Aviation Meteorological Forecaster Competency 2

Forecast Aeronautical Meteorological Phenomena and Parameters

TREND Forecast

AMF AC 1.2, 2.1.2, 2.1.4, 2.1.5, 2.1.6, 2.1.7 and 2.2

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AIM OF THIS PRESENTATION

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

- Know the **format** of TREND forecasts in accordance with latest ICAO Annex 3, WMO-No.49, regional and national formats, codes and technical regulations on content, accuracy and timeliness **(AMF AC 2.2).**

- Know the **significant weather changes** according to documented significant weather (SPECI) criteria that need to be applied in the writing of TREND forecasts (**AMF AC 1.2, 2.1.2, 2.1.4, 2.1.5, 2.1.6, 2.1.7)**

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TREND FORECAST

- A **TREND or landing forecast** shall consist of a concise statement of the **expected significant changes** in the meteorological conditions at the aerodrome
- The **validity period** of a TREND forecast **shall be 2 hours** from the time of the report.
- The TREND forecast is appended to the METAR, or local special report (SPECI).

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TREND FORMAT - 3 significant weather change descriptors:

The TREND shall start with one of the following 3 significant weather change descriptors as explained on the following slide.

NOSIG – Used when **No Significant Change** in weather is expected to occur in the next 2 hours.

When a **significant change** is expected to occur in the next 2 hours,
the TREND forecast appended to the end of the METAR shall begin with one of the following change indicators

- "**BECMG**" or
- "**TEMPO**"

NB: Note "PROB" shall not be used in TREND forecasts.

After BECMG or TEMPO only those weather elements will be included for which, a **significant change** is expected in the next 2 hours.

-**surface wind** (AMF AC 2.1.2),
-**visibility (including weather phenomena causing it)** (AMF AC 2.1.5, 2.1.6 and 2.1.7)
-**clouds** (AMF AC 2.1.4)

-There can be more than 1 element which is significantly changing

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USE OF CHANGE GROUP BECMG IN A TREND FORECAST

- **"BECMG":** shall indicate a significant forecast where the meteorological conditions are expected to reach or pass-through specified values at a regular or irregular rate.
- The period during which, or the time at which, the change is forecast to occur **within** the 2-hour period shall be indicated, using the abbreviations "FM", "TL" or "AT", as appropriate, each followed by a time group in hours and minutes.

Example:

METAR FAPE 081300Z 23015KT 9999 **BKN008** 20/19 Q1024 **BECMG FM1400 SCT008**=

METAR FAPE 081300Z 23015KT 9999 **BKN008** 20/19 Q1024 **BECMG AT1400 SCT008**=

METAR FAPE 081300Z 23015KT 9999 **BKN008** 20/19 Q1024 **BECMG TL1400 SCT008**=

- When the change is forecast to begin and end wholly **within** the TREND forecast period, the beginning and end of the change shall be indicated by using the abbreviations "FM" and "TL", respectively, with their associated time groups.

USE OF CHANGE GROUP TEMPO IN A TREND FORECAST

- **"TEMPO" :** shall be used to describe forecast temporary fluctuations in the meteorological conditions which reach or pass specified values and last for a period of less than one hour in each instance and, in the aggregate, cover less than one half of the period during which the fluctuations are forecast to occur.

- **Period** during which the temporary fluctuations are forecast to occur shall be indicated by **using "FM" and/or "TL"** If the forecast period **begins and ends wholly within the TREND forecast period,** then the **beginning and end** time period will be **indicated by "FM" and "TL",** respectively, with their associated time groups.

Example:

METAR FAPE 081300Z 23015KT 9999 **BKN008** 20/19 Q1024 **TEMPO FM1330 TL1430 SCT008**=

- When temporary fluctuations is **forecast to commence at the beginning of the TREND forecast period but cease before the end of that period**, the abbreviation "FM" and its associated time group shall be omitted and **only "TL" and its associated time group** shall be used.

