

**Jack Mackerel (*Trachurus murphyi*) spatial  
distribution and seasonal  
acoustic biomass estimated in the north of  
Chile. 1981 - 1995; 2006-2007**

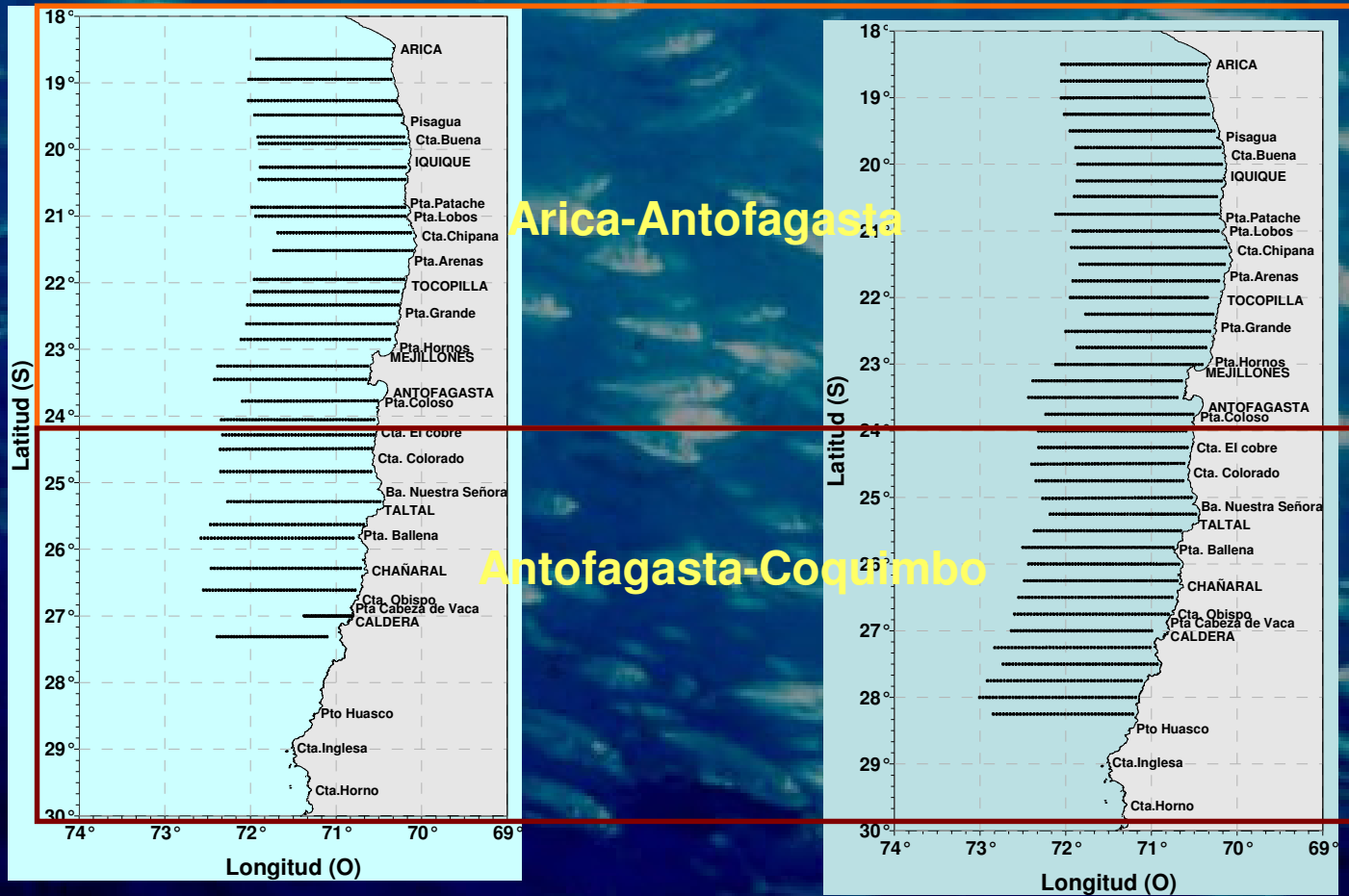
Jorge Castillo,  
José Córdova



# Acoustic Data

- Data was obtained in 40 seasonal acoustic surveys carried out between 1981 and 1995 in northern Chile ( $18^{\circ}20'S$  -  $30^{\circ}00'S$ ) from the coast to 200 nmi offshore and in spring of 2006 and 2007.
