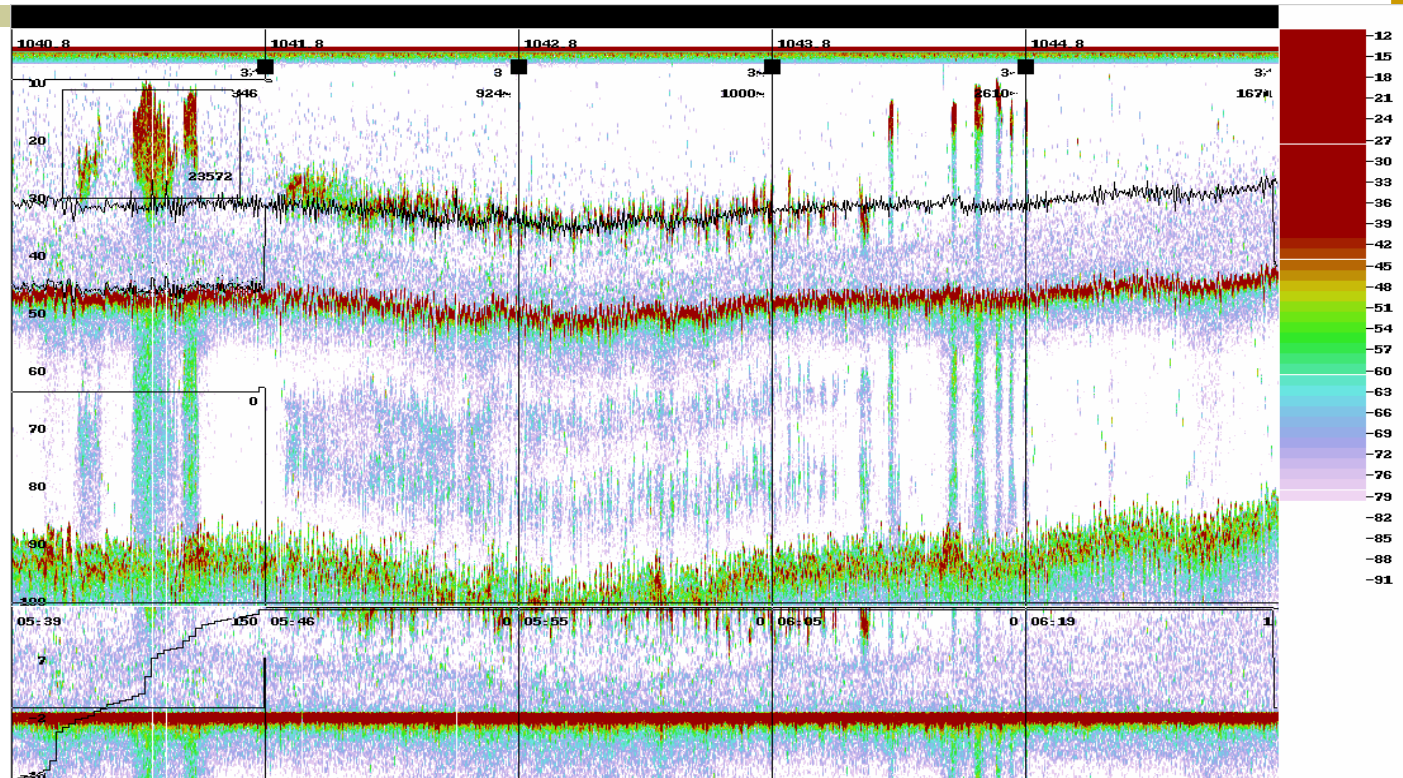


CONTRIBUTION TO ACOUSTIC TARGETS IDENTIFICATION IN NORTH WEST AFRICA BY STATISTICAL PROPERTIES

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1. CRODT, Dakar, Senegal
2. INRH, Casablanca, Morocco
3. IMROP, Nouadhibou, Mauritania
4. IMR, Bergen, Norway

Objectif



- Trawling.

- knowledge on the fish behavior and species associations ———> Possible subjective decisions???

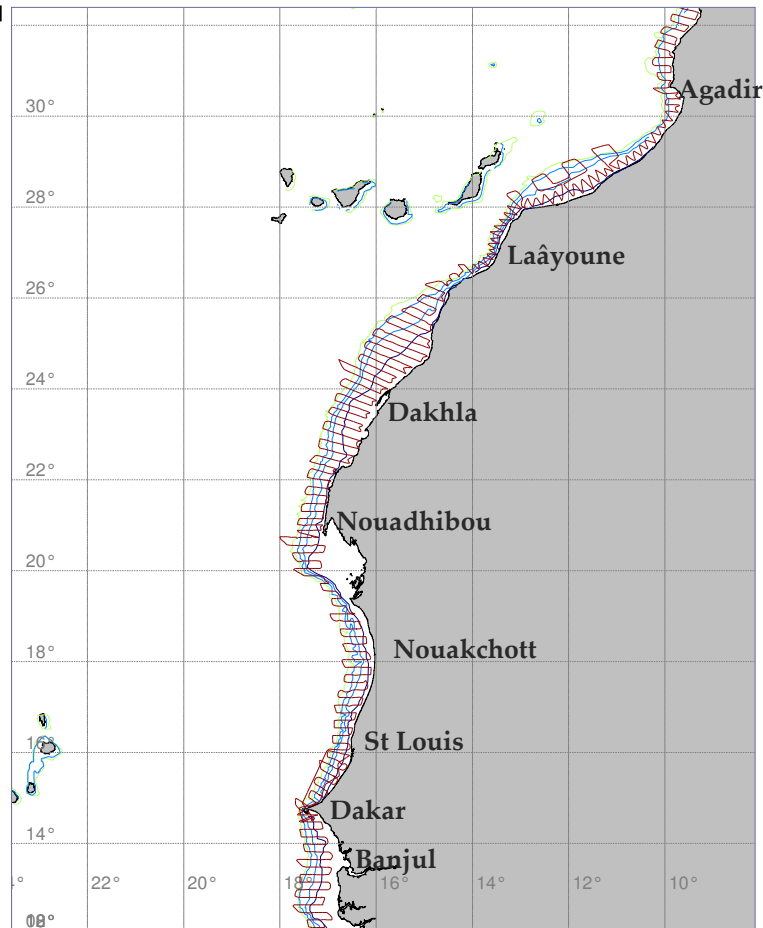
- Experience....



