Aviation Meteorological Forecaster Competency 1

Analyse and diagnose the weather situation as required in forecast and warning preparation

Convective cloud and poor visibility

(AMF AC 1.1 and 1.2)

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OBJECTIVES OF THIS PRESENTATION

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

- **Analyse** low unstable convective cloud and poor visibility from observational and remotely sensed data and determine its impact on observed warnings.
- **Diagnose** what dominant weather system/s is/are causing the low unstable convective cloud and poor visibility.
- **Determine** the movement of this weather system/s and development of this low unstable convective cloud and poor visibility into the following day.

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Introduction

As per AMF AC 1.1, the first step in the forecasting process is to:

Analyse and diagnose the weather situation as required in forecast and warning preparation

There are 3 questions related to each one of the 3 objectives of this presentation, which address the analysis (what is currently happening in the weather?) and the diagnosis (Why is the weather happening?) with regards to the convective cloud and poor visibility.

Once you have answered the 3 questions competently, you will have provided evidence towards AMF competency 1.

Once you have mastered competency 1, you may then proceed to competency 2 and 3 which is to forecast and warn for hazardous aviation weather.

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Question 4 - Analyse low unstable convective cloud and poor visibility from observational and remotely sensed data and its impact on observed warnings.

For 4 marks,
Identify, if and where, **significant unstable convective cloud** (vertical cloud growth and poor visibility) is located referring to all available observational and remotely sensed data (Remember in aviation the word **significant** has specific meaning which can be quantified).

TIP: When answering be sure to address the following:

4.1 latest satellite image (DNC/Convective storms RGB) to support your answer discussion and refer explicitly to geographical locations/provinces/airports where convective cloud (TCU and CB) and visibility < 5000m due to convection are observed.
Also state if the CB is embedded or not. This has implication down the line whether we issue an OBS AIRMET or SIGMET warning in Section 3. **1 Mark**

4.2 latest real time data (METARs/SPECIs) indicating **TCU and/or CB** to support your answer discussion. Copy and paste them here. **1 Mark**

4.3 Tephigrams/AMDAR data which support convective activity. Using Normands theorem determine possible convective cloud base height, convective cloud top and vertical extent - Refer to instability and CAPE, wind structure (trough/COL). **1 Mark**

4.4 observed **AIRMETs/SIGMETs/Aerodrome warnings** caused by the **significant unstable convective cloud (vertical cloud growth and poor visibility) and** turbulence due to the jet stream?

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Question 4: Answer

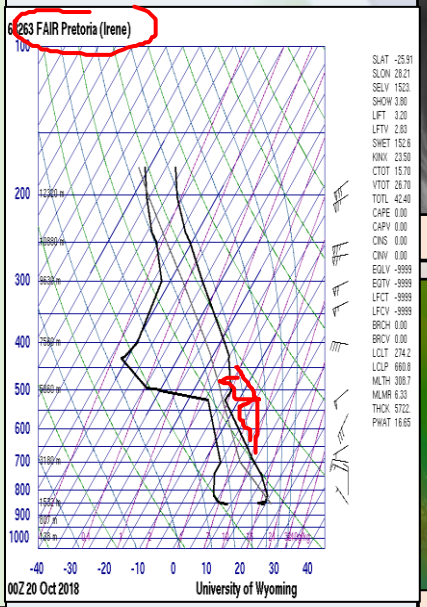
Answer:

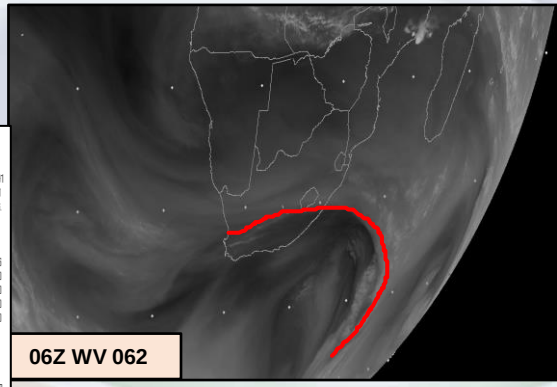
4.1 There is some dissipating convection around Swaziland (ISOL CB/TCU) aligned with the trough over Mpumalanga, seen on DNC/CS RGB. Weather system can generate CB/TCU east of trough later in the day over Gauteng and Mpumalanga Highveld.

