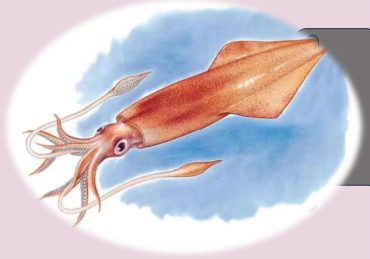


Academic English poster

Title:
Relationship between latitude differences in individual growth and environmental variables in Uroteuthis edulis

Supervisor: Zhou Fang
Name : ZiXuan Yang

01 ABSTRACT

Based on the samples of Uroteuthis edulis collected in the South China Sea from March to May from 2017 to 2021 and the East China Sea from September to October from 2017 to 2021, the basic biological information was measured. The hatching date and population composition were determined by the information of statolith. The Gradient Forest Method (GFM) and Generalized Additive Models (GAMs) were used to determine the hatching date and population composition to screen the important environmental factors and their effect relationships affecting the daily growth of statolith. The results showed that the hatching peak of female U. edulis in the East China Sea was in April, and the important environmental variable affecting the daily increments of statolith was Sea Surface Temperature (SST), temperature at 50 meters (Temp_50), temperature at 25 meters (Temp_25) and Sea Surface Salinity (SSS).Among them, Temp_25 has the largest influence weight, and when Temp_25 is in the range of 20 ° C to 26 ° C, the statolith width shows a decreasing trend with the increase of temperature. The peak incubation period of female U. edulis in the South China Sea is December. Temperature at 75 meters (Temp_75), temperature at 25 meters (Temp_25), temperature at 50 meters (Temp_50) and Sea Surface Temperature (SST) were the main environmental variables affecting the daily increments of statolith. Among them, Temp_25 had the largest influence weight, so the temperature of 25 m water depth is an important determinant of the growth of female U. edulis. This study provided scientific reference for the assessment and management of this fishery resource.

02 BACKGROUND

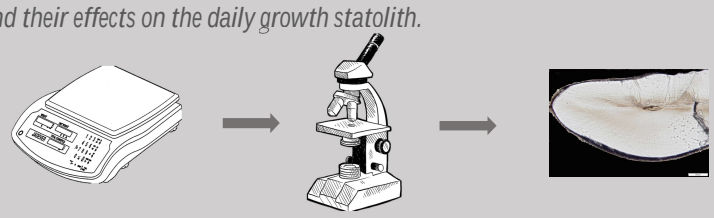
1、As one of the most important offshore cephalopod resources in China, the U. edulis has abundant resources in the southern Yellow Sea, the East China Sea and the north of the South China Sea, with an annual output of about 1.5 × 10^4 t (East China Sea). At present, scholars at home and abroad have conducted a comprehensive study on the U. edulis from the aspects of population composition, migration path, age growth, resource assessment and so on.

2、Age and growth play an important role in the study of Cephalopod biology. Cephalopod statolith is a pair of hard tissue structure located in statolith , which is a good carrier of Cephalopod biological information due to its stable structure. Studying its microstructure can reveal the differences and growth rules of individual cephalopod growth. The change of the incremental width of the equilibrium stone day can significantly reflect the difference of cephalopod growth caused by the change of Marine environment.

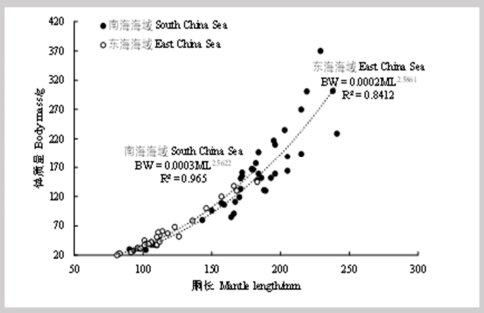
03 MATERIALS&METHODS

Commercial trawlers were used to conduct sampling in the South China Sea (111°E-117°E, 18°N-22°N) and the East China Sea (120°E-124°E, 25°N-29°N) during March-May 2017-2021 and September-October 2017-2021, respectively. The samples were refrigerated and transported to the laboratory for basic biological tests. The body mass (g) and the body length (mm) of the sample were measured, and the body length was measured with a tape measure with a measuring accuracy of 1mm. The electronic balance is used to measure the body mass, and the measurement accuracy is 1g.

