Seasonal change of surface pCO_2 distribution in the East China Sea

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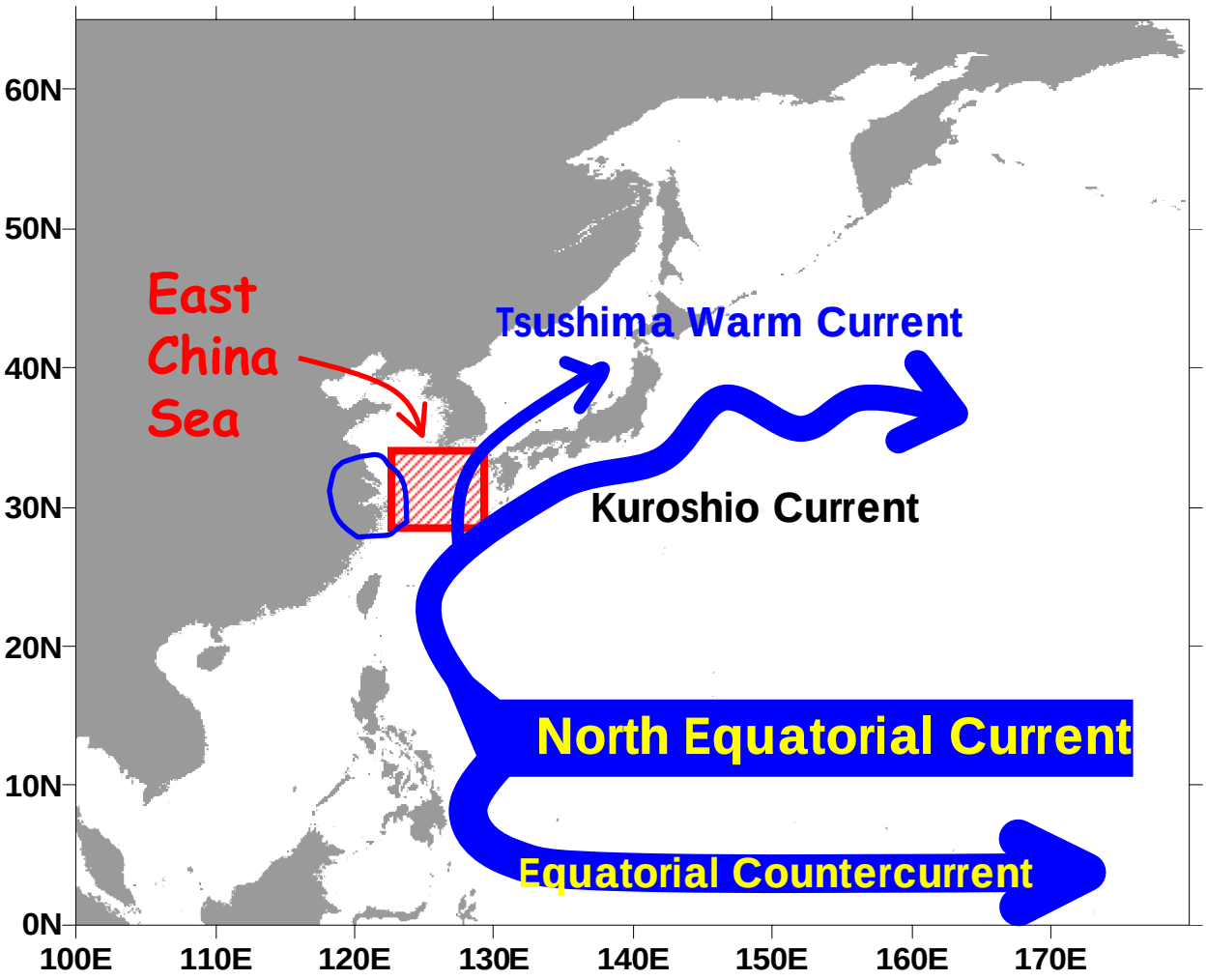
Korea Ocean Research and Development Institute