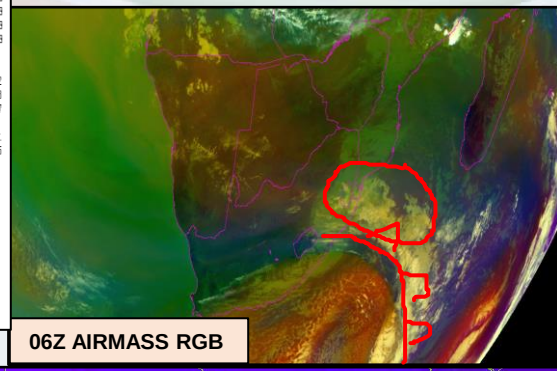
4.2 No CB or TCU observed on 08Z METAR collective.

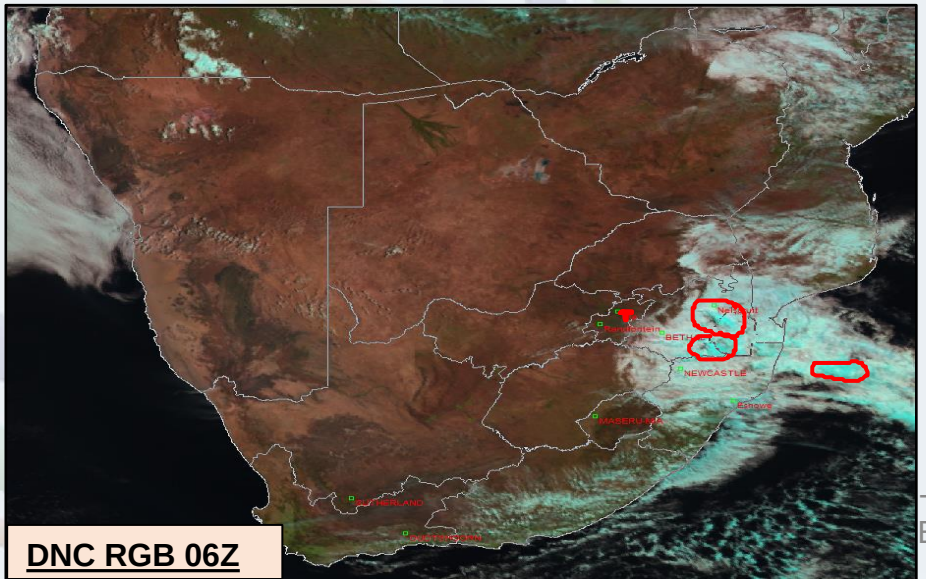
4.3 Irene Tephi is unstable in mid-levels and can support convective development later.

