COLLABORATIVE RESEARCH SURVEY ON MARINE FISHERIES RESOURCES AND ENVIRONMENT IN THE GULF OF THAILAND 2018

Distribution of benthic debris in the Gulf of Thailand

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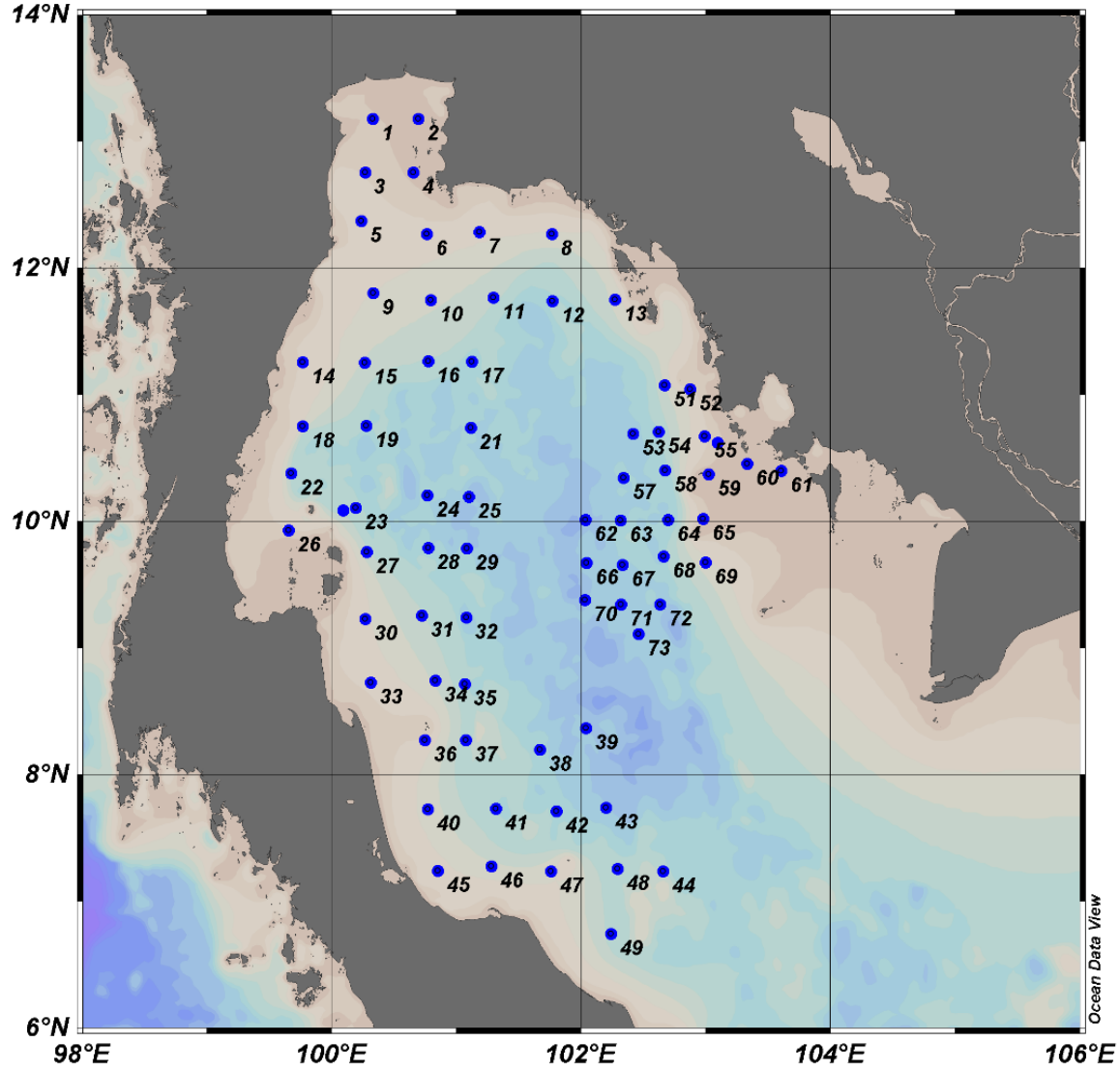
Supported by Southeast Asian Fisheries Development Center Training Department, Samut Prakan, Thailand

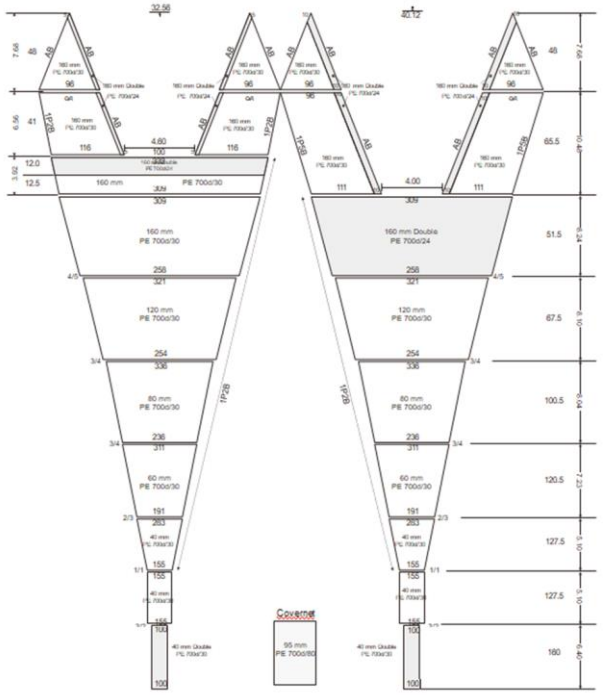
Map of study area and distribution of survey stations



Survey period:
17 Aug-11 Oct 2018

Bottom trawl survey:
73 stations

Sampling equipment,



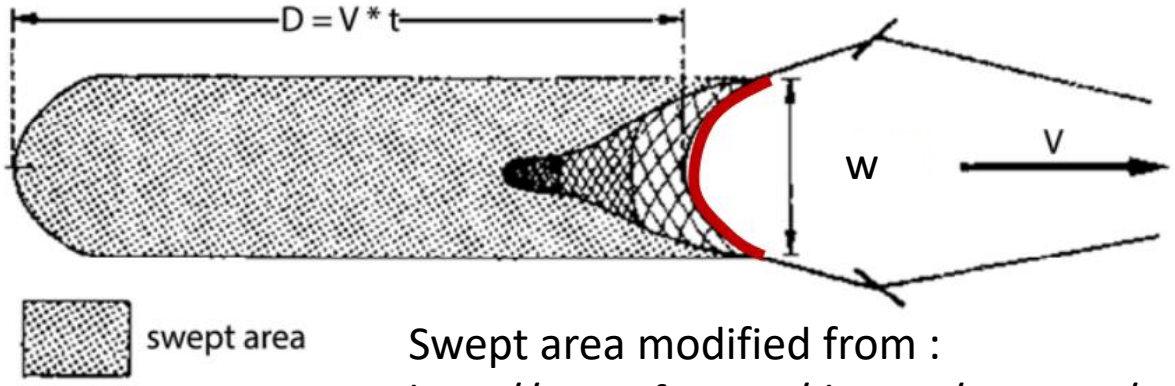
Specification of MV.SEAFDEC2 bottom trawl (SEAFDEC/TD,2018) as follow;

1) Ground rope length 40.12 m.
2) Head rope length 32.56 m.
3) Total net length 58.11 m.
4) Cod end length 6.40 m.
5) Wing net mesh size 160 mm.
6) Cod end mesh size 40 mm.

Method:

- Methodology for Monitoring Marine Litter on the Seafloor (continental shelf) (Vlachogianni,T. and Somarakis, S., 2014)
- Trawling speed ~3 Knots
- Trawling period 1 hour
- Spread of trawl (*width of the path swept by the trawl)* -- > from sensor (Scanmar) attached

Method: calculate swept area



Swept area modified from :
http://www.fao.org/docrep/w5449e/w5449e0f.htm)

Swept area (km^2) = D * W

D is the cover of distance = V * t

V is the velocity of the trawl over the ground when trawling in km/hour

t is the time spent trawling in hour

W is width of the path swept by the trawl recorded from Door opening sensor (https://www.scanmar.no/sensors/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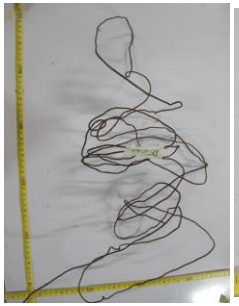
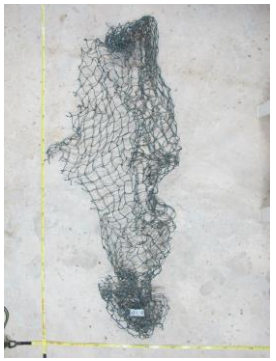
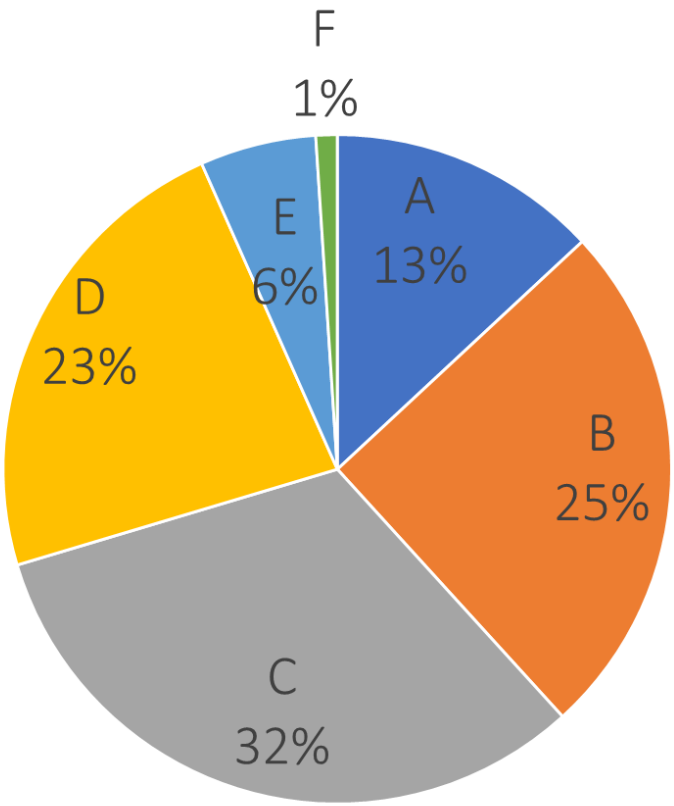
Total number of benthic debris -- > 906 items , 6.2 km^2)