Outline

- The sampling process
- Typical echograms description
- Statistical descriptors
- Factorial analysis
- Discussion and perspectives

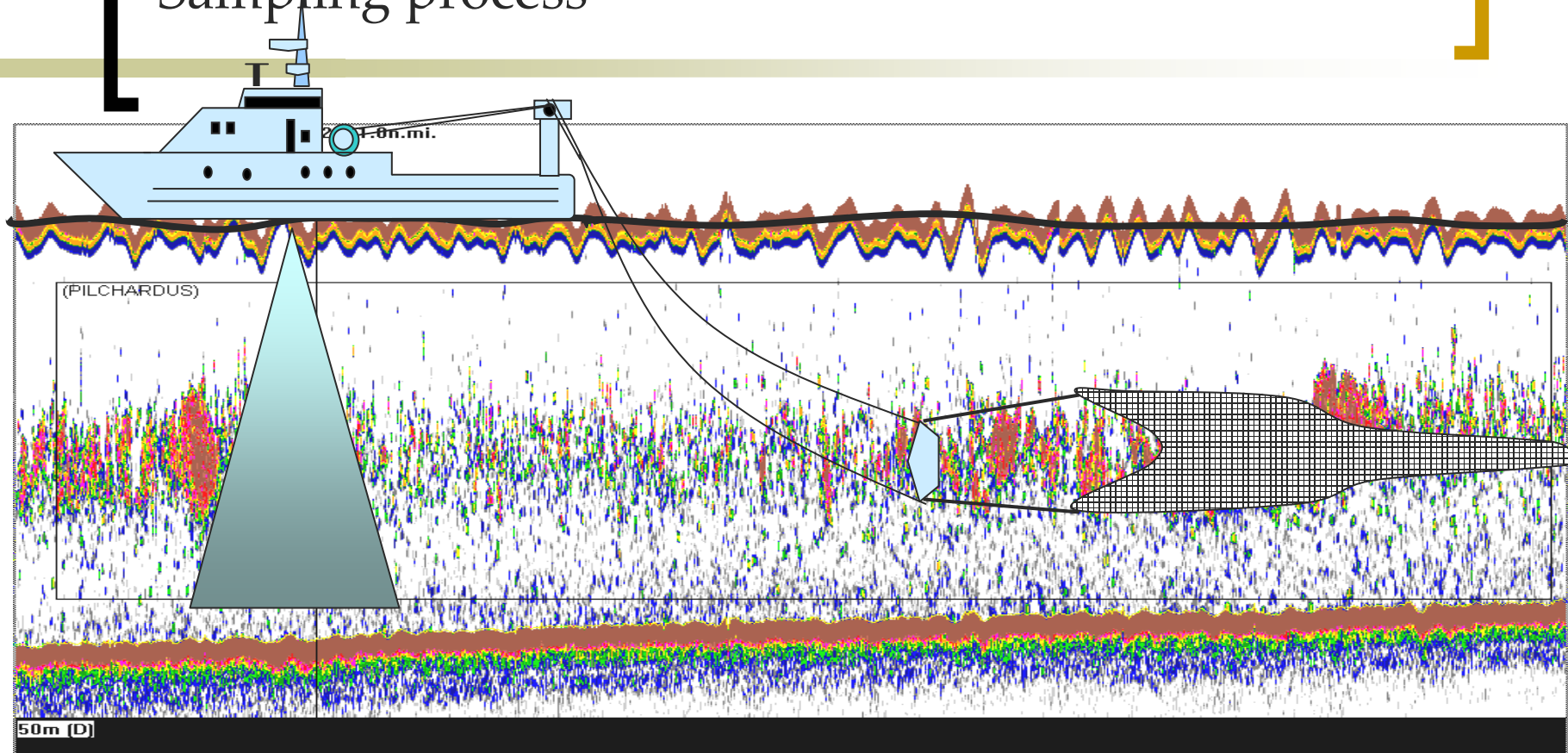
Sampling process



- 6790 miles covered:
 - 1310 in Senegambia
 - 1340 in Mauritania
 - 4140 in Morocco
- 90 Echograms collected
 - Daytime
 - Night time

Dr Fridtjof Nansen course track in Nov-Dec 2003-2004

Sampling process



- Monospecific schools: One species represent more than 70%
- Typical echograms: Occurrence in echograms collection is more than 40%
- Statistical descriptors are extracted from boxed schools in the echograms

Target species



Sardina pilchardus
Photo Fridjof Nansen, Maroc, décembre1998.



