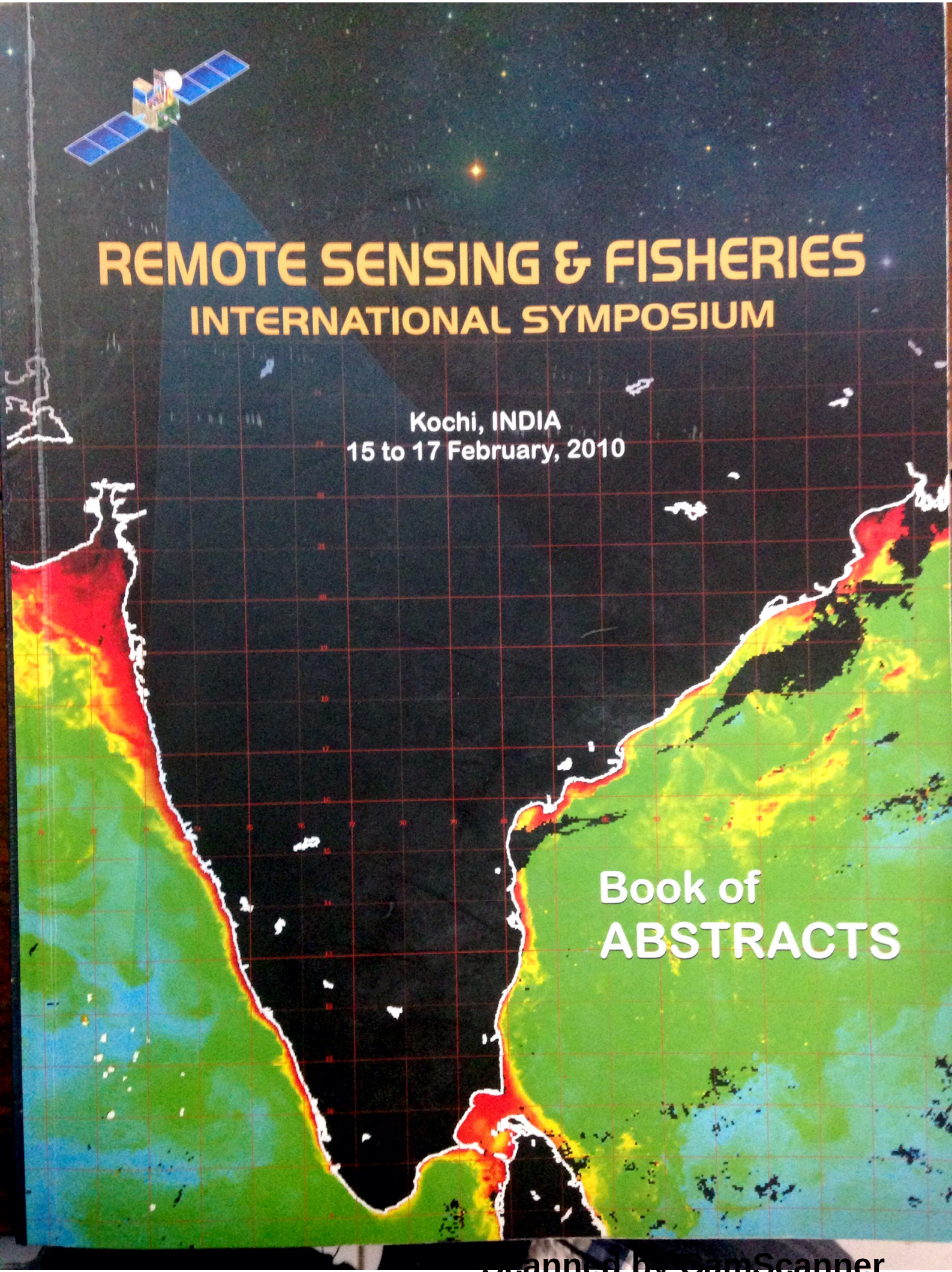
REMOTE SENSING & FISHERIES

INTERNATIONAL SYMPOSIUM

Kochi, INDIA
15 to 17 February, 2010



Book of ABSTRACTS

Remote sensing applications for fishing ground assessment in Indonesian waters

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Remote sensing applications for the determination of potential fishing zone in Indonesia waters began in 1990. In this paper will be described the application of remote sensing research to know the relationship between oceanographic parameters and catch of pelagic fish (oily sardine and bigeye tuna) in Indonesian waters. The results of research shows there is a significant relationship between oceanographic parameters (such as sea surface temperature, chlorophyll *a* concentrations, and sea surface high derived satellite) and fish productions.