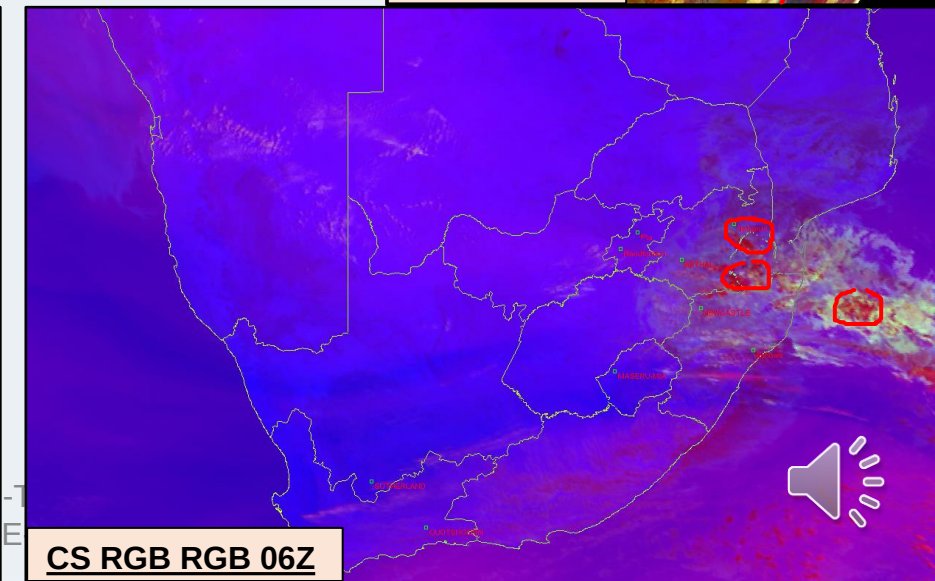
4.4 – None at moment – could give OBS AIRMET for ISOL CB/TCU for next few hours.











Question 5 – Diagnose what dominant weather system/s is/are causing the low unstable convective cloud and poor visibility at the moment/now

For 1 mark,
Identify, name and discuss, the dominant **mid (500 hPa)** to **upper level (300 hPa)** **weather system/s** (ocean and land) affecting the weather **at F+06** and causing the **observed convective and mid-level cloud.** Remember a surface trough also supports convective development.

TIP: When answering be sure to address the following:
Refer to NWP surface trough information at 850 hPa (Q2) and 500 and 300 hPa (GPM, Temp, winds and RELH) valid closest to the time of latest satellite observation **(F+06)** to support your answer discussion **(now)**. For example if the latest SAT image you have is 08 UTC, then the closest NWP output may be F+06 depending on which NWP output you use.

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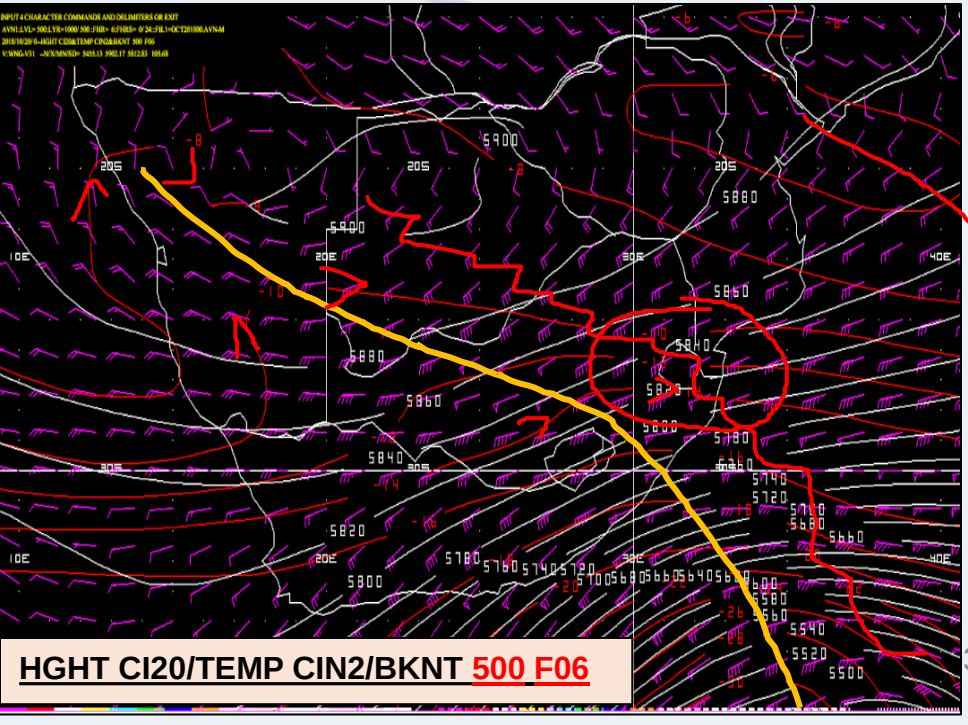
Question 5 – Now at Answer F06

