

# The incidence of SST and SSTA on the small pelagics catches from the Canary Islands

L'incidence des SST et SSTA sur les captures des petits pélagiques aux îles Canaries  
(English only/En anglais seulement)

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## ABSTRACT

The evolution of catches by month of mackerel (*Scomber japonicus* Houttuyn, 1782), round sardinella (*Sardinella aurita* Valenciennes, 1847), horse mackerel (*Trachurus picturatus* Bowdich, 1825), sardine (*Sardina pilchardus* Walbaum, 1792), flat sardinella (*Sardinella maderensis* Lowe, 1838) and anchovy (*Engraulis encrasicolus* Linnaeus, 1758) in areas located north and south of Tenerife and Gran Canaria (Canary Islands) during 2005 and 2006 and monthly satellite-derived sea-surface temperature (SST) and oscillations of sea surface temperature anomalies (SSTA) were analysed together, trying to detect analytically changes in the oceanographic conditions that may affect the level of catches.

Annual mean value of SST from 1982 to 2006 around the Canary Islands waters showed an increase of temperatures from 1994, reaching a maximum in 1997. After this period, in 2000 a decrease was observed, followed by a new increase, reaching in 2006 the maximum value in the whole series.

In 2005 and 2006 lower SST values were observed in February–March (18.0° C–20.0° C) and in September–October (23.5° C–25.0° C) the greatest. With the exception of January and February 2005, SSTA values were always positive. An inverse relationship was noted between catch-index (CI) and SSTA series. Increments of CI were associated with negative SSTA events and vice versa, always with some lag of time. Certain stability of SSTA coincided with the lowest CI values along the studied period.

## RÉSUMÉ

L'évolution des captures mensuelles de maquereau (*Scomber japonicus* Houttuyn, 1782), sardinelle ronde (*Sardinella aurita* Valenciennes, 1847), chinchard (*Trachurus picturatus* Bowdich, 1825), sardine (*Sardina pilchardus* Walbaum, 1792), sardinelle plate (*Sardinella maderensis* Lowe, 1838) et anchois (*Engraulis encrasicolus* Linnaeus, 1758) dans les zones au nord et au sud de Tenerife et de Gran Canaria (Îles Canaries) au cours des années 2005 et 2006, la température de la surface de la mer enregistrée mensuellement par satellite (SST), et les oscillations des anomalies de SST, ont été analysées ensemble, en essayant de détecter des changements des conditions océanographiques qui puissent affecter les niveaux des captures.

La moyenne de la température de la surface de la mer enregistrée mensuellement par satellite (SST) de 1982 à 2006 par les eaux des Canaries montre un accroissement des températures depuis 1994, en

atteignant le chiffre maximal en 1997. Après cette période, en 2000 une chute apparaît, suivie d'une nouvelle hausse, qui atteint en 2006 la valeur maximale de toute la série.

En 2005 et 2006 on a observé des valeurs plus basses en février-mars (18.0° C-20.0° C) et en septembre-octobre (23.5° C-25.0° C) les plus hautes. Avec la seule exception de janvier et février 2005, les valeurs ont été toujours positives. On a remarqué une relation inverse entre les taux de captures (CI) et les mesures de SSTA. Les augmentations de CI ont été associées avec des événements négatifs de SSTA et *vice versa* avec quelque retard. Quelque stabilité de SSTA coïncidait avec les valeurs de CI les plus basses au cours de la période étudiée.

## 1. INTRODUCTION

Possible linkages between catches-catch index of small pelagics and the Sea Surface Temperature (SST) anomalies were studied for the period 2005–2006.

Six species were studied: mackerel (*Scomber colias* Gmelin, 1789), round sardinella (*Sardinella aurita* Valenciennes, 1847), horse mackerel (*Trachurus picturatus* Bowdich, 1825), sardine (*Sardina pilchardus* Walbaum, 1792), flat sardinella (*Sardinella maderensis* Lowe, 1838) and anchovy (*Engraulis encrasicolus* Linnaeus, 1758).

Catches were taken North-East (28°30' N–15°30' W) and South (27°30' N–16°30' W) of Tenerife, and South of Gran Canaria (27°30' N–15°30' W) (Canary Islands).

Monthly satellite-derived sea-surface temperature (SST) and SST anomalies were obtained from the IGOSS-IRI (International Research Institute for Climate Prediction, Columbia University).

This study was carried out in the framework of the ConAfrica Project (Cicyt CTM2004-02319).

## 2. RESULTS

From 1982 to 2006, an increase of the sea surface temperature in the Canary waters was observed. However, between 1982 and 1994 the SST values were similar. Late 1994 an increased temperature process started until reaching its maximum level in 1997. A small decrease of SST occurred in 1998 that continued until 2000 (with current values). Since 2000 the temperature increased until it reached the highest values in the whole series (25.2° C, in September 2006) (Figure 1).

