



MECOS2

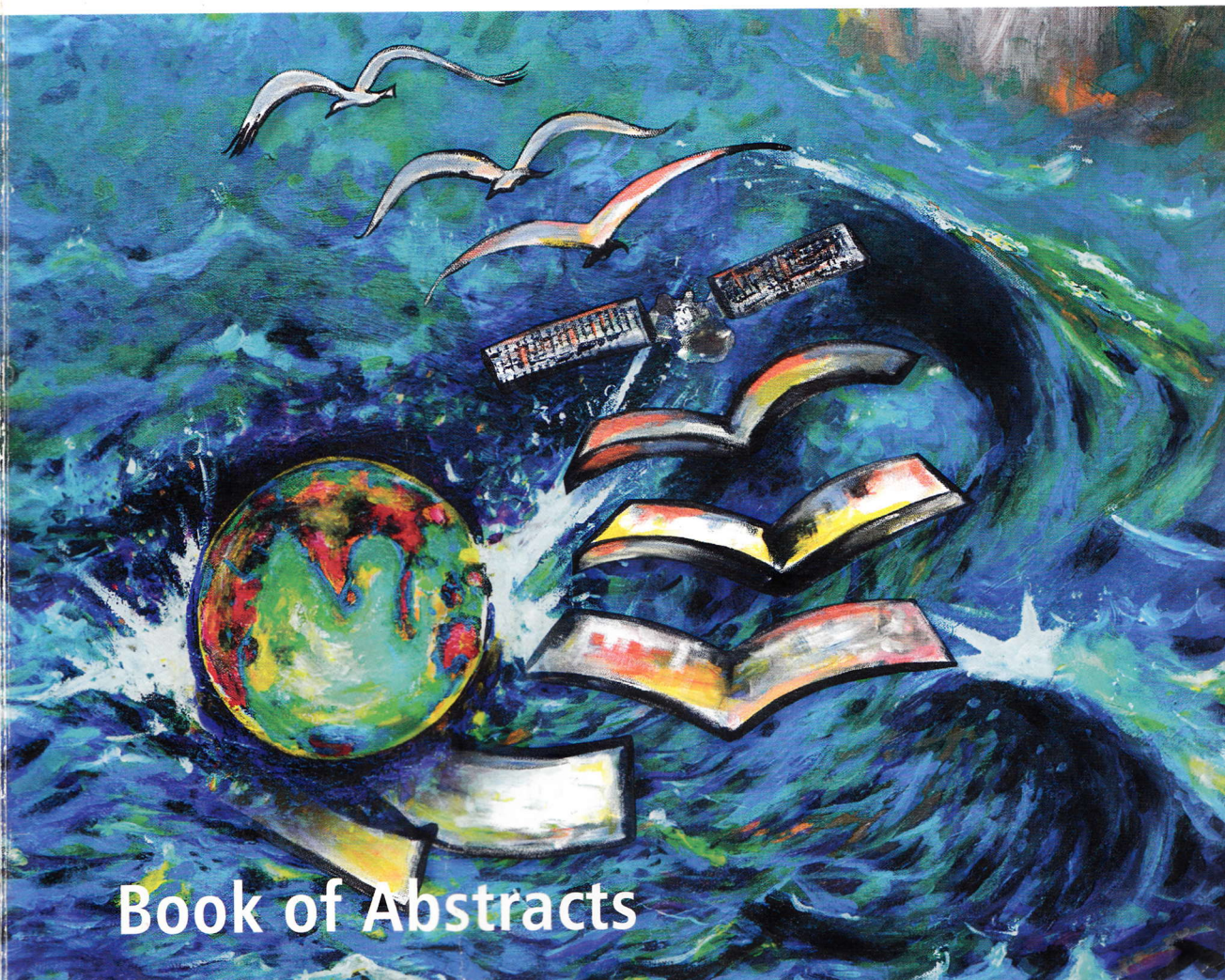
Marine Ecosystems

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Book of Abstracts

percentage distribution of all these food items showed clear fluctuations. The GSI of different months varied from 0.04 to 0.56. Highest GSI were seen on the month October 2011. The RLG values of *A. subrostratus* in the present study ranged from 1.497 to 1.737. The highest percentage of poor feeding intensity (1/4 full stomach) was recorded during December (51.43%), January (51.35%) and March (52%). Active feeding (full and 3/4 full stomachs) was found in July 28.89 % and 35 % in August.



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Relating purple back flying squid (*Sthenoteuthis oualaniensis*) abundance to environmental parameters using GIS and GAM in south eastern Arabian Sea

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Purple-back flying squid (*Sthenoteuthis oualaniensis*) is a short-lived, fast growing cephalopod commonly known as the "Master of Arabian Sea". The distribution pattern of purple-back flying squid and the relationship between abundance and environmental variables in the south eastern Arabian Sea were analyzed using geographical information system (GIS) and statistical modelling (GAM-Generalized Additive Models). The present work aims to develop predictive models of oceanic squid abundance in relation to physical and environmental conditions.

