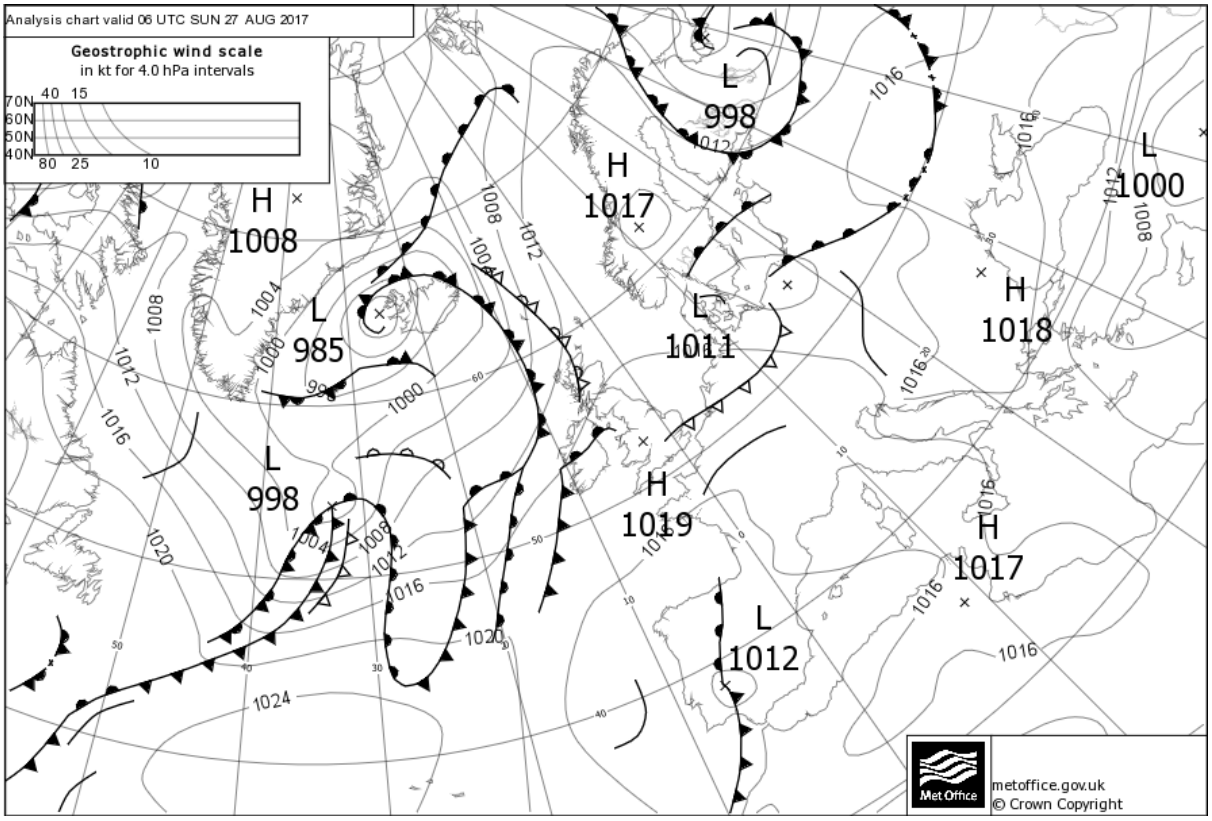
Case 1

Route: Southampton to Norwich (VFR)
Date: 27th August 2017, departing 08 UTC

Let's take a look at the weather forecast, assess the potential threats and start investigating how to mitigate against these risks.

a. Synoptic situation

Describe the broad features in the synoptic chart, what is the main type of airmass covering the region and what kind of weather can we expect from it? How strong is the wind likely to be and what will its direction be?



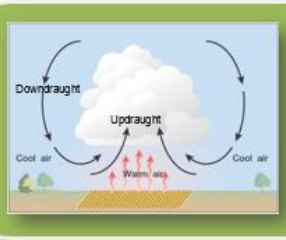
The south of the UK is dominated by an anticyclone (1019 hPa), giving predominantly fair weather and gentle winds. There are not many isobars on the chart so we can assume that the winds will be light and variable although mainly north-easterly on the planned route and, when considering the time of year, it is possible for sea breezes to develop around the coasts. Looking at the wider flow, the airmass seems to have a mixture of maritime and continental influences; the air is likely to be warm and predominantly dry, generating fair weather clouds but also some lower cloud bases in moister air to the west. The presence of an upper cold front to the east of England complicates the picture somewhat and will need investigating. What is the cloud base associated with it? Does it produce rain and if so, how much of it is reaching the ground? How much does it affect the visibility?

Anticyclones (high pressure) are normally associated with clear skies and good weather, so it is often assumed that there are no aviation hazards to be considered. However, the clear skies can allow overnight temperatures to fall and early/late radiation mist and fog can occur. Furthermore, the generally subsiding air beneath an anticyclone can trap pollution, smoke, dust and other microscopic solids to make the atmosphere particularly hazy. This can adversely affect visibility, particularly from the air to the ground (slant visibility).