Benthic debris by size classes



A < 25cm^2

B < 100cm^2

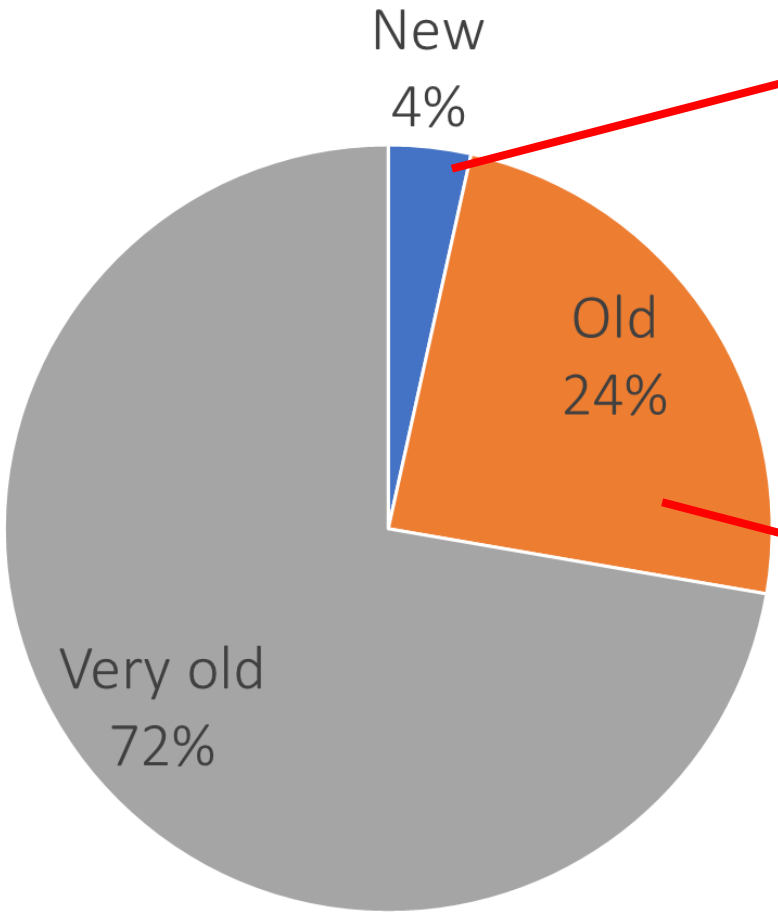
C < 400cm^2

D < 2500cm^2

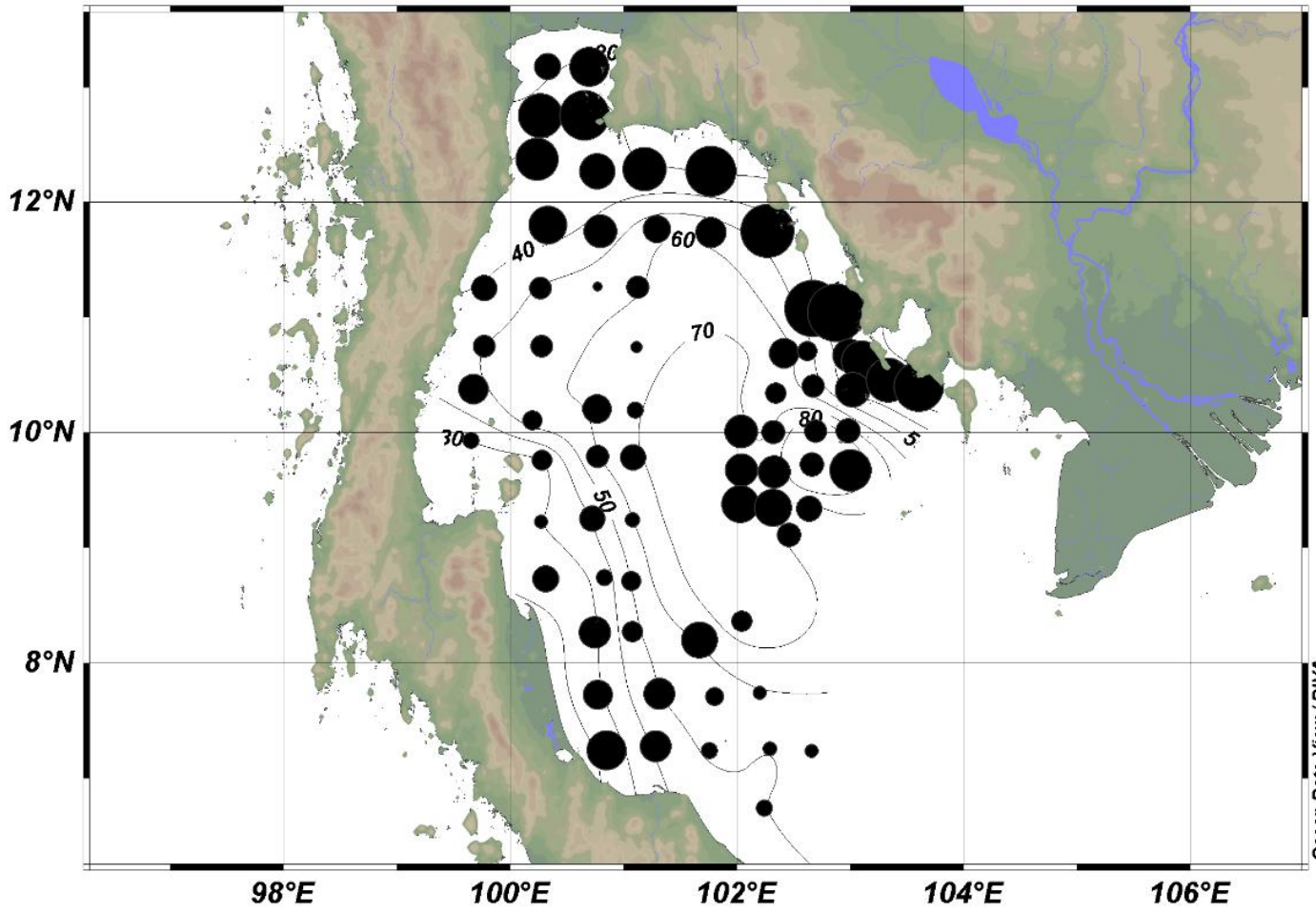
E < 1m^2

F > 1m^2

Benthic debris by age



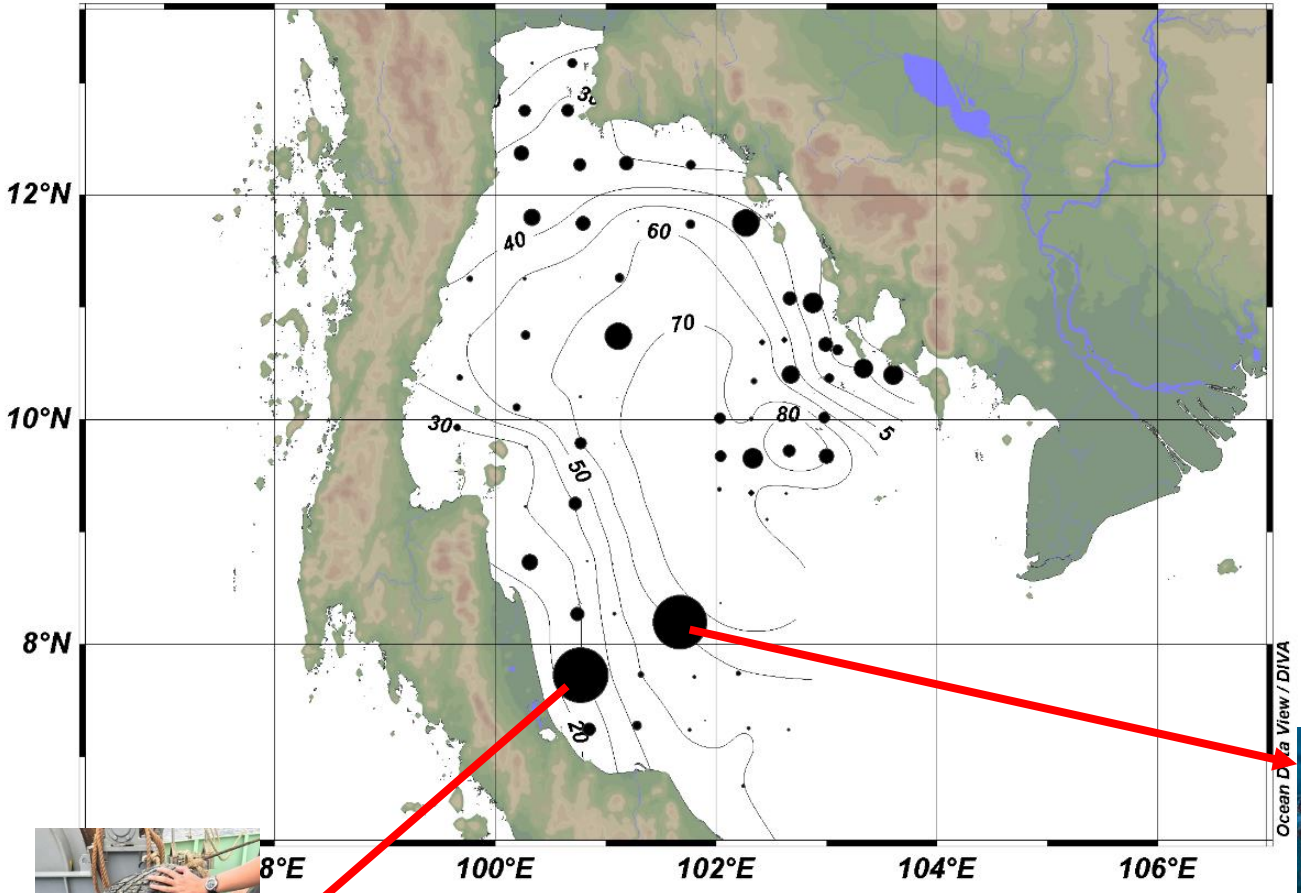
Density of benthic debris (items/km^2)