Northwest Pacific Sea

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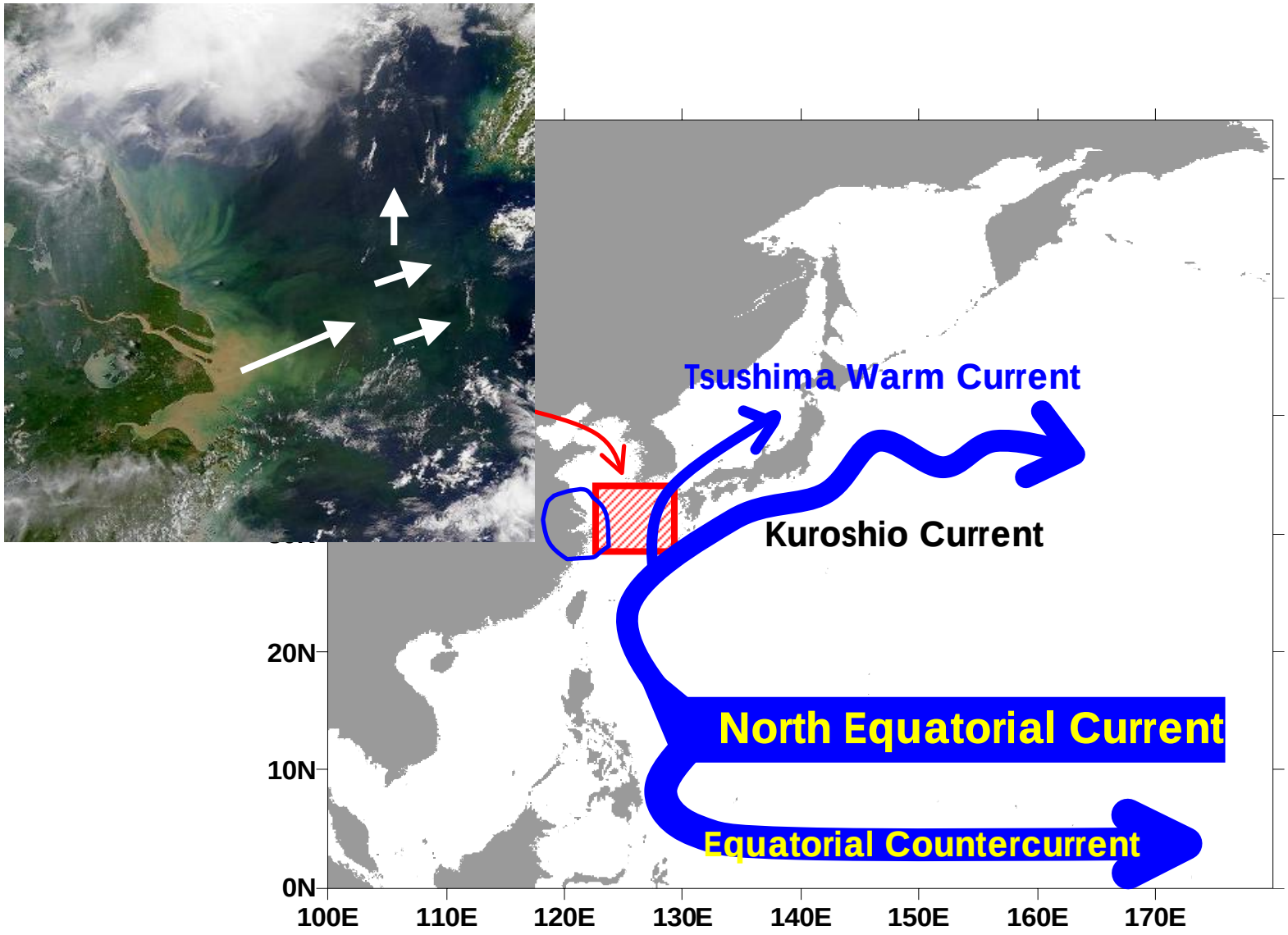

Northwest Pacific Sea

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Objectives

Surface pCO_2 variation
in the East China Sea

- What are major controlling factors ?

temperature

salinity (river discharge)

biological process

water column stability (mixing)

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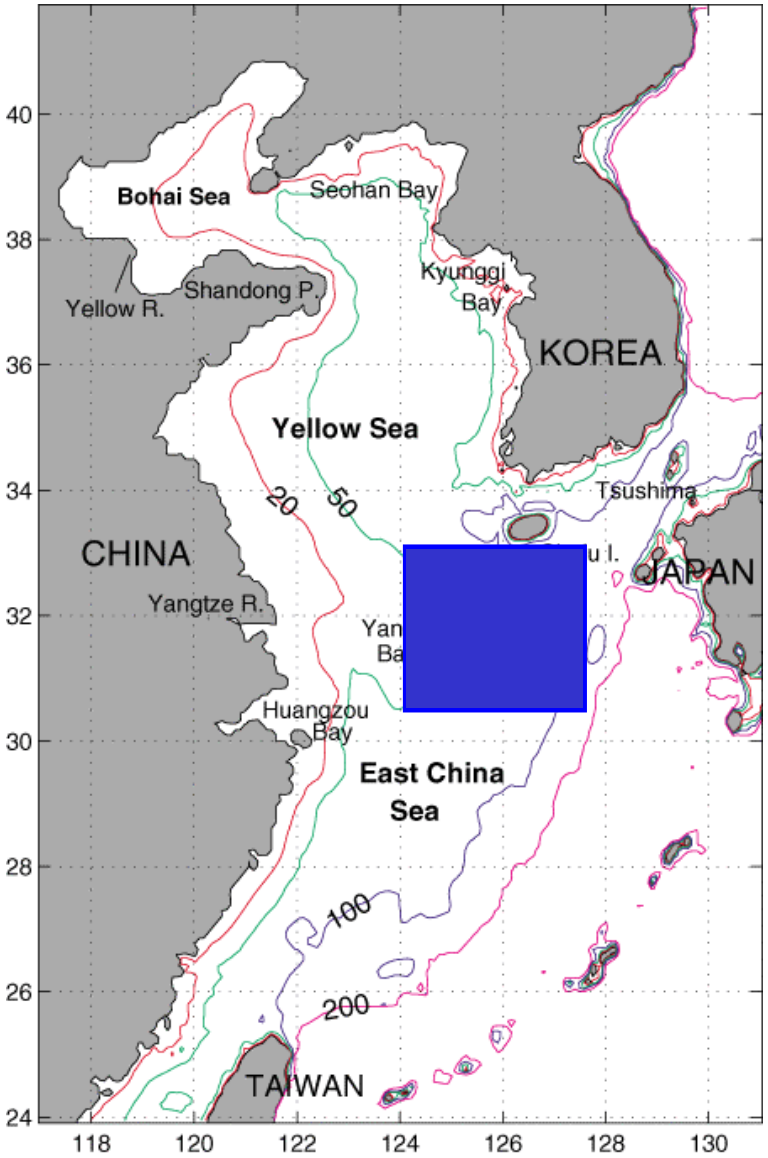
Study Area