Remote sensing applications for fishing ground assessment in Indonesian waters

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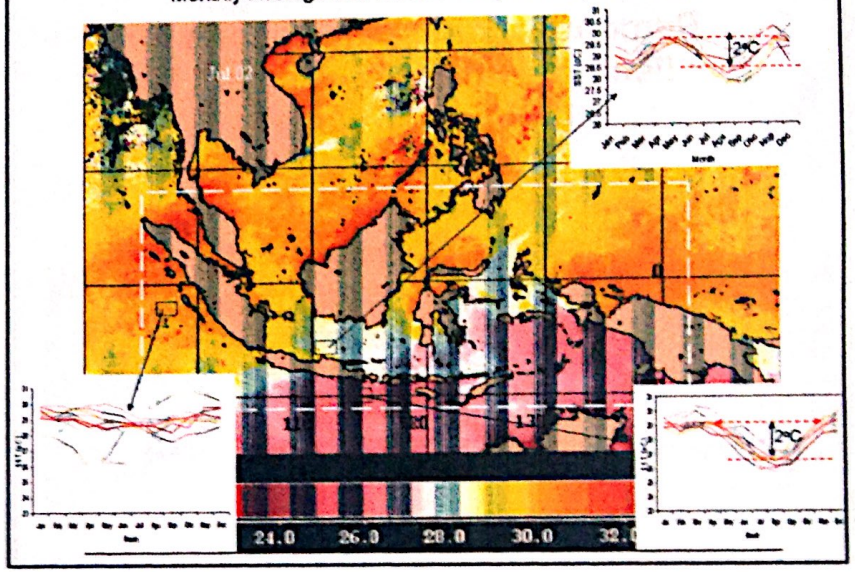
Monthly Average Sea Surface Temperature (2002-2007)



Background

Indonesian Tropical seawater

- **Spatial variability ?**

To asses PFZ using remote sensing data is difficult:

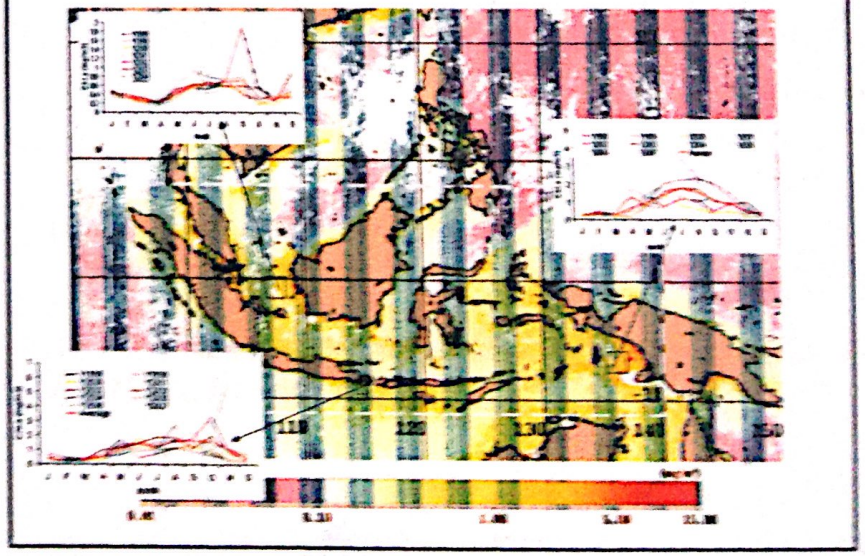
- **Spatially, oceanographic condition relatively homogenous**
- **A lot of fish species needed data/information such as life cycle, distribution, etc.**