Lowest -- > 11 items/km^2
Highest -- > 482 items/km^2
Avg 138.58±15 items/km^2

10 items/km^2
50 items/km^2
100 items/km^2
500 items/km^2

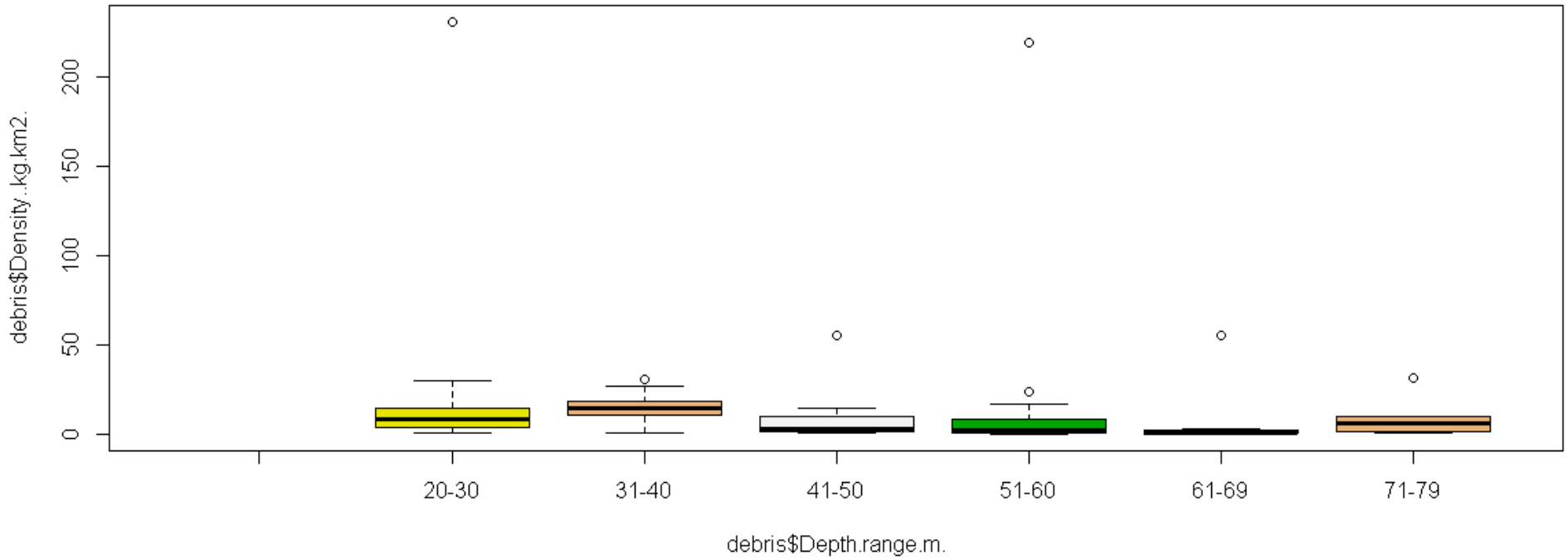
Density of benthic debris (kg/km^2)



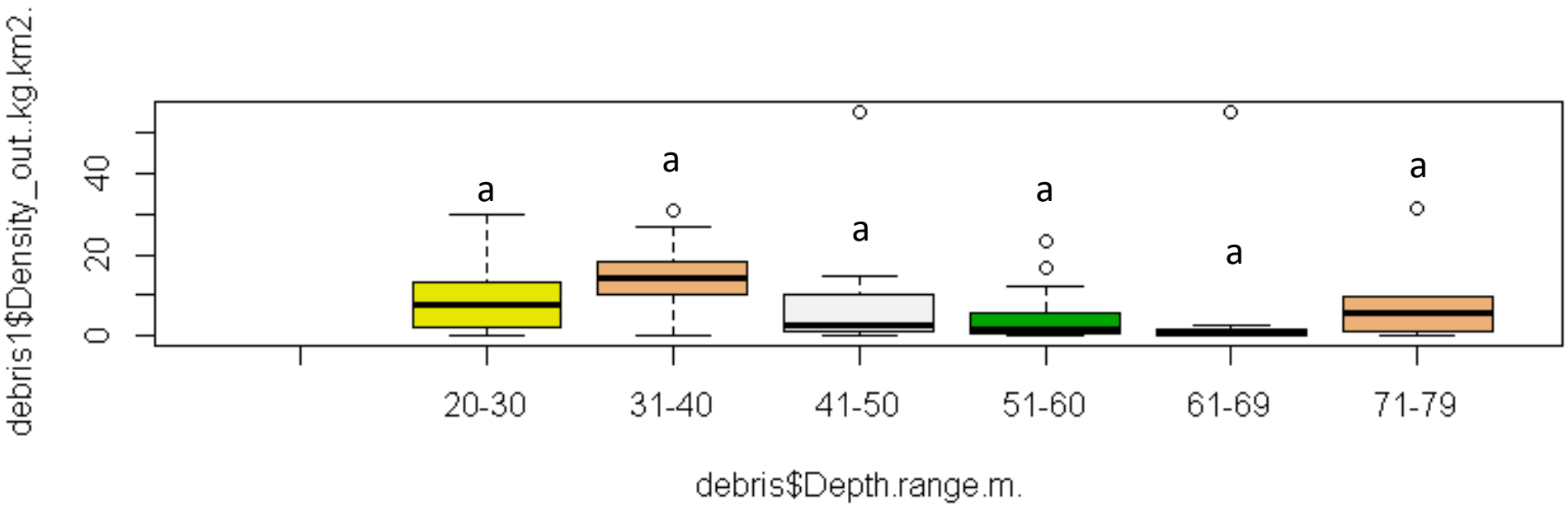
Lowest -- > 0.02 kg/km^2
Highest -- > 231 kg/km^2
Avg 14.77±38 kg/km^2