Answer:

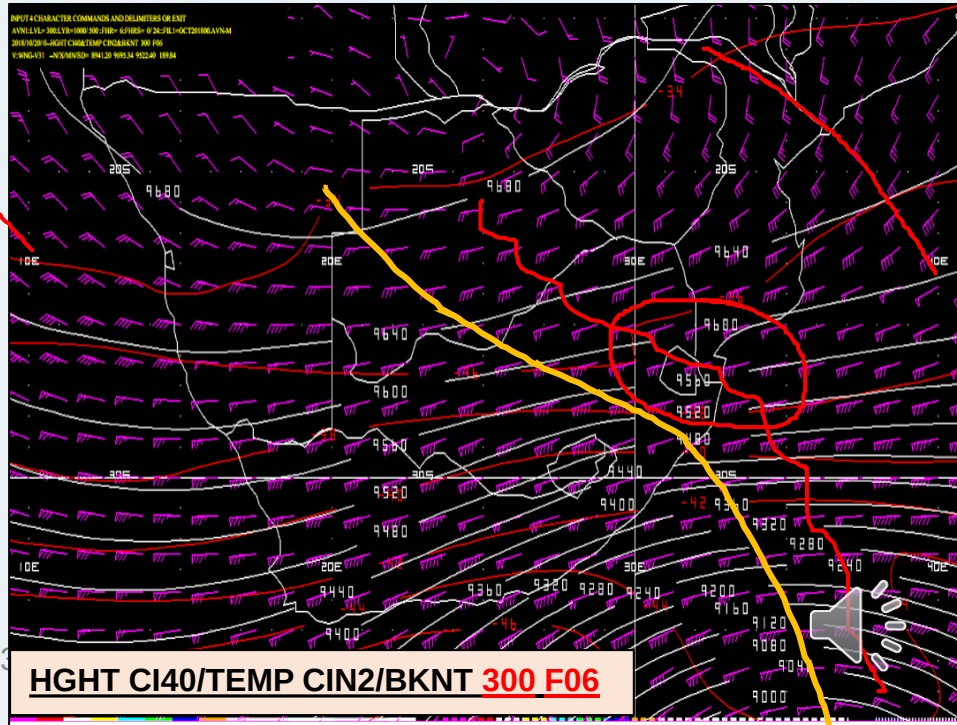
There is a mid-level trough at 500 hPa over the NE part of the country associated with the surface cold front.

There is also a clear thermal trough over the central part of the country into Namibia which is linked to the convective cloud observed on the satellite picture.
A similar pattern is found at 300 hPa.

There is also a clear trough and thermal trough over N Mozambique associated with the cloud on satellite image.



HGHT CI20/TEMP CIN2/BKNT 500 F06



HGHT CI40/TEMP CIN2/BKNT 300 F06

Question 6: Determine the movement of this weather system/s and development of this low unstable convective cloud and poor visibility into the following day.

For 2 marks

6.1 Explain the **movement** of this/these dominant significant mid to upper-level **weather system/s** and its affect on the **forecast amount and horizontal extent** of significant unstable convective cloud growth and poor visibility in the **next 4 to 6 hours** and its affect on AIRMET/SIGMET warnings) **1 Mark**

6.2 Explain the **movement** of this/these dominant significant mid to upper-level **weather system/s** and its affect on the **forecast amount and horizontal extent** of significant unstable convective cloud growth and poor visibility in the **next 30 hours** **1 Mark**

TIP: When answering be sure to address the following:

Refer to NWP at 500 hPa and 300 hPa (GPM, Temp, winds and RELH) valid **(F+12)** to support your answer discussion **(today) and (F+36)** to support your answer discussion **(tomorrow)**.