- The acoustic data was collected in 2 nmi Sampling Basic Units (ESDU) and performed in parallel diurnal transects, separated by 16 nmi in 1981-1984 and 25 nmi in all other years.
- A  $-32.5$  dB kg TSk<sub>g</sub> was applied to transform the echo integrator output into biomass.

# Acoustic survey design applied in the northern of Chile 1981-1995



1981-1982 random design, distance between transects: 16 nmi

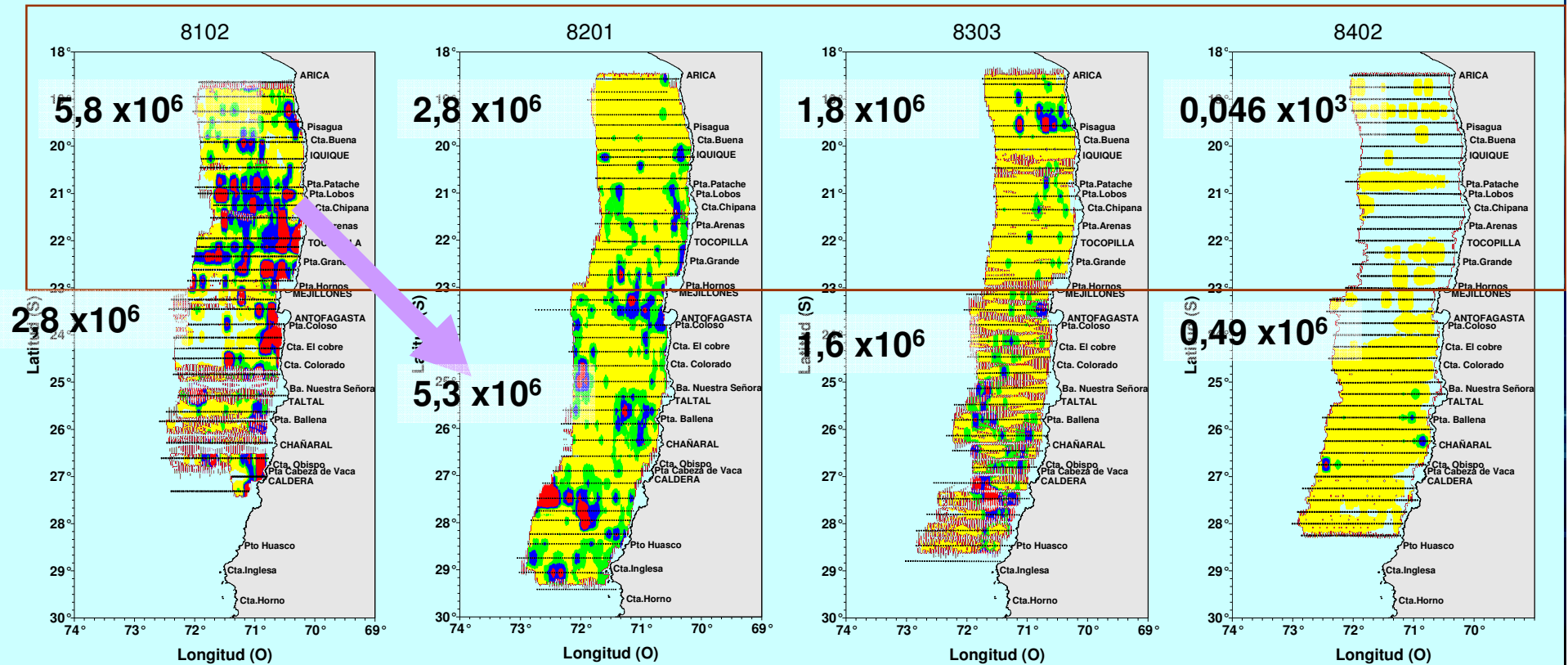
1983-1984, systematic design, distance between transects: 15 nmi.  
After 1985 transects each 25 nmi