10 kg/km^2
50 kg/km^2
250 kg/km^2

Boxplot of debris weight (kg/km^2) in each depth range
p-value = 0.855

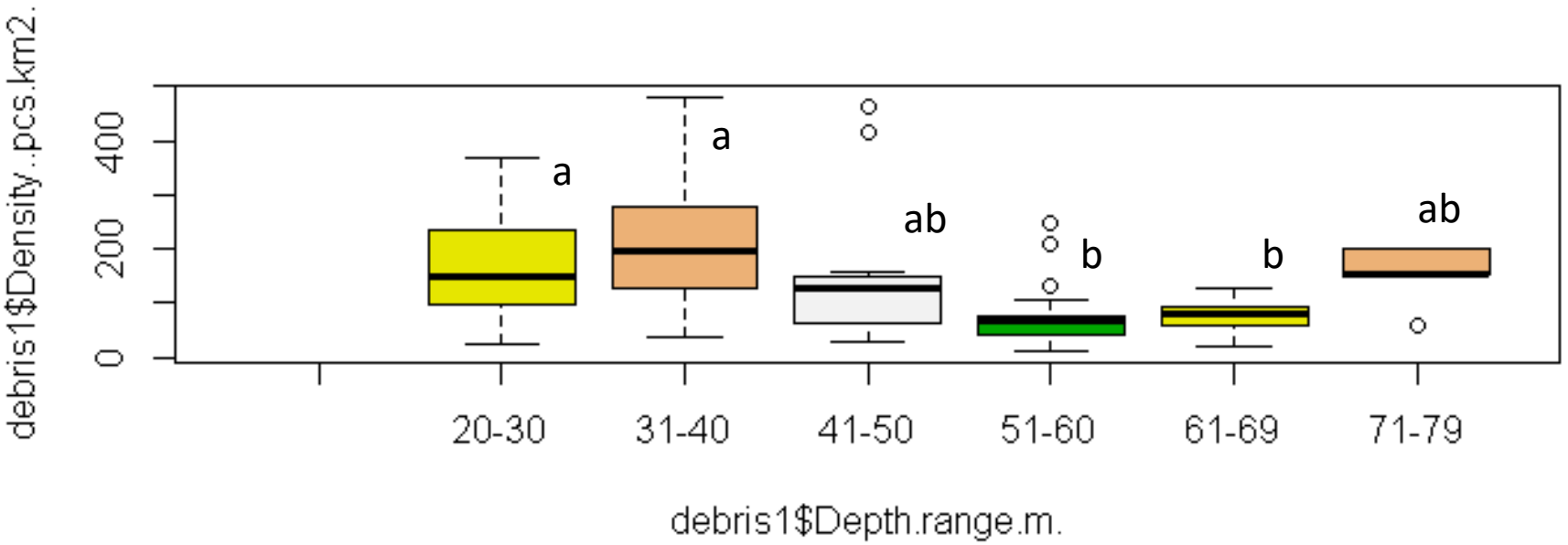


Boxplot of debris weight (kg/km^2) in each depth range
p-value = 0.345



Boxplot of debris (items/km^2) in depth range

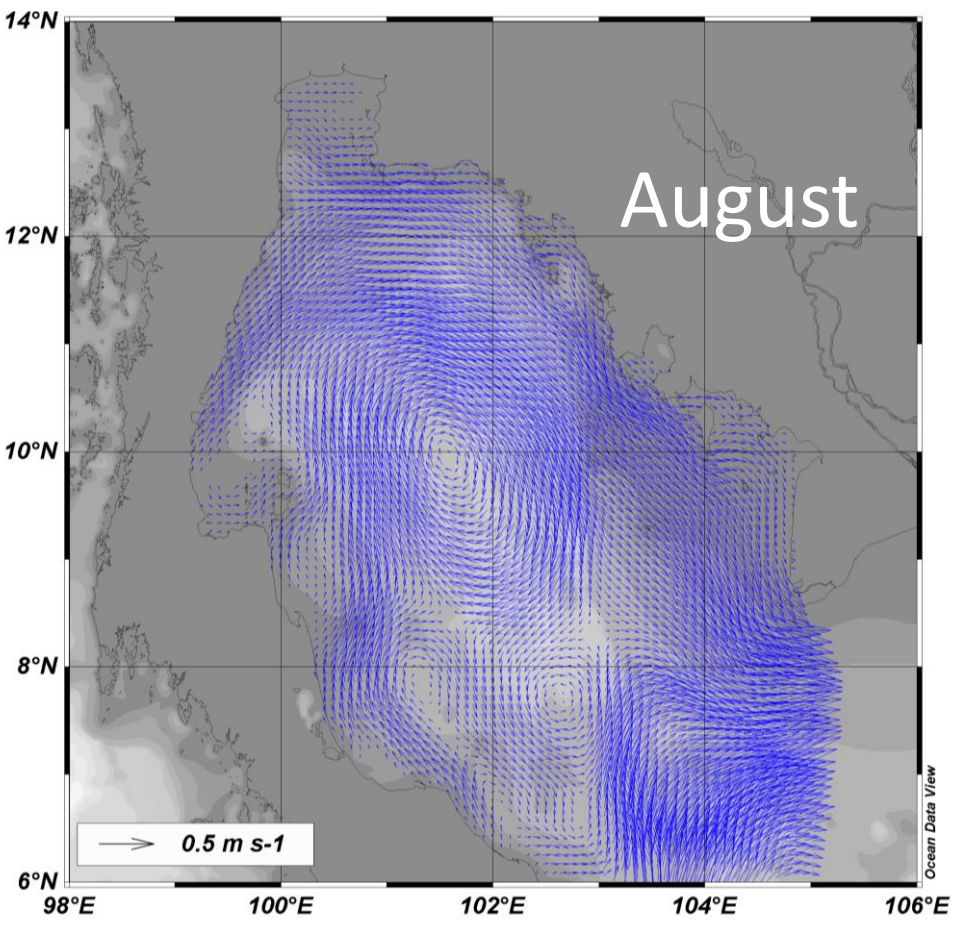
p-value = 0.00215 **

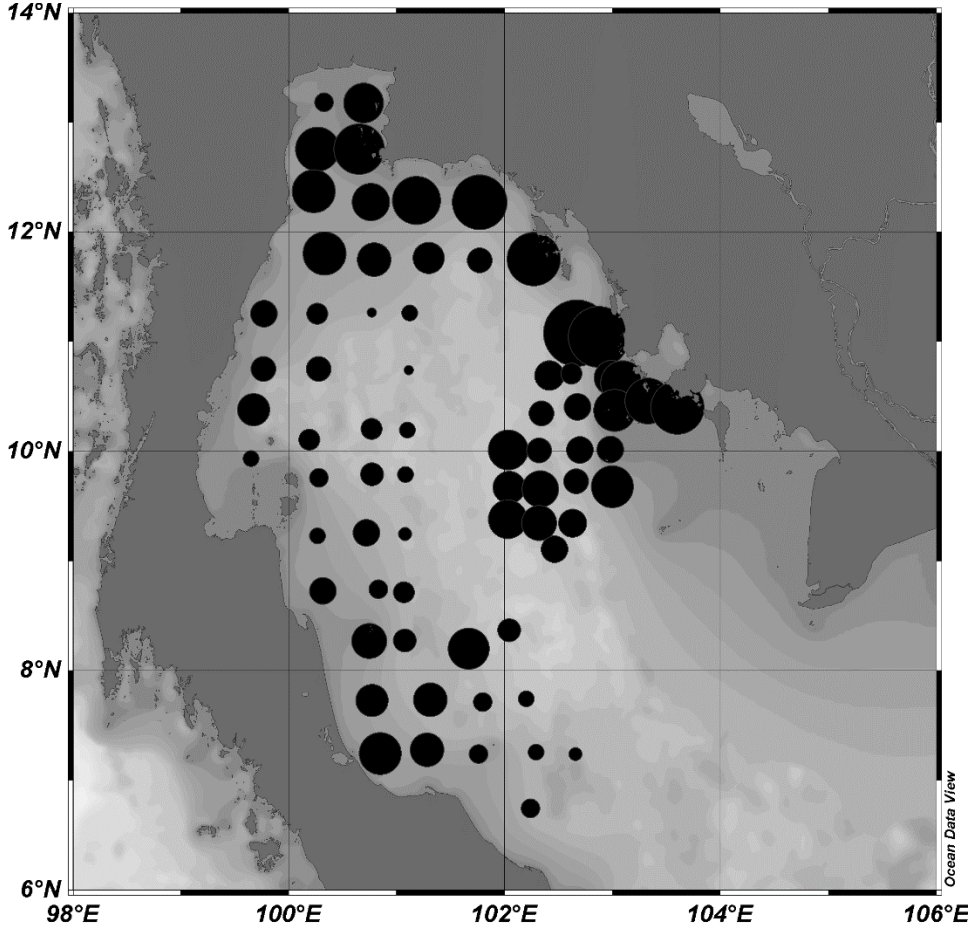


Frequency of occurrence ,mean number and weight of debris in each water depth range

Depth range (m)	Number of trawls	Area covered (km^2)	Frequency %	Mean number of items ±SD (items/km^2)	Mean weight of debris ±SD (kg/km2)
20-30	13	1.10	100	176.71 ± 113.47^{a}	26.5 ± 64.04^{a}
31-40	12	1.09	100	217.50 ± 123.98^{a}	14.71 ± 8.40^{a}
41-50	11	1.04	100	158.08 ± 146.54^{ab}	9.13 ± 16.20^{a}
51-60	19	1.75	100	77.85 ± 59.27^{b}	15.55 ± 48.43^{a}
61-70	10	0.68	100	79.24 ± 35.18^{b}	6.92 ± 17.07^{a}
71-80	6	0.55	100	153.81 ± 51.45^{ab}	8.97 ± 11.82^{a}

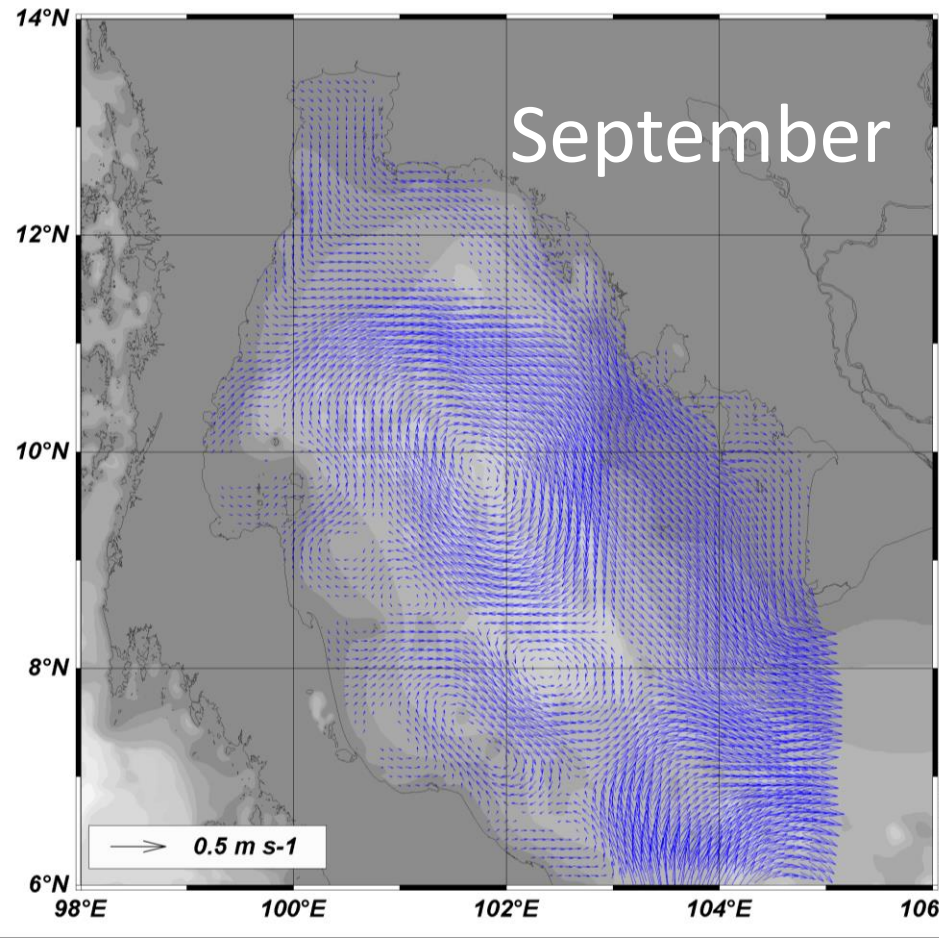
Surface current & number of debris (items/km^2)