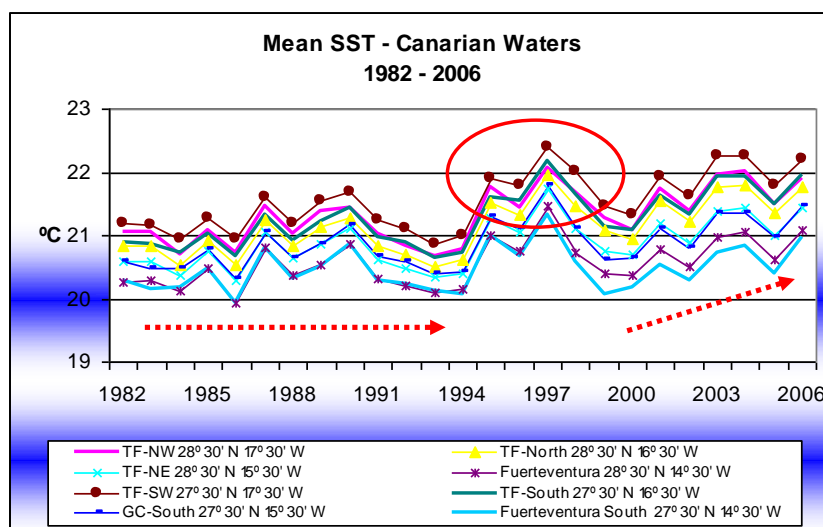
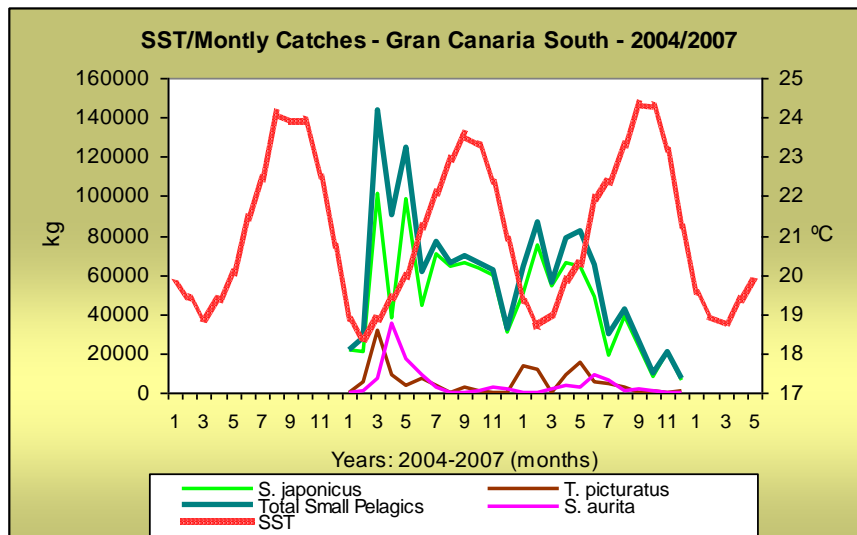


Figure 1: SST evolution in the Canarian waters from 1982 to 2006

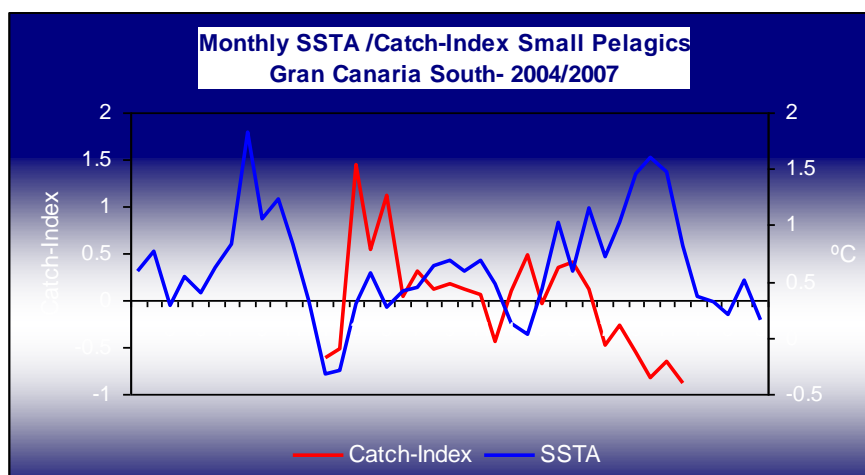
During the period 2005–2006, lower SST occurred in February–March ( $18^{\circ}\text{C}$ – $20^{\circ}\text{C}$ ) and greater in September–October ( $25.2^{\circ}\text{C}$ – $23.5^{\circ}\text{C}$ ). Total catches, where mackerel was the predominant species, were high in the first semester of every year, observing a certain lag on February with respect to the lower SST value. Lower values of catches corresponded to previous months where temperatures increased. In general terms, greater catches seem to be linked to lower SST and *vice-versa* (Figure 2).



**Figure 2:** Monthly evolution of SST and small pelagic catches in Gran Canaria (Canary Islands)

The SSTA values were always positive except for January and February 2005. Greater SSTA positive values occurred in August–September 2004. The relationship between catch-index (CI) and SSTA showed a general process that can be summarized as follows (Figure 3):

- i. CI increases with a lag in relation to the cooling process in the previous months.
- ii. CI decreases in relation to the warming period, until reaching lower values, which correspond to a certain «stability» of temperatures.
- iii. CI decreases in general after the warming processes.



**Figure 3:** Monthly evolution of SSTA and small pelagic catch-index in Gran Canaria (Canary Islands)

### **3. DISCUSSION**

It seems that catches increase and decrease (depending on the distribution and/or abundance) of small pelagics off Tenerife and Gran Canaria (probably in all the Canaries) could be mainly affected by SST variations rather than by SST themselves. However, the SSTA could indicate that oceanographic processes acted on the resource, by the process itself rather than by the temperature.

It does not seem prudent to draw conclusions with only two years analysed. Nevertheless, the established «pattern» might be considered to be a contribution to the knowledge of the distribution and catches of small pelagic distributed in the Canary waters, besides as hypothesis to be confirmed by the study of the historical catch series and the series of oceanographic parameters.