*** Temporal variability :**

1. Monsoon → seasonal variation

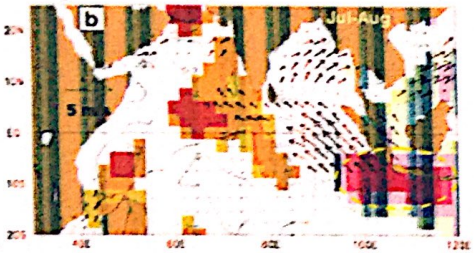
2. El Nino and Indian Ocean Dipole (interannual variation)

Monthly Average Chl-a (2002-2007)



Interannual variation

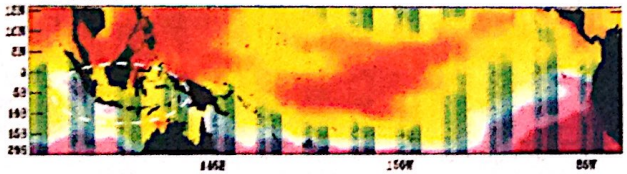
Dipole Mode (+)



During IOD (+) & El Nino

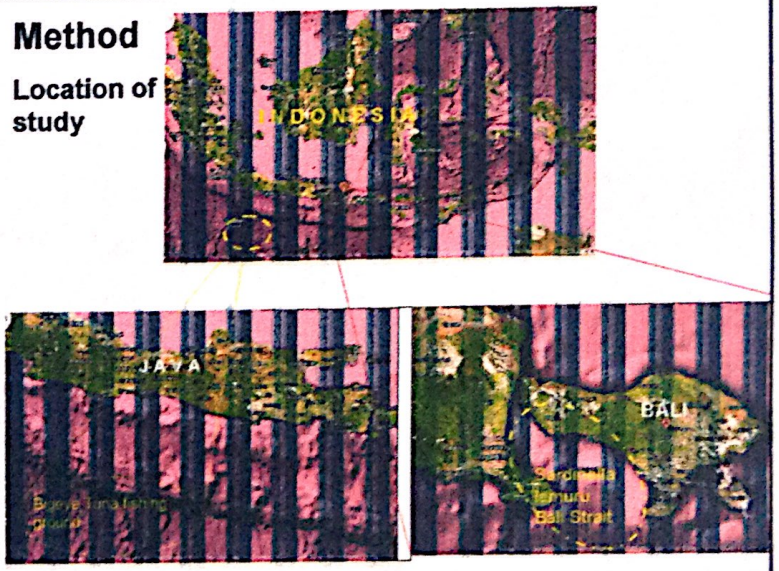
Upwelling more extensive

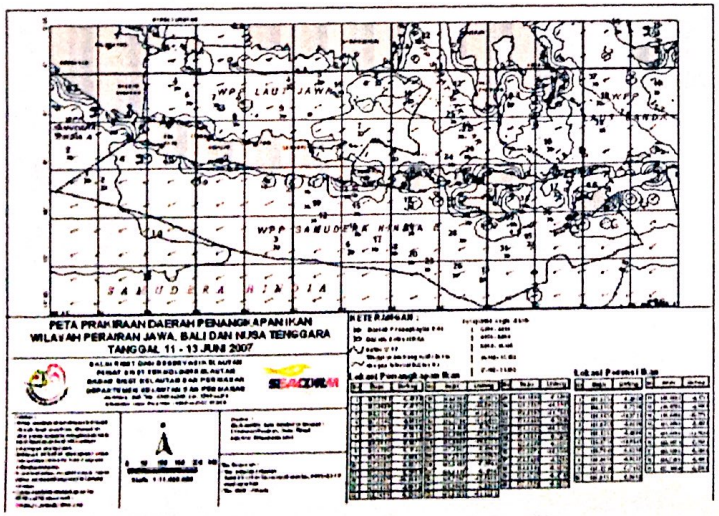
El Nino



Method

Location of study





Example: Map of Fishing ground Prediction in Indonesian water

Data Sources:

(1) Chl-a concentration (SeaWiFS) from NASA GSF and GIOVANNI.

