AIR-SEA INTERACTION OVER WEST AFRICA

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1- OBJECT OF STUDY

a- Analysis of temperature annual series in the low layers at Dakar

b- Comparison with ERA40 reanalyzed temperature

c- Correlation of low temperature inversions with wind pattern

2- DATA

a- Twice daily (00 and 12 UTC) temperature from Dakar station radiosoundings between ground and 850 hPa leval for year 2001

b- Temperature from ERA40 reanalyses at several grid-points around Dakar for year 2001

3- METHODS

a- Statistical analysis and comparison between observed and reanalyzed temperature;

b- Detection of temperature inversion

4- RESULTS AND DISCUSSIONS

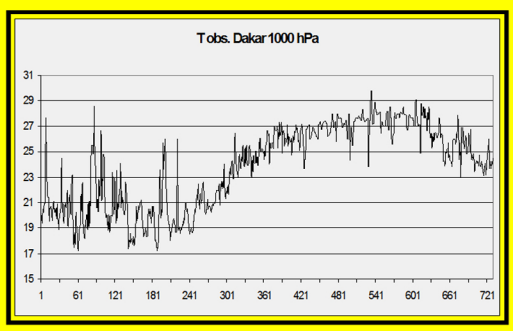

Figure 1: Temperature (°C) at 1000 hPa level as observed at Dakar years 2001

	1000 hPa	850 hPa
Moyenne obs (*mobs*)	23.86	21.18
Moyenne analyses (*man*)	24.53	20.96
Ecart-type analyse (*etan*)	2.76	2.11
Ecart-type obs (*etobs*)	3.23	2.30
Ecart moyen (*E*)	-0.67	0.21
Ecart quadratique (*etE*)	1.68	0.80
etE / *etobs*	0.52	0.35
Pourcentage (%)	91.9	97.4
Corrélation Obs/Era	0.86	0.93
Corrélation inter-niveau	-0.19	

Table 1: Average (man) and standard deviation (etan) of the reanalyses at the point 14.63°N/18°W; standard deviation of the observation (etobs), average difference (E) between observation and analysis; standard deviation (etE) of this difference; ratio etE / etobs, percentage of cases where Ei was higher than the climatological standard deviation etobs ;Correlation between obs and Era and between obs of the two levels

Month	Percentage of inversion	Thickness of temperature inversion layer (m)
January	100%	322
Febuary	100%	277
March	100%	374
April	100%	398
May	100%	392
June	98%	320
July	79%	216
August	69%	202
September	80%	167
October	95%	189
November	97%	173
December	92%	249

Table 2: Monthly percentage of temperature inversion and mean variation of thickness of the temperature inversion layer

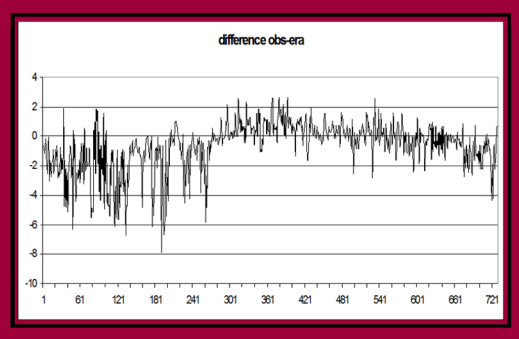

Figure 2: Difference (°C) between observed and reanalyzed temperature at nearest grid-point at 1000 hPa level , year 2001

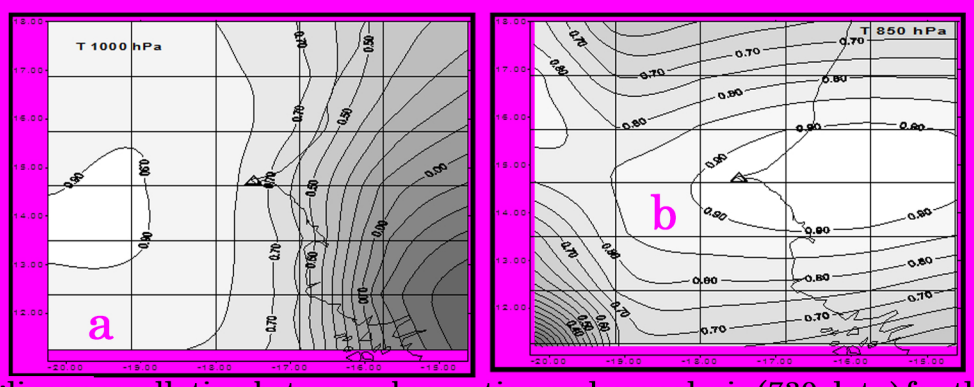

Figure 3:linear corellation between observation and reanalysis (730 data) for the grid points around Dakar