Study Period

-Aug. 26 ~ Sep. 2, 2003 (Summer)

-Apr. 28 ~ May 7. 2004 (Spring)

Measurements

-Surface water (every 1 min)
: Temp, Sal., pCO_2

-Hydrocasting (about 50 stations)
: Temp, Sal., Nutrients, Chl-a, POC

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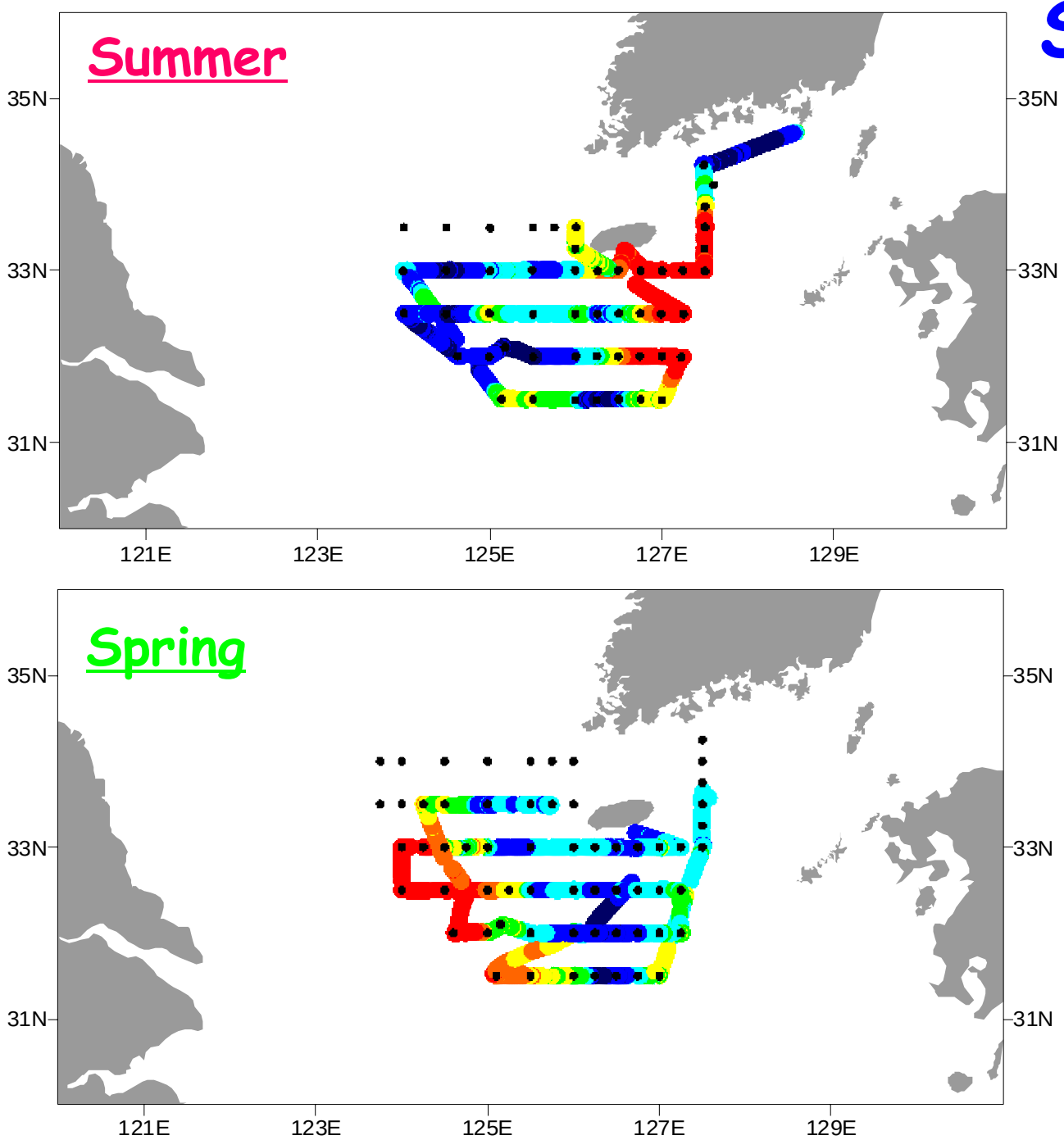
Surface pCO_2 (μatm)



- 230 to 280
- 280 to 300
- 300 to 320
- 320 to 340
- 340 to 360
- 360 to 380
- 380 to 450

