength
2) Size of the obstruction
3) Solar heating on the lee side
4) Air stability
5) Shape of the hill
6) See breeze or valley wind considerations

There can be no hard and fast rules as to whether if it is safe for flying in the lee, everyone must make it´s own decision based on it´s own skill level and their ability to be able to cope with any turbulence likely to be encountered.

One last consideration is that it is often the edge of the lee side that is the most dangerous area. If you are completely in the lee, you may be fully protected, but if you are at the edge of the protected area, then you may well encounter the maximum amount of turbulence. If you intend to fly in a protected area you need to go all the way into the lee, it is often more dangerous to test out the waters by feeling around the edge of the protected area than flying all the way into it.

One final word…Lee side flying is only for the very experienced pilot, or for pilots under the instruction of a very experienced pilot flying in controlled conditions. Please take all possible precautions when considering flying in the lee.



Valle de Bravo, Mexico. Picture: Mads Syndergaard.