# Surveys

- The vessels used between 1981 to 1995 were “Carlos Porter” (27 m trawler); Itzumi (40,59 m trawler) and Abate Molina (43,62 m trawler) in 2006-2007.
- All of them were equipped with calibrated acoustic scientific systems SIMRAD.
- Species discrimination in the acoustic readings was done based upon purse seine fishing (“Carlos Porter”), performed by an auxiliary fishing ship, and midwater trawling (“Abate Molina”).

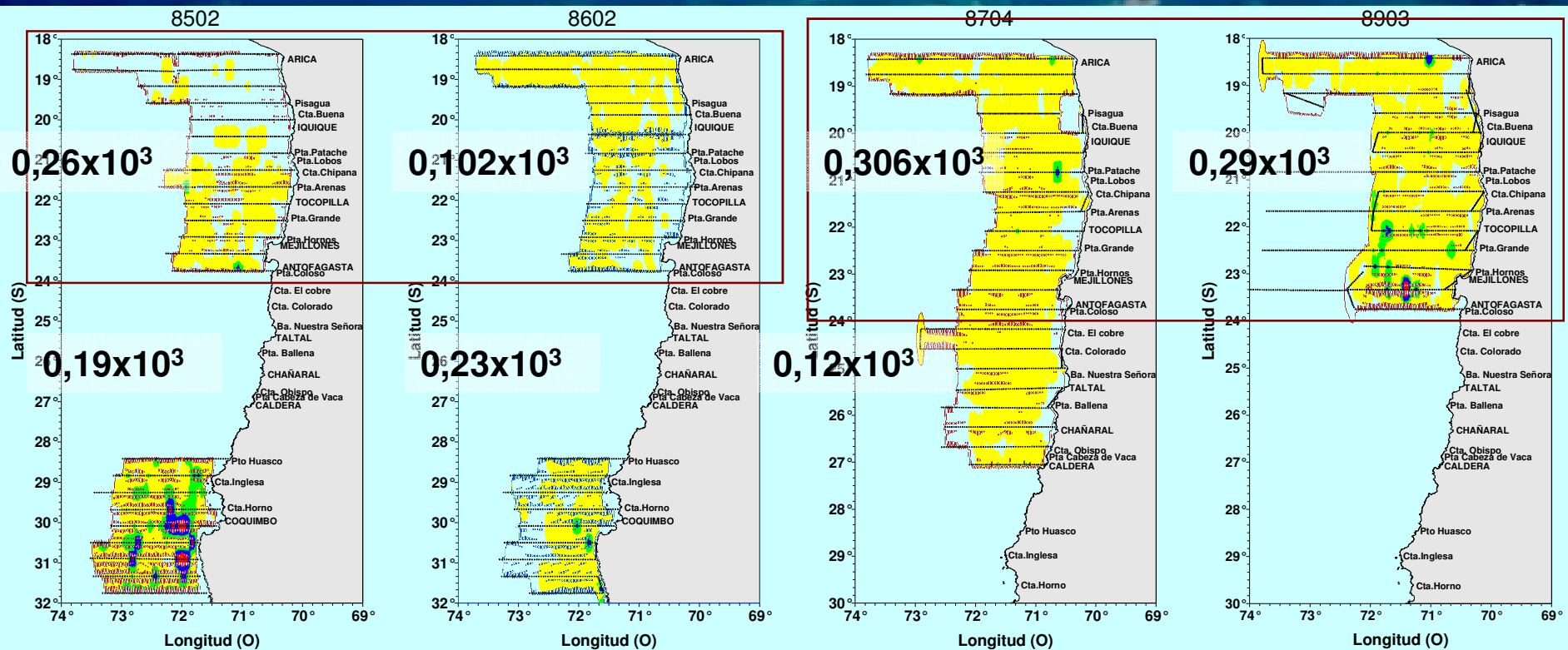


# Spatial distribution in winter, the biomass values are indicated by sector



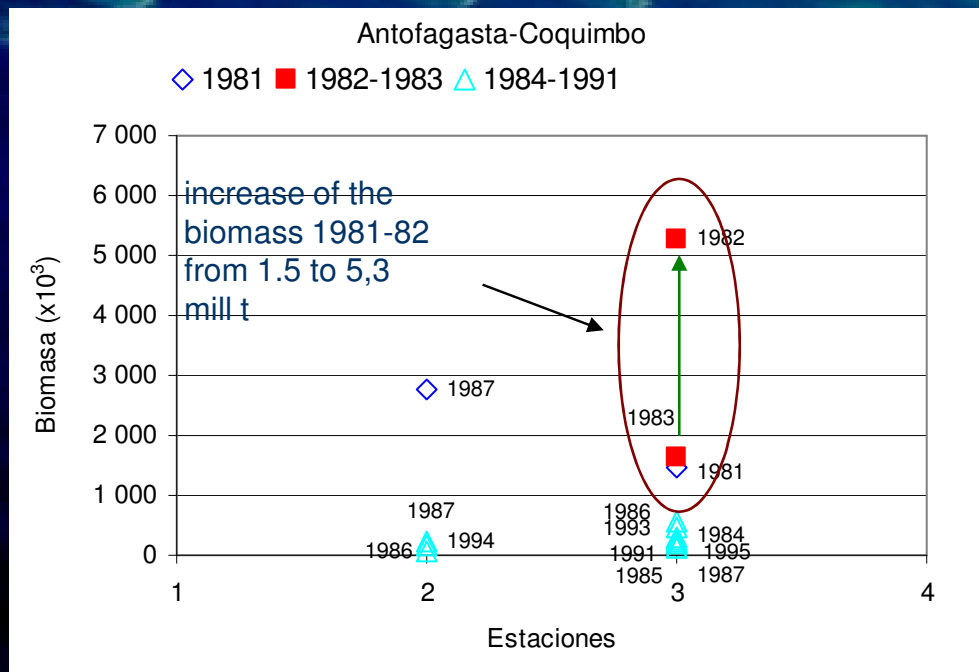
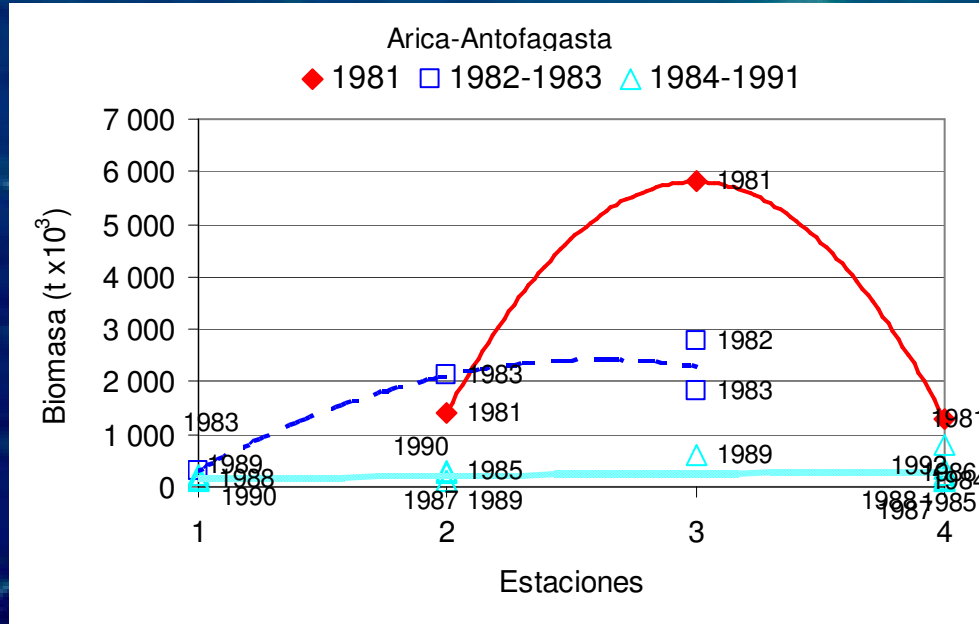
The biomass in Arica-Antofagasta in 1981 and Antofagasta-Coquimbo in 1982 suggest a migration to south before El Niño 1981-82.

