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The near shore carbonates' relationship between ocean saline components and sea shells growing and its investigating activities in the high school.

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AGU Bright STaRS

セッション用
紹介動画2020ナレーション
ナレーション音声
（背景映像は無視してください）

This presentation has 2 goals

One is to create new scientific educational activity as geoscience teacher, the other is high school student's data discussing activity report.

Ocean----

The most important biologic reaction field

Near shore environment---

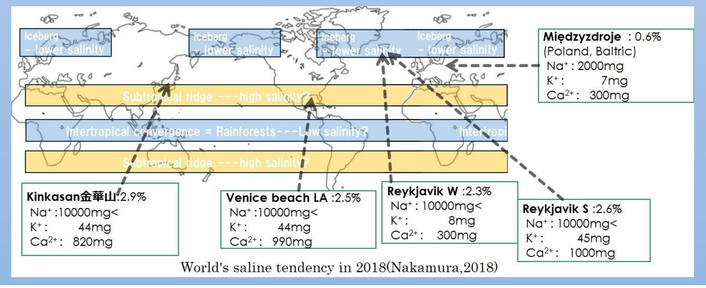
Facing human to the ocean to investigate, Facing land biosphere to oceanic to supply land nutrients.

Both Ocean/Land get disturbance and convection and create new biosphere with chemical reactions.

Easy to reach the entrance how to research the science.

(1)Ocean Saline monitoring
（A) Saline monitoring activity at the near shore

Saline quantity world-wide tendency in august （Nakamura 2018）
Higher evaporation season or lower land water income leads higher saline quantity.

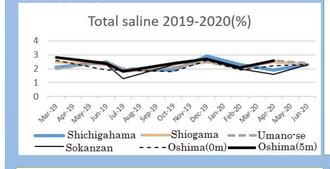


World's saline tendency in 2018(Nakamura,2018)

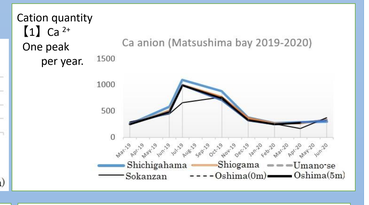
(1)Ocean Saline monitoring
（B） Regional saline monitoring activity in Matsushima bay

For 2 years, we have made monitoring activities in our region.
The world wide saline tendency in august(2018) Regional monitoring activity at Matsushima-bay research.
①Shichigahama(Outer ocean)
②Shiogama(the entrance of the bay)
③Umanose④Sokanzan (Inner bay)
⑤Oshima(Most inner bay)

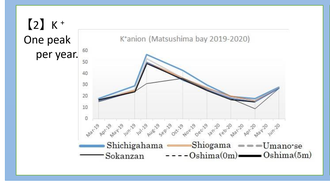
At first, we took ocean water at Oshima(map ⑤), inner bay area just the coast(om) and 5m by far throw method(5m).
Saline monitoring for 2 years
Many data showed us resemble tendency, almost only seasonal changing as we show below.
Total saline



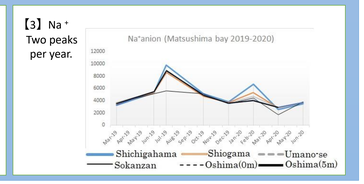
Cation quantity
【1】Ca^{2+}
One peak per year.



【2】K^+
One peak per year.



【3】Na^+
Two peaks per year.



(2)Biochemical carbonates anabolic delay for Seashell forming

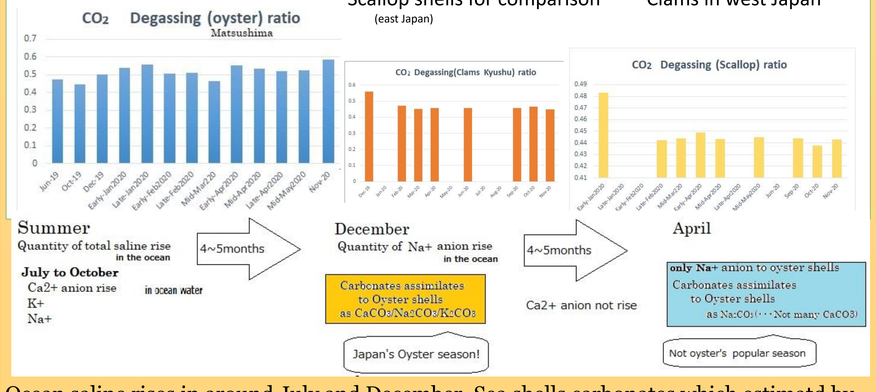
Seashells must absorb cation from ocean water and form carbonates.
Therefore, measured degassed CO_2 weight ratio by strongly heated up to 1000 degree C.
Heated for 4 hours.


Heated(up to 1000 degreeC)

Regional Oyster in Matsushima bay

Degassed CO2 ratio has Two peaks per year.
Matsushima region is famous for oyster produce, The oyster shells composition has been reported as mainly $CaCO_3$.

Scallop shells for comparison (east Japan)
Clams in west Japan



Ocean saline rises in around July and December. Sea shells carbonates which estimatd by degassed CO2 rises in January and April, it has about 4month delay rises against ocean saline rising.

(3)Near shore influence for Saline quantity

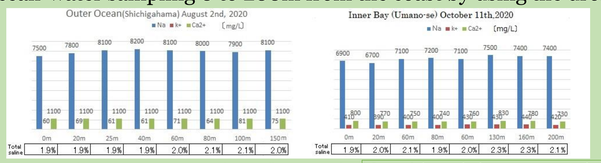
Ocean saline is always stable composition?
Is there any differences between at the coast and far from the coast?

We constructed water sampling units.

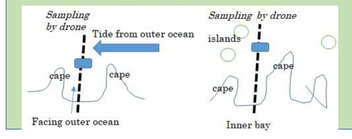
Water Sampling activity for far from the coast
Recently we are operating Drones—MavicAir （DJI） and Spark（DJI）.

Capes and Outer ocean / inner island（Higher salinity water gathered around the tip of the cape）

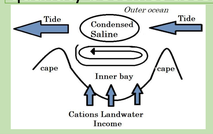
Ocean-water sampling 0 to 200m from the coast by using the drones.



Marine salt water is greatly influenced by the topography of the cape.



Considered the reason why the water saline quantity becomes ascend near tip of capes...



The water corrides between tide from the outer ocean and income from Landwater flow...

Conclusion

Seasonal changes in seawater and shell components have been revealed.
However, there are many more variations in long-term changes over the years.
It is easy to mention climate changes by long term seashells coposition changes.

Summary

The water and seashells that are easy to get have important information to measure environmental changes.
Especially, degassed CO_2 of 2020 is lager quantity than 2019. This year 2020's CO_2 is higher absorbance by its' higher temperature. This region has higher temperature tendency this year.

References

・R Nakamura（2018）AGU Fall meeting 2018.ED31E-1087：Educational model for short-term in situ ocean water monitoring in high school classes and science club activities
・R Nakamura（2019）Asia Oceania geoscience society OS16-A001：Educational Ocean saline monitoring activity in the high school and constructing applied model.

Acknowledgments

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