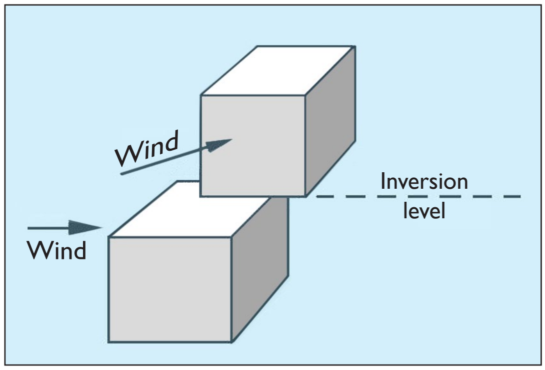

Figure 77
Wind shear

re-center promptly, the thermal can be quickly lost. At the wind shear level, the climb rate usually drops off (at least temporarily) and the core tends to shift. A good weather briefing is very helpful. Knowing the wind direction above the inversion provides a definite clue and makes centering again less time consuming.

Having managed to climb above the wind shear level it is usually best to adopt slightly more conservative flying tactics in an attempt to remain high. Climbing through a wind shear can be slow and will reduce the average rate of climb considerably. Repeatedly dropping below the shear level usually equates to an ongoing struggle with the wind shear and can reduce the achieved cross-country speed substantially.

4.8 Air flow above the convection level

We have all experienced at times buoyant air with good lift for miles on end that rather unexpectedly turns into never-ending sink. It seems like someone flicked a switch, replacing easy soaring conditions by unworkable lift with large patches of heavy sink in between. Our adrenalin level increases with unwinding of the altimeter and we ask, "What on earth is going on?" If you haven't seen such conditions yet, you almost certainly will. Perhaps we think of streeting first, but on second thought this appears rather unlikely. But what is happening on days like these? The answer is, "probably it is the air flow above the convection level" or put another way, "the influence of waves aloft".

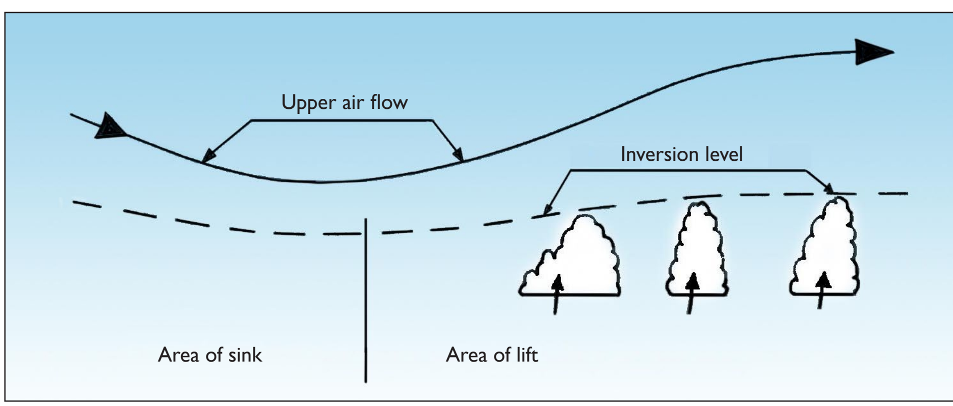

Figure 78
Influence of air flow above the inversion level

Most glider pilots know that the basic ingredients of wave flow are strengthening wind with height and a stable layer of air above the convection level. If these conditions are met and there is some sort of upwind undulation in the ground there is a good chance of upper level wave (Figure 78).

Just because the illustration does not show a penetration of wave motion into the convective layer, it doesn't mean that it is not affecting the lower levels. On the contrary – what happens aloft has a significant effect on thermal activity below. Wave-like upper flow not only tends to boost thermals but

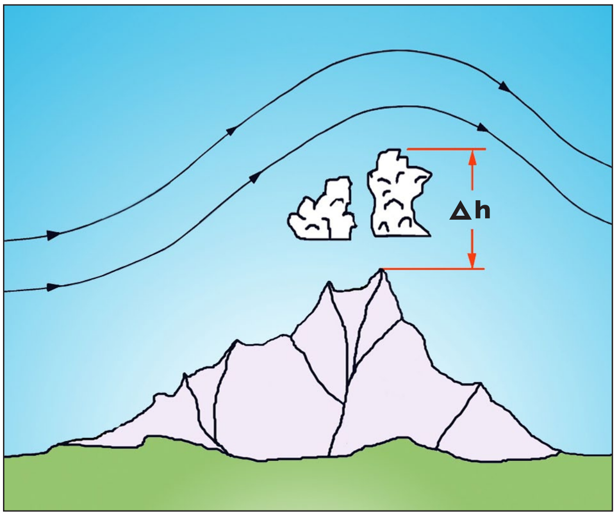

Figure 79

Thermals increasing the apparent size of obstacles

it can also provide larger scale buoyancy. On the other hand, it has the potential to greatly suppress lift in other areas, to the extent that thermals can become very broken or completely unworkable.

Ingo Renner is of the opinion that such conditions exist far more frequently than commonly expected. In fact, he believes that in some parts of the world, wave-interrelated thermals are found on half of all flying days, and upwind hills or mountains trigger thermals which in turn increase the size of the obstacle for the wave flow (Figure 79). The subsequent primary and secondary wave from the mountains unstabilises the air below their crest and encourages cumulus type wave clouds to form. These cumulus, with their thermals below them, enhance the wave flow, with the result that it continues downwind for a long distance. Even a good weather briefing is unlikely to predict such conditions unless the forecaster has the benefit of extensive local knowledge. The $64,000 question is, "How can we recognise such conditions and deal with them?"

Well, let's look at days with cumulus first, because we can often get a clue from textbook-looking cumulus in one area of the sky and the suspicious absence of them in another. The reasons are almost self-explanatory when we have a closer look at Figure 78. It confirms that in areas of rising air we experience a strengthening of the convection with the added bonus of a higher cloudbase, but the exact opposite can be expected under a descending upper air flow.

Although it is not too difficult to soar under such conditions on cumulus days, it's much harder to enjoy ourselves on blue days. The absence of visual clues makes it hard to draw the correct conclusions and to implement appropriate flying tactics. However, if we are puzzled by a rapid change in soaring conditions we should suspect wave aloft and – after striking buoyant air – take up a heading at right angles to the upper wind. If, however, we are in an area of sink we are well advised to take up a heading closely aligned with the upper wind. Needless to say, it provides the shortest possible track back into a buoyant patch of air with workable lift. Making the mistake of continuing to search for lift under a descending upper flow will see us in trouble sooner rather than later.

Flight recorders are discussed at a later stage, but allow me to mention here their role in training. Rather than just being used for flight verification, they have proved an excellent tool for flight analysis and for drawing conclusions for use in future flights in similar conditions. A prime example is the retrospective identification of the conditions described above.