Example:

METAR FAPE 081300Z 23015KT 9999 **BKN008** 20/19 Q1024 **TEMPO TL1400 SCT008**=

- When the period of temporary fluctuations is forecast **to begin during the TREND forecast period and cease by the end of that period**, the abbreviation "TL" and its associated time group shall be omitted and **only "FM" and its associated time group** shall be used.

Example:

METAR FAPE 081300Z 23015KT 9999 **BKN008** 20/19 Q1024 **TEMPO FM1400 SCT008**=

- When the period of temporary fluctuations is forecast to **commence at the beginning of the TREND forecast period and cease by the end of that period**, both abbreviations "**FM" and "TL"** and their associated time groups shall be **omitted,** and the change indicator "TEMPO" shall be used alone. It appears from examples that TRENDs in South Africa follow this format.

Example:

METAR FAPE 081300Z 23015KT 9999 **BKN008** 20/19 Q1024 **TEMPO SCT008**=

TREND FORMAT (AMF AC 2.2)

Trend forecast (O)[14]	Name of the element (M)	TREND					
	Change indicator (M)[15]	NOSIG	BECMG *or* TEMPO				TREND NOSIG TREND BECMG FEW 600M (TREND BECMG FEW 2000FT)
	Period of change (C)[9]		FMnnnn *and/or* TLnnnn *or* ATnnnn				
	Wind (C)[9]		nnn/ [ABV] n[n][n]KMH [MAX[ABV]nn[n]] (*or* nnn/ [ABV] n[n]KT [MAX[ABV]nn])				TREND TEMPO 250/70KMH MAX 100 (TREND TEMPO 250/35KT MAX 50)
	Visibility (C)[9]		VIS nn[n][n]M *or* VIS n[n]KM			C A V O K	TREND BECMG AT1800 VIS 10KM NSW TREND BECMG TL1700 VIS 800M FG TREND BECMG FM1030 TL1130 CAVOK
	Weather phenomenon: intensity (C)[9]		FBL *or* MOD *or* HVY	—	NSW		TREND TEMPO TL1200 VIS 600M BECMG AT1230 VIS 8KM NSW NSC
	Weather phenomenon: characteristics and type (C)[9, 10, 12]		DZ *or* RA *or* SN *or* SG *or* PL *or* DS *or* SS *or* FZDZ *or* FZRA *or* SHGR *or* SHGS *or* SHRA *or* SHSN *or* TSGR *or* TSGS *or* TSRA *or* TSSN	IC *or* FG *or* BR *or* SA *or* DU *or* HZ *or* FU *or* VA *or* SQ *or* PO *or* FC *or* TS *or* BCFG *or* BLDU *or* BLSA *or* BLSN *or* DRDU *or* DRSA *or* DRSN *or* FZFG *or* MIFG *or* PRFG			TREND TEMPO FM0300 TL0430 MOD FZRA TREND BECMG FM1900 VIS 500M HVY SNRA TREND BECMG FM1100 MOD SN TEMPO FM1130 BLSN
	Name of the element (C)[9]		CLD				
	Cloud amount and vertical visibility (C)[9]		FEW *or* SCT *or* BKN *or* OVC	OBSC	NSC		TREND BECMG AT1130 CLD OVC 300M (TREND BECMG AT1130 CLD OVC 1000FT)
	Cloud type (C)[9]		CB *or* TCU	—			TREND TEMPO TL1530 HVY SHRA CLD BKN CB 360M (TREND TEMPO TL1530 HVY SHRA CLD BKN CB 1200FT)
	Height of cloud base *or* the value of vertical visibility (C)[9]		nn[n][n]M (*or* nnn[n]FT)	[VER VIS nn[n]M (*or* VER VIS nnn[n]FT)]			

Significant changes in surface wind and/or direction (AMF AC 2.1.2) TREND Forecast