a) 1000 hPa b) 850 hPa

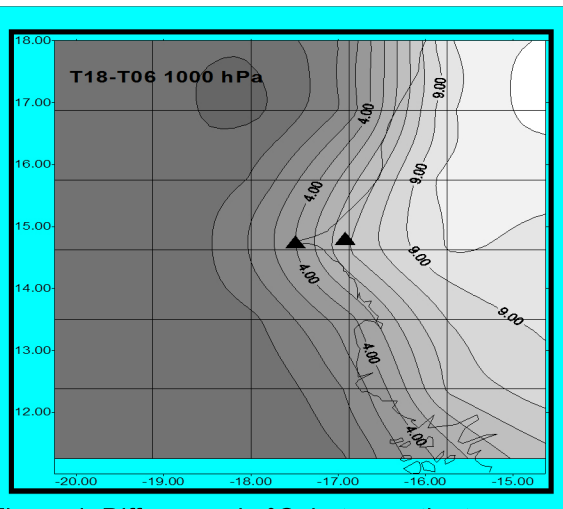

Figure 4: Difference, in °C, between the temperature at 18 and 06 UTC of reanalyses, at 1000 hPa. Black triangles, Dakar and Thiès.

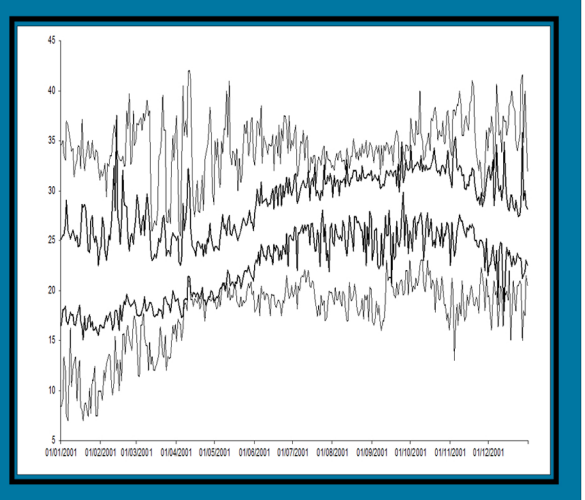

Figure 5: Tmax and Tmin surface observed temperature (°C) at .Dakar (thick lines) and Thiès (thin lines) ; year 2001

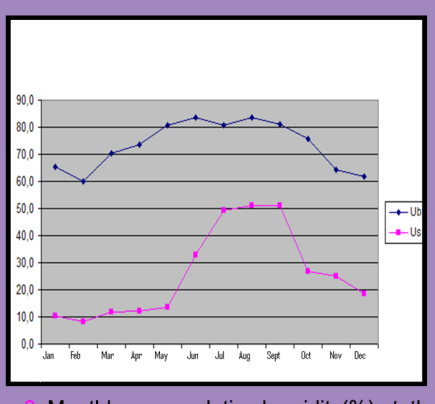

Figure 6: Monthly mean relative humidity(%) at the top (Us) and bottom (Ub) of inversion layer, Dakar, year 2001

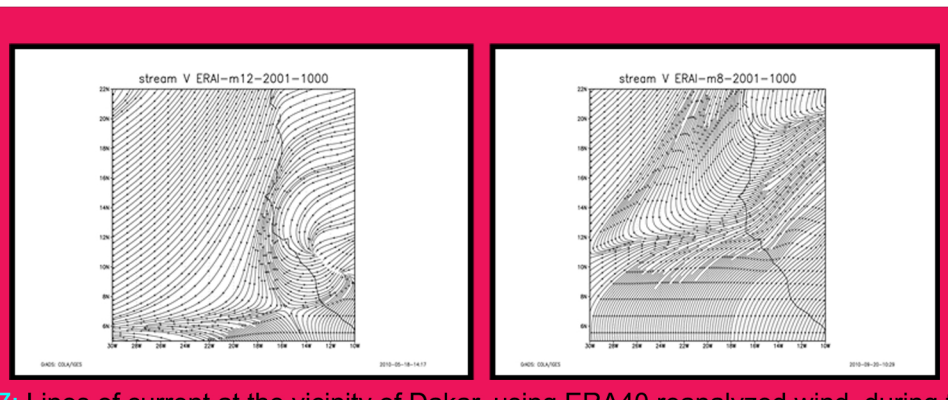

Figure 7: Lines of current at the vicinity of Dakar, using ERA40 reanalyzed wind during the dry (sesaon (Fig 7-a) and during the rainy season (Fig 7-b

5– CONCLUSION

In the West African coastal zones,

1– ERA40 temperatures restore well the observed temperatures using radiosoundings

2– The diurnal as the seasonal horizontal and vertical variations of temperature are strongly influenced by the daily and seasonal variability of the wind:

- at 1000 hPa, the wind blows from the sea while it comes from the continent at 850 hPa,
- An effect of night and day breeze is noticed which advecte on the coast a dry or wet diet

18th AMS Conference on Air-Sea Interaction

Poster No 076