

FORECASTING ACTIVITIES DURING THE SOP

THE WEST AFRICA SYNTHETIC ANALYSIS WASA/F APPROACH

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1. Forecasting requirements

1. Operational needs:

- Provide the **forecasts** of key aspects → AOC decisions
- Help to **plan IOPs** and relevant observation strategies
- **Security** (aircraft protection)
- Answer to PIs and platforms needs

2. Contribute to the science:

- Evaluate the skill of models
- Predictability
- Feed the scientific discussion at AOC based on a description of the WAM system at all scales and for all its components



2. Tools -Methods

- Synergie Forecasting System (MF)
 - 4 Stations at ACMAD
 - Fed with NWP products + MSG with the RETIM link
- AOC-Web site (Medias, MF)
 - VSAT internet link at ACMAD
 - Reports, quicklooks, NWP, diagnostics, research models...
 - MCS tracking: RDT from SAF-Nowcasting
- Synthetic analysis
 - Main features on a single synthetic map for analysis and forecasts
 - WASA at 06, 18: West Afr. Synthetic Analysis (2) at D-1, D
 - WASF at 06, 18: West Afr. Synthetic Forecast (5) at D, D+1 and D+2



WA Synthetic Analysis/Forecast

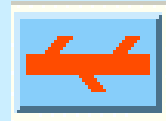
List of the 10 key features to put

1. ITD
 2. Heat-Low
 3. SubTrop Jet
 4. Trough from midlatitude
 5. TEJ
 6. AEJ
 7. Troughs and cyclonic centres associated to African Easterly Waves (AEW)
 8. Midlevel dry intrusions
 9. Monsoon layer
- 9 Provided by models*
- Models skill is OK*



WASA/F Drawing rules

1. ITD Intertropical Discontinuity OK



1. Convergence line at **surface** between southerly and northerly trade winds
2. Strong **gradient** (if available) θ_w , Td or relative humidity
3. Td =15°C
4. Pressure minima for some regions (West coast region, also Chad, Soudan...)
5. Weather, clouds... (in practice)

2. Heat Low

OK

Outlined by the pressure lower than a given threshold (between 1004 and 1008 hPa)

- **At 0600Z: 1008 and 1006 hPa isolines**
- **At 1800Z: 1006 and 1004 hPa isolines**

Indicate Low locations by the lowest values



WASA/F Drawing rules

3. Subtropical or Polar Jet



Drawn the STJ core above 35 kt at 200 hPa

Need improvement

- Objective method

- Clearer rules

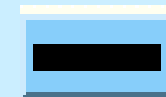
- Specific diagnostics

If intense add (look at divergence field)

- Entrance
- Exit zones



4. Trough axis North the ITD



Need improvement

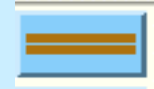
Vorticity or wind rotation or streamlines

at midlevel (500 or 600 hPa) → PV anomaly + WV channel (to be studied)



WASA/F Drawing rules

5. Tropical Easterly Jet



Draw the TEJ core above 35 kt (more when the monsoon is well established)
at 200 hPa or even higher (150-100 hPa).

Caution: draw the jet-stream (core) not the maximum of speed owing to the use of the stream lines

Not obvious in some cases!

- Widespread region
- Several maxima...

Need improvement



WASA/F Drawing rules

6. African Easterly Jet



- Draw the AEJ core above 20 kt/s at 600 hPa (if available) or 700 hPa

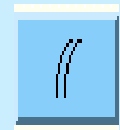
Not obvious in some cases!

- Widespread region
- When over Gulf of Guinea
- 600 hPa not available with Synergie

Need improvement

→ Add a map of wind and streamlines at 700 hPa

7. African Easterly Waves



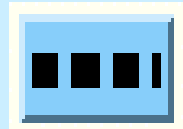
Need improvement

- AEW Trough around AEJ level (700 hPa)
- + Vortex centers at 850 hPa with the C symbol
- + Anticyclonic centers at 850 hPa with the A symbol



WASA/F Drawing rules

8. Dry air boundaries



Need improvement

Draw the **outline of the Dry air masses** where the horizontal gradient of T_d

Evolution: better to use a **T_d threshold ($< -36^\circ\text{C}$ at 500 hPa),**

or θ'_w is maximum at mid-level (500-600-700 hPa).