- ***The prevailing wind direction*** *should be forecast, when it is not possible to forecast a prevailing surface wind direction due to its expected variability, for example, during light wind conditions (less than 6 km/h (3 kt)) or thunderstorms, the forecast wind direction should be indicated as variable using* ***"VRB".***
- *When the wind is forecast to be less than 2 km/h (1 kt), the forecast wind speed should be indicated as* ***calm****.*
- *When the forecast maximum speed* ***(gust)*** *exceeds the forecast mean wind speed by 20 km/h (10 kt) or more, the forecast maximum wind speed should be indicated.*
- *Surface wind direction and speed is important to be accurately forecast because it determines which runway is to be used.*

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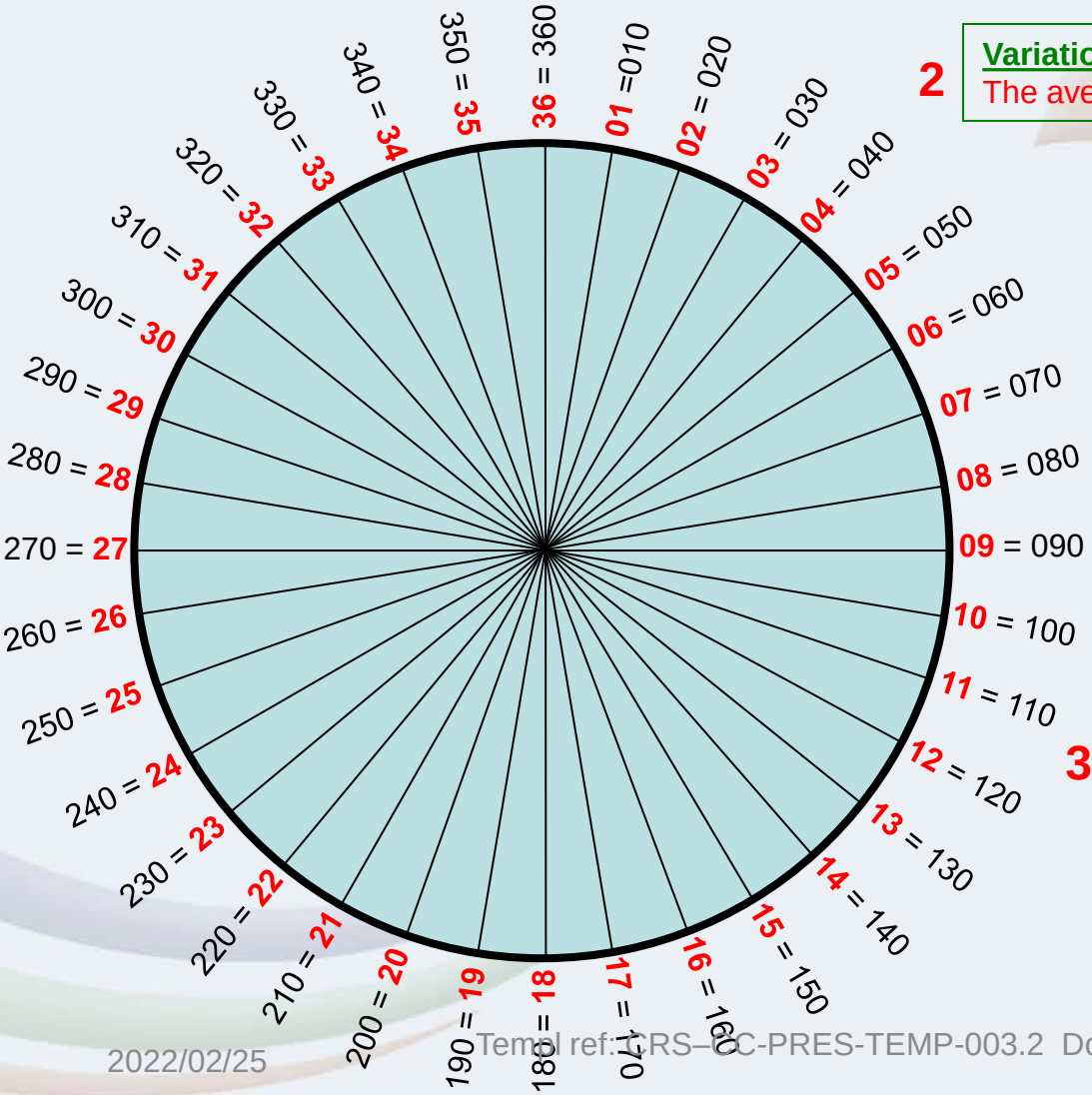
Significant changes in surface wind direction and/or speed to be included using change groups BECMG in a TREND