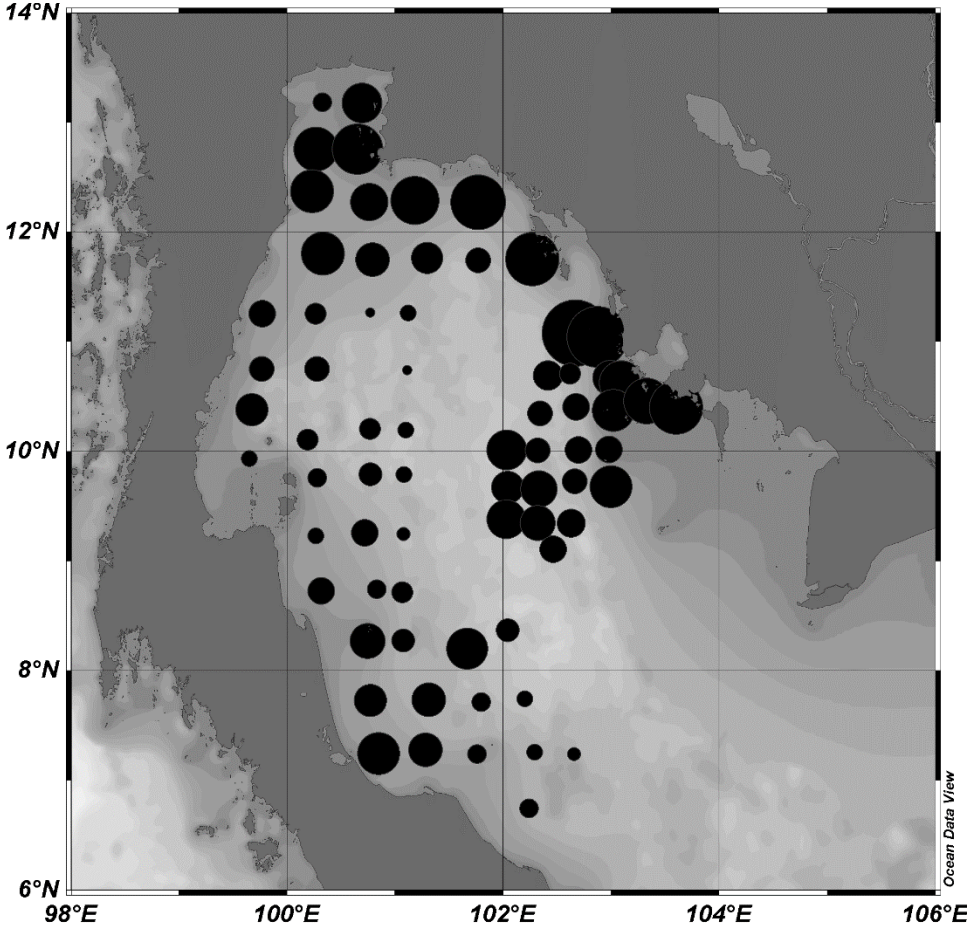




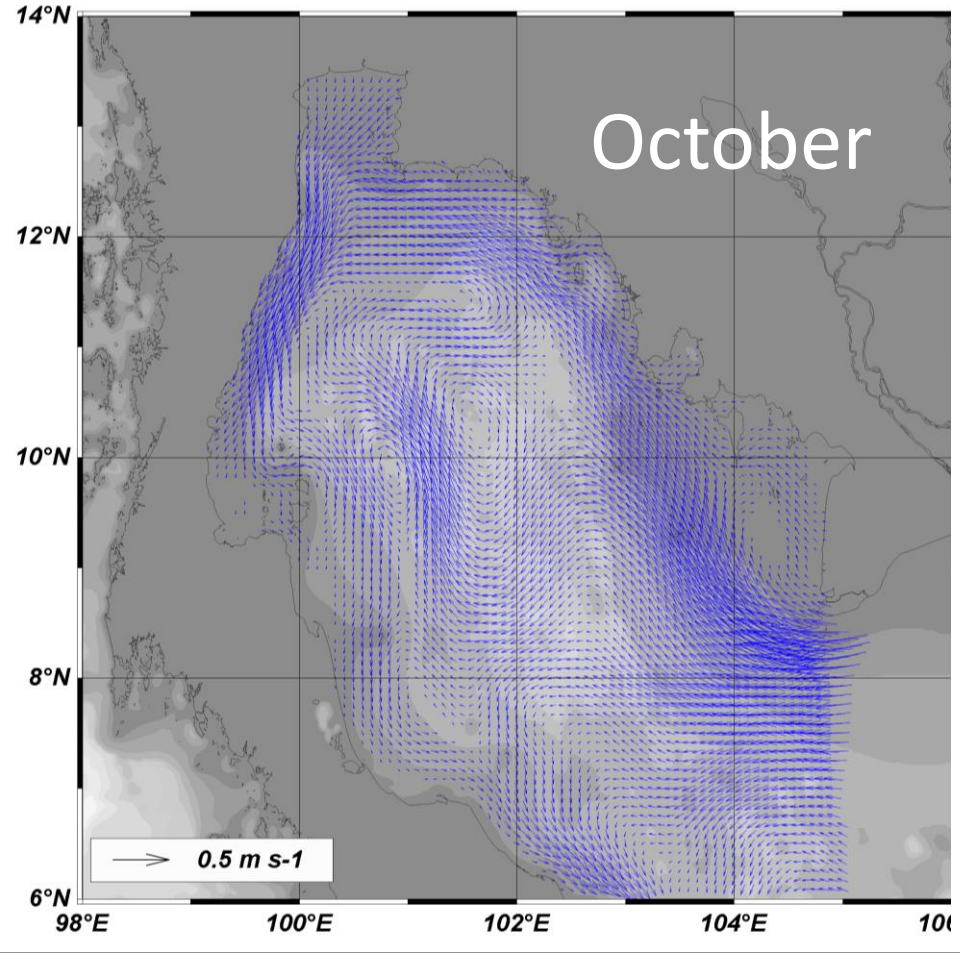
"Monthly mean fields for product GLOBAL_ANALYSIS_FORECAST_PHY_001_024" "CMEMS - Global Monitoring and Forecasting Centre"

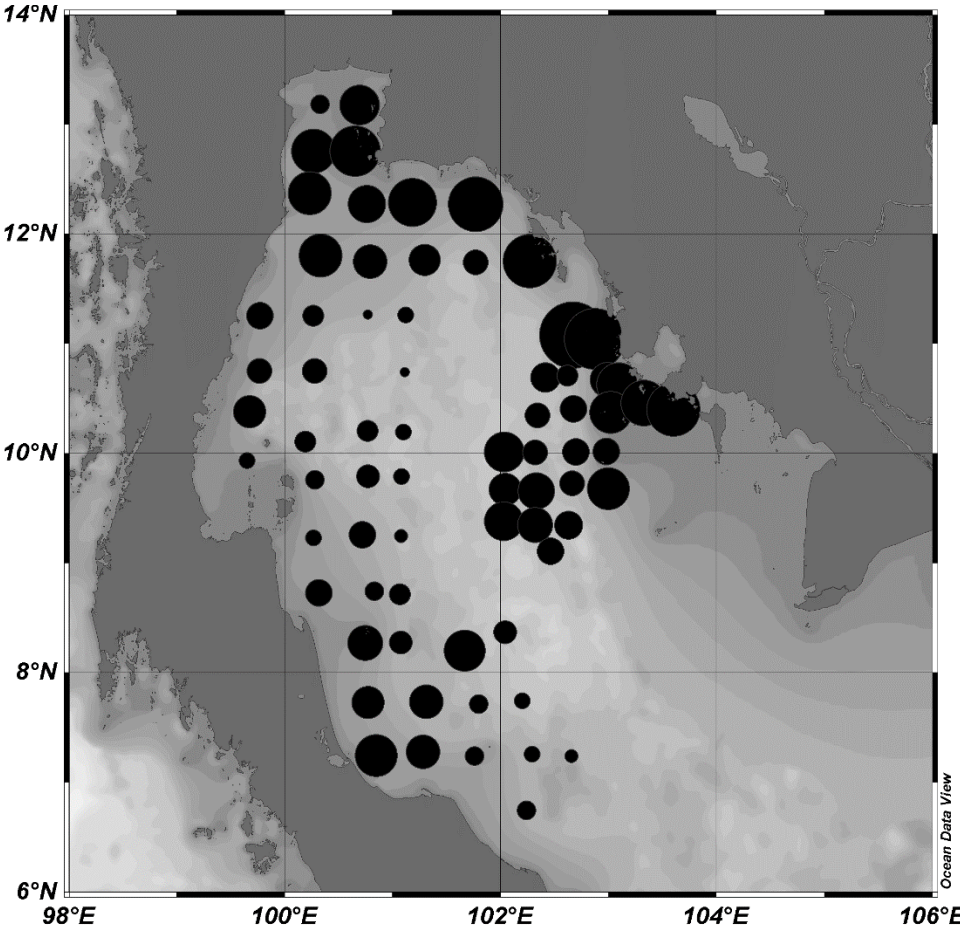
Surface current & number of debris (items/km^2)