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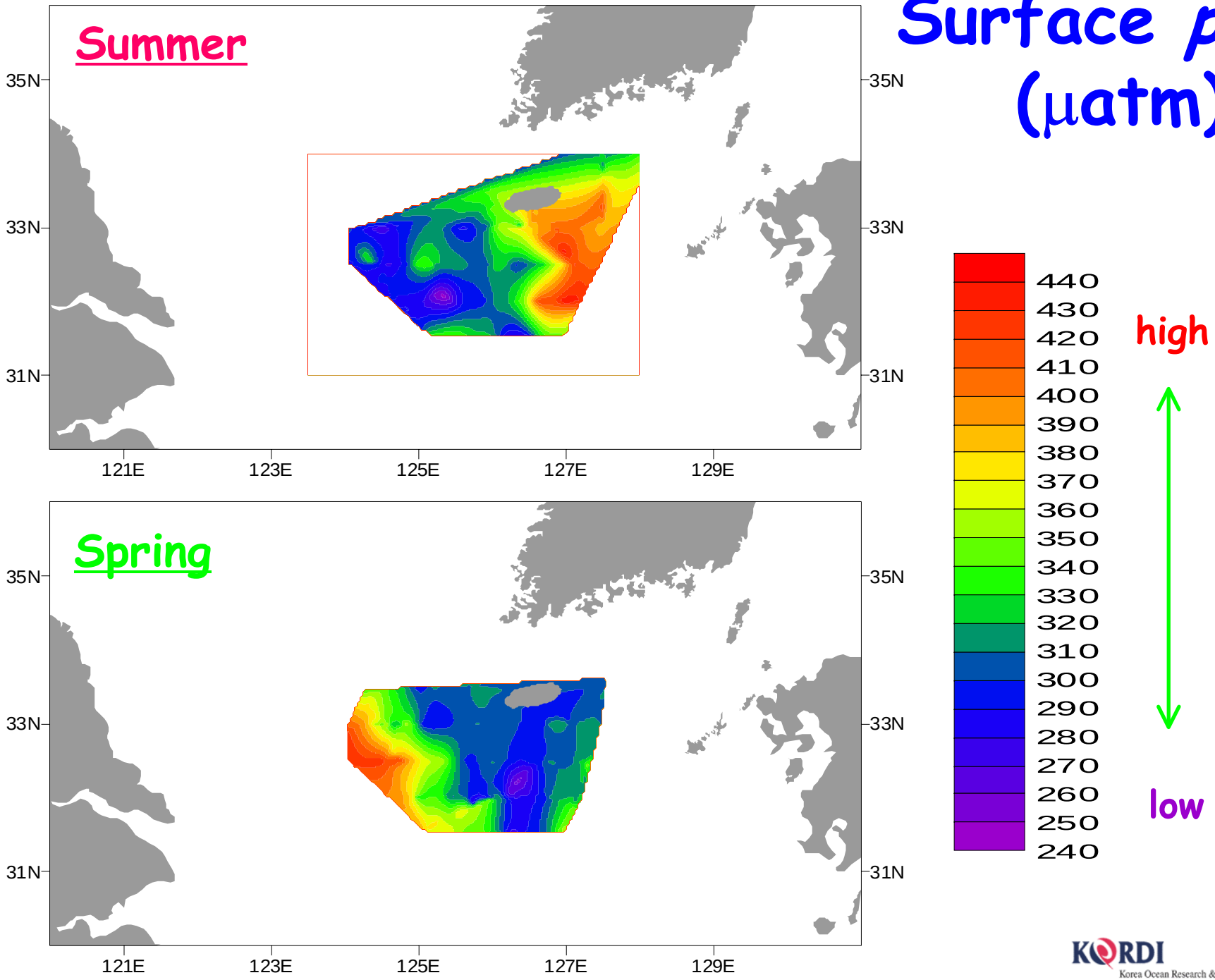
Surface pCO_2 (μatm)



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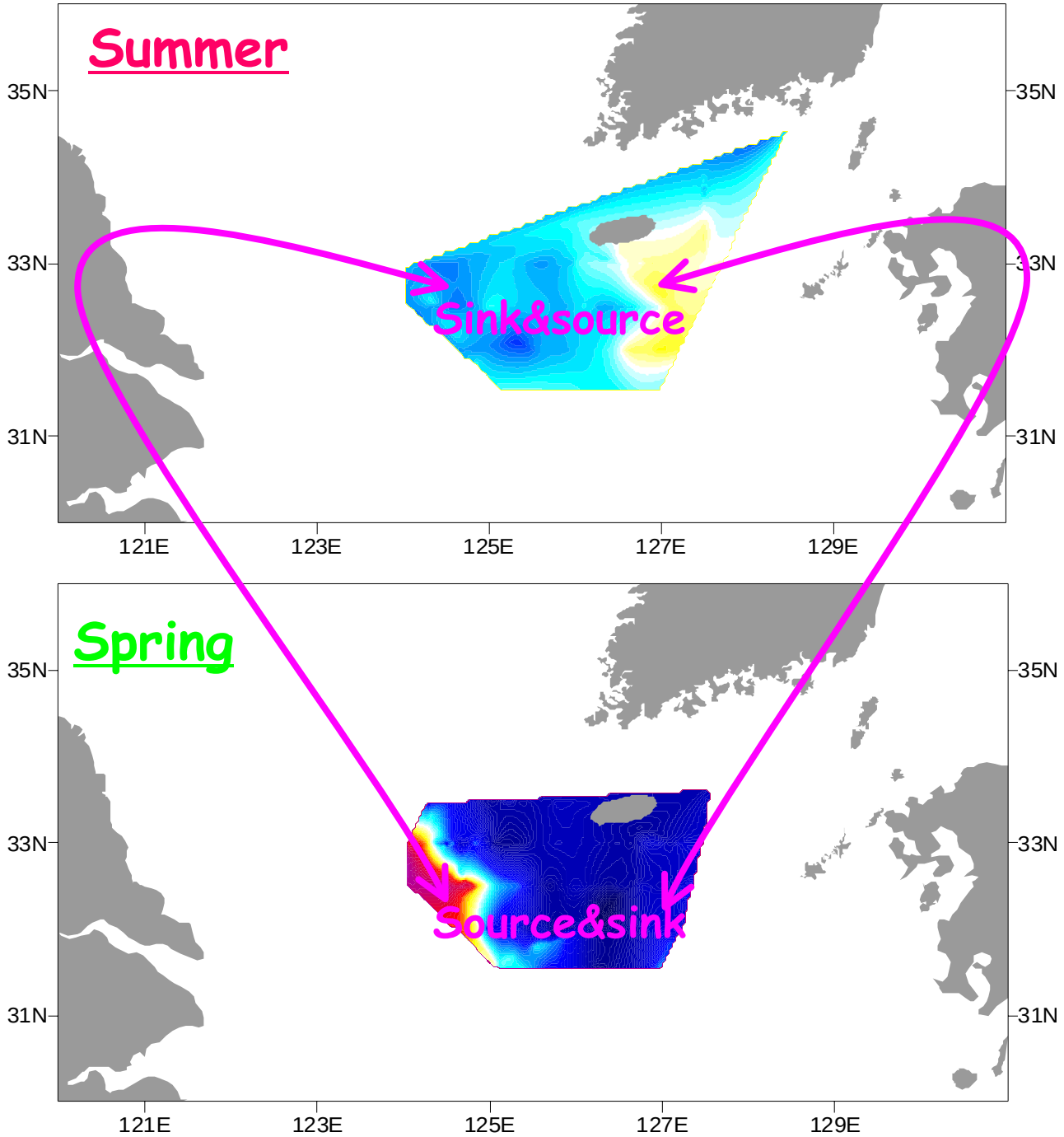
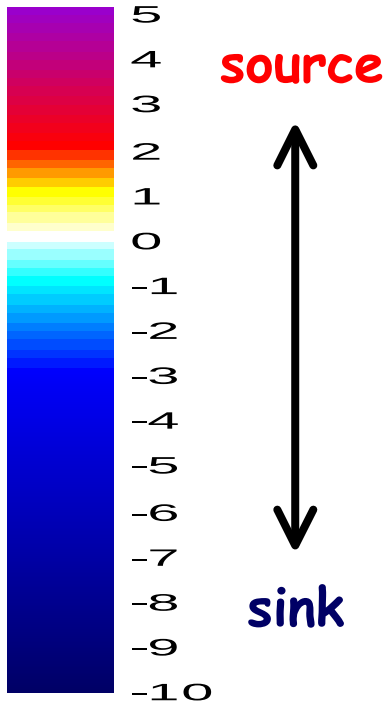
CO_2 Flux
(mmol m^{-2} d^{-1})