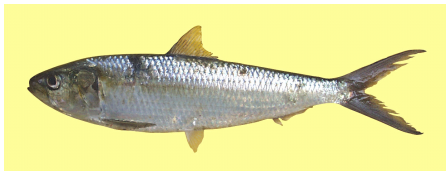
Engraulis encrasicolus
Photo Fridjof Nansen, Maroc, décembre1998.



Trachurus trachurus
Photo Fridjof Nansen, Maroc, novembre1998.



Trachurus trecae
Photo Fridjof Nansen, Angola, Mai1998.



Sardinella aurita
Photo Fridjof Nansen, Angola, Mai1998.

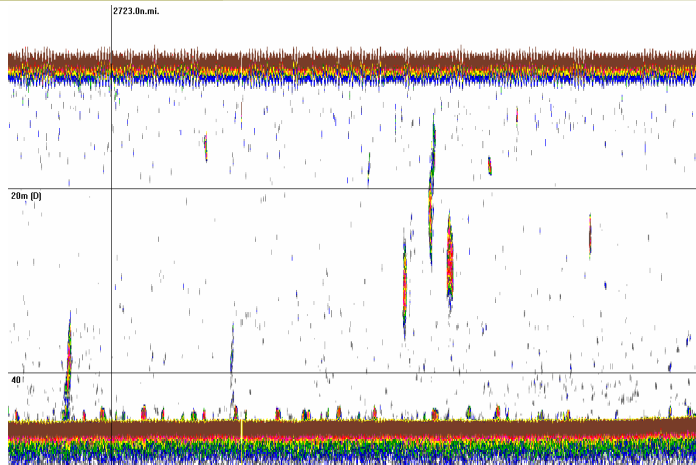


Sardinella maderensis
Photo Fridjof Nansen, Angola, Mai1998.

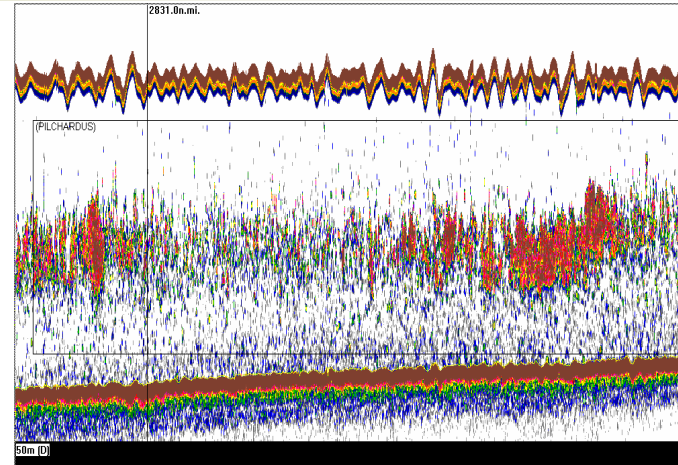


Scomber japonicus
Photo Fridjof Nansen, Angola, Mai1998.

