

Zooplankton Incidence in Abnormally High Sea Surface Temperature in the Eastern Arabian Sea

S C GOSWAMI

National Institute of Oceanography, Dona Paula, Goa 403 004

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Zooplankton in an abnormally high sea surface temperature (33.1 to 33.8°C) and alternate bands of slick formation were studied in the eastern Arabian Sea during 26 and 29 April 1981. The phenomenon which may be due to intense diurnal heating and internal waves may cause zooplankton abundance. Average biomass values in high sea surface temperature areas were higher (0.30 ml.m⁻³) than at the other stations (0.07 ml.m⁻³). Crustacean eggs, fish eggs and mysids clustered in pockets of abnormally high sea surface temperature areas.

Some information is available on surface meteorological and oceanographic conditions in areas of abnormally high sea surface temperature^{1,2}. However, there is no report on planktonic organisms occurring there. The present paper deals with zooplankton in abnormally high sea surface temperature (SST) areas (11°N, 07°30'E and 13°30'N, 07°30'E).

Surface zooplankton samples were collected during 91 cruise of *R V Gaveshani* in the eastern Arabian Sea during 26 and 29 April 1981. The samples were taken at stations located in high SST (areas A and B) and adjoining regions (Fig. 1). Sampling was done with HT

net (mouth area 0.25 m²; mesh size 330 µm) fitted with a calibrated flowmeter. Zooplankton biomass was determined by displacement volume method. An aliquot of 4 to 10% was examined for enumeration of major groups. Twelve zooplankton samples were examined, 8 from high SST (sts 1-8) and 4 from neighbouring stations (sts 9-12).

During the present study, 2 localised pockets of abnormally high SST were noticed (33.1 to 33.8°C). SST at the neighbouring stations varied from 28.3 to 30.4°C. The high SST was recorded over an area of 300 km² under calm wind and sea conditions. The highest temperature (33.8°C) was recorded at 1512 hrs on 26th

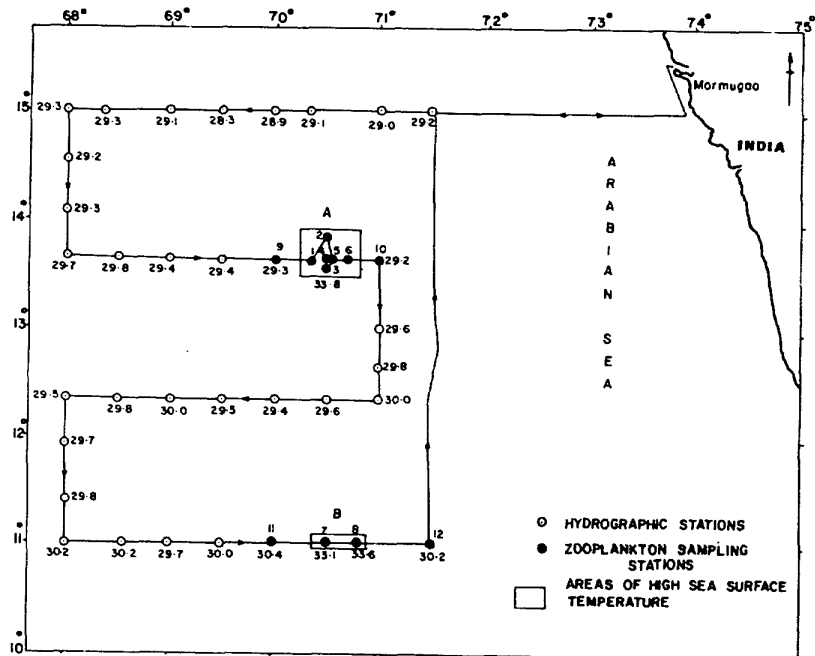


Fig. 1—Position of sampling stations (Numbers indicate temperature in °C)

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Table 1—Percentage Distribution of Major Zooplankton Groups in Areas of High Sea Surface Temperature (sts 1-8) and Neighbouring Areas (sts 9-12)

