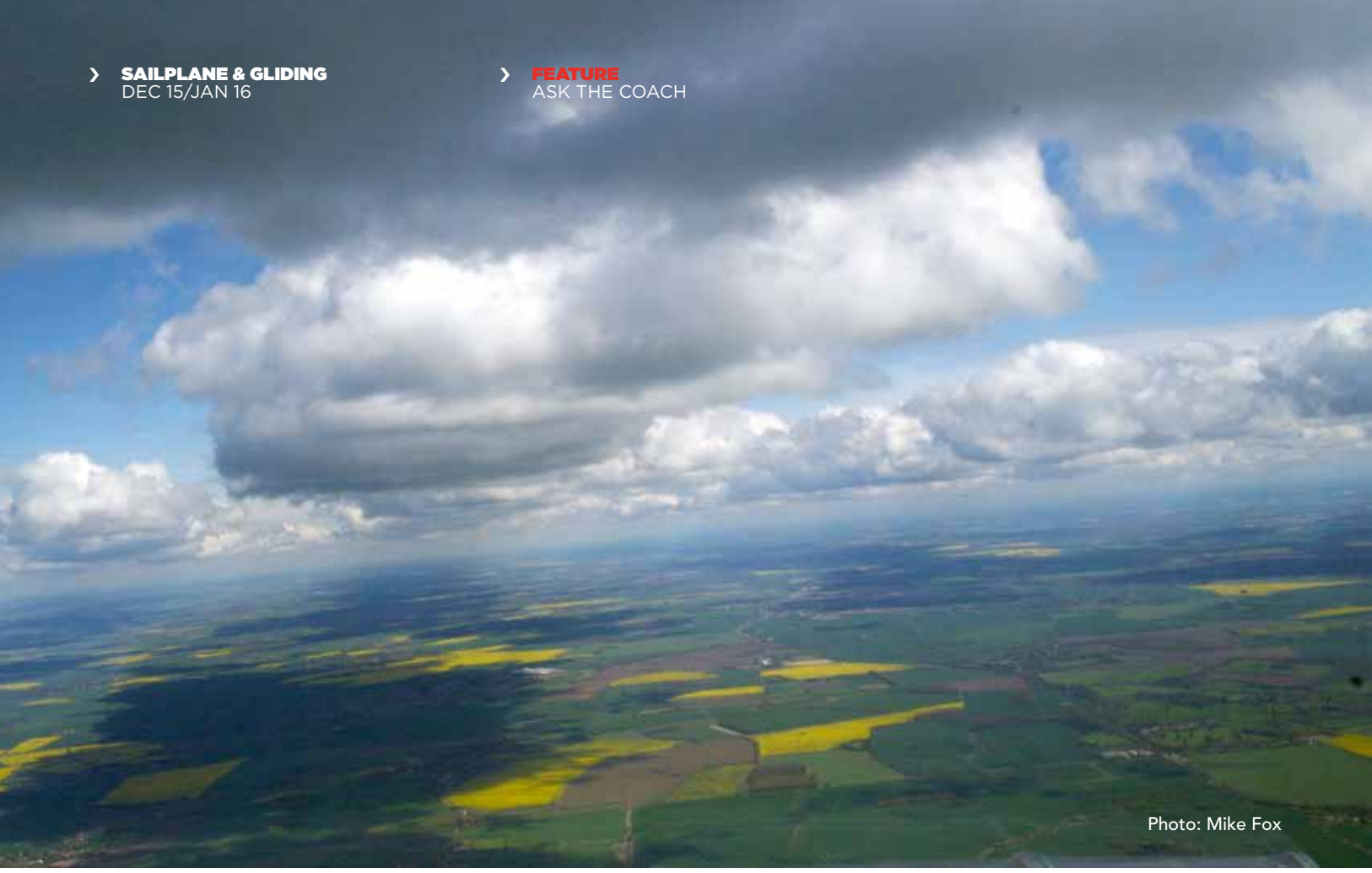

Photo: Mike Fox

LEARN BASICS TO EXPLOIT STREETS

Tony Cronshaw asks Kevin Atkinson about the physical structure of streeting

Tony Cronshaw is an Ass Cat instructor at Cambridge Gliding Centre with over 1,000 hours gliding. His enthusiasm for helping the next generation of pilots includes running courses for visitors and members, and supporting CGC's recruitment and retention sub-committee

TONY Cronshaw asks Kevin Atkinson about physical explanations and the basics for exploiting streets.

TONY: ***What are "cloud streets" and how can we benefit from "streeting"?***
KEVIN: I will explain the physics of the commonest form of streets in a moment, but often when we see lines of clouds forming in winds of 10kts or more, these lines of energy can enable us to fly many miles without losing height. There are several mechanisms which generate a 'street', a line of rising energy that we don't have to do turns in, to make good progress on track. Even if the street consists of loosely linked clouds, the energy along the wind line enables us to stretch our glide as if flying a higher performance ship. Either way, the benefits are clear: More time making distance and less time spent circling – which is particularly helpful when there is a strong headwind. This translates into a faster average cross-country speed and the possibility to tackle greater task distances.