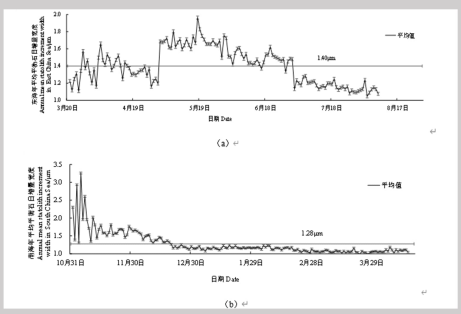
Models : The Gradient Forest Method (**GFM**) and Generalized Additive Models (**GAMs**) were used to screen the important environmental factors and their effects on the daily growth statolith.



04 RESULTS



Mantle length-body mass relationship of female U.edulis



Annual mean daily increment width of statolith of female individuals hatched in different sea areas (a: the East China Sea; b: the South China Sea)

Tab. 3 The significance of key environmental variables on daily statolith increment width in different sea areas based on the generalized additive model (GAMs) analyses.

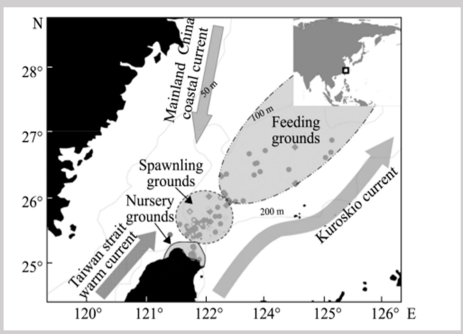
Hatching area	Environmental variables	AIC	R^2	Deviance explained %	P-Value	F	Significance
the East China Sea	SST	-322.65	0.76	77.10	0.000	0.60	***
	Temp_25	**-336.80**	**0.78**	**79.30**	**0.000**	**59.86**	***
	Temp_50	-334.69	0.78	78.90	0.000	58.84	***
	SSS	-173.70	0.29	31.70	0.000	9.74	***
	SST	-266.08	0.73	74.40	0.000	62.01	***
the South China Sea	**Temp_25**	**-286.40**	**0.77**	**77.50**	**0.000**	**66.87**	***
	Temp_50	-120.76	0.32	34.78	0.000	57.80	***
	Temp_75	-112.18	0.34	37.00	0.000	10.58	***

The significance of key environmental variables on daily statolith increment width in different sea areas based on the generalized additive model (GAMs) analyses.

05 DISCUSSION

The results of this study confirmed that the incubation peak of female U.edulis d in the East China Sea was from March to May, and the dominant spawning groups were spring and summer spawning groups.

Former study:



Environmental factors:

- Temperature : Sea water temperature is an important factor in Cephalopod life history, which not only affects the reproduction and migration of the organism, but also affects the distribution of feeding groups of the organism.
- Salinity : The influence of salinity on Cephalopods is usually manifested in indirect aspects, through environmental factors such as water mass and ocean current, which affects the osmotic pressure of individual organisms, and then affects the reproductive growth and metabolism process.

06 CONCLUSION

In the East China Sea, the interpretation rate of the water temperature at 25m depth (Temp_25) is higher than that of other environmental factors, followed by the water temperature at 50m depth (Temp_50), which verifies the previous research results: water temperature plays a crucial role in the growth process of cephalopods. The interpretation rate of T25 was higher than other environmental factors in the South China Sea, followed by sea surface temperature (SST).

Limitation: In this study, U.edulis captured in the South China Sea from March to May of 2017 to 2021 and in the East China Sea from September to October of 2017 to 2021 were taken as samples, and the number of samples was relatively sufficient. However, according to previous studies, there were significant differences between the growth years of male individuals, so this study only targeted at female individuals. At the same time, the selected environmental factors are only related to sea water temperature, salinity and depth, and do not involve other biological factors.

Future: Strengthen the fishery investigation of this species, taking into account all environmental factors, including biological and abiotic factors.

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SOFTWARE