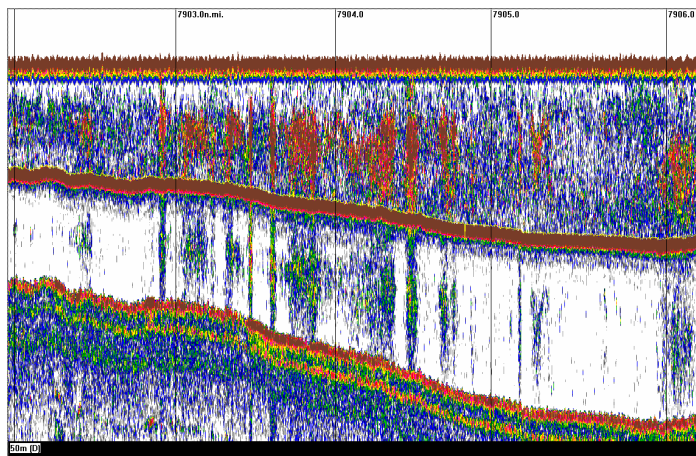
Sardina pilchardus



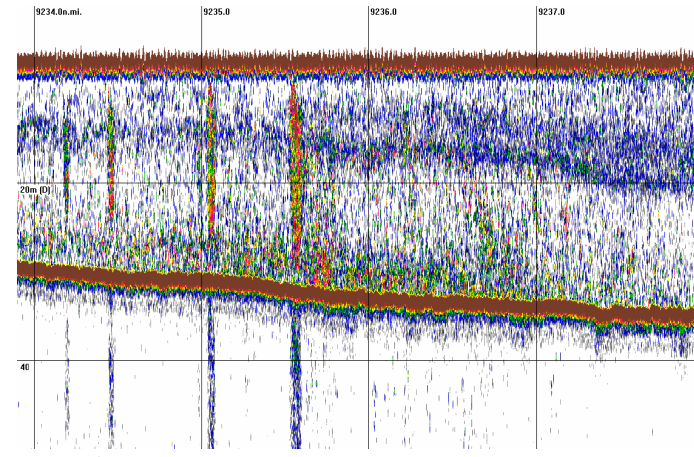
Daytime, Morocco



Night time, Morocco

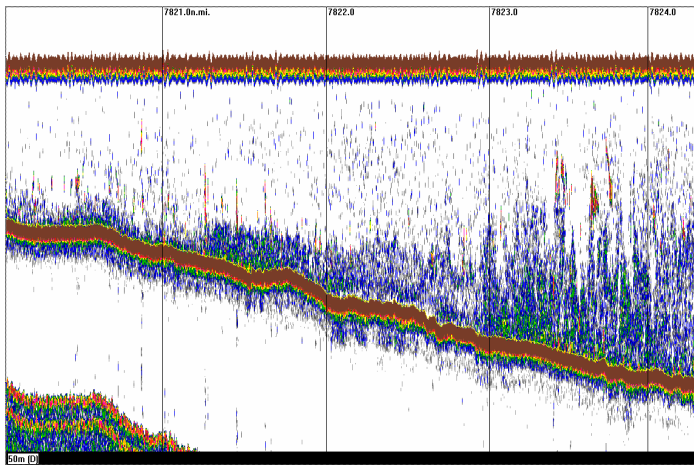


Daytime, Mauritania

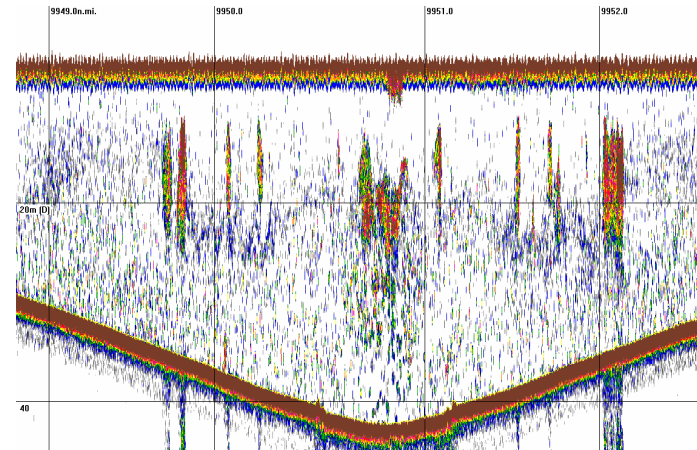


Night time, Mauritania

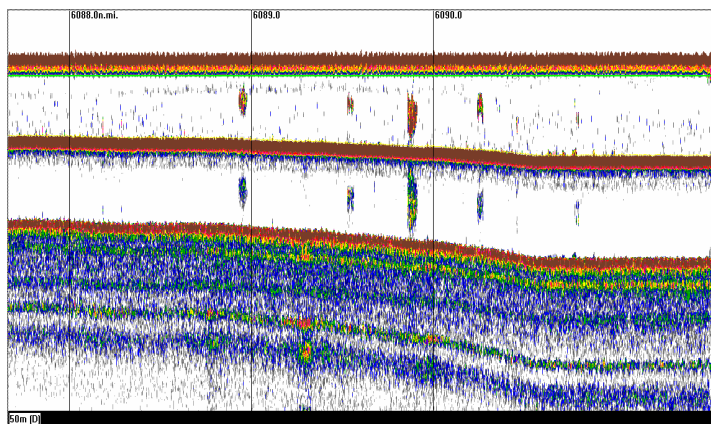
Sardinellas



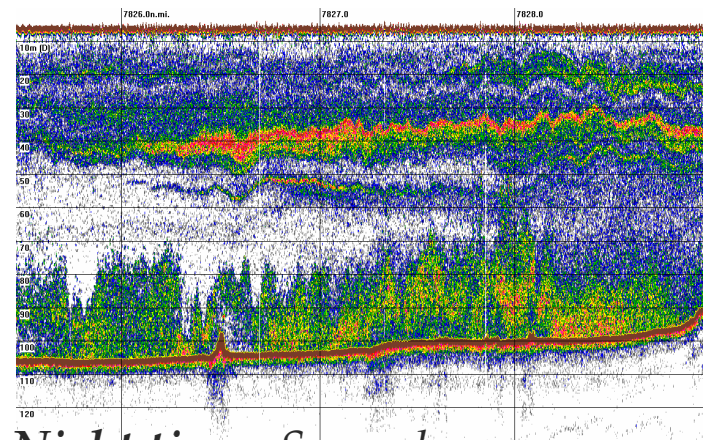
Daytime, Mauritania



Night time, Morocco

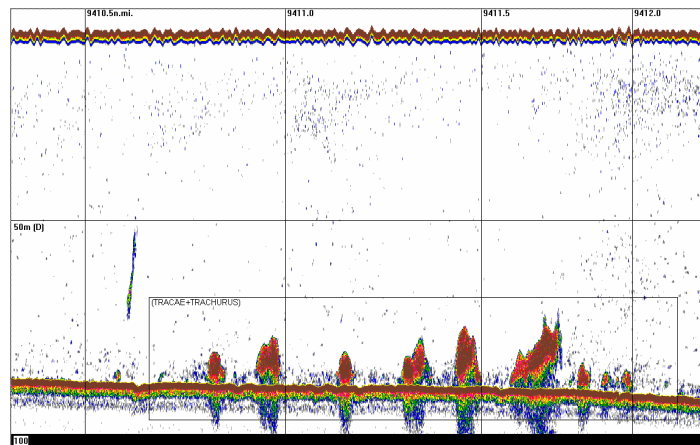


Daytime, Senegal

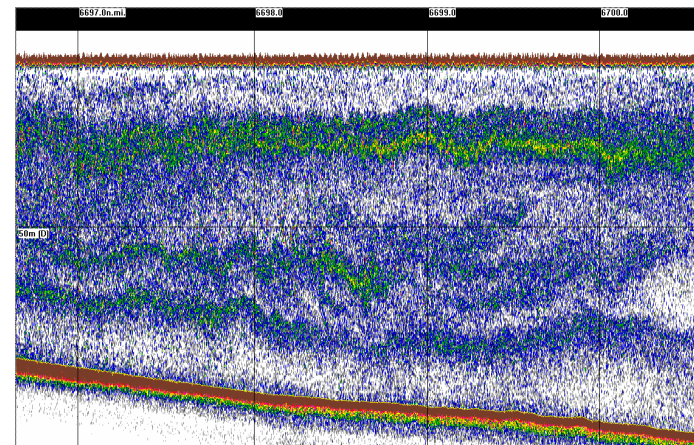