(2) Sea surface height anomaly from Colorado Center for Astrodynamic Research

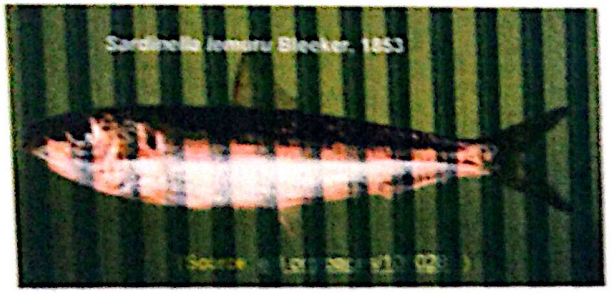
(3) Monthly sardinelle lemuru catch from local fisheries agency

(4) Daily Bigeye tuna catch data from logbook of tuna fishing vessels company at Benoa Bali.

(5) XBT data from WOD

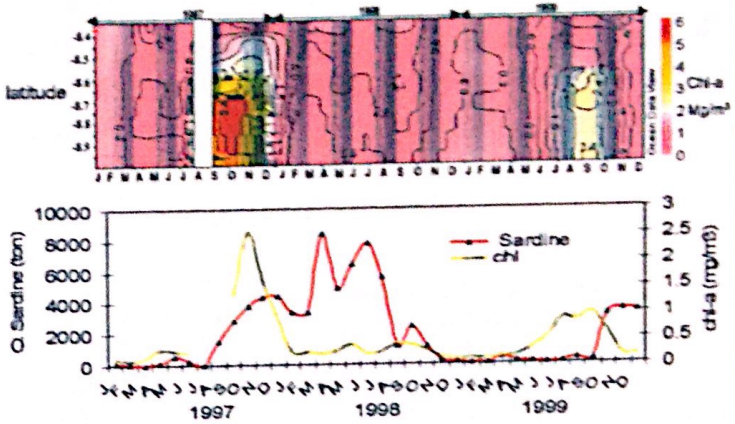
RESULTS

Case (1) Phytoplankton/chl-a Concentration and Sardinella Life Cycle in Bali Strait

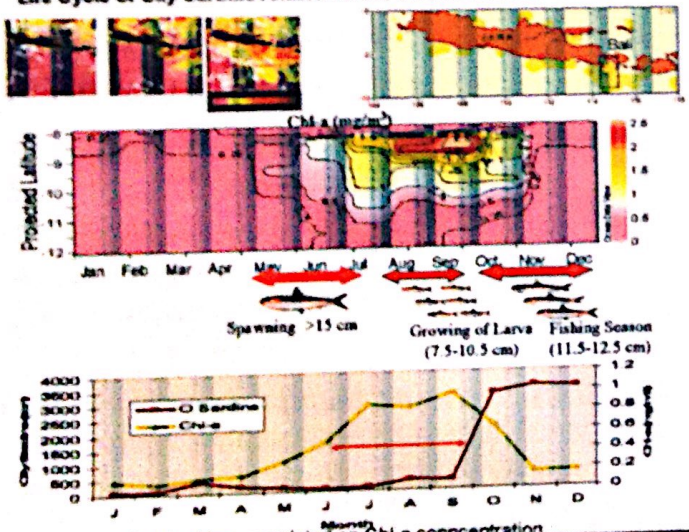


Forms large schools in coastal waters, particularly in the Bali Strait upwelling. Feeds on phytoplankton and zooplankton, chiefly copepods.
(http://content2.eol.org/content/2008/10/06/16/30392_large.jpg&imgrefur)

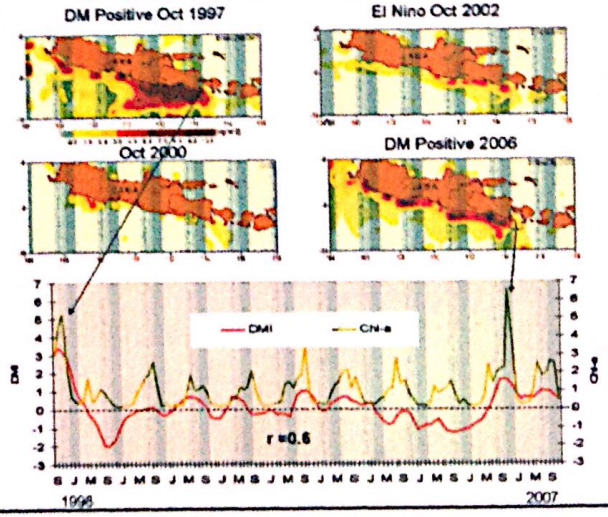
Climate variability impact on Chl_a and Oily Sardine in Bali Strait (IOD and El Nino 1997/98) (Gaol et al., 2004)