Groups	Stations											
	1	2	3	4	5	6	7	8	9	10	11	12
Fish eggs	42.0	42.2	34.2	31.3	38.0	35.2	35.7	34.7	2.9	1.9	1.4	1.4
Crustacean eggs	14.7	16.5	24.3	12.9	10.6	10.8	14.1	15.3	0.0	0.1	0.0	0.0
Mysidacea	9.0	11.4	11.1	10.6	12.4	11.4	10.7	11.7	0.0	0.4	0.0	0.2
Ostracoda	9.9	6.7	7.9	11.4	11.3	10.0	11.4	10.7	7.8	3.3	3.5	2.9
Copepoda	8.7	8.2	7.7	12.3	8.2	7.1	7.0	5.7	58.5	58.9	56.4	67.0
Copelata	2.5	2.7	2.9	3.4	3.2	5.0	3.8	4.5	0.0	0.0	0.0	0.1
Sergestidae	2.3	1.4	2.8	2.1	2.8	5.6	4.3	4.2	10.5	11.8	13.3	9.7
Amphipoda	1.5	0.9	1.5	5.9	5.0	3.4	2.5	3.3	0.3	1.9	2.1	2.3
Euphausiacea	1.1	0.8	1.0	3.8	3.7	4.9	2.8	3.1	6.6	7.9	8.8	3.4
Siphonophora	1.5	2.1	1.4	1.5	1.6	2.1	2.6	2.2	0.3	0.3	0.2	0.2
Salps and doliolids	0.9	1.3	1.0	1.2	1.3	1.9	2.2	1.3	0.7	0.6	0.0	0.0
Chaetognatha	0.6	1.0	1.3	1.5	1.1	1.2	1.1	1.4	1.3	0.9	0.9	0.5
Hydromedusae	1.1	1.5	0.7	0.1	0.0	0.4	0.4	0.7	0.0	0.2	0.3	0.1
Decapod larvae	0.4	0.6	0.2	0.4	0.0	0.1	0.0	0.0	7.2	7.1	8.3	7.6
Fish larvae	0.2	0.4	0.5	0.1	0.0	0.2	0.2	0.0	0.8	0.8	0.7	0.4
Pteropoda	0.8	0.2	0.6	0.4	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.1
Cephalopod larvae	0.4	0.4	0.1	0.2	0.0	0.1	0.0	0.0	0.0	0.0	0.2	0.1
Polychaete larvae	0.1	0.4	0.1	0.2	0.0	0.0	0.2	0.0	1.8	2.2	2.9	2.3
Miscellaneous	2.3	1.3	0.7	0.7	0.5	0.6	0.9	1.2	1.3	1.7	1.0	1.7

April 1981. Alternate slick bands with mirror-like appearance and floating tar-like material with froth were also observed. Abnormally high SST was also reported off Somalia coast³. The phenomenon of high SST associated with slick formation was explained to be due to internal waves and rotary currents^{1,2}.

Higher zooplankton biomass values were obtained at high SST stations and fluctuated from 0.19 to 0.39 ml. m⁻³. Biomass values at stations outside the pockets of high SST varied from 0.01 to 0.1 ml. m⁻³. The circulation in convection cells may be aggregating the plankton in the warm sea surface waters. Defant⁴ stated that long bands of foams often seen in the sea can be formed by the combination of strong current in a single direction and rotary circulation in convection cells. The faunal composition of the zooplankton samples collected from SST and from the surrounding areas was also different (Table 1). Fish eggs and crustacean eggs were abundant in collections from the former (sts 1-8). High incidence of copepods, sergestids decapod larvae, polychaete larvae and fish larvae at sts 9-12 reflects the normal oceanic fauna there. It is likely that yolk-filled fish eggs and crustacean eggs are brought near the sea surface with convective currents. The fish larvae obtained from the zooplankton

samples from the high SST seas were inactive. The fish eggs contained more yolk compared to those collected from the neighbouring cooler stations Buckley⁵ reported that very high temperature may influence fish larval development by effecting the timing of completion of yolk sac absorption of Winter Flounder *Pseudopleuronectes americanus*.

Present studies indicate that numerous crustacean eggs, fish eggs and mysids get trapped near the abnormally high SST layers. This may be influencing the fisheries by delaying yolk sac consumptions by developing crustacean and fish and their subsequent recruitment in the affected areas.

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References

- 1 La Fond E C. *Indian Meteorol Geophys*, 10 (1959) 415.
- 2 Roll H C. *Int Geophys Ser*, 7 (1965) 426.
- 3 William H B, John G B & Robert C G. *Circulation and oceanography in the Somali Basin as observed during the 1979 southwest monsoon*, (Technical report, prepared for Commander, Naval Oceanography Command, NSTL Station, Bay St Louis) 1981.
- 4 Defant A. *Physical Oceanography*, 1 (1961) 729 pp
- 5 Buckley L J, *Mar Ecol Prog Ser*, 8 (1982) 181