1 Ave wind speed change of ≥ 10kts



2 Variation between gusts and ave wind speed is ≥ 10kts
The ave wind speed before and or after being ≥ 15 kts

3 Ave wind direction change of ≥ 60°
The ave wind speed before and or after being ≥ 10

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Examples of TREND forecast containing significant changes in wind direction and/or speed

- **Criteria 1** — **Ave wind speed change of ≥ 10kts**

METAR FAPE 081300Z 100**10**KT 070V130 9999 FEW033 20/11 Q1024 **BECMG** 100**20**KT=

- **Criteria 2** — **Variation between gusts and ave wind speed is ≥ 10kts**
  The ave wind speed before and or after being ≥ 15 kts

METAR FAPE 091300Z 230**15**KT 070V130 9999 FEW033 20/11 Q1024 **BECMG** 23015**G25**KT=

- **Criteria 3** — **Ave wind direction change of ≥ 60°**
  The ave wind speed before and or after being ≥ 10

METAR FAPE 111300Z **360**07KT 070V130 9999 FEW033 20/11 Q1024 **BECMG** **300**15KT=

METAR FAPE 121300Z **300**15KT 070V130 9999 FEW033 20/11 Q1024 **BECMG** **240**07KT=

METAR FAPE 131300Z **090**15**KT** 070V130 9999 FEW033 20/11 Q1024 **BECMG** **030**15KT=

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Documented Local agreements

- Threshold values can be set and documented by the Met Authority in consultations with ATS authority/operators and then agreed upon.

- Threshold values can relate to:

- forecasted changes in surface wind and/or direction through values of operational significance
- forecasted changes in surface wind and/or direction that require a change in of runway
- forecasted changes in runway tailwind/crosswind component through values representative of operating limits of typical aircraft used at the airport.

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When encountering significant changes in wind speed and or direction, the following needs to be done

- When these significant changes in wind speed and or direction are expected in the next 2 hours; **indicate the significant change in wind speed and or direction using the BECMG change group.**

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Significant changes in surface visibility to be included using change groups (BECMG/TEMPO) in a TREND

- The prevailing visibility should be forecast. When visibility is forecast to vary in different directions, the lowest visibility should be forecast.
- When the visibility is forecast < than 800 m, it should be expressed in steps of 50 m;
- when it is forecast to be >= 800 m but < than 5 km, in steps of 100 m;
- >= 5 km but < than 10 km, in 1-kilometer steps;
- and when it is forecast to be >= 10 km, it should be expressed as 9999, except when CAVOK conditions are forecast.
- Any reduction in visibility below 5000m is a hazard to aviation

Significant changes in surface horizontal visibility to be included using change groups (BECMG/TEMPO) in a TREND

Horizontal visibility is deteriorating AND passes through the following…

A deterioration

Using RVR

Runway Visual Range

50m ↔ 175m ↔ 300m ↔ 550m ↔ 800m

800m ↔ 1500m ↔ 3000m ↔ 5000m

Horizontal visibility

Using eyes & visibility markers

An improvement

Horizontal visibility is improving AND changes to or passes through the following

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Examples of TREND forecast containing significant horizontal visibility changes (BECMG/TEMPO)

➢Criteria 1

Visibility deterioration

METAR FAPE 081300Z 23015KT 5000 RA BKN008 20/19 Q1024 **BECMG** 3000 RA=

OR

METAR FAPE 081300Z 23015KT 5000 RA BKN008 20/19 Q1024 **TEMPO** 3000 RA=

➢Criteria 2

Visibility improvement

METAR FAPE 081300Z 23015KT 070V130 5000 TSRA BKN010 FEW040CB 20/11 Q1024 **BECMG** CAVOK=

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When encountering significant changes in visibility; the following needs to be done

