

Aviation Meteorological Forecaster Competency 2

Forecast Aeronautical Meteorological Phenomena and Parameters

TAFs

AMF AC 2.1.1, 2.1.2, 2.1.4, 2.1.5, 2.1.6,
2.1.7, 2.2

Jannie Stander
RTC
Pretoria



AIM OF THIS PRESENTATION

Before starting this presentation, review the following theory presentation:

RTC-PRE-010 AMF AC 2.1.1 2.1.2 2.1.4 2.1.5 2.1.6 2.2 1.2 1.3 Forecast Weather Parameters and Phenomena TAF

At the end of this presentation, you will be able to:

- Compile a TAF from an NWP time section and use it to demonstrate competency in AMF AC 2.1.1, 2.1.2, 2.1.4, 2.1.5, 2.1.6, 2.2
- Complete weekly quizzes related to the issue of TAFs using this presentation as an example.



Introduction

Example Task for Case Study 20 Oct 2018:

Issue the following TAFs (**FAOR and FALE** at 1000Z) and **FAKN** at **0900Z** in the correct format for the following Aerodromes.

FAOR 30-hour TAF valid from 1200Z

FALE 30-hour TAF valid from 1200Z

FAKN 9-hour TAF valid from 1000Z

- From **AMF Competency 1**, you will have a good idea of the **dominating low and upper level weather systems and their movement into tomorrow (F+30hr TAF)**
- It is important to know the bigger picture of expected weather before looking at the individual time sections for each of the aerodromes.
- From AMF Competency 2 – the 12Z significant weather charts were issued, this will give you a good idea of the expected weather at the start of your 12Z TAF.



Different types of TAF with reference to cloud type (AMF AC 2,1,4) and visibility (2.1.5, 2.1.6 and 2.1.7)

For this case - when looking at the expected weather between today and tomorrow it is important to determine the type of TAF to be written:

- 1) Convective cloud
- 2) Stratiform cloud
- 3) Mixed cloud

It is also important to ensure the cloud type fits with the precipitation type being forecast

Convective cloud TAF with thunderstorms (typical for interior stations):

Convective cloud TAF which starts of with scattered Cumulus clouds (2500 to 6500 ft a.g.l) in the morning and develops into CB clouds in the early afternoon with thunderstorms.

Stratiform cloud TAF with drizzle/mist/fog/rain (typical for coastal stations):

Stratiform cloud TAF made up of stratiform low cloud which will be broken to overcast below 1500 ft a.g.l with associated drizzle/mist/fog/rain. Along the coast the onshore wind direction determines this. If the flow is offshore no low cloud likely.

Mixed cloud TAF:

A TAF which contains elements of both Stratiform and Convective cloud.

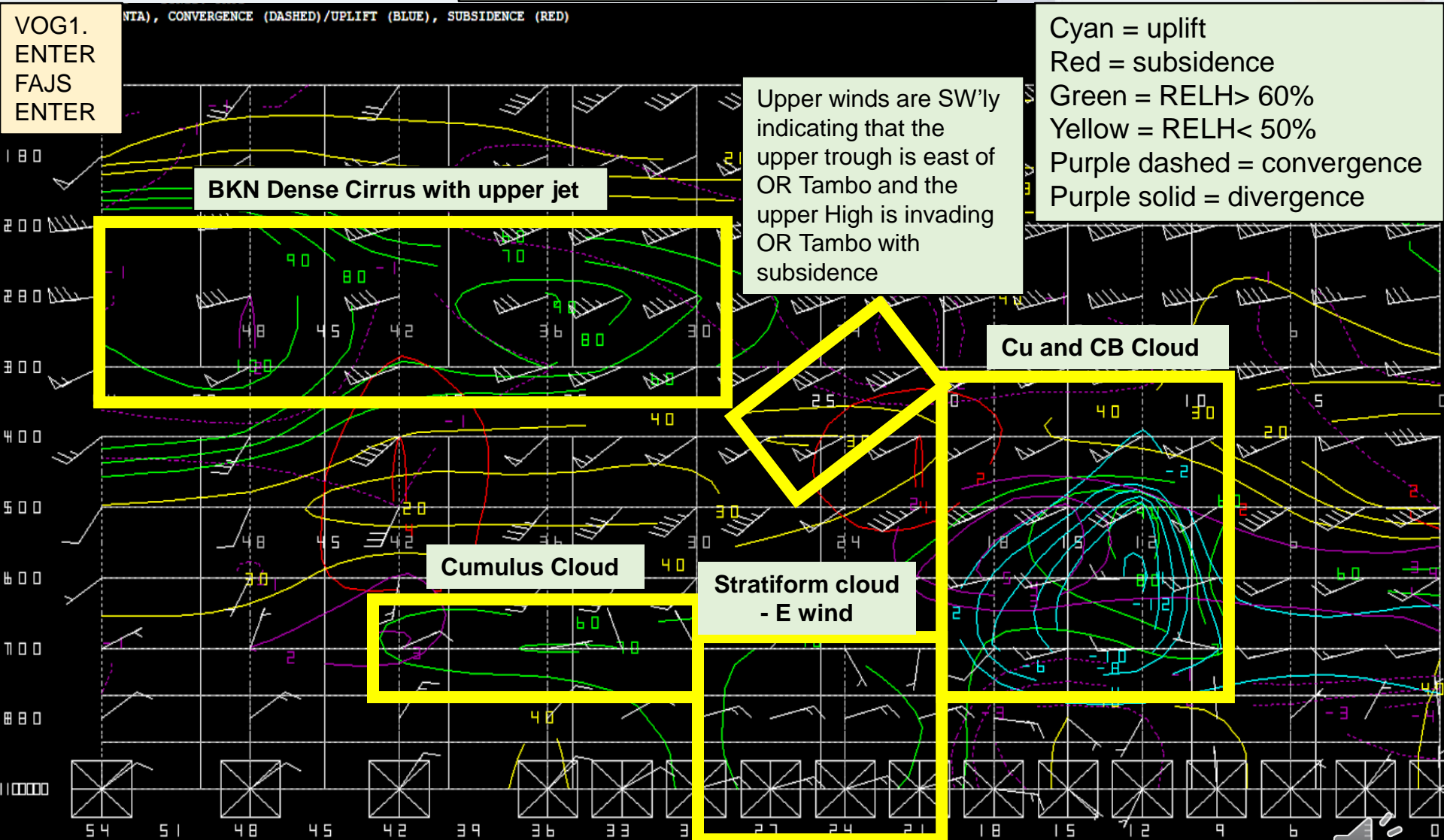
This can be when you have low cloud and foggy conditions in the morning which burns of to become Cumulus clouds and convection later in the day.