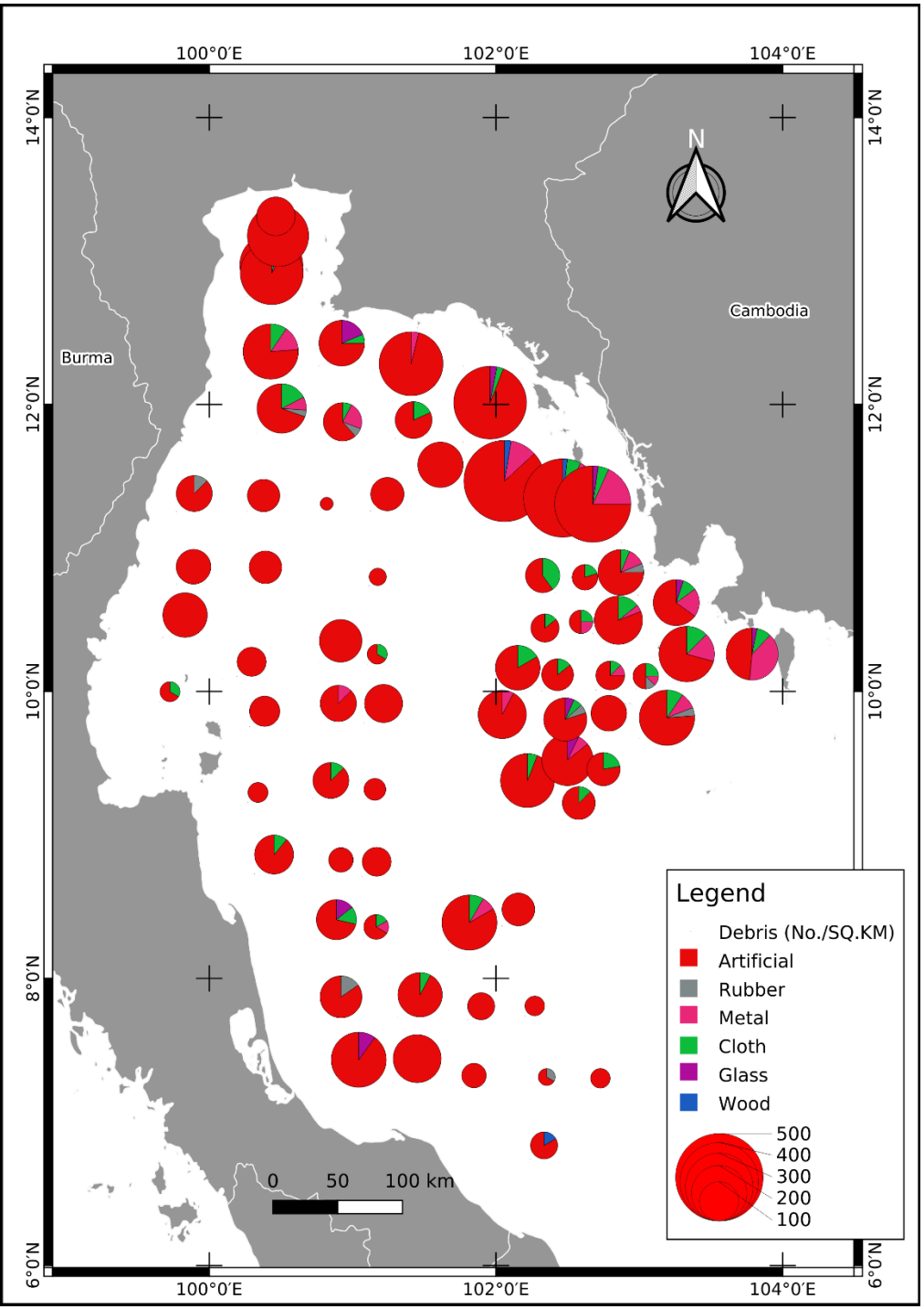




Surface current & number of debris (items/km^2)



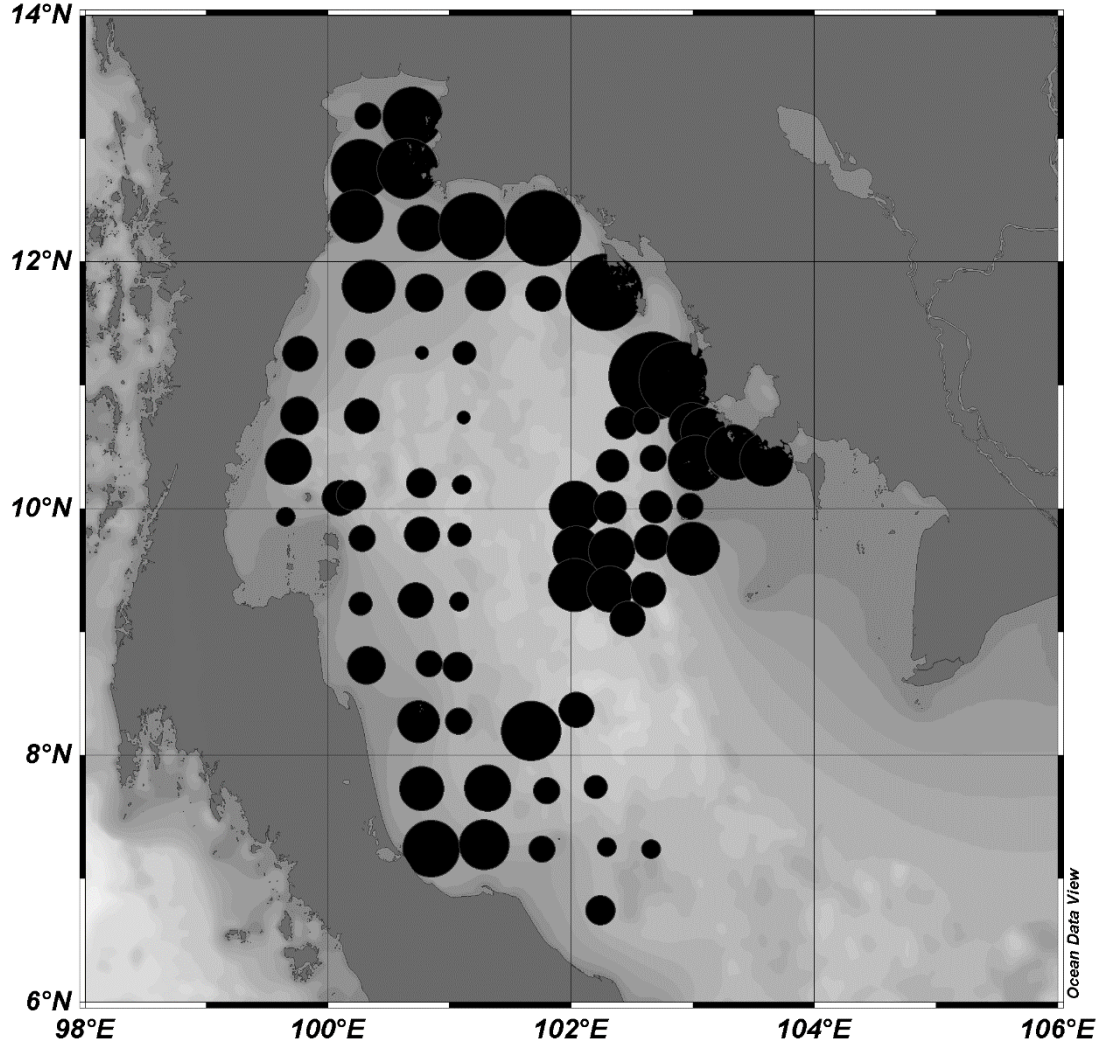




Composition of benthic debris categories by type of materials

Items/km^2

Artificial Polymer materials(items/km^2)