- When these significant changes in visibility are expected in the next 2 hours; **indicate the significant change in visibility and weather in a BECMG/TEMPO group.**

- N.B. If rain is lasting for more than an hour, use BECMG, if showery lasting for less than an hour use TEMPO

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Significant changes in weather phenomena to be included using change groups (BECMG/TEMPO) in a TREND

- One or more, up to a maximum of three, of the following weather phenomena or combinations thereof, together with their characteristics and, where appropriate, intensity, should be forecast if they are expected to occur at the aerodrome

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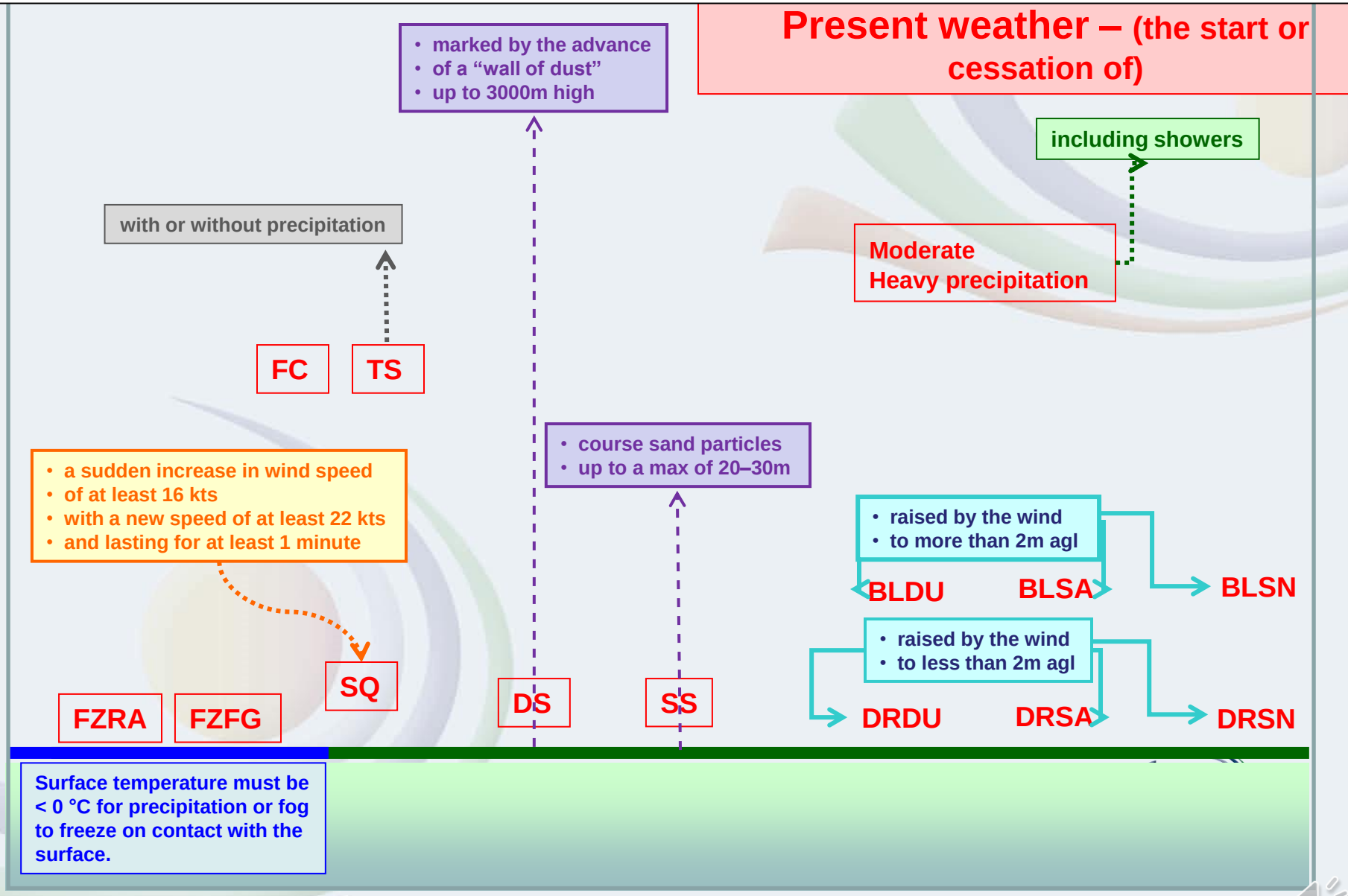
Significant changes in weather phenomena to be included using change groups (BECMG/TEMPO) in a TREND