This can also occur when you have significant weather systems such as a Cut-off low or tropical low when widespread Nimbostratus cloud is present.



TAF FAOR

Convective and stratiform cloud



TAF FAOR – Dominant weather

- FAOR is a convective TAF for today and needs to be written as such (From AMF Competency 1 and Time section between 09 and 19Z). That means cloud base can be between 2500 and 6500 ft a.g.l.
- FAOR is a stratiform TAF overnight. That means cloud base can be between 100 ft to 2000 ft a.g.l. This is due to the ridging high causing low stratiform cloud over the eastern escarpment today, a continued ridging and easterly flow can cause the low cloud to reach OR Tambo overnight as shown in the time section between 21Z and 30Z.
- Tomorrow the low cloud breaks up to forms Cumulus clouds at around 700 hPa and fits the convective TAF structure again. Due to subsidence in the upper air west of the upper trough, no thunderstorms will develop.

The TAF will now be written in sections with explanations.

- Before issuing the TAF at 10Z check the latest available weather to ensure clouds are developing convectively as per your understanding of the weather system (AMF Competency 1) and the time section.
METAR FAOR 200930Z 03006KT 350V080 9999 BKN044 FEW048TCU **23/10** Q1025 NOSIG=
- Start the TAF with the wind (the time section suggests that the wind will remain easterly for the duration of the TAF), visibility (always start with a good visibility), weather and cloud that is expected to be most prevalent for the duration of the TAF. In this case it is convective cloud as Cumulus cloud will be the most dominant over the 24-to-30-hour period.
- The significant weather chart issued at 08Z and valid at 12Z provides an idea of the expected cloud (Note your 10000ft a.m.s.l in the low sigweather chart is 4000 ft a.g.l in the TAF).

TAF FAOR 201000Z 2012/2118 09013KT 9999 BKN040 FEW040CB

The next group in the TAF requires max and min temperature



Determining min/max temperature in TAF (AMF AC 2.1.1)

Minimum Temperature:

Consult today's METARs before sunrise (03/04Z)
METAR FAOR 200300Z 35011KT CAVOK 17/08 Q1022 NOSIG=
METAR FAOR 200400Z 35009KT CAVOK 16/09 Q1023 NOSIG=
METAR FAOR 200500Z 04007KT CAVOK 17/10 Q1025 NOSIG=
Today's lowest temp is 16°C.

Tomorrow morning is colder than today according to 2m temperature change, so minimum will be tomorrow morning on **21 Oct at 03Z.**