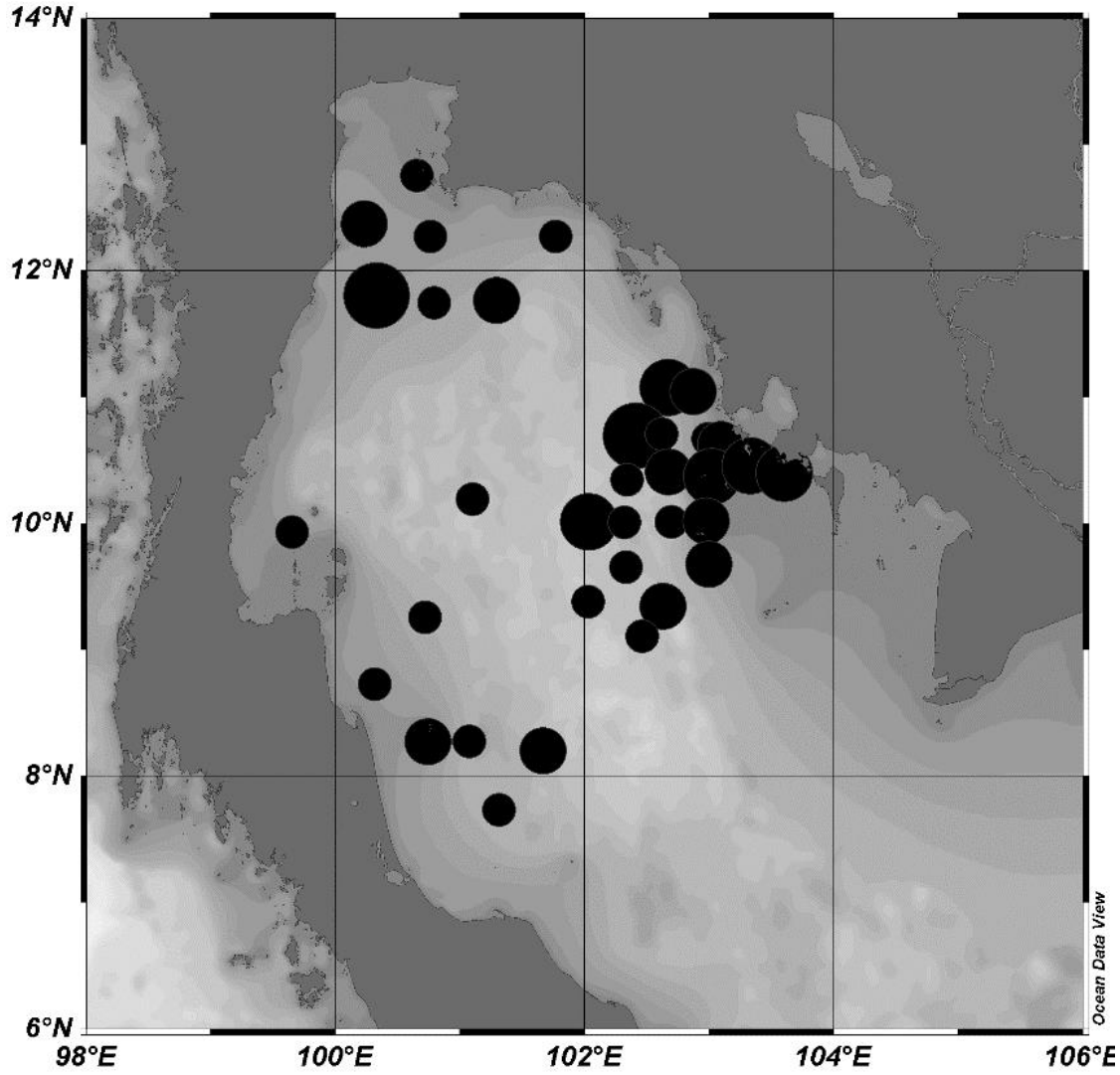
10 items/km^2

50 items/km^2

150 items/km^2

450 items/km^2

Cloth/Textile (items/km^2)

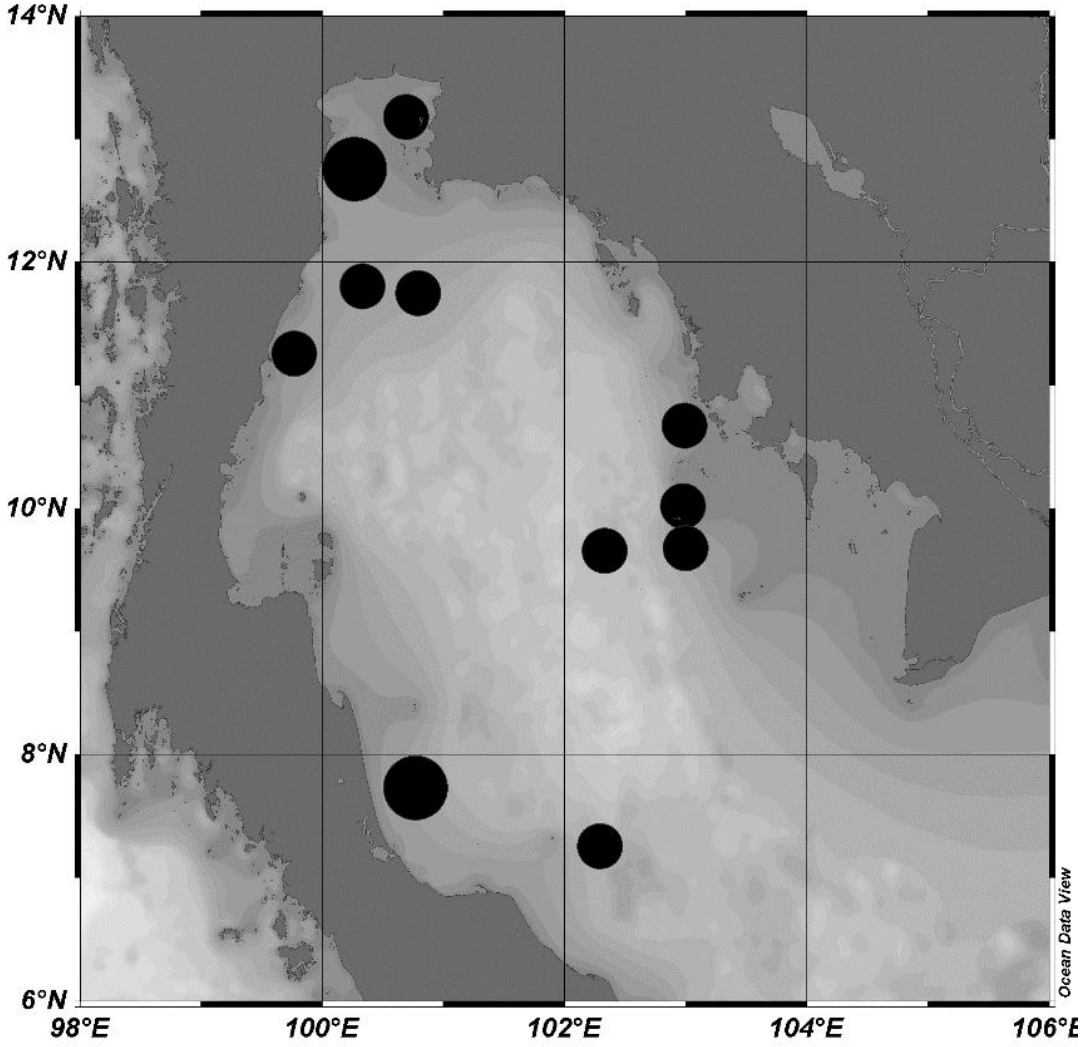


10 items/km^2

20 items/km^2

55 items/km^2

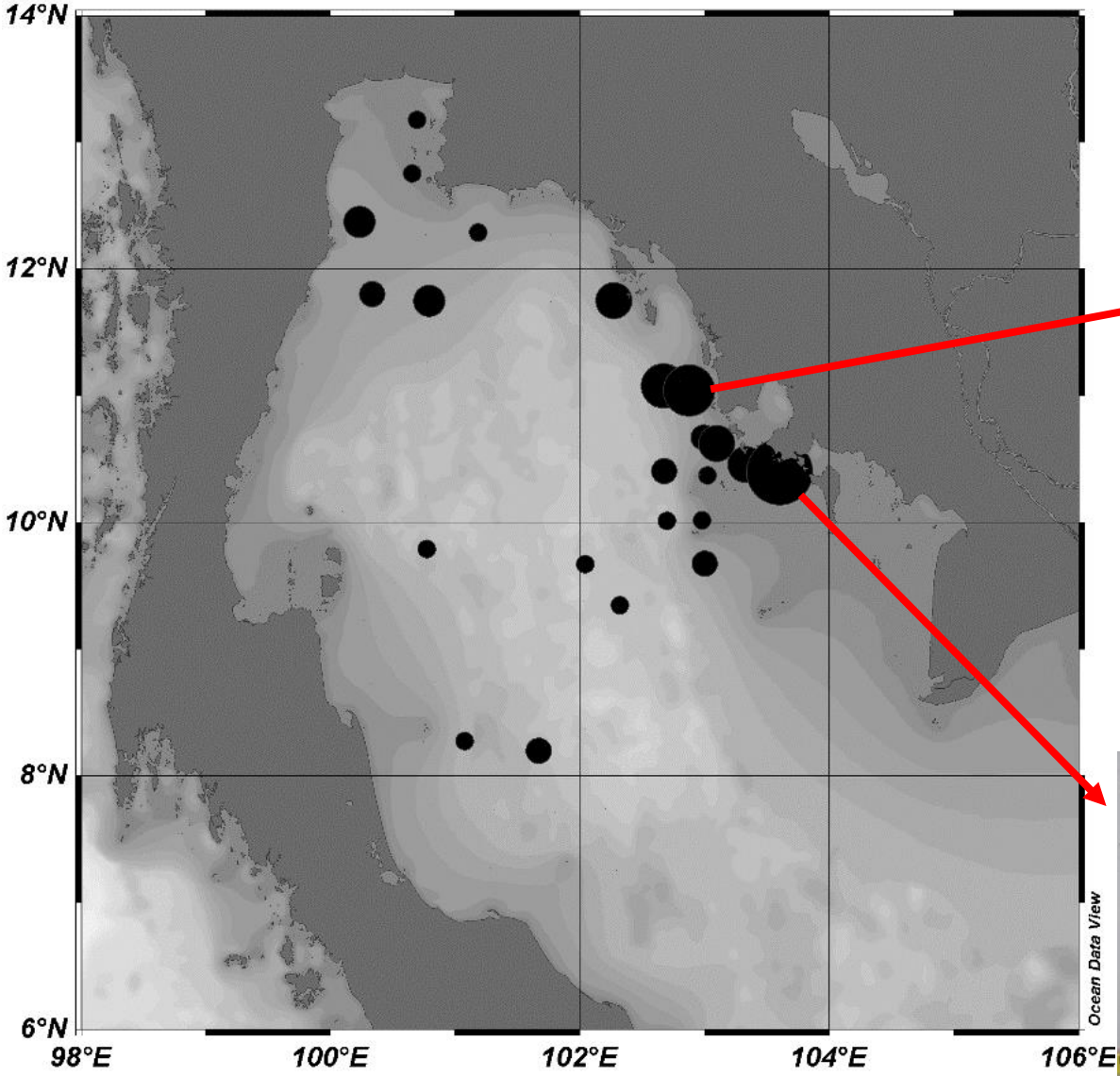
Rubber (items/km^2)



10 items/km^2

25 items/km^2

Metal (items/km^2)