θ'_w less than 19°C is the maximum required energy.



WASA/F Drawing rules

9. Monsoon layer & Low level energy

Crucial but not easy to figure on the WASA/F

→ Need to look at:

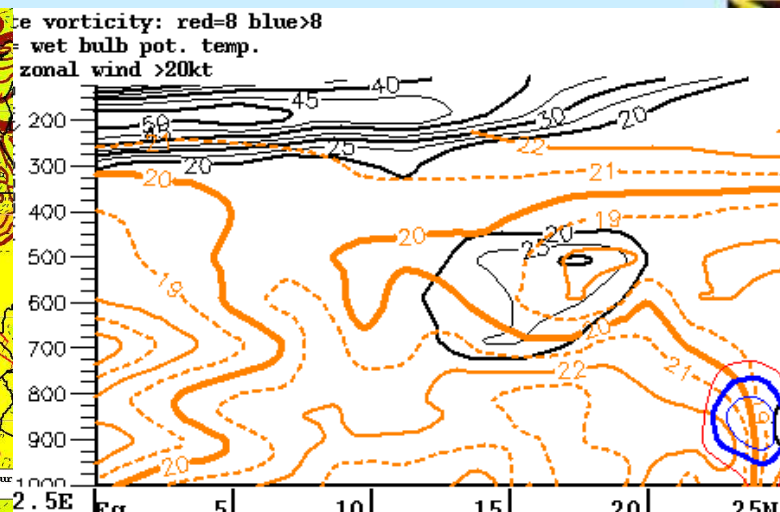
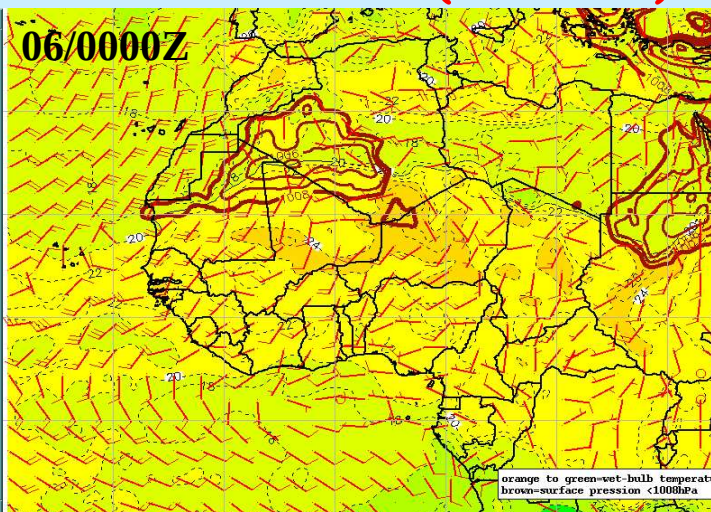
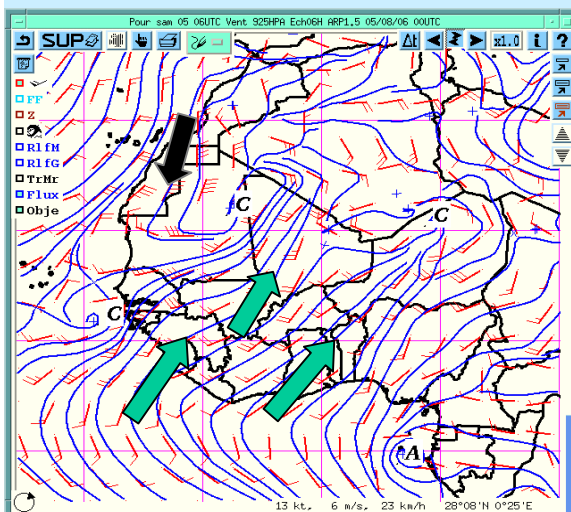
Stream lines - wind
925 and 850 hPa