# Spatial distribution in winter, the biomass values are indicated



The following year shows a negative trends in the biomass, with a distribution spread in all area, but in low densities.

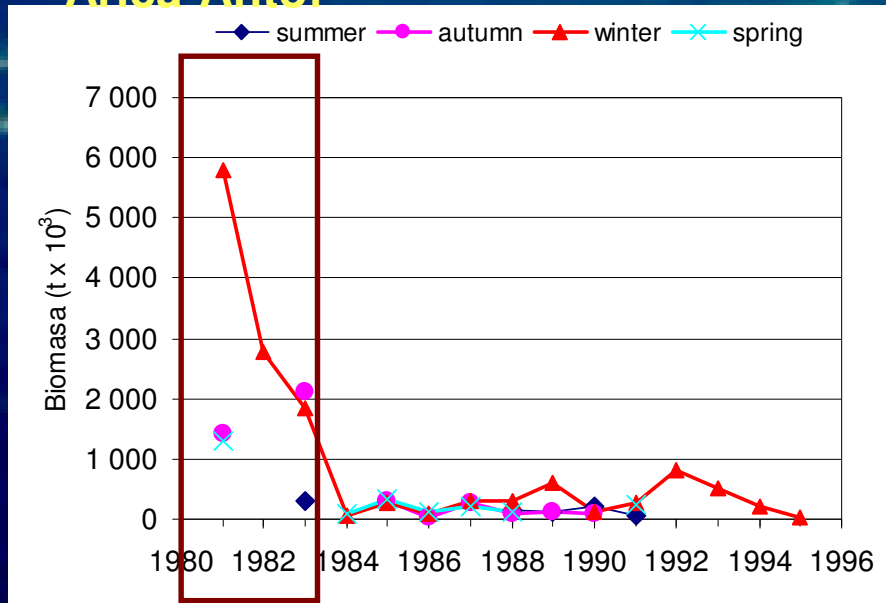
# Seasonality of the biomass



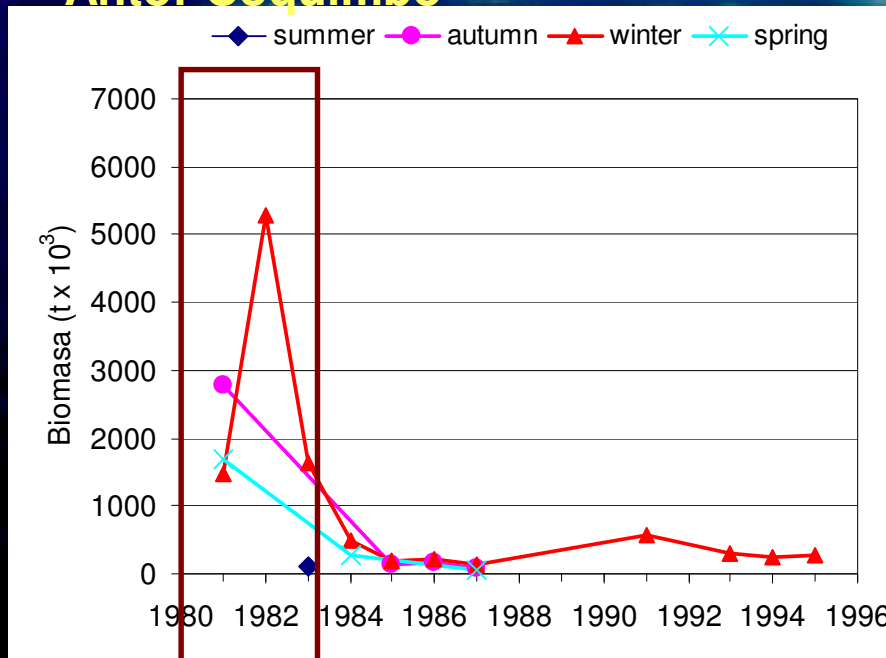
The bigger values of biomass were estimated in winter in both sectors (Arica-Antofagasta and Antofagasta-Coquimbo). The level between the winter of 1981 and 1982-1983 changed, probably due to migration to south