Night time, Senegal

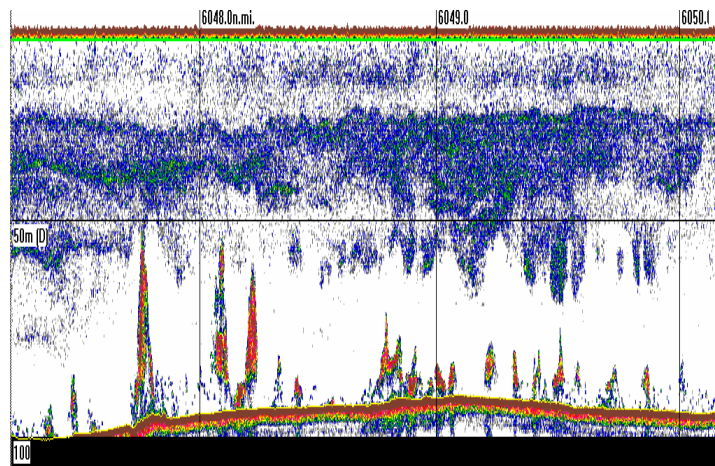
Horse mackerels



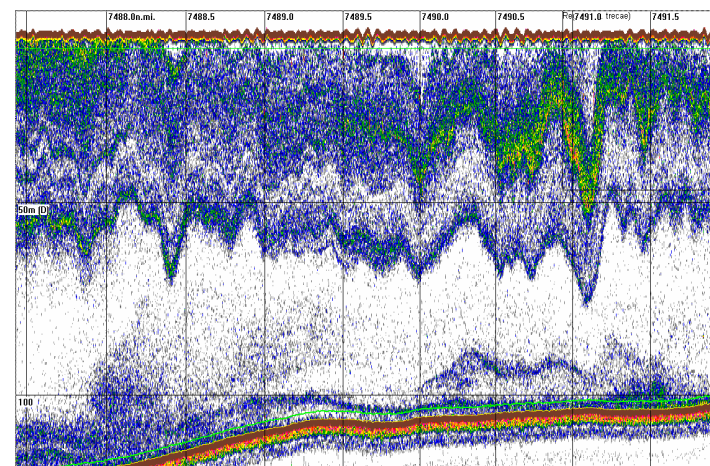
Daytime, Morocco



Nighttime, Mauritania

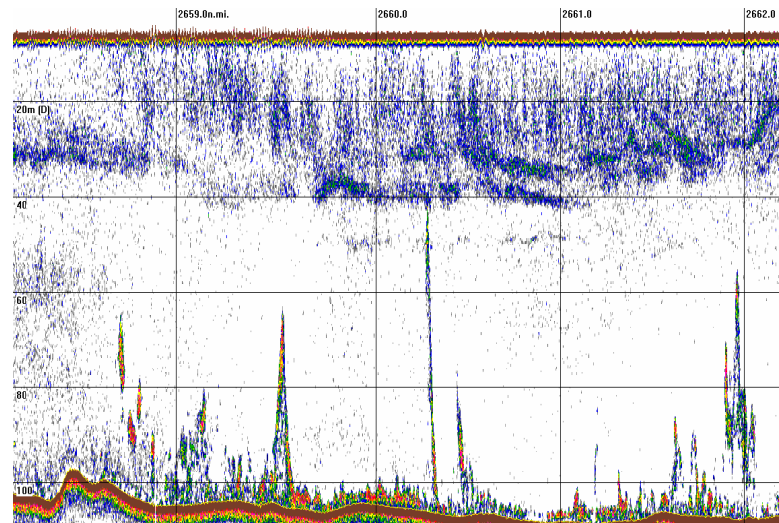


Daytime, Senegal

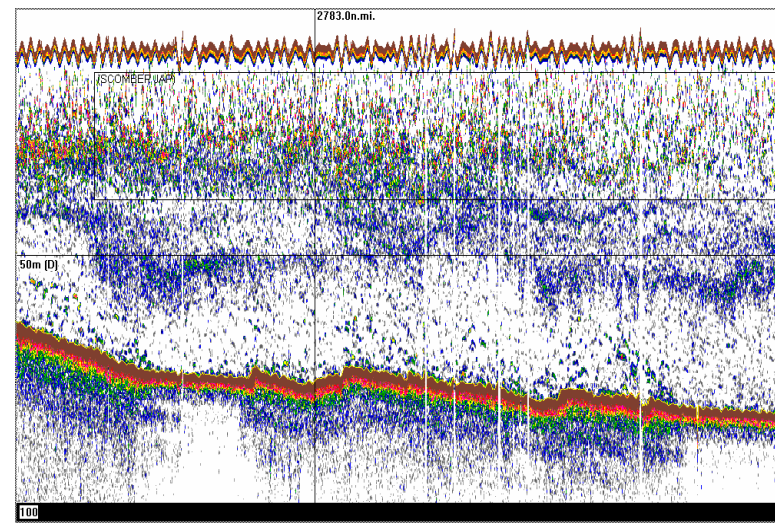


Nighttime, Senegal

Chub mackerel

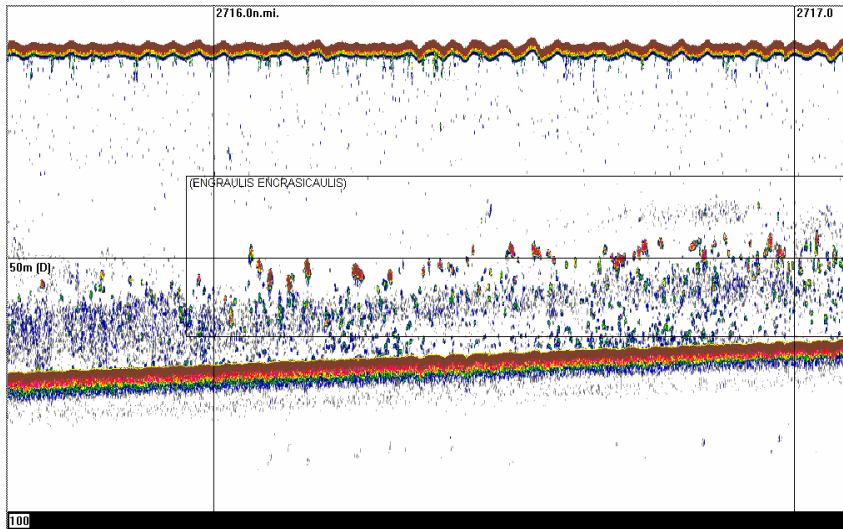


Daytime, Morocco



Night time, Morocco

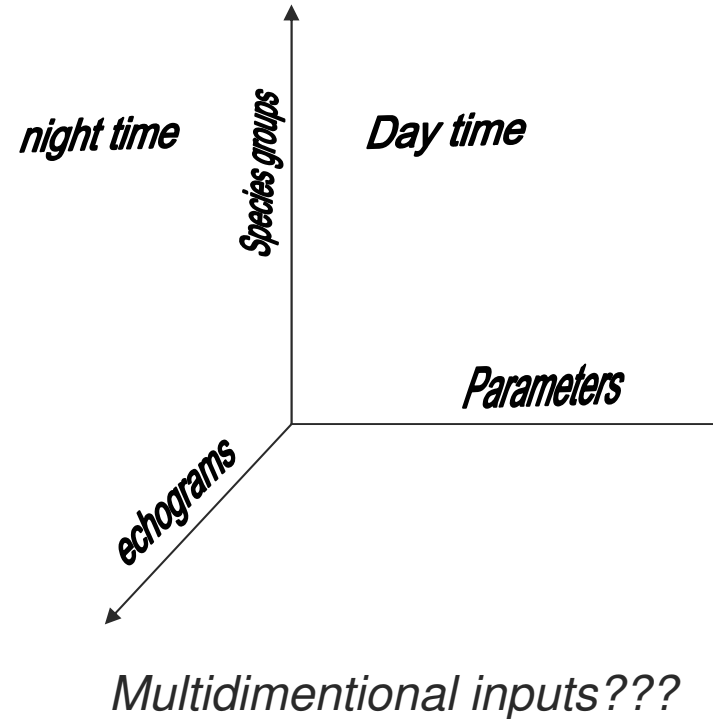
Anchovy



Daytime, Morocco

Statistical schools descriptors

- School s_A
- Skewness
- Average SV
- Kurtosis
- Height
- ImageCompactness
- Distance from surface
- Length
- Distance from bottom
- Bottom depth



Statistical schools descriptors: codification

1- Echogram codes: figure number

2- Parameters code

Sv mean	Svmean
NASC(1/1000)	Nasc
Density Number (nm)	dn
Area Length(nm)	arlenh
Skewness	skew
Kurtosis	kur
Image Compactness	imcompness

3- Species groups codes

Sardina pilchardus	P
Sardinellas	S
Trachurus	Tr
Scomber japonicus	Sc
Engraulis encrasicolis	-