T_d , θ'_w , θ_e

Surface fields (950 hPa)

Need improvement

Monsoon depth
vertical cross section



- CAPE
- CIN: not available diagnostic → look at soundings
- Precipitable Water
- Shear
- Latent heat fluxes - Soil moisture

Accumulated rain of previous days,
Soil temperature (AMSR 5 day delay)

WA Synthetic Analysis/Forecast

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10. Convective activity:

- a. Suppressed convection
- b. Convection: isolated, MCS and Squall Lines

Other features



WASA/F Drawing rules

10. Convective activity



- Convective areas result from the **combination of favorable conditions** listed before, such as:
 - Instability, precipitable water, amount of energy
 - Vortex at 850 hPa
 - Associated with a trough (who is responsible?)
 - Shear and midlevel dry air for the fast-moving SL
- Convection is not well represented in present models → be careful, **do not trust** them to much
 - Humidity field, precipitation, vertical motions
 - Vortices are better treated, but caution wrong convection area can generate erroneous vortices.
- But models are useful if confronted to the forecast and to observations.

*Depends on
the Forecaster expertise
and experience*





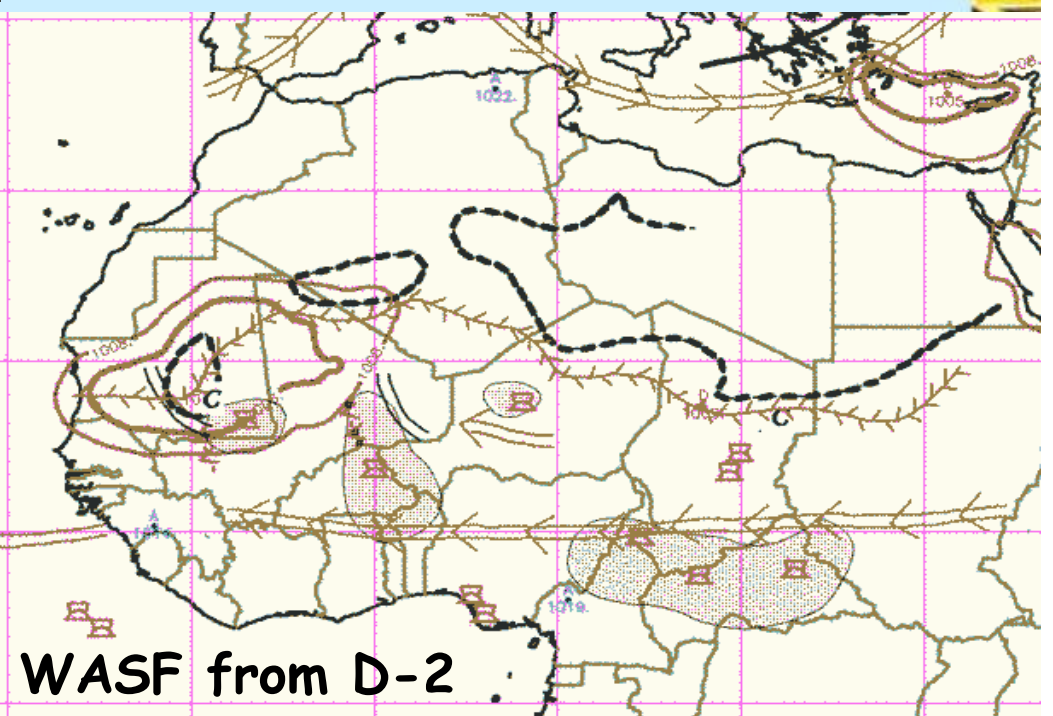
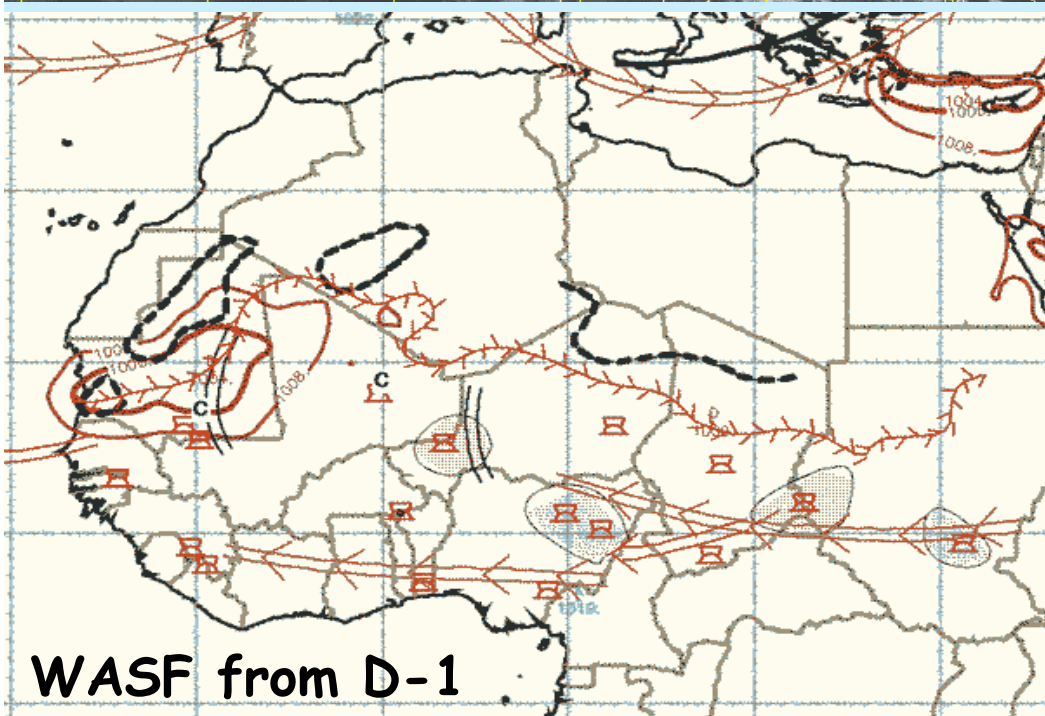
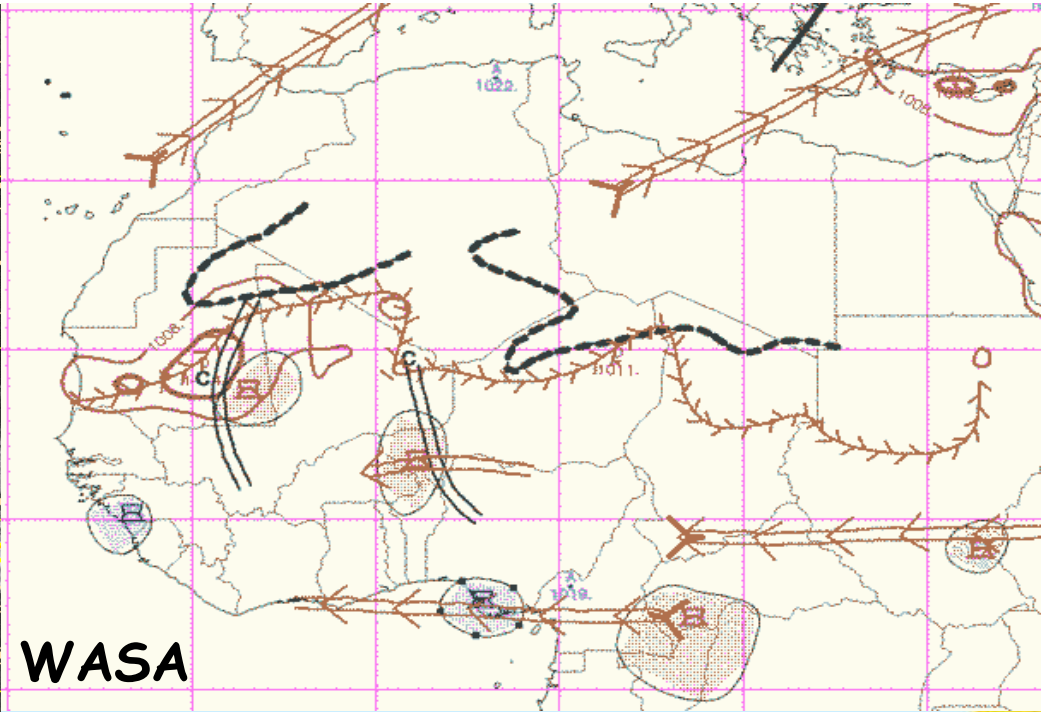
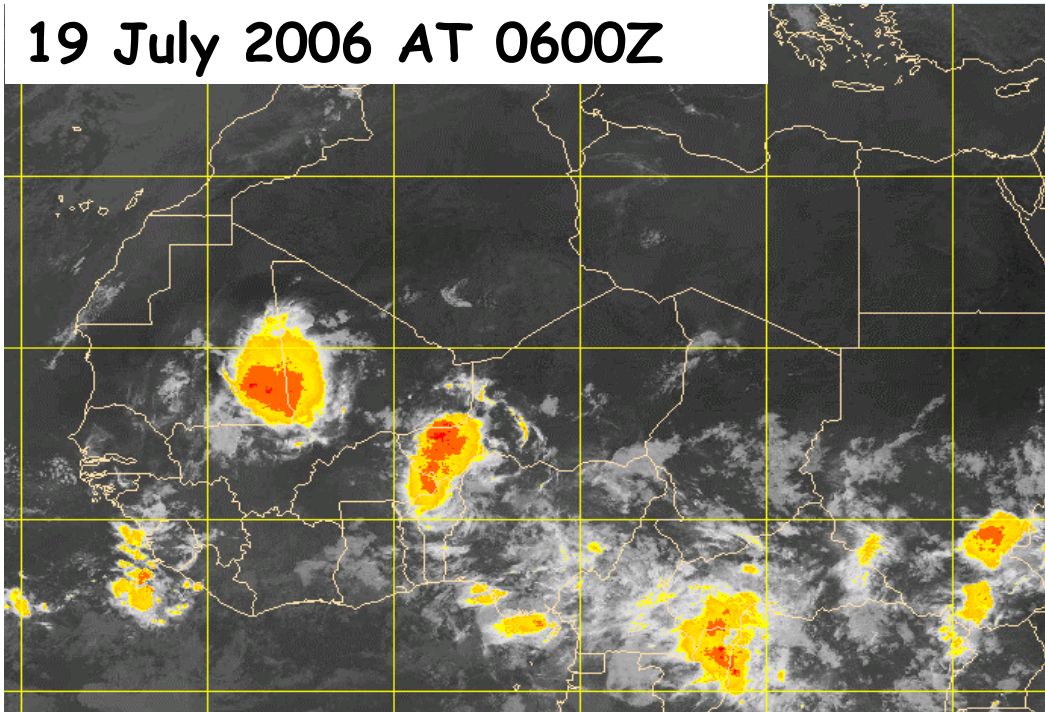
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C



19 July 2006 AT 0600Z



Conclusion

- WASA/F approach tested during 4 months
- Useful way to synthesize
- Very rich experience

Further Tasks

1. Evaluation
2. Improvement
 - *Objective method*
 - *Clearer rules*
 - *Specific diagnostics*
3. Adaptation to
 - *Other seasons*
 - *Other African regions*

→ *collaboration between
Scientists and forecasters*