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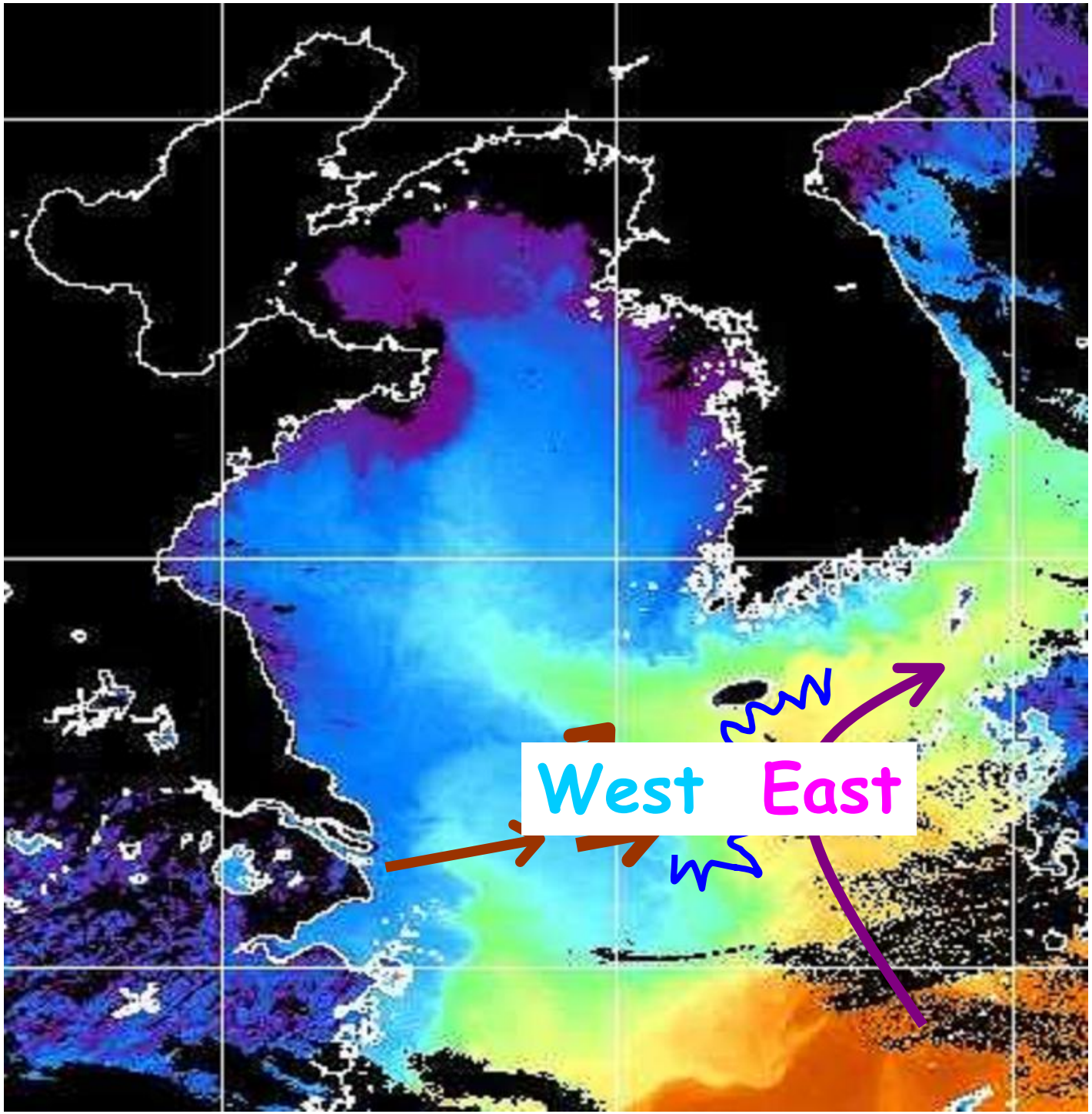