4- Day-night factor

Day	d
Night	n

Example: n27p : figure 27.night time, Pilchardus

Factorial analysis

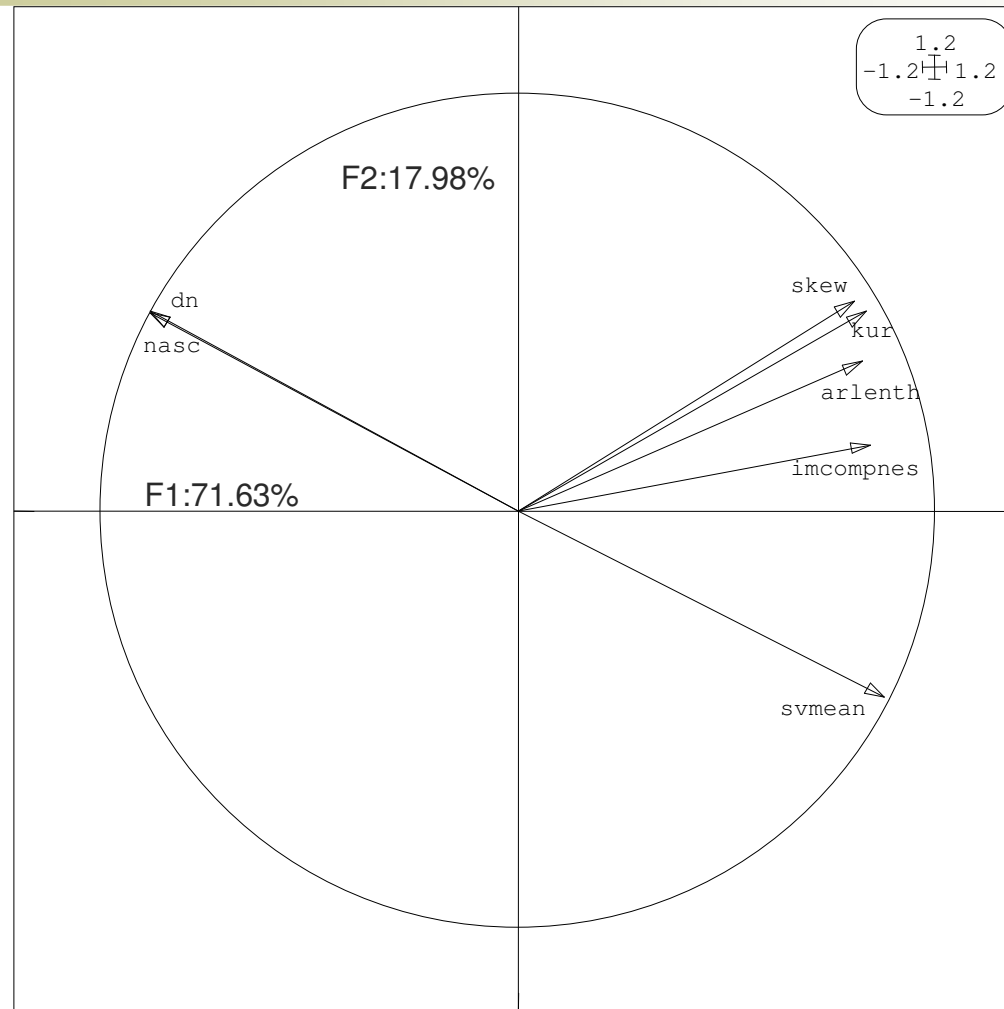
1- ----- Correlation matrix -----

```
[ 1] 1000
[ 2] -976 1000
[ 3] -968 984 1000
[ 4] 541 -527 -541 1000
[ 5] 515 -488 -483 709 1000
[ 6] 553 -520 -513 741 990 1000
[ 7] 588 -643 -647 851 612 646 1000
```

Factorial axis:

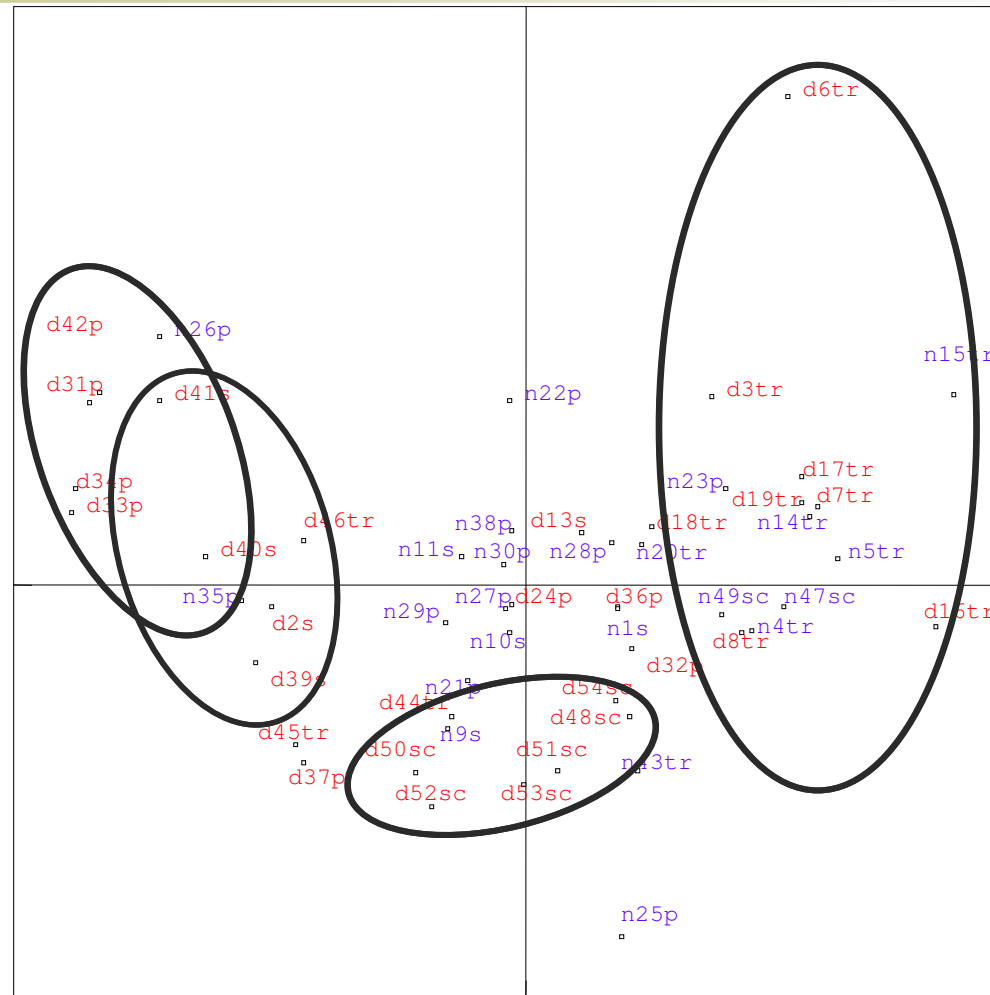
- 1st axis: 71.63%
- 2st axis: 17.68%

Factorial analysis: Parameters projection



PCA: projection of statistical descriptors on the factorial plan F1XF2

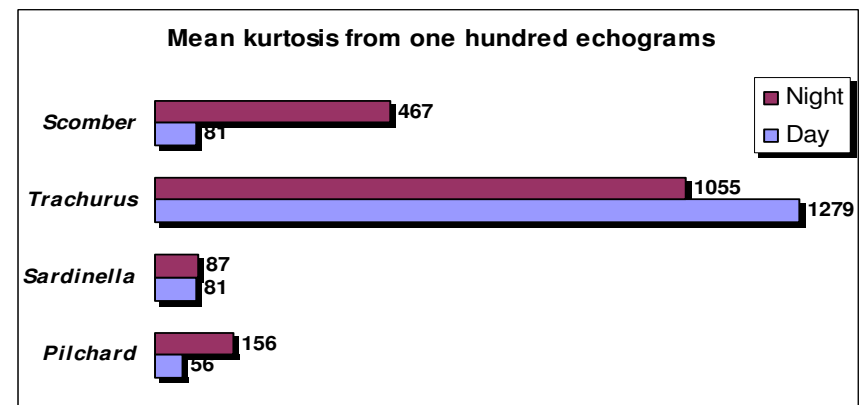
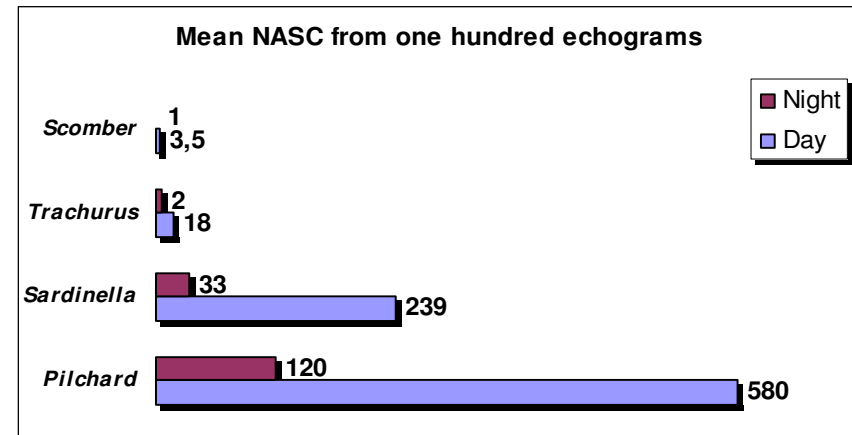
Factorial analysis: Observations projection



PCA: projection of echograms on the factorial plan F1XF2

Interpretations

- *More presentativity of species in daytime than in night time*
- *NASC negatively correlated with the other parameters*
- *Strength correlation of pilchards with NASC, specialy in Day time.*
- *Correlation(Less important) of Sardinellas with NASC.*
- *Strength correlation of horse mackerel with Kurtosis ans Skewness*
- *Insignifiant presentativity of chub mackrel.*



Discussion & perspective

- *Spatial and temporal variability in the echogram integration*
 - *Integrate the geographical variable in the analysis*
 - *Correspondance analysis between Day-Night data*
- *Confirmation of the high NASC values of Sardine and relatively high NASC values of Sardinellas.*
- *Possible characterisation of Horse mackerels by kurtosis and skewness*
 - *Continue collecting echograms to confirm or not this characterisation*
- *Collect monospecific echograms of the other carangids and anchovy*

Thank you