TONY: ***Are there any downsides?***
KEVIN: There is a flip side: Between cloud streets there will be lines of blue sky often forming areas of horrible sink. Finding ourselves in a 'sink street' without realising it and heading along its length is a recipe for rapid height loss. Stories abound of early solo pilots flying locally upwind, finding heavy sink and turning back to retreat to the airfield experiencing seemingly a huge area

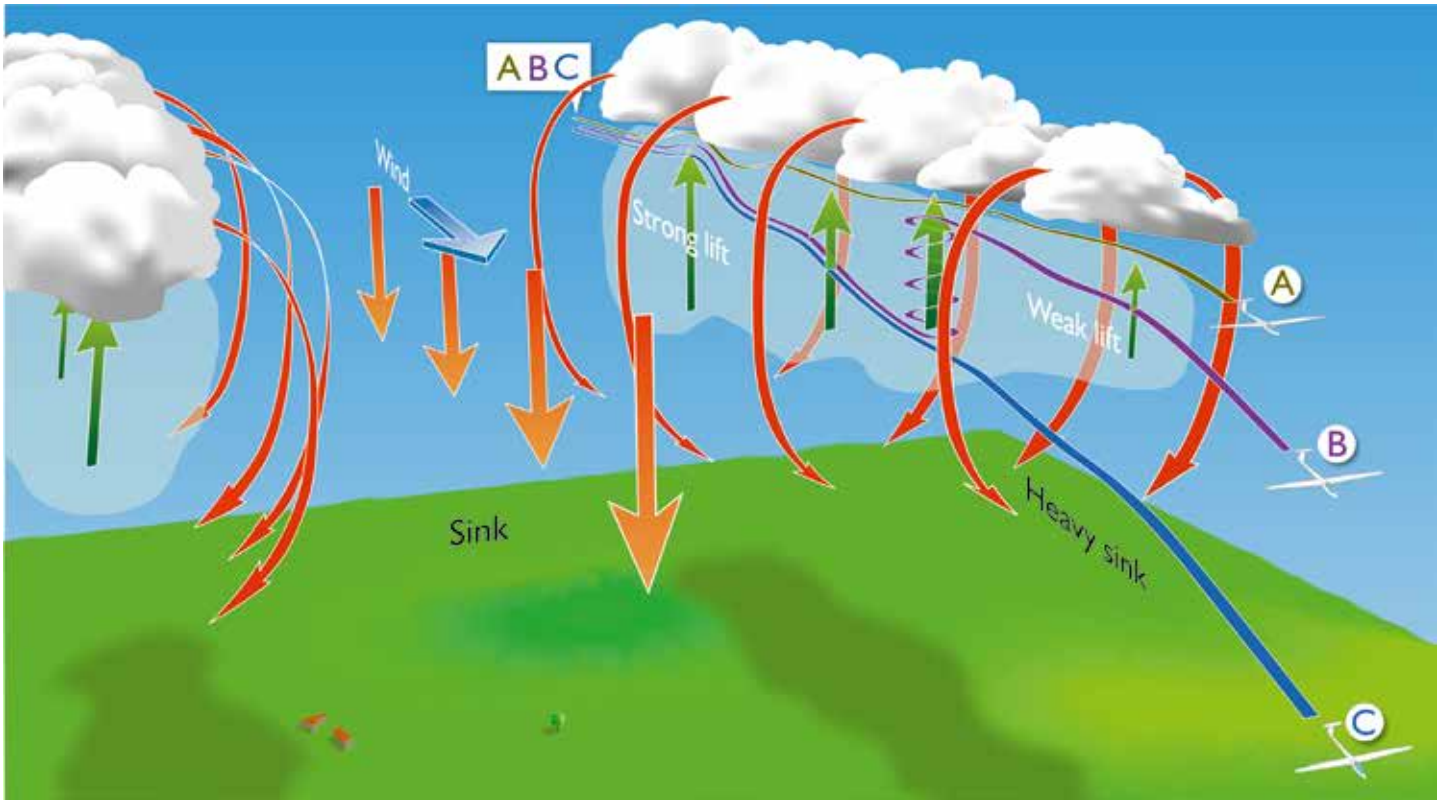

Figure 1: sink cascades down the sides of the street to form broad walls of sink
(illustration by Steve Longland)

of severe sink all the way home. Or being forced to make a field landing.