Finally, under clear skies the ground can heat quickly during the day and this can trigger convective processes leading to turbulence, gusty winds, sea breezes, spreading cloud, showers or even thunderstorms. Sinking air under high pressure does tend to suppress convection, but **not always**, and usually not in the first few thousand feet – don't get caught out!

So, what kind of hazards may be associated with convection? See the cheat sheet below…

Atmospheric Convection



Warm air rises below the cumulus but cool air sinks in between clouds generating areas of updraught and downdraught, source of turbulence.

These updraughts and downdraughts turn the surface wind into something more erratic, enhancing (gusts) and reducing (lull) it.

A good way of avoiding icing and turbulence is to fly above the clouds, can you do it?

Check the F215 chart

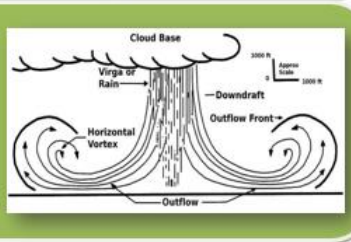
Consider alternative routes

Convection always starts earlier over hills and mountains, often masking their summit during the morning. The cloud generated is also more developed.

Turbulence will be stronger over the land

An absence of convection along the coast is a good indication of sea breeze. The air coming from the sea is cooler and more stable.

The bigger the cloud, the stronger the microburst, the heavier the rain and the poorer the visibility under the shower.



Check surface pressure charts

Areas of low pressure enhance convective development, whereas areas of high pressure decrease it.

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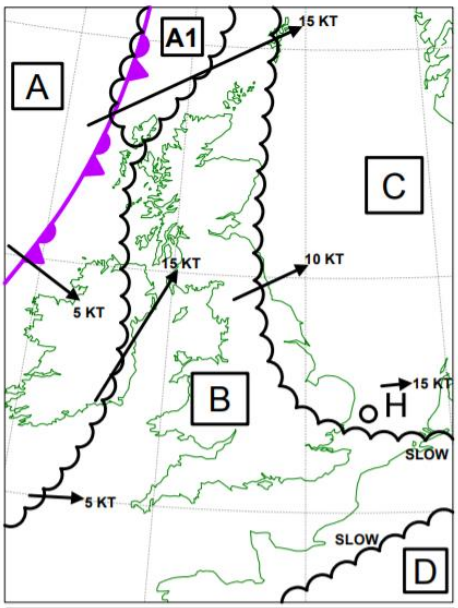
b. Area Forecast

Looking at the F215 chart, is there anything along the route that I should be taking into consideration? What are the main cloud base and visibility? What is the altitude of the freezing level? Can I expect any fronts, weather, turbulence or icing?



Forecast Weather below 10000 FT

Met Office Valid 270800 to 271700 Z AUG 17 Fronts/zones valid at 271200 Z

AREA	SURFACE VIS AND WX	CLOUD	0 C
A	15 KM NIL/-DZ OCNL 7 KM RA **A1** ISOL (OCNL W OF FRONT AND FAR S) ... ...3500 M RADZ/BR ISOL 200 M FG SEA WINDWARD COT ISOL ⅄ **A1** OCNL HILL FG	BKN/OVC AC AS Ψ ⅄ 080 / XXX **A1** BKN (LCA SCT LEE MON) SC (Ψ N) ⅄... ... 015-025 / 050-080 WDSPR BKN (LCA FEW/SCT LEE MON)... ... ST 002-008 / 015 (BASE 000 FG)	070-090 N XXX S
B	30 KM NIL ISOL 3000 M BR LAN TL 09 Z ISOL HILL FG	AREAS BKN AC (Ψ N) ⅄ 080 / XXX SCT/BKN CU SC ⅄ 015-030 / 060-080 ISOL SCT/BKN ST 007-012 / 015 NW ... ...MAINLY UPSLOPES (AND LAN... ...ELSEWHERE TL 09 Z)	080 N XXX S
C	40 KM NIL ISOL 3500 M BR LAN TL 09 Z ISOL HILL FG	OCNL SCT/BKN CU SC ⅄... ...020-035 / 050-070 ISOL SCT/BKN ST 007-012 / 015 SEA ... ...WINDWARD COT	090 NE XXX SW
D	25 KM NIL ISOL 3500 M +SHRA/+TSRA ISOL 3000 M BR TL 09 Z ISOL HILL FG	AREAS SCT/BKN AC ⅄ 080 / XXX ISOL CB 060 / XXX ISOL SCT/BKN ST 005-010 / 015 TL 09 Z	XXX

Outlook Until 272400 Z:ISOL BR FORMING LAN AREAS B AND D. OCNL MOD TURB DEVELOPING AREA A W OF FRONT.

For the flight from Southampton to Norwich I need to focus on areas B & C. Visibility is, generally, excellent but I may encounter patches of mist until 09Z. Hill fog may even be possible on windward slopes, with cloud as low as 500ft.