SST/ AVHRR/ NOAA 1997. 4.20

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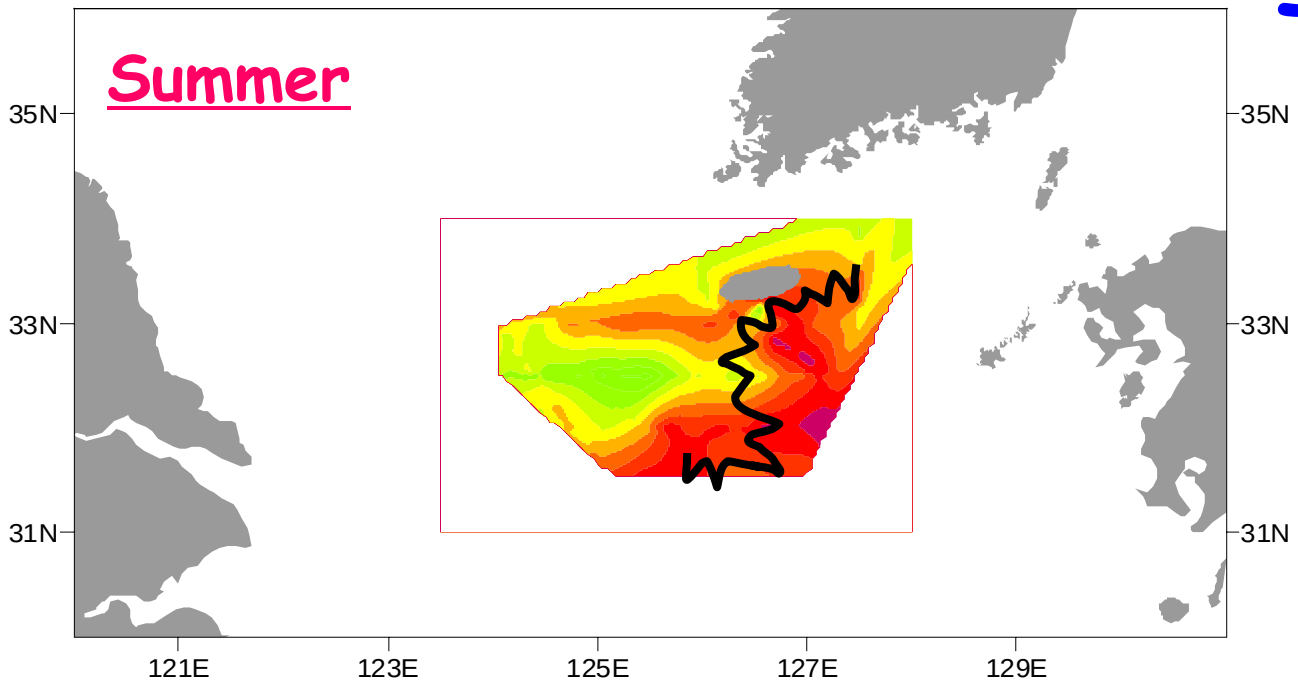
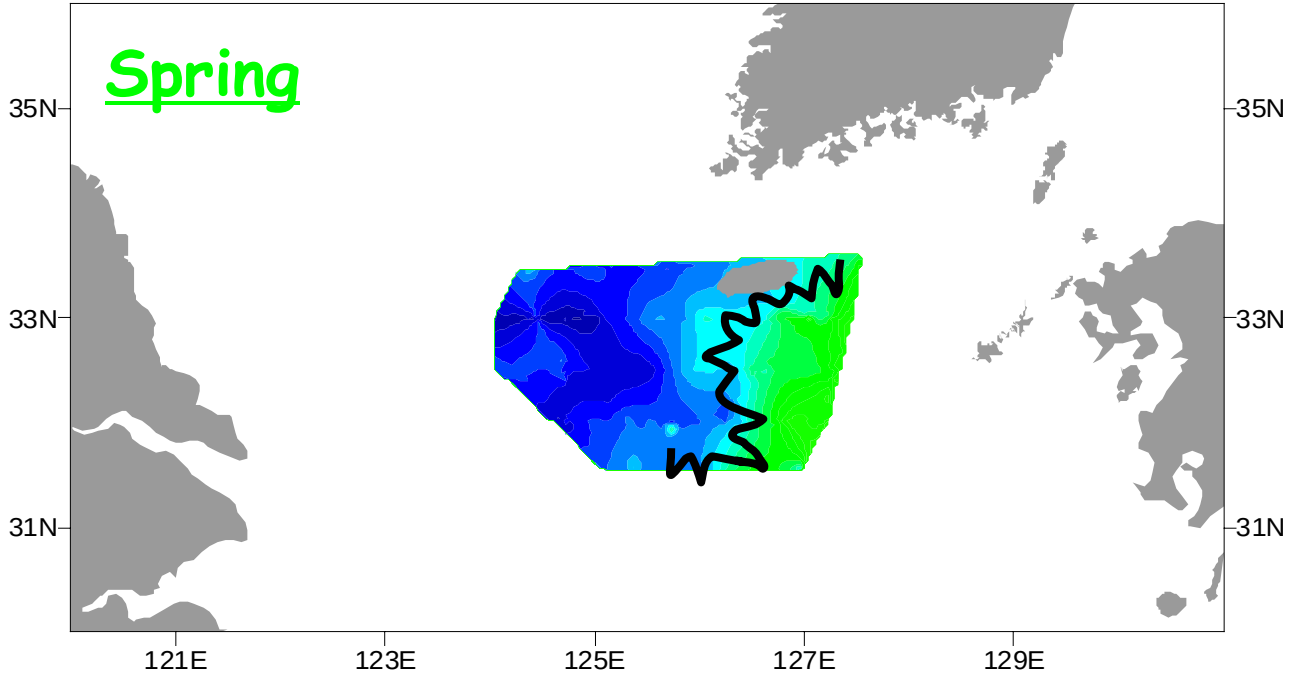
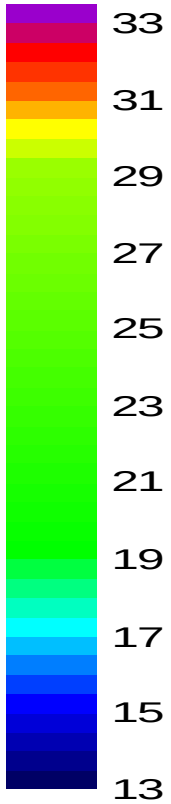
Temperature (°C)