TONY: ***How do streets form?***
KEVIN: Let's first consider how streets form downwind of a power station. Experience shows that such streets can produce useful lift for tens of miles downwind. Now consider that we can even find lift under streets running out over the sea. Both cases show that it's not just about an initial burst of energy from a source, but physical forces are at work sustaining the street during its journey downwind. Replace the power station with a strong thermal source, or sources of thermals dotted across the countryside, and we now see a sky filled with multiple streets.

TONY: ***What mechanism sustains the street as it drifts downwind?***
KEVIN: A major factor is the way that clouds generate sink due to evaporation, and how the sink cascades down the sides of the street to form broad walls of sink (see diagram above). The sinking air forms a sink street which restricts and disrupts any bubbles trying to rise there – and generates a recirculating light wind, which undercuts the air under the street. This motion of recirculating air encourages even weak thermal bubbles rising up under the cloud. The sinking air also undercuts warmer air on the ground below the street (rather like a sea breeze front) hence encouraging a curtain of lift under the street. This circulation pattern is similar to how column thermals grow [1] and sustain themselves whilst drifting downwind.

TONY: ***Given this structure, what's the best way to route our glider under a street?***
KEVIN: Once we begin to understand the physical mechanisms, there are several important consequences. Firstly, we want to fly along the wind line, whether up or downwind, whilst seeking to maximise the position under the street for best lift. It is not always down the middle of the cloud line. A good tactic is to try weaving or wandering a few yards left or right to find where the lift is best and associate it with the cloud line above. If we encounter a surge of strong lift, the temptation may be to start circling. However, the width of lift under a street can often be narrower than we expect. As a result, trying to circle in the strongest lift is not bound to produce a height gain, and may just waste time – especially if we lose the best line of energy.

TONY: ***Given that other gliders may be using the street, including in the opposing direction, what approach do you***

TRYING TO CIRCLE IN THE STRONGEST LIFT IS NOT BOUND TO PRODUCE A HEIGHT GAIN, AND MAY JUST WASTE TIME – ESPECIALLY IF WE LOSE THE BEST LINE OF ENERGY

WITH THE PROSPECT OF CROSSING SINK WE WANT TO MAXIMISE HEIGHT BY THE END OF THE STREET

Kevin Atkinson is the club coach lead for the BGA Aim Higher initiative (*www.gliding.co.uk/bgainfo/aimhigher.htm*). He started gliding at age 13 at Ouse GC (now York), flying his first solo on his 16th. Kevin has over 3,500 hours gliding, including competing in UK national and regional competitions. He also has more than 7,500 military jet hours (Tiger Moths to Typhoon)

■ *Gliding in Lift and G-SINK*, Kevin's newly-published book, is available at *www.bgashop.co.uk*

Running a line of energy with promising cloud shadows ahead from the street (Tony Cronshaw)

■ In the next *Ask the Coach* Tony asks Kevin about how streets behave in the presence of wind shear and inversion

One of those days when you'd rather be flying than behind the wheel of your car (Kevin Atkinson)

recommend for maintaining safe traffic separation?

KEVIN: Given strong streeting where we need to put on extra speed to avoid entering cloud, the closing speed with opposing traffic could be very high, and the warning time from our FLARMs very limited. Keeping a very good lookout ahead is vital – not all gliders have FLARM anyway. Flying a bit lower is going to help improve our lookout and our visibility to other gliders. Avoid pulling up too hard such that you lose the view ahead.

TONY: ***When we see the end of a street approaching, what tactics should we consider?***

KEVIN: Quite simply we need to prepare to cross a blue hole, whether to join another street ahead, or to cross over to an adjacent street, which will incur a large loss of height and will have to be flown at a relatively high speed because of the sink. With the prospect of crossing sink we want to maximise height by the end of the street (pilot 'A' in the diagram on p9). Waiting until the last cloud or surge in the street is, however, often disappointing (pilot 'C') because this is where its energy may not be at a maximum: If we are not already at maximum height I recommend taking a climb well before reaching the end of the street (pilot 'B'). Or simply flying slower for the last few kms may suffice to gain height before the end of the street.

TONY: ***Can streeting happen on blue days?***

KEVIN: Streets can form on blue days when the wind is above 10kts, but obviously these streets will be invisible. The strength of lift under these streets will be less, as there is no energy from cloud evaporation to enhance the system, but the recirculation pattern will be similar in the unstable band. If we find ourselves in sink on a blue day, we should try searching crosswind for better air. If we then turn on to the invisible street we may be able to fly a useful line of energy, but with no clue as to when the end of the street might occur!

TONY: ***Which areas would you recommend readers pursue to gain a more detailed understanding of streets?***

KEVIN: Inversions and wind shear both have a major impact on how streets form. Weather forecasting is another key area. It's a fascinating area to read up on and the gains in cross-country speed and distance make further study very worthwhile.

[1] *How a column thermal forms*, pp10-11 *S&G* Oct/Nov 2015