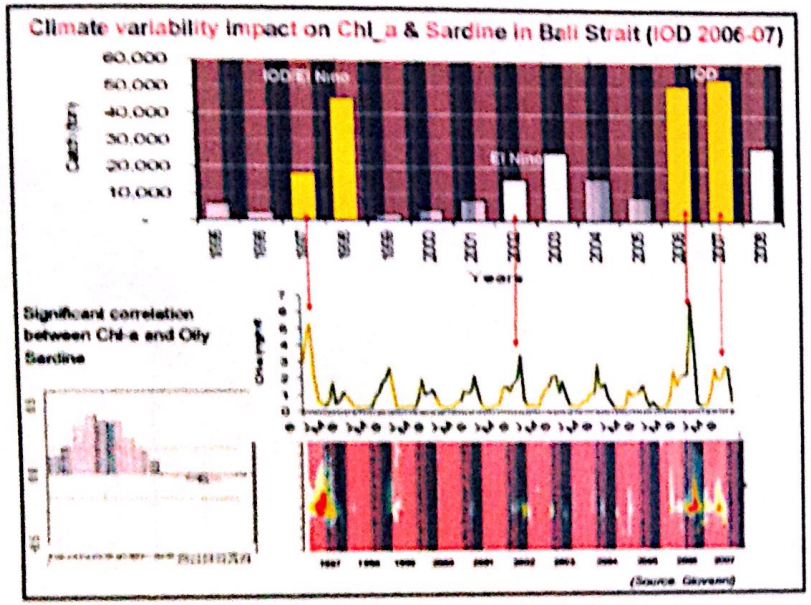


Life Cycle of Oily Sardine related on Chl-a Concentration in Bali Strait



Dipole Mode (+), El Nino and Chl-a Concentration





What happen during IOD 1997 & 2006
Although Fish catch production high but the fishermen suffered :

- Local governments do not have the ability to predict the abundance of fish
- Fishermen were unprepared for the abundant production.
- Oily Sardine price → lowest

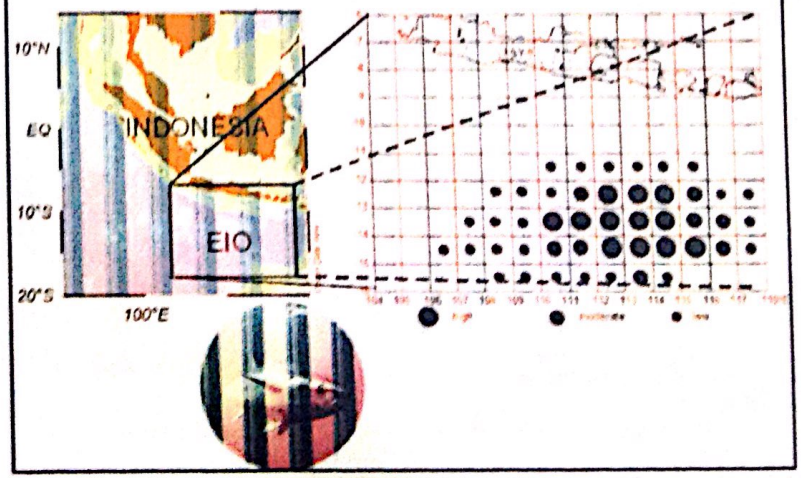
Negative impacts should be avoided if the Chl-a data are continuously monitored and used to predict the abundance of fish → Ocean color data very important for managing oily sardine fishery