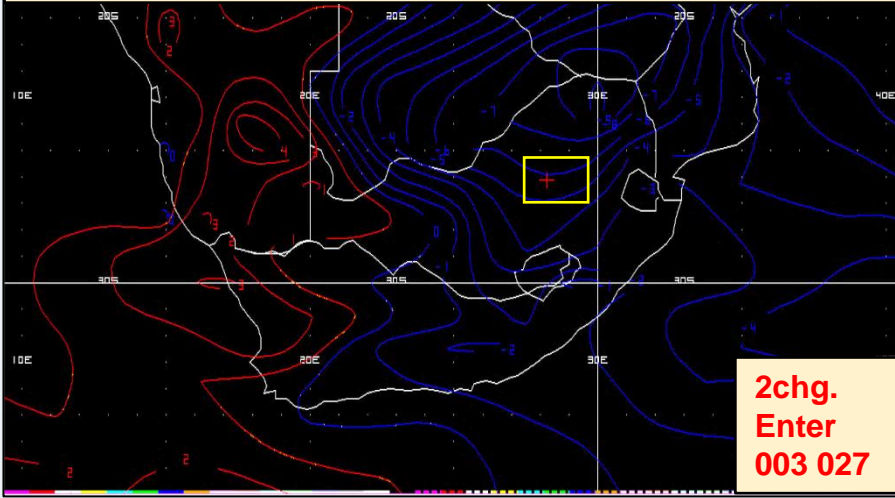
Now apply the -5°C change between this morning and tomorrow morning to obtain: 16°C - 5°C = **11°C for tomorrow**

Maximum Temperature:

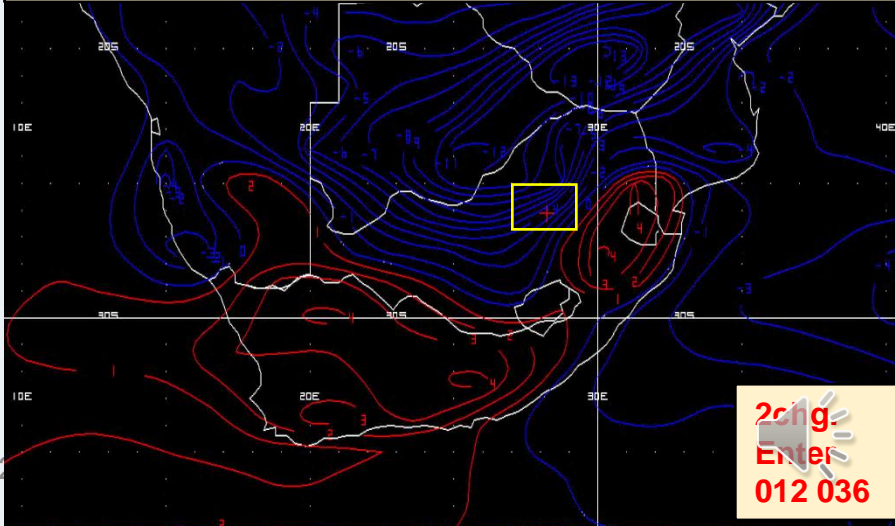
Check what you predicted for today's max in take-off data =26°C. Before submitting TAF at 10Z check that it is on track or lower it to 24°C with regards to real time data.
METAR FAOR 200930Z 03006KT 350V080 9999 BKN044 FEW048TCU 23/10 Q1025 NOSIG=
Tomorrow afternoon is colder than this afternoon according to 2m temperature change, therefore maximum temperature must be today: **20 Oct at 12Z**

TAF FAOR 201000Z 2012/2118 09013KT 9999 BKN040 FEW040CB
TX24/2012ZTN11/2103Z

2m temp change between 03Z (F+003) this morning and 03Z (F+027) tomorrow morning. If 003 and 027 field not available use 006 and 030



2m temp change between 12Z (F012) today and 12Z (F+036) tomorrow.



Probability and change groups

- In the time section, the period highlighted in the YELLOW block (09 to 20) indicates when all thunderstorm ingredients are present – moisture, trigger, instability, vertical motion, surface convergence and upper divergence.
- This is the same motivation used AMF Competency 2 – Significant weather charts for forecasting thunderstorms but that was done in a plan view. Visibility value is forecast as per low significant weather chart.

TAF FAOR 201000Z 2012/2118 09013KT 9999 BKN040 FEW040CB
TX24/2012Z TN11/2103Z
TEMPO 2012/2019 2500 TSRA SCT035CB

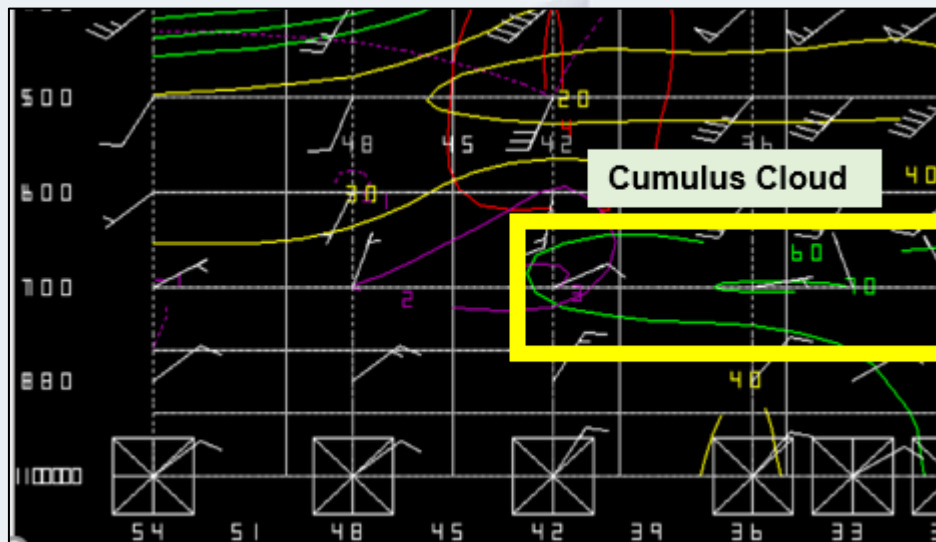
- Between 21Z (9pm) and 30Z (06am) there is an increase in low level moisture to 70% caused by the ridging high – AMF Competency 1.
- This fits with the stratiform cloud TAF. You have to change the cloud from convective to stratiform.
- Check that is a significant change from that which was previously stated. At OR Tambo mist is a probability in the morning due to the low cloud base and an easterly wind (OR Tambo is also highly elevated). If mist occurs the cloud base can lower significantly more.