Example of TREND forecast containing significant weather phenomena changes (BECMG/TEMPO)

Example:

METAR FAPE 081300Z 30010KT 9999 SCT045 FEW045CB 30/19 Q1020
BECMG TS=

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When encountering significant changes in weather phenomena; the following needs to be done

- When these significant changes in weather phenomena are expected in the next 2 hours; **indicate the significant change in weather phenomena and visibility in a BECMG/TEMPO** group.
- The total number of phenomena reported in TREND shall not exceed three.
- The expected end of occurrence of the weather phenomena in the TREND shall be indicated by the abbreviation “NSW”.

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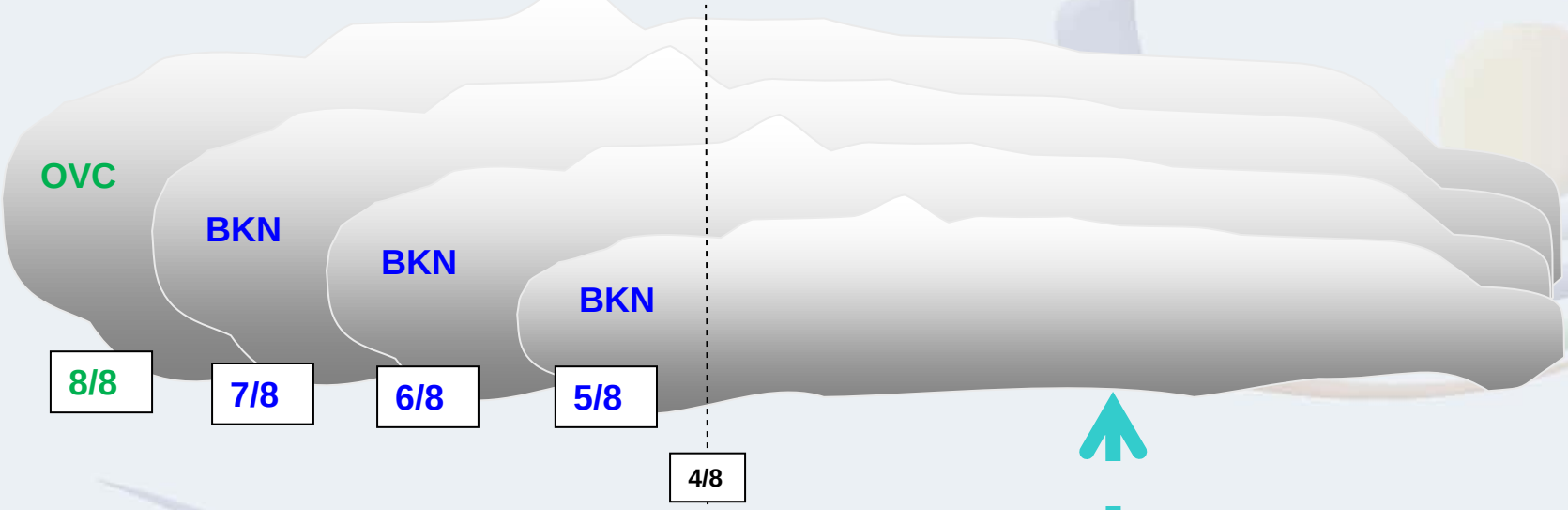
Significant changes in cloud cover or amount to be included using change groups (BECMG/TEMPO) in a TREND