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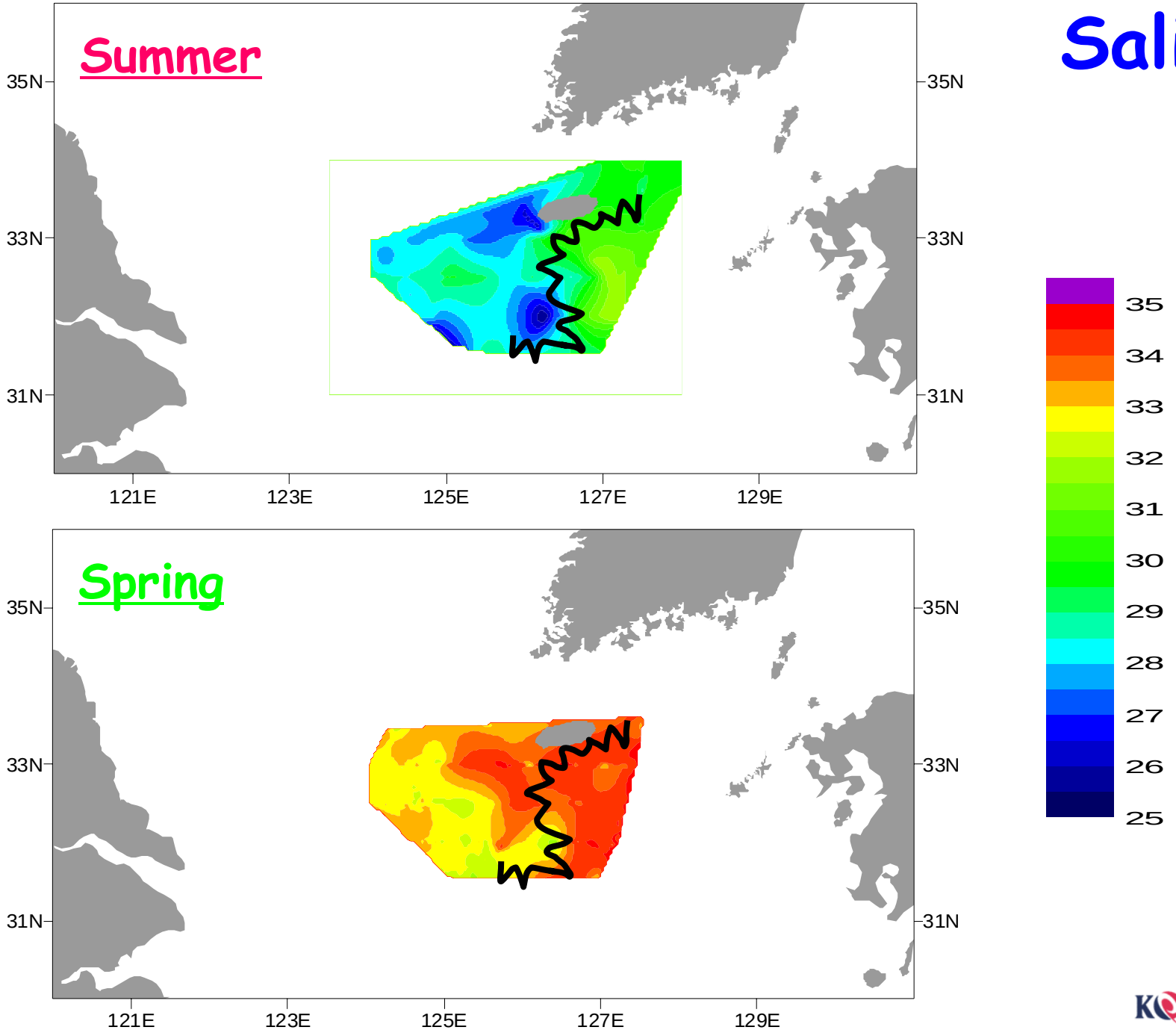
Salinity