TAF FAOR 201000Z 2012/2118 09013KT 9999 BKN040 FEW040CB
TX24/2012Z TN11/2103Z
TEMPO 2012/2019 2500 TSRA SCT035CB
BECMG 2018/2020 BKN015
PROB30 TEMPO 2023/2106 3000 BR BKN008



Probability and change groups

- Tomorrow between 30Z (06am) and 42Z (18pm), the cloud amount lessens and the cloud base height increases to around 700 hPa (10000ft a.m.s.l) which is about 4000 ft a.g.l. (Cumulus cloud). See yellow block.
- Subsidence aloft, due to the upper high invading the country will prevent the Cumulus from growing into TCU or CB.
- Note the change from BKN015 TO SCT040 was significant



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TAF FAOR 201000Z 2012/2118 09013KT  
9999 BKN040 FEW040CB  
TX24/2012Z TN11/2103Z  
TEMPO 2012/2019 2500 TSRA SCT035CB  
BECMG 2018/2020 BKN015  
PROB30 TEMPO 2023/2106 3000 BR  
BKN008  
BECMG 2107/2109 SCT040=
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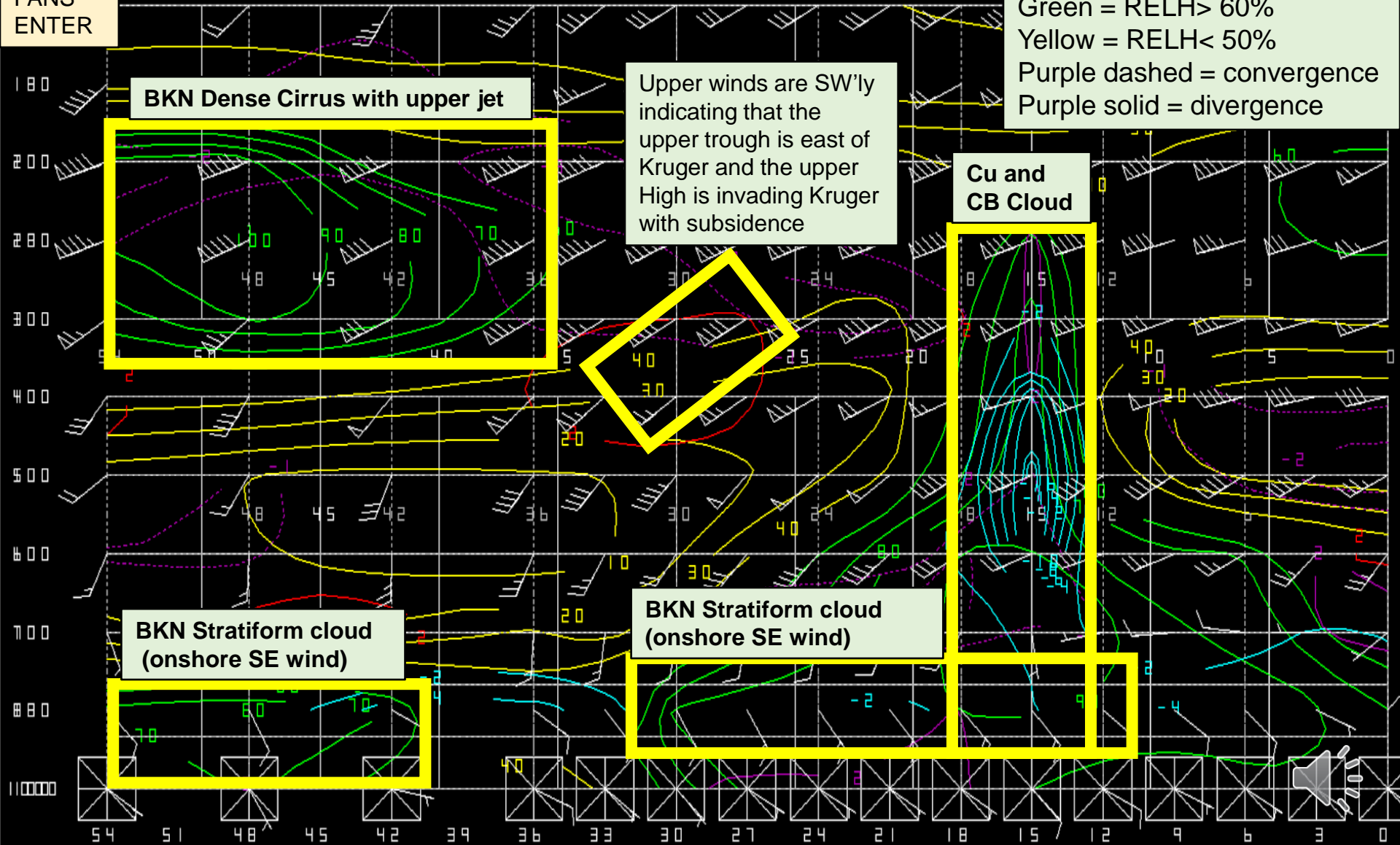