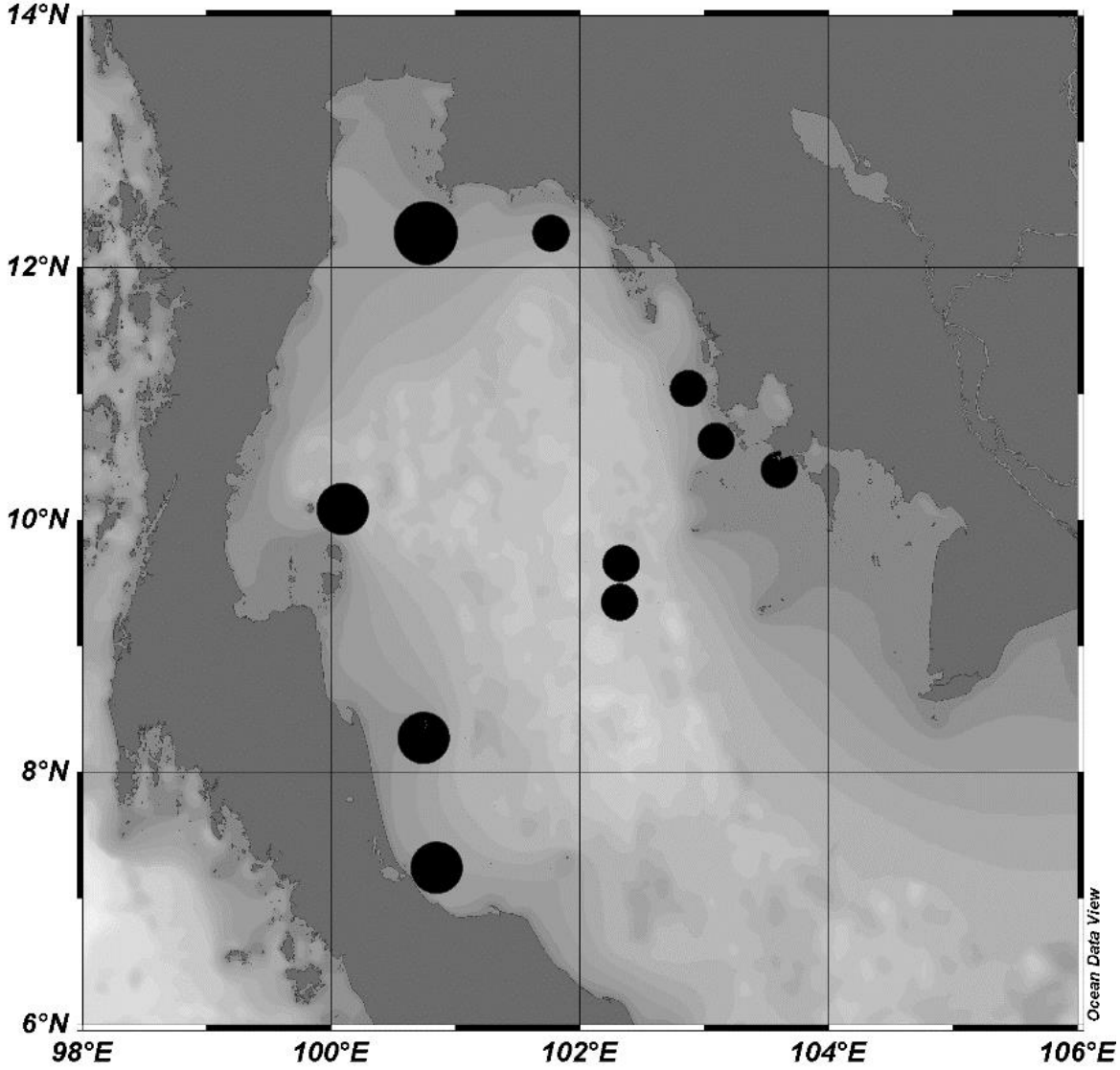


10 items/km^2

50 items/km^2

150 items/km^2

Glass/Ceramics (items/km^2)

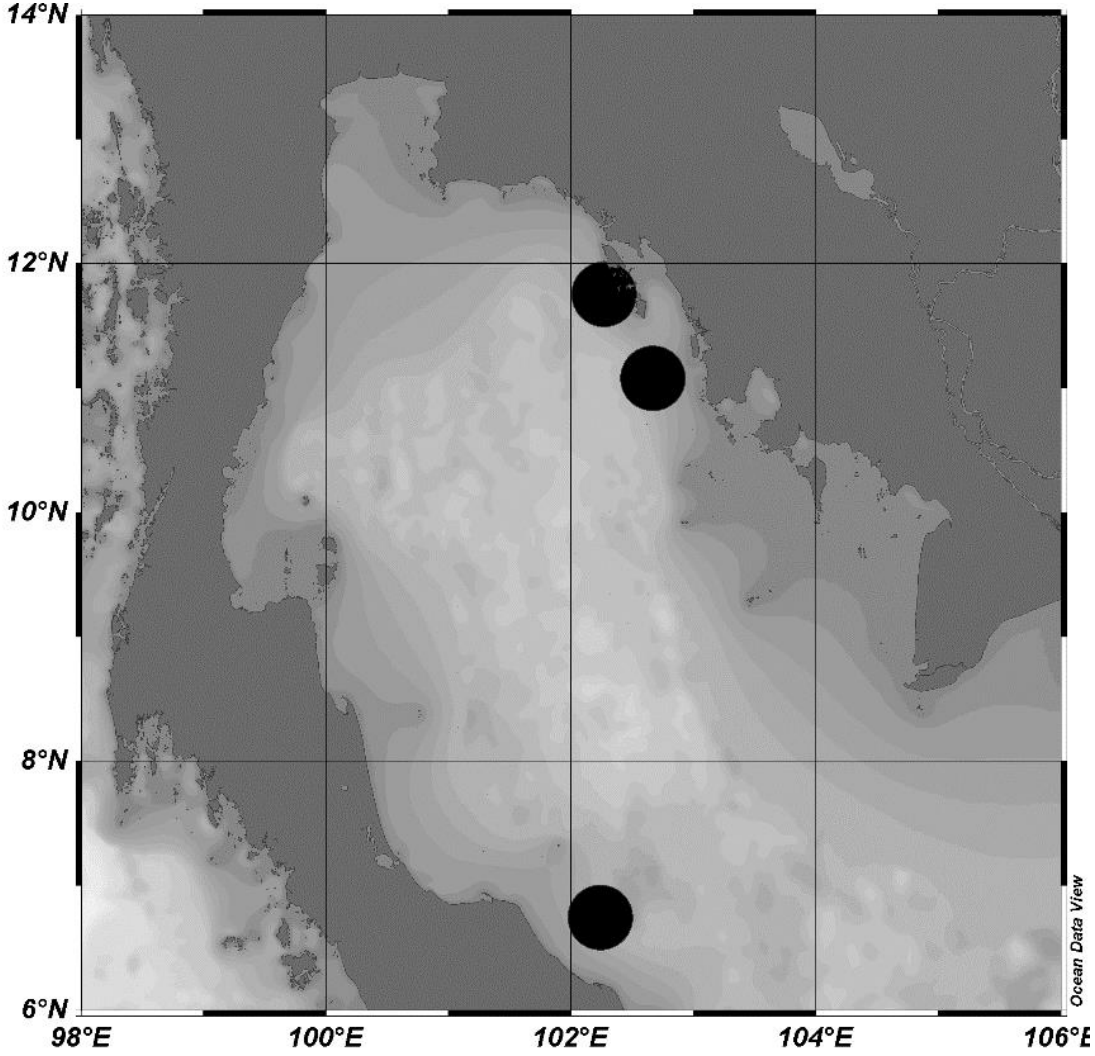


10 items/km^2

20 items/km^2

35 items/km^2

Wood (items/km^2)



15 items/km^2

Comparison with other areas

Area	Study period	kg/km^2
Mediterranean Sea (Loulad S., *et.al*,2019)	June 2012	78.68±146
	June 2013	135.91±176
	June 2015	85.83±201
Gulf of Thailand	Aug-Oct 2018	0.02 – 231 Avg 14.77±38

Area	Study period	Items/km^2 (frequency of occurrence)
Southern Baltic sea (Malinga B.U.,et al,2018)	2015-2016	0 (34%)-223 Avg 20±30
Gulf of Thailand	Aug-Oct 2018	11 – 482 (100%) Avg 138.58±15

Summaries

- 73 stations, coveraged area 6.2 km^2,
- 906 items
- Plastic 83%, Cloth/Textile 7%, Metal 7%, Glass/Ceramics 2%, Rubber 1%, Wood 0. 3%
- Frequency of occurrence -- >100%
- Density -- > 0.02 – 231 kg/km^2 , Avg 14.77±38 kg/km^2
- Density -- > 11 – 482 items/km^2, Avg 138.58±15 items/km^2
- Items/km^2 in < 40 m (a) > 41-50 and 71-80m (ab) > 41-60 m (b)
- Eastern area > Western and Center -- > relate with circulation

References:

SEAFDEC/TD. 2018. Report on the regional technical meeting collaborative research survey on fisheries resources and marine environment in the Gulf of Thailand (Cambodia, Thailand and Vietnam waters) 24-26 July 2018, TD/RP/202.

Vlachogianni,T. and Somarakis, S. 2014. Methodology for Monitoring Marine Litter on the Seafloor (continental shelf). Download from https://mio-ecsde.org/wp-content/uploads/2014/12/Seafloor-litter_monitoring-methodology_continental-selves_final.pdf. Download on July,2018. 11 pages.

Loulad S, Houssa R., Ouamari EL and Rhinane H., 2019. Quantity and spatial distribution of seafloor marine debris in the Moroccan Mediterranean Sea. Marine Pollution Bulletin 139, 163-173.

Malinga B.U.,Wodzinowski T.,Witalis B.and Zalewski M.,2018. Marine litter on the seafloor of the Southern Baltic. Marine Pollution Bulletin 127, 612-617.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