# Historical biomass of jack mackerel between 1981 to 1995 (Arica-Antofagasta and Antofagasta-Coquimbo)

## Arica-Antof



## Antof-Coquimbo

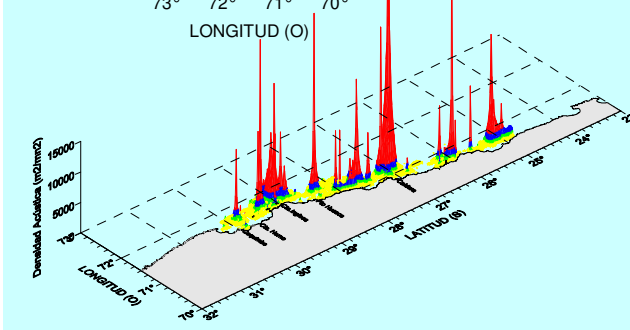
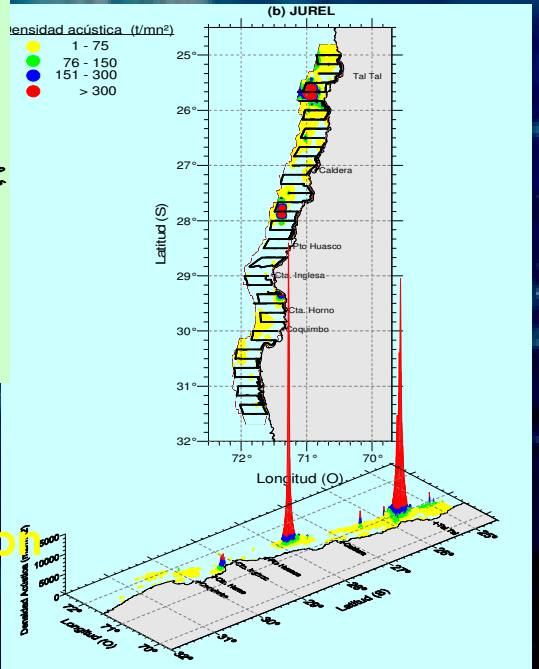
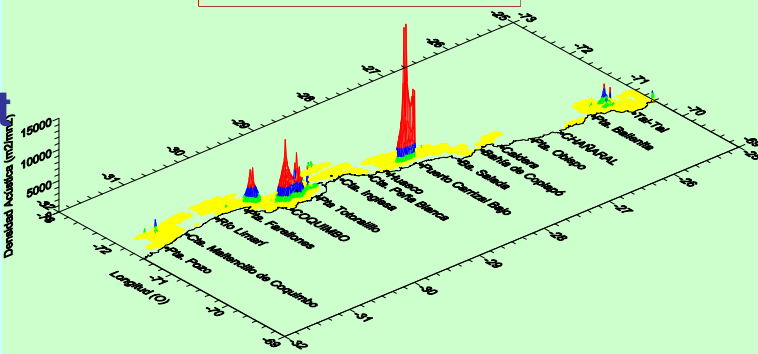
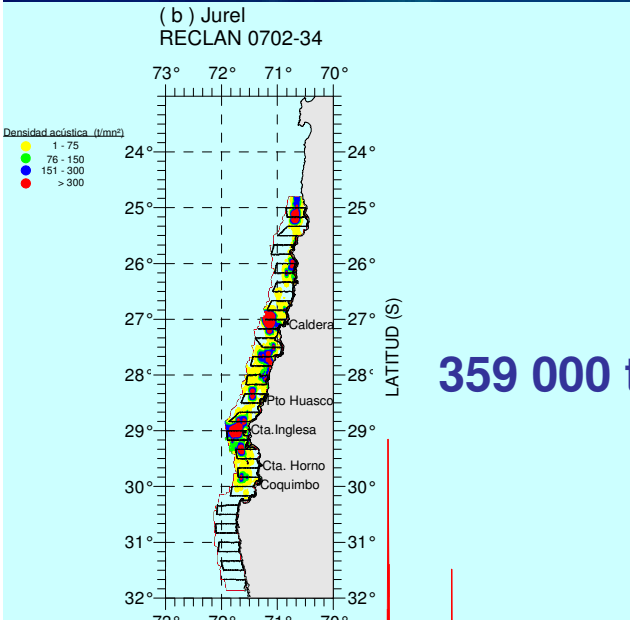
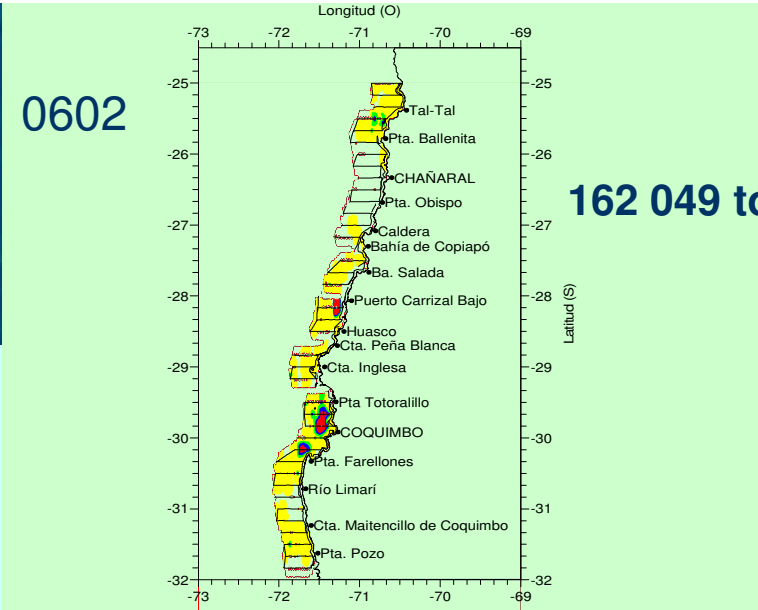


The biomass of jack mackerel in Arica-Antofagasta reached a maximum of  $5.8 \times 10^6$  in the winter of 1981, falling quickly in the following years.

Next to the diminution between Arica-Antofagasta, the biomass between Antofagasta-Coquimbo was increased in 250% in the winter of 1982. This change suggest a migration from north to south.

From 1984 the Bo in the Arica-Antof. area was reduced gradually until becoming stabilized in values less to 300 thousand ton.

The biomass estimated in 2006-2007 confirmed low values for this area, similar to the 90's, with levels between 115 – 300 thousand tons.



Biomass estimated in summer 2006 to 2008 between coast and 20 nmi south Antofagasta

A large school of fish swimming in deep blue water. The fish are small and silvery, moving in a coordinated pattern. The word "GRACIAS" is written in yellow capital letters in the center of the image.

GRACIAS