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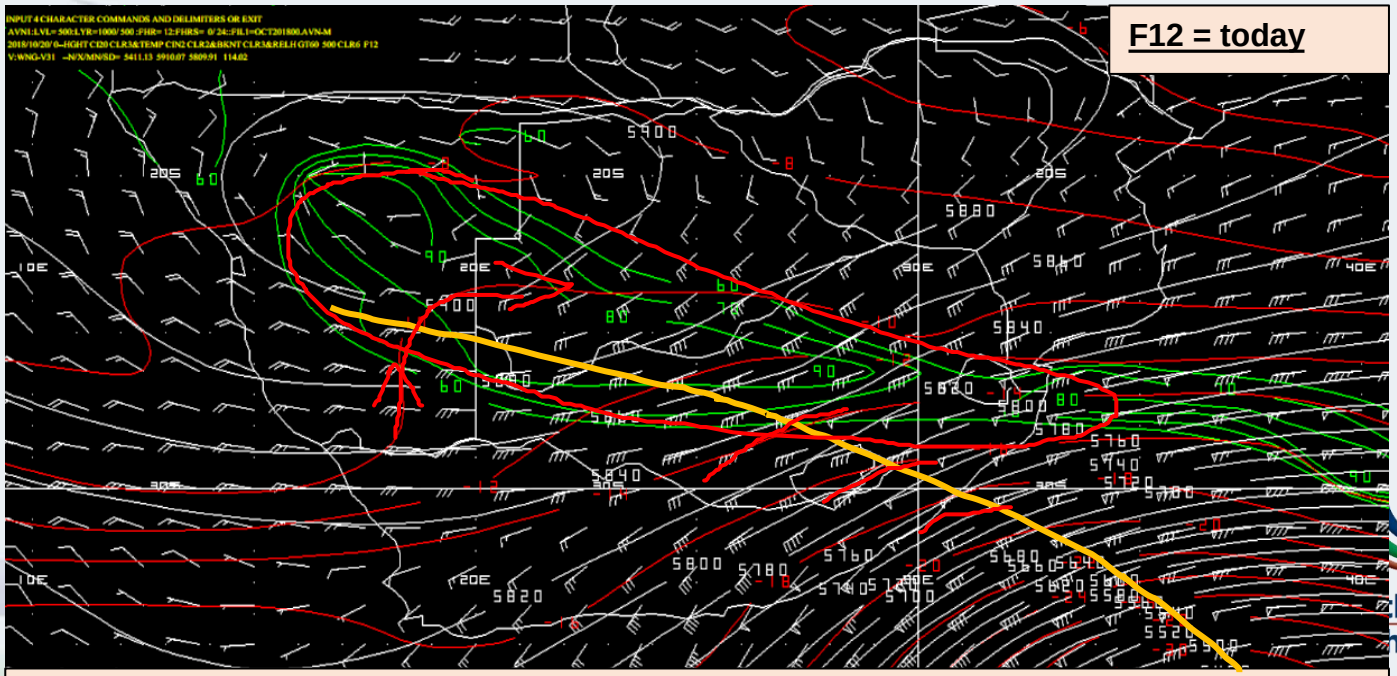
Question 6 – Answer Movement to F+12

6.1 Answer:

In the next 4 to 6 hours:

Mid-level 500 hPa trough and the 500 hPa thermal trough continue to persist in a similar position causing potential cloud development east of this area in the mid levels (FL180). This can be seen as the top of Cumulus cloud development.

