

Analysis of the AMF 2006 Niamey Radiosonde Data: Some Preliminary Results

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Introduction

The 2006 ARM Mobile Facility (AMF) deployment in Niamey in support of the RADAGAST component of the AMMA Programme brought out a more complete picture of the Sahelian atmospheric environment.

This poster presents an analysis of the AMF rawinsonde soundings made in Niamey between January 07, 2006 and January 07, 2007. This is a comprehensive study of all soundings considered together and at the principal synoptic observation times (0000, 0600, 1200, and 1800 UTC). The analysis focuses on temperature, humidity, and wind data, in order to better document their annual, seasonal, and diurnal cycles. Also highlighted are some specific regional climate features that prevailed during the two main seasons (dry and humid).

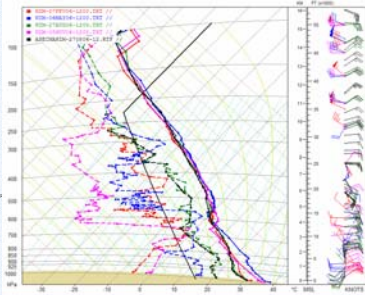
Weather and climate seriously impact socioeconomic development in the Sahel. However, very few in-depth investigations of the Sahelian atmospheric environment have been conducted until now. Therefore, the results of the present study will help improve meteorological applications for development in this highly climate sensitive area.

> **Data:** processed 1441 soundings, including 12 ASECNA (0000 & 1200); 19 definitely missing, essentially 0600 and 1800;

> **Software and limitations:** The RAwinsonde OBServation Program v5.8, allows only up to 1,000 soundings per cross-section;

> **Investigated parameters:** Temperature and Wet Bulb Temperature, Precipitable Water and Liquid Water Content, Dew Point Depression, Mixing Ratio, Wind speed, Zonal U-component of the wind, Meridional V-component of the wind.

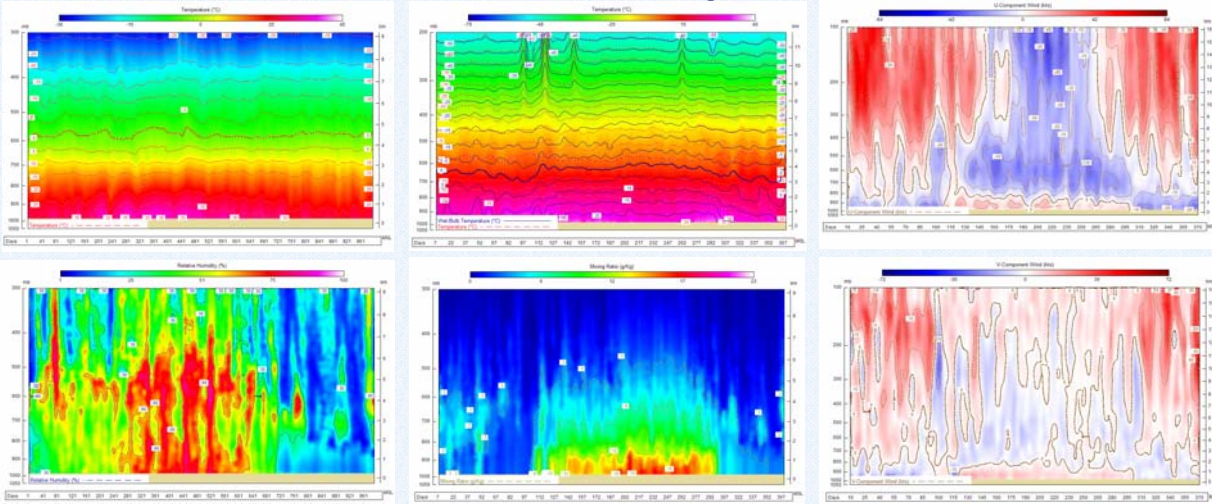
TYPICAL SOUNDINGS REPRESENTATIVES OF DRY, TRANSITION DRY-TO-HUMID, HUMID, AND TRANSITION HUMID-TO-DRY SEASONS. ALSO APPEARING: ASECNA AND ICAO SOUNDINGS



Principal synoptic observation times

Global Pictures

January 07, 2006 to September 18, 2006 (all soundings)



May 01, 2006 to January 07, 2007 (all soundings)

Potential applications:

- ❖ Monsoon forecasting
- ❖ Impacts of dust haze episodes upon physical parameters of the atmosphere
- ❖ Mesoscale Convective Systems in the Sahel

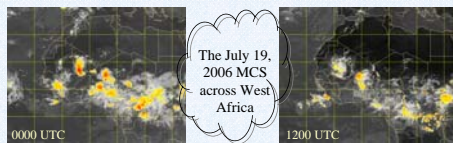
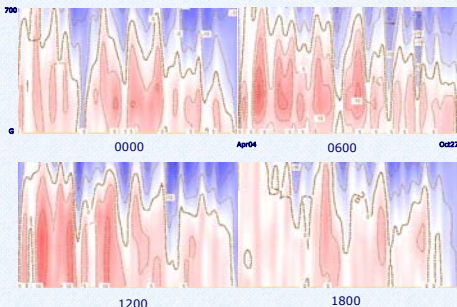
Main findings:

- ✓ Atmospheric layers, ABL (Ground to 800hPa), 600hPa
- ✓ Position and intensity of jet streams (AEJ, TEJ, STWJ)
- ✓ Monsoon onset, withdrawal, depth

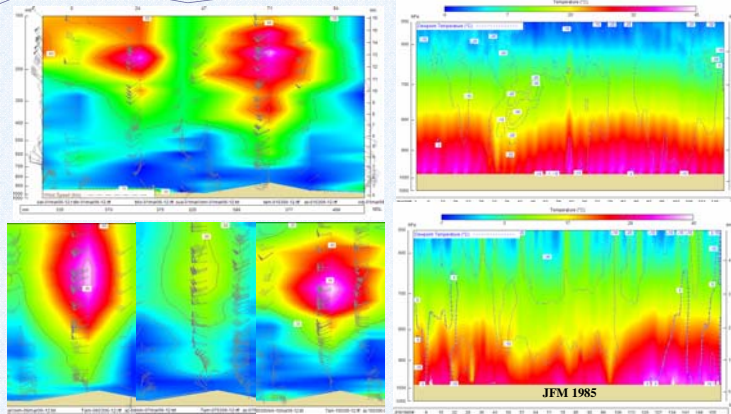
Suspended dust affects atmospheric humidity

Dust over Niamey as a result of cold front across the Sahara

Monsoon intensity - Niamey 2006



The July 19, 2006 MCS across West Africa



Further investigations

- ✓ Vertical temperature and wind gradients; atmospheric stability studies
- ✓ Explanation of the generation mechanisms of the atmospheric dust observed in Niamey during AMF deployment;
- ✓ Atmospheric environment related to Squall Lines across the Sahel zone during 2006.

CONCLUSION

AMF Niamey 2006 soundings: unique dataset for the Sahel zone, provides a good insight into the local atmosphere; need to maintain/upgrade existing network. Main findings and applications: ground radiative effects, high altitude humidity, ~600 hPa layer, monsoon forecast, explanation of the area's main climatic features; Further investigations: explanation of the 0900 low level wind surge and associated local dust generation mechanism; Additional measurements needed in this area: vertical ozone profiles combined with radiation measurements.

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