Cloud cover changes from … … …

SCT or less → BKN or OVC

or from

OVC or BKN → SCT or less

Cloud base ≤ 1500 ft

Examples of TREND forecast containing changes in cloud amount (BECMG/TEMPO)

- **Cloud must be <= 1500ft:**

The following **are significant changes** in **cloud amount** within a **TREND forecast**:

METAR FAPE 081300Z 23015KT 9999 **BKN008** 20/19 Q1024 **BECMG SCT008**=

METAR FAPE 081300Z 23015KT 9999 **SCT015** 20/19 Q1024 **BECMG BKN015**=

METAR FAPE 081300Z 23015KT 9999 **OVC005** 20/19 Q1024 **BECMG FEW005**=

METAR FAPE 081300Z 23015KT 9999 **SCT010** 20/19 Q1024 **TEMPO OVC010**=

METAR FAPE 081300Z 23015KT 9999 **SCT005** 20/19 Q1024 **BECMG BKN005**=

The following **are not significant changes** in **cloud amount** within a **TREND forecast**:

METAR FAPE 081300Z 23015KT 9999 **BKN020** 20/19 Q1024 **BECMG SCT020**=

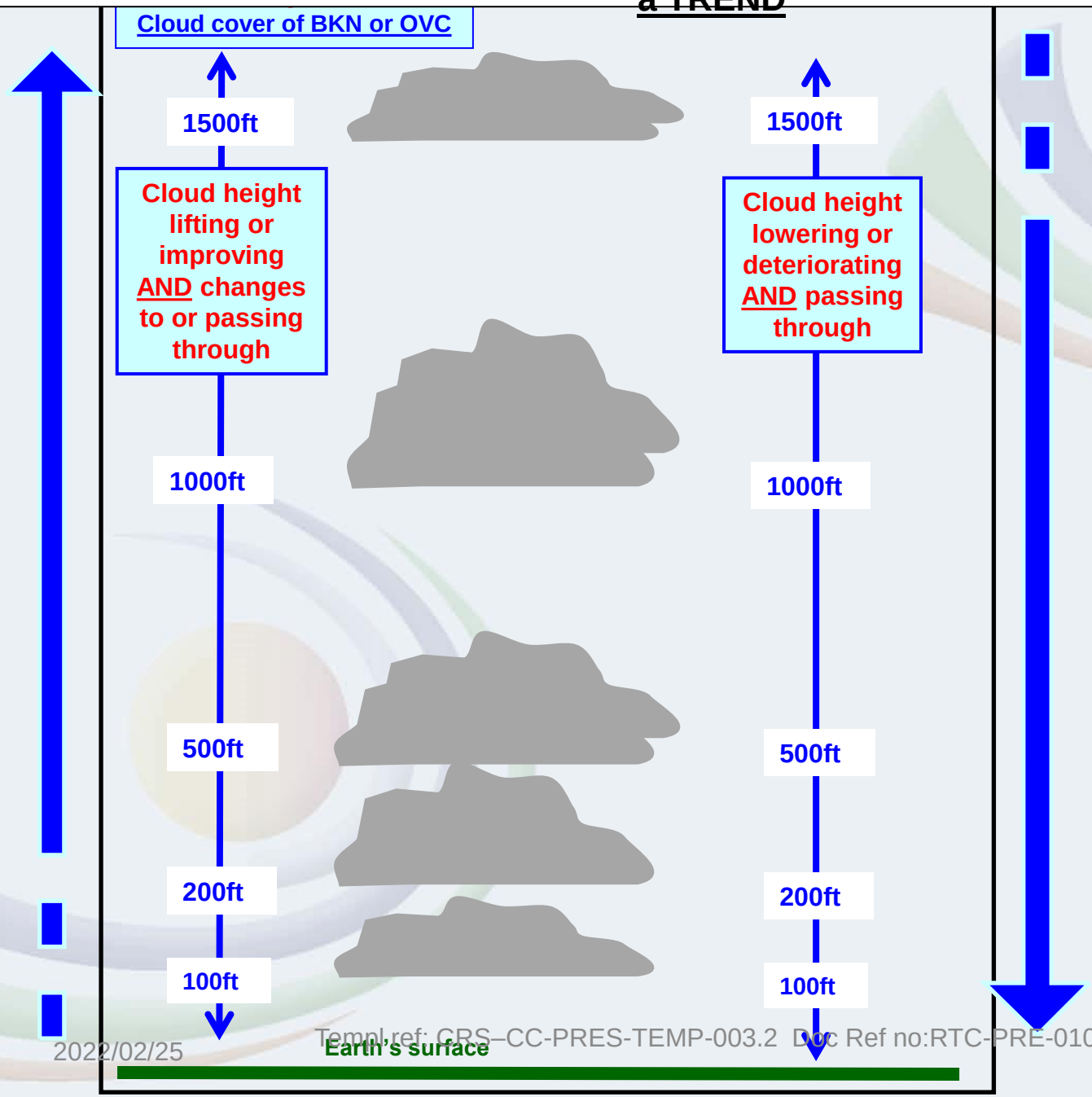
METAR FAPE 081300Z 23015KT 9999 **BKN010** 20/19 Q1024 **BECMG OVC010**=