TAF FAKN

VOG1.
ENTER
FANS
ENTER

Convective and stratiform cloud TAF

Cyan = uplift
Red = subsidence
Green = RELH > 60%
Yellow = RELH < 50%
Purple dashed = convergence
Purple solid = divergence



TAF FAKN - Dominant weather

- At FAKN we have a mixed TAF (convective and stratiform cloud). The thunderstorms were not explicitly forecast over FAKN at 12Z in our significant weather charts.
- It is possible that these storms can develop in the south-west and be steered by the upper south-westerly flow over Kruger in the afternoon.
- However, due to the ridging high causing low stratiform cloud over the eastern escarpment today, a continued ridging and easterly flow will maintain the low cloud over the area.

The TAF will now be written in sections with explanations.

Just before issuing the TAF at 09Z check the latest available weather.

METAR FAKN 200800Z 14010KT 9999 BKN008 OVC015 16/14 Q1026 BECMG BKN012=

- Start the TAF with the wind, visibility, weather and cloud that be expected to be most prevalent for the duration of the TAF.
- In this case it is stratiform and convective TAF mixed, and the visibility should be good - as this will be the most dominant over the period. Low cloud is dominant due to the onshore flow from the ridging high.
- The significant weather chart issued at 08Z provides guidance of the expected cloud at 12Z (Note your 4500ft a.m.s.l in the sigweather chart is about 1000 to 1500 ft a.g.l in the TAF).
- The time section indicates the wind will remain easterly for the duration of the TAF.

TAF FAKN 200900Z 2010/2018 09007KT 9999 BKN015

The next group in the TAF requires max and min temperature



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Determining min/max temperature in TAF (AMF AC 2.1.1)

Minimum Temperature:

Minimum will be at 18Z because TAF validity ends at 18Z when the sun has set. Consult Take-off data at 18Z or NWP.

Before submitting TAF at 09Z check latest weather to anticipate maximum temperature.

METAR FAKN 200900Z 14008KT 9999 -DZ BKN008 OVC015
16/13 Q1027 NOSIG=

Apply 2m temperature change between 12Z and 18Z ($18^{\circ}\text{C} - 4^{\circ}\text{C}$
= **14°C on 20 Dec.**

Using the predicted temperature at 2m for F18 gives a similar answer of 14 °C

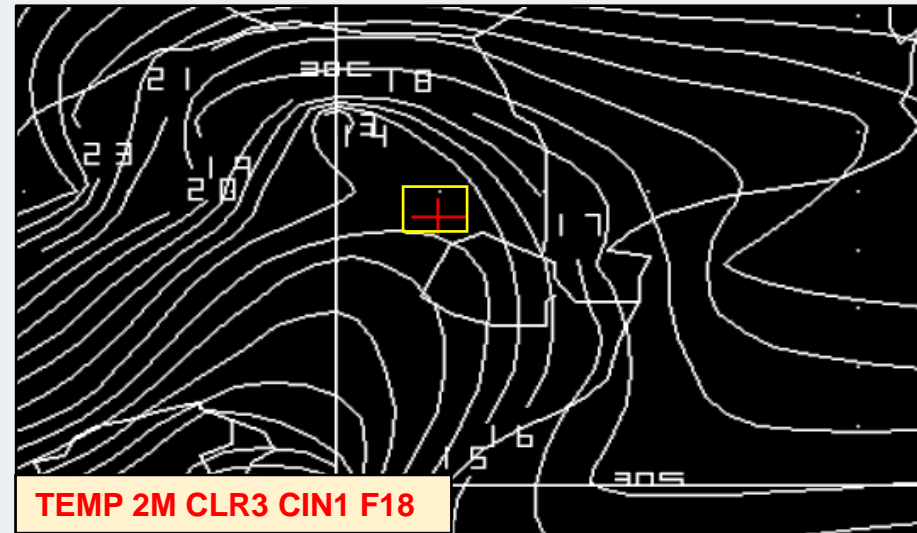
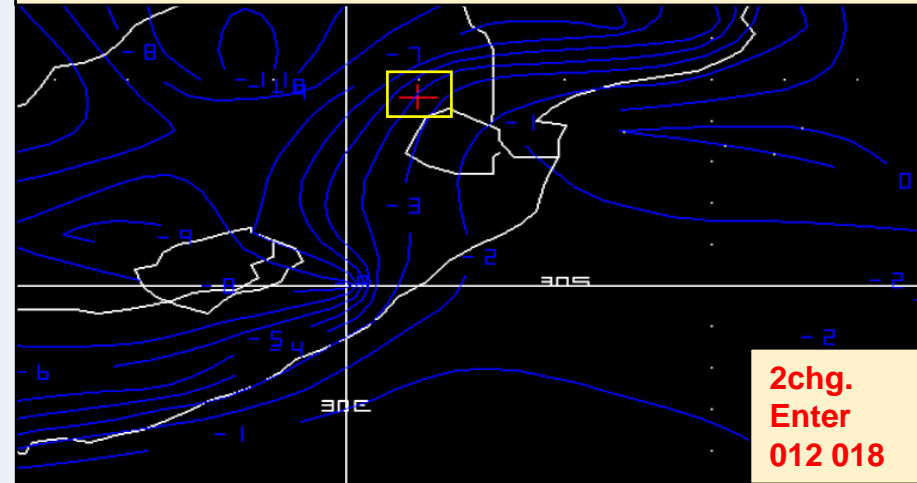
Maximum Temperature:

Maximum can only be at midday today due to TAF validity. It is 16°C in the 09Z METAR above, it can possibly reach a maximum of 18°C at 12Z because it is cloudy.

TAF FAKN 200900Z 2010/2018 09007KT 9999
BKN010

TX18/2012Z TN14/2018Z

2m temp change between 12Z (012) this afternoon and 18Z (018) this evening.



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Probability and change groups

- In the time section, the period highlighted in the YELLOW block indicates when all thunderstorm ingredients are present up to 18Z – moisture, trigger, instability, vertical motion, surface convergence and upper divergence. In the sigweather charts we were expecting these to still only be on the Highveld at 12Z.
- At the same time it is highly probably to have reduced visibility due to light rain, drizzle or mist as was expected in the sigweather charts at 12Z which will last for the full duration of the TAF (in the time section, there are some signs of low level vertical motion in this yellow block) but because Kruger is close to the escarpment it becomes more likely.
- When there is drizzle it will reduce the cloud base even further to 1000 ft. It is important that you select the most hazardous weather here and convey that message.
- Visibility value is forecast as per low significant weather chart. I have chosen to show you how to include both.

TAF FAKN 200900Z 2010/2018 09007KT 9999 BKN015
TX18/2012Z TN14/2018Z

TEMPO 2010/2018 3000 DZ BKN010

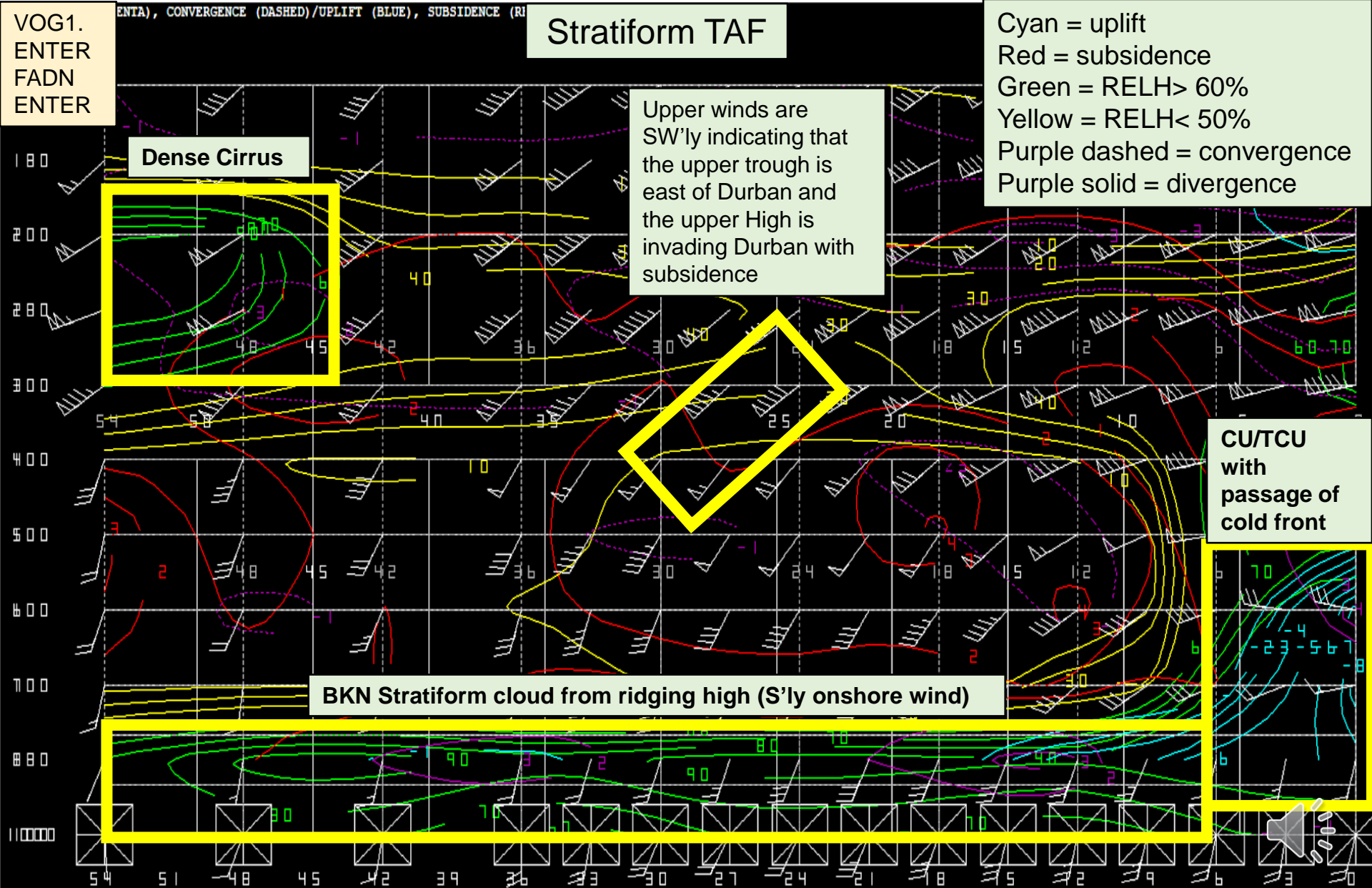
PROB30 TEMPO 2012/2018 -TSRA FEW030CB=



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TAF FALE



TAF FALE dominant weather

- For the FALE TAF validity, we have a stratiform TAF caused by the ridging high causing a stable environment with lots of subsidence and layered low stratiform cloud.
- In the time section it is evident that between 00Z and 06Z we have convective weather, which was due to the passage of the cold front but falls outside the validity of our TAF.
- It is clear that the surface winds remain southerly with the ridging high which will maintain the stability in the low level and support horizontal low cloud growth for the duration of the TAF validity. This was also found in Competency 1.
- In the upper air the flow is south-westerly indicating that the upper trough associated with the cold front has passed Durban and the upper air is now under the influence of the high which will cause subsidence and prevent vertical cloud growth

Just before issuing the TAF at 10Z, check the latest available weather.

METAR FALE 200900Z 17018KT 130V190 9999 SCT020 20/14 Q1027 NOSIG=

- Start the TAF with the wind, visibility, weather and cloud that be expected to be most prevalent for the duration of the TAF. In this case stratiform low cloud is dominant due to the onshore flow from ridging high. Visibility should be good - as this will be the most dominant over the period.
- In this case, the significant weather chart issued provides guidance of the expected cloud at 12Z (Note your 2000ft a.m.s.l in the sigweather chart is also roughly 2000 ft a.g.l in the TAF, since the airport is close to sea level).
- Given the time section, it looks like this BKN020 is a dominant cloud and the wind remains southerly which will be applicable for the entire TAF validity

TAF FALE 201000Z 2012/2118 20020G30KT 9999 BKN020



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The next group in the TAF requires max and min temperature



Determining min/max temperature in TAF (AMF AC 2.1.1)

Minimum Temperature:

Consult today's METARs before sunrise (03/04Z)

METAR **FALE 200300Z** 20012KT 9999 FEW016 OVC035 **16/13**
Q1025 NOSIG=

METAR **FALE 200400Z** 19013KT 6000 DZRA BR FEW016
BKN020 OVC030 **16/13** Q1026 NOSIG=

Today's lowest temp is 16°C.

Tomorrow morning is colder than this morning according to 2m temperature change, so minimum will be tomorrow morning on **21 Oct at 03Z**.

How much will it be? Apply - 4°C change between this morning and tomorrow morning to obtain: 16°C - 4°C = **12°C for tomorrow**

Maximum Temperature:

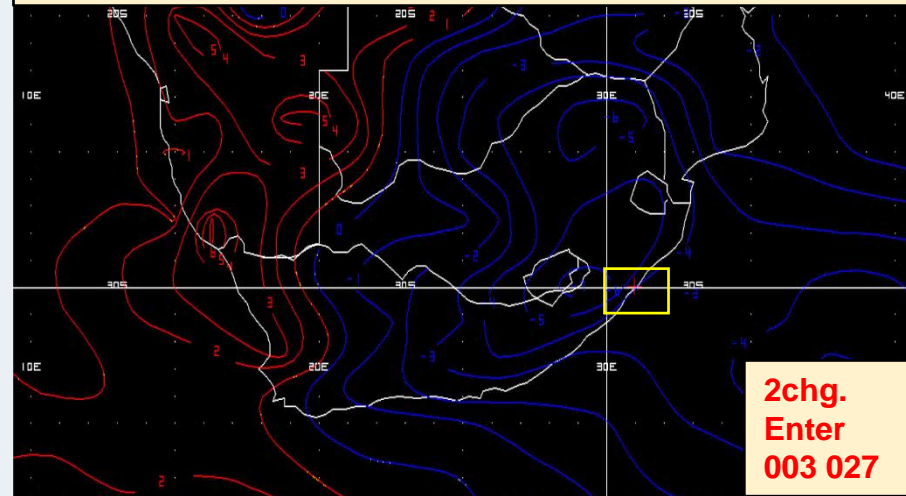
METAR **FALE 200930Z** 16017G28KT 9999 SCT020 **21/14**
Q1027 NOSIG=

Tomorrow afternoon is colder than this afternoon according to 2m temperature change, therefore maximum temperature must be today: **20 Oct at 12Z**

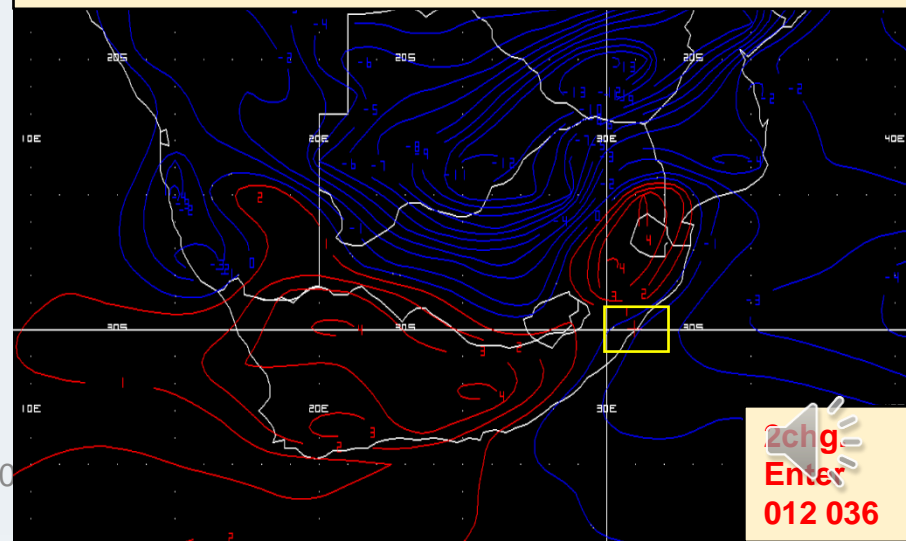
How much will it be? What are you predicting for today's max. It can possibly reach a maximum of 23°C.

TAF **FALE 201000Z** 2012/2118 20020G30KT 9999
BKN020
TX23/2012Z TN12/2104Z

2m temp change between 03Z (003) this morning and 03Z (027) tomorrow morning. If 003 and 027 field not available use 006 and 030



2m temp change between 12Z (012) today and 12Z (036) tomorrow.



Probability and change groups

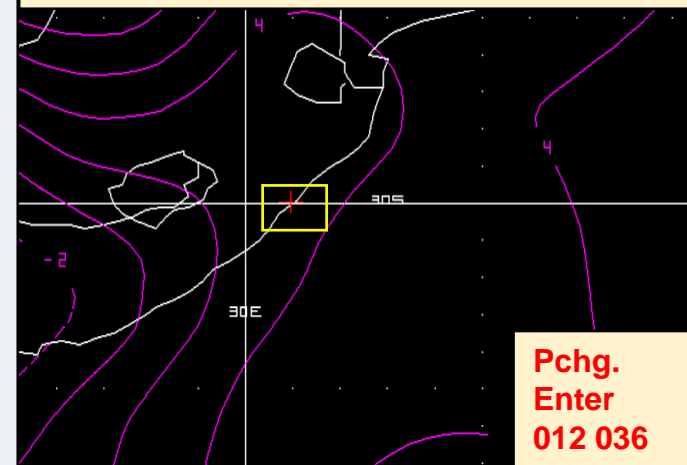
In the time section, the period highlighted in the YELLOW block indicates the stratiform cloud TAF.

Uncertainties: With the onshore flow and low cloud it is possible for there to be light rain/drizzle. The time section does not show any low level vertical motion but there is a 3 to 4 hPa pressure increase between today and tomorrow. It is advised the TAF be monitored and amended if necessary.

From F36 (12Z) tomorrow the wind speed significantly changes by more than 10 knots from the wind which was previously stated.

TAF FALE 201000Z 2012/2118 20020G30KT
9999 BKN020 TX23/2012Z TN12/2104Z
BECMG 2112/2114 20010KT=

Pressure change between today 12Z and tomorrow 12Z



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References

- Latest edition of RTC-CN-020_Aviation Practical Course Notes
- RTC-PRE-010_AMF AC
2.1.1_2.1.2_2.1.4_2.1.5_2.1.6_2.2_1.2_1.3_Forecast Weather Parameters and Phenomena_TREND and TAF