There are extensive areas of cumulus and stratocumulus with a cloud base of around 1500-2000 FT. Considering the highest point of the Cotswolds is ~1100 ft, the gap is significantly reduced. Additionally, areas of stratus are possible early in the planned flight period and near windward coasts. The freezing level is high at this time of year and should not be an issue and this is confirmed on the chart. The upper front on the synoptic chart appears to be no more than residual cloud, hence not precipitating nor reducing the visibility and with no significant turbulence.

c. Site specific information

Let's have a look at the METARs/TAFs along the route, do they confirm the information contained in the F215? Have you checked possible diversion airfield(s) along your track as well as your destination? Are they suitable?

METAR EGHI 270650Z 01005KT 330V040 CAVOK 15/12 Q1018=
METAR EGLF 270650Z 31001KT CAVOK 15/14 Q1018=
METAR EGUB 270650Z 34002KT CAVOK 15/13 Q1018 BLU=
METAR COR EGLL 270650Z AUTO 04005KT 9999 NCD 17/11 Q1018 NOSIG=
METAR EGGW 270650Z AUTO 02006KT 350V060 9999 NCD 14/11 Q1019=
METAR EGSS 270650Z AUTO 36005KT 330V040 9999 NCD 15/11 Q1019=
METAR EGSC 270650Z VRB01KT CAVOK 14/11 Q1019=
METAR EGYM 270650Z AUTO 33003KT 9999 NCD 13/12 Q1018=
METAR COR EGSH 270650Z 29004KT 250V320 CAVOK 15/12 Q1018 NOSIG=

TAF EGHI 270625Z 2706/2715 VRB03KT 9999 FEW045=
TAF EGSC 270659Z 2706/2715 35003KT CAVOK=
TAF AMD EGSH 270557Z 2706/2715 VRB03KT 9999 FEW045=

The METARs are looking promising, most airfields reporting CAVOK (Cloud And Visibility OK), implying that the visibility is 10 KM or more, or NCD (No Cloud Detected). Some airfields are not yet opened but the few TAFs available indicate good conditions too. Based on these, it looks like the early visibility problems that are highlighted on the F215 have now cleared.

d. Threat & Error Management

ANTICIPATION: The weather seems fine – but what could go wrong to spoil your day?

a. Visibility is already good at Southampton, but what about the surroundings in the event of an emergency in the early phases of flight?

b. Can you fly your planned route in appropriate airspace when constrained by the terrain and forecast cloud? EGHI to EGSH involves some busy airspace with limited scope for manoeuvre.

c. The surface visibility may be over 10km, but how far and how clearly can you see the ground in the cruise? Will it be far/clear enough to allow accurate navigation in busy airspace?

d. How will variable wind (albeit light) affect your navigation?

e. What is your plan for convection? Whilst it's not specifically forecast for your area it can occur in these conditions in the first few thousand feet without generating cloud or weather (what glider pilots call "blue thermals"). Vertical motion and turbulence from convection may make it more difficult to maintain a constant height/altitude.

f. If convective cloud, showers or even thunderstorms do develop unexpectedly what is your avoidance plan? (There are thunderstorms forecast across the English Channel in area D.)

g. Some METARS are showing 15 – 17°C at 0700UTC. What is the maximum temperature for the day and how will it affect your aircraft's performance?

RECOGNITION: A safe flight depends on being able to conduct safe VFR navigation and respond to unexpected hazards.

a. Could you consider delaying departure for an hour or two to ensure clearance of mist / fog patches?

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b. With possibly limited air-to-ground visibility, do you intend making more regular navigation (gross error) checks and plan more regular waypoint checks?

c. What is the variable wind doing to your track in relation to navigation and airspace limitations?

d. Are you maintaining height/altitude accurately? Are you aware of vertical airspace limitations?

e. If you need to avoid convective cloud or even showers, what are your plans for diversion, delay, extended fuel use etc?

RECOVERY: The potential combination of relatively poor visibility from the air and the development of apparently random convection/turbulence makes planning particularly difficult.

a. Do you have diversion information for appropriate airfields along your planned track?

b. Have diversion plans and clear go/no-go decision points for the flight. Be prepared to develop and adapt recovery plans as situations develop.

c. What is your plan if you become unsure of your position? When did you last practise with London Centre/D&D on VHF 121.5MHz?

d. Ensure careful monitoring of fuel, distance, speed and elapsed time when dealing with delays (e.g. showers).

e. During take-off and landing, be ready to deal with convective gusts and reduced performance due to high temperatures. Be ready to go around if necessary.

e. Summary

Anticyclonic conditions should mean a pleasant and straightforward flying day. Conditions for this flight are forecast to improve after a misty or foggy start and METARS suggest that this is already true. It's looking good!
However, be aware that while winds may be light, they can also be variable, so monitor the impact on navigation and airspace avoidance. High pressure can trap haze in the lower atmosphere, affecting air-to-ground visibility. Higher ground temperatures can introduce hazards that are not explicitly forecast such as convection/thermals, associated turbulence, gusty ground winds and high density altitude values. Don't let fine weather cause complacency.

Finally – warm summer air can be surprisingly humid: **beware carburettor icing.**