METAR FAPE 081300Z 23015KT 9999 **OVC020** 20/19 Q1024 **TEMPO SCT020**=

METAR FAPE 081300Z 23015KT 9999 **SCT015** 20/19 Q1024 **BECMG FEW015**=

METAR FAPE 081300Z 23015KT 9999 **SCT005** 20/19 Q1024 **BECMG FEW005**=

Significant changes in cloud height to be included using change groups (BECMG/TEMPO) in a TREND



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Examples of TREND forecast containing significant changes in cloud height (BECMG/TEMPO)

- **Cloud must be BKN or OVC**

The following **are significant changes** in **cloud height** within a **TREND forecast**:

METAR FAPE 081300Z 23015KT 9999 **BKN001** 20/19 Q1024 **BECMG BKN005**=

METAR FAPE 081300Z 23015KT 9999 **BKN002** 20/19 Q1024 **BECMG BKN007**=

METAR FAPE 081300Z 23015KT 9999 **OVC010** 20/19 Q1024 **BECMG OVC015**=

METAR FAPE 081300Z 23015KT 9999 **OVC009** 20/19 Q1024 **BECMG OVC005**=

METAR FAPE 081300Z 23015KT 9999 **BKN015** 20/19 Q1024 **BECMG BKN001**=

The following **are not significant changes** in **cloud height** within a **TREND forecast**:

METAR FAPE 081300Z 23015KT 9999 **OVC020** 20/19 Q1024 **BECMG OVC025**=

METAR FAPE 081300Z 23015KT 9999 **BKN006** 20/19 Q1024 **BECMG BKN008**=

METAR FAPE 081300Z 23015KT 9999 **OVC003** 20/19 Q1024 **BECMG OVC004**=

METAR FAPE 081300Z 23015KT 9999 **BKN009** 20/19 Q1024 **BECMG BKN006**=

METAR FAPE 081300Z 23015KT 9999 **OVC012** 20/19 Q1024 **BECMG OVC014**=

When encountering significant changes in cloud (amount and height); the following needs to be done

- When these significant changes in cloud amount and height are expected in the next 2 hours; **indicate the significant change in cloud amount and height in a BECMG/TEMPO group**.

- When no cloud is expected below 5,000 ft (1,500 m) or no cloud below the highest minimum sector altitude and no Cumulonimbus (CB) or towering Cumulus (TCU) at any level and a horizontal visibility of at least 10 km or more – **CAVOK**

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Significant changes in Temperature

- When considering a **TREND** or landing forecast, significant temperature changes don't affect the length of runway needed to land and thus **no action is required**.

TEMP
An increase of ≥ 2°C at any given point in time

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References

- Aviation Practical Course Notes
- ICAO Annex 3, Latest addition
- DOC 8896

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