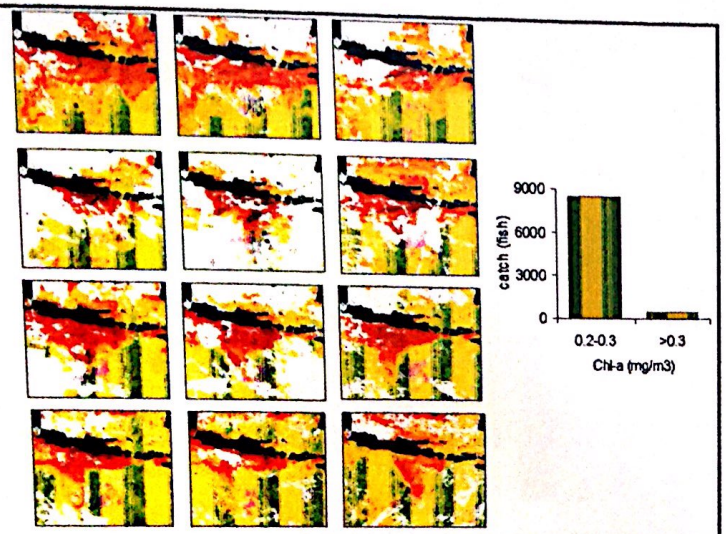
Abundance of fish catch during IOD 1997 & 2006 cause the fishermen suffered due to:

- Local governments do not have the ability to predict the abundance of fish
- Fishermen were unprepared for the abundant production.
- Oily Sardine price → lowest

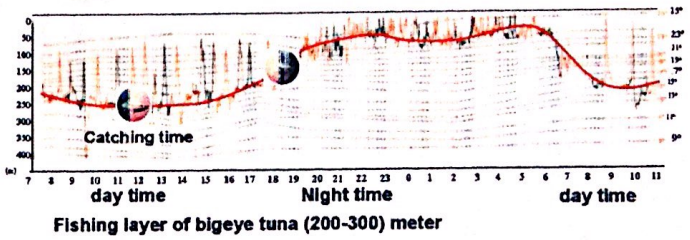
Negative impacts should be avoided if the Chl-a data are continuously monitored and used to predict the abundance of fish

Case (2) Relationship between oceanographic parameter derived RS and bigeye tuna catch



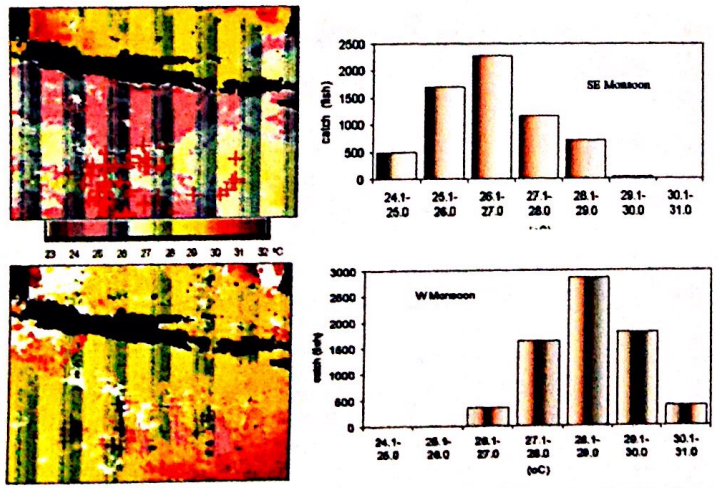


Overlaid between Chl-a and bigeye tuna catch

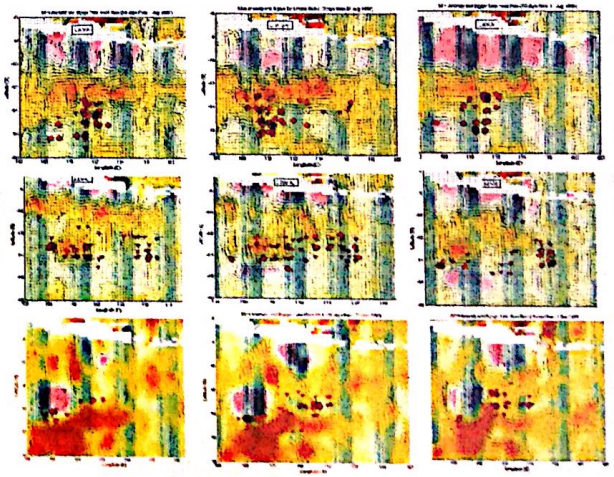


Fishing layer of bigeye tuna (200-300) meter

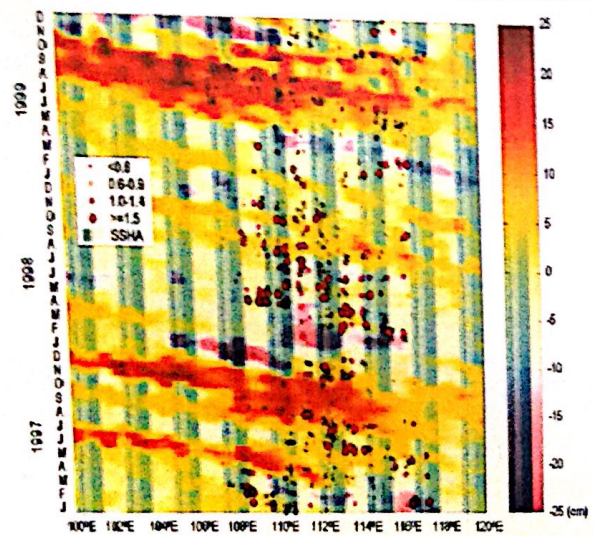
Vertical movement of Big eye tuna by tagging (Hollant et al, 1990)



Overlaid between SST and bigeye tuna catch (a) during South East monsoon (b) West Monsoon) → there is no consistency

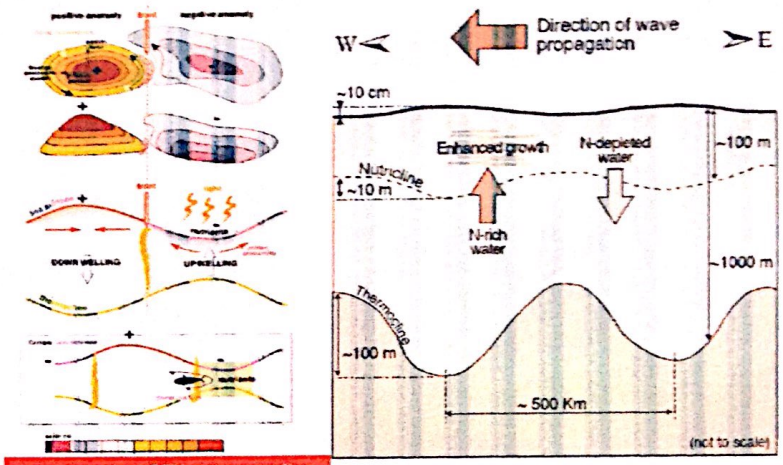


Overlaid between SSH anomaly and bigeye tuna catch



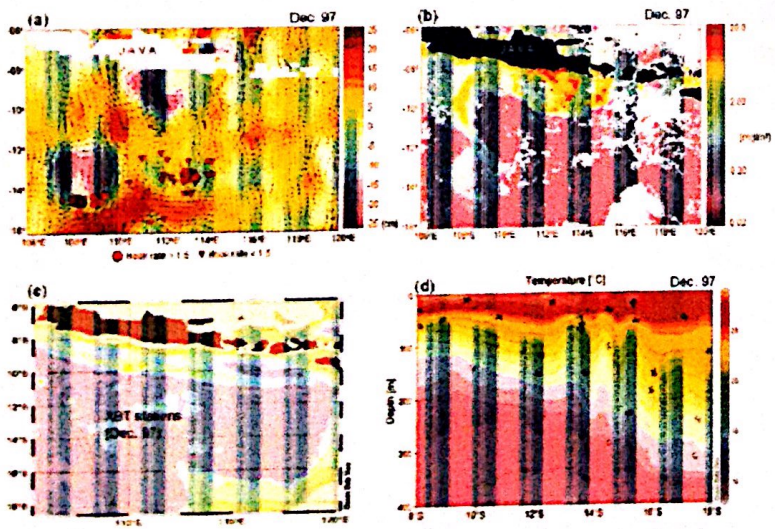
Overlaid between time-Longitude SSA anomaly at13°S and bigeye tuna hook rate

Schematic of anti-cyclonic eddy and biological enhancement in the ocean



Low (negative) SSH corresponding to sallow (positive) termocline, vice versa

Killoward, (2001)



Lifetimes of anticyclonic eddy - more than a month