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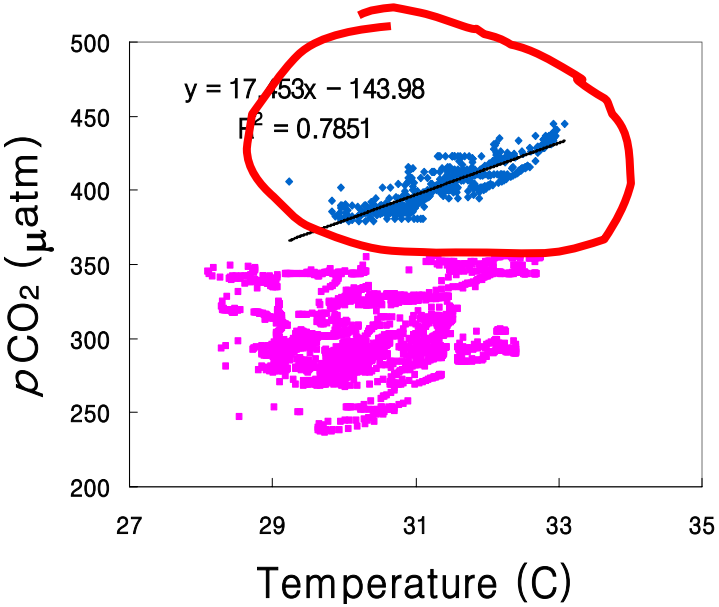
Correlation for pCO_2 & temp. and salinity

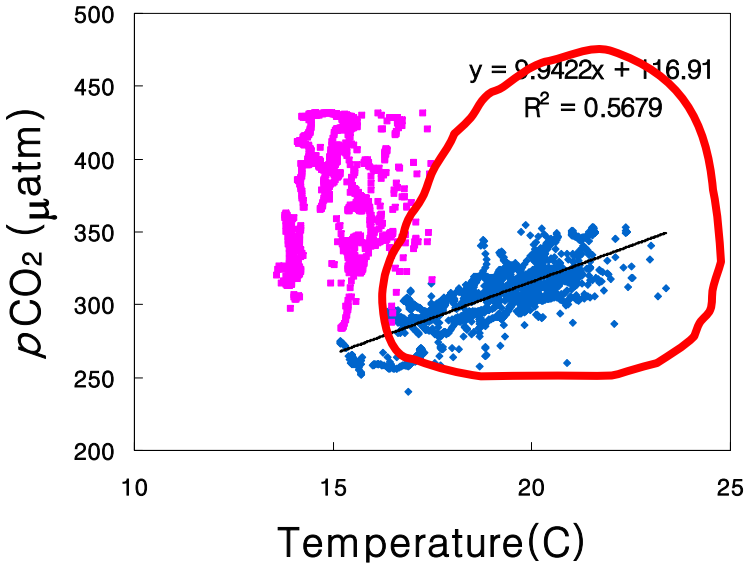
Summer

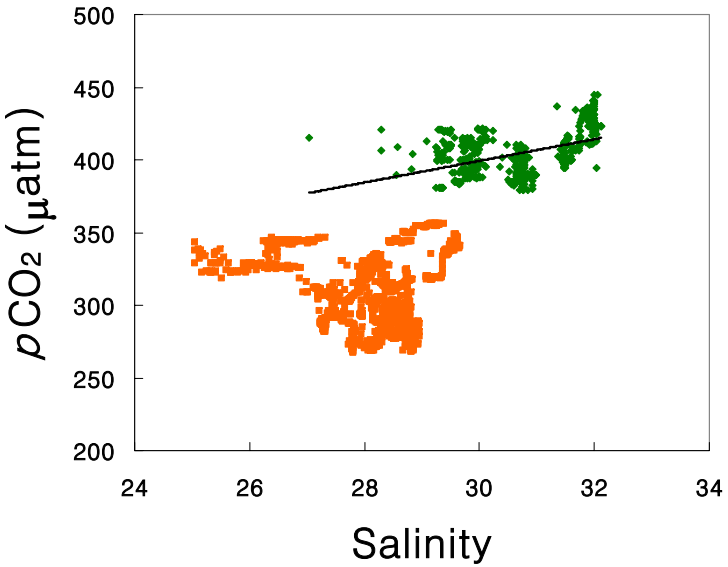


East

West

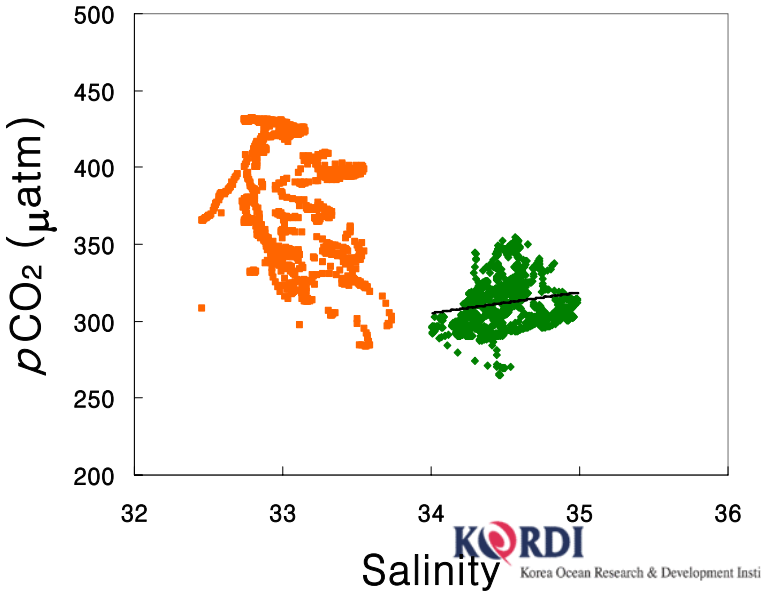
Spring





East

West



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