Fishery and oceanographic survey were conducted for exploration of purple-back flying squid onboard MV *Titanic*, a trawler converted to a squid jigger during September 2010-March 2013. Oceanographic and biological samplings were taken from 58 stations during this period. The study covered the oceanic waters from 8°N to 17°N latitudes and 64°E to 76°E longitudes along the eastern and central Arabian Sea at depths ranging from 100 to 4000 m. The environmental parameters measured were SST, Dissolved Oxygen, pH and Chlorophylls which was measured by using a YSI Fluorometer (650 MDS). Zooplankton samples were collected by using KC Denmark (Model 23.100-WP-2). A series of GIS maps were produced by using ArcGIS software. Generalized additive models (GAMs) were run in R programme to describe variation in *S. oualaniensis* abundance in relation to geographical and environmental variables.

The GIS maps showed that highest abundance was observed mainly within 14° N, 72°E areas. Temperature was the most important variable, showed strong positive association with *S. oualaniensis* abundance with optimum temperature between 28.03 to 28.80 °C. Salinity (32.70 to 35.08 ppt), Dissolved Oxygen (6.02 to 6.27 mg/litre) and pH (7.75 to 8.30) also showed positive association with abundance (Fig.1). Abundance of *S. oualaniensis* was negatively related to Chlorophyll values. GAM analysis indicated that environmental conditions influence the abundance and also provided a predictive model. The GAM model demonstrates that the

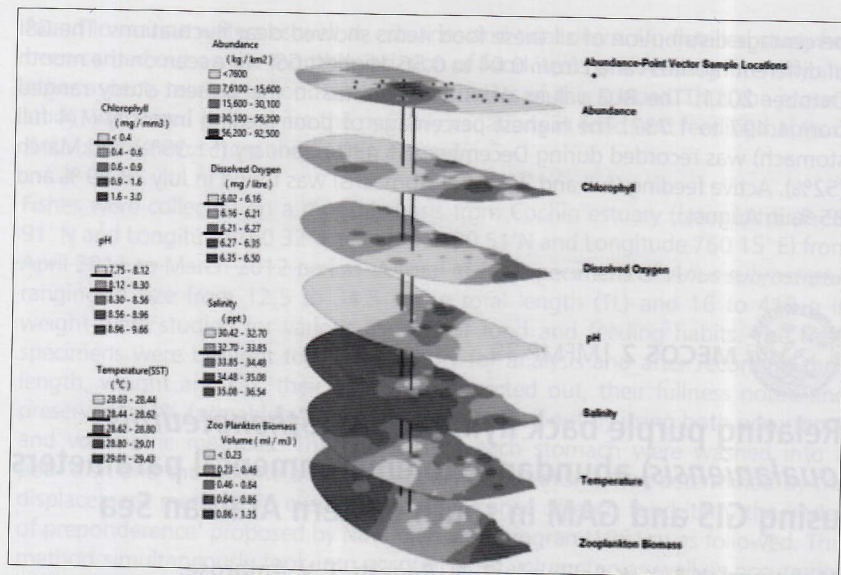


Fig.1 Composite GIS map shows relation between abundance and physico-chemical parameters

relationship between latitude and abundance is highly significant, even though longitude and pH were also significantly related. Model selections were carried out based on the AIC criteria.

The fifth model explained almost 46 % of the variance in purple-back flying squid abundance (Table 1).

Table-1. Sequential goodness of fit measures associated with addition of each term to the abundance model. The best model indicated by bold type.

	R ² (adj)	Dev. explained(%)	AIC
Model 1	0.0343	13.08	3587.62
Model 2	0.0656	31.73	3557.23
Model 3	0.0653	36.14	3554.60
Model 4	0.0827	38.93	3555.50
Model 5	0.1200	45.74	3544.70
Model 6	0.1205	46.84	3549.46
Model 7	0.1294	47.73	3554.75

- 1 Abundance~s(Lat)
- 2 Abundance~ s (Lat) +s (Lon)
- 3 Abundance~ s (Lat) +s (Lon) + s(SST)
- 4 Abundance~ s(Lat)+ s(Lon)+ s(SST)+ (pH)
- 5 Abundance ~ s(Lat)+ s(Lon)+ s(SST)+ s(pH)+s(Sal)
- 6 Abundance ~ s(Lat)+ s(Lon)+ s(SST)+ s(pH)+s(Sal)+s(Chl)
- 7 Abundance ~ s(Lat)+ s(Lon)+ s(SST)+ s(pH)+s(Sal)+s(Chl)+s(DO)

The outcome of this study suggest that distribution and abundance of the Purple - back flying squid population in the south eastern Arabian Sea was predominantly influenced by spatial and temporal factors and significant association with certain