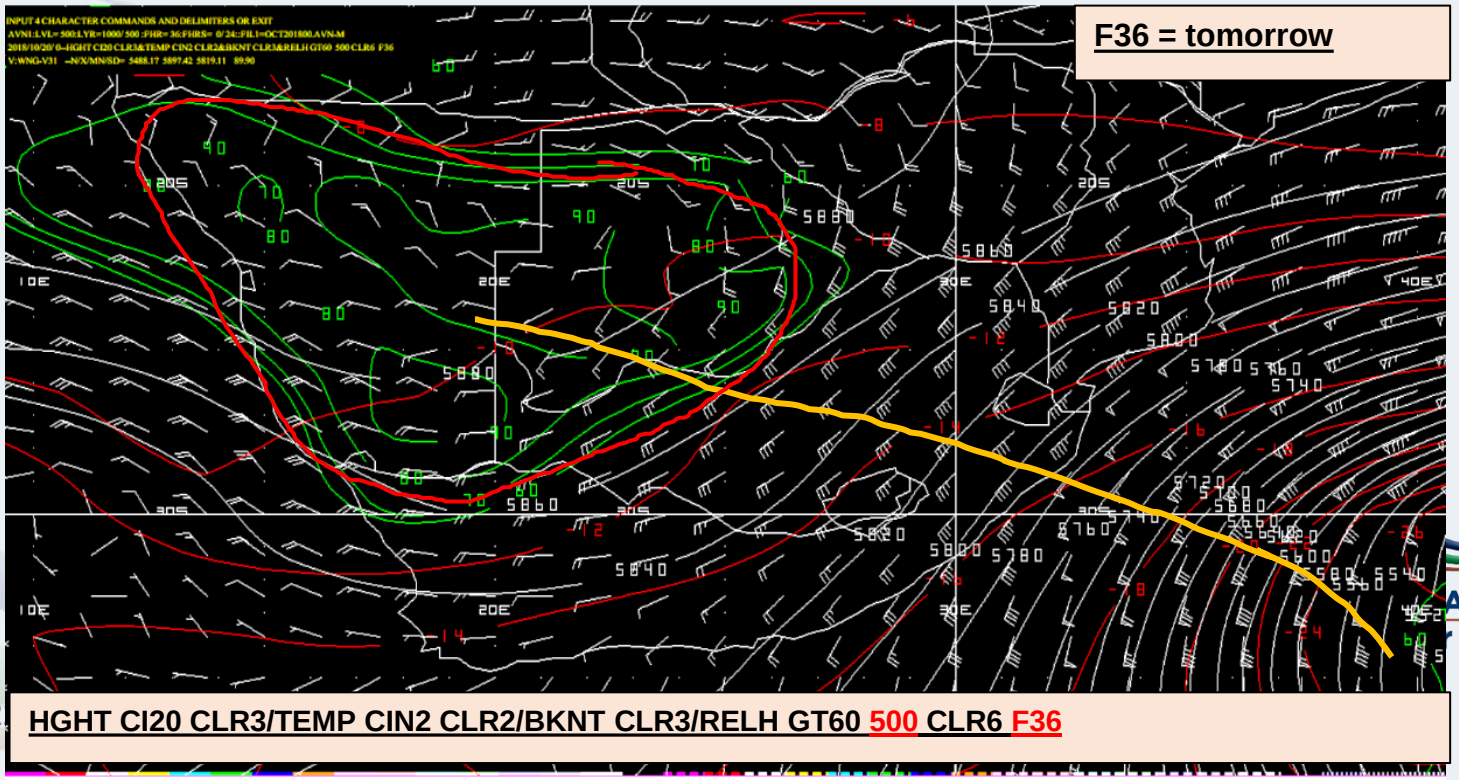


Question 6 – Answer Movement to F+36

6.2 Answer:

In the next 30 hours (tomorrow):

500 hPa mid level trough moves slightly eastwards but the 500 hPa thermal trough maintains its position through the N Cape into SE Namibia. Cloud development will occur more westwards and towards the surface low at 850 hPa that has moves southwards into Namibia.



References

- Latest edition of RTC-CN-020_Aviation Practical Course Notes
- Presentation - RTC-PRE-081_Different Types of Aeronautical Forecast
- Document - RTC-FRM-080_AMF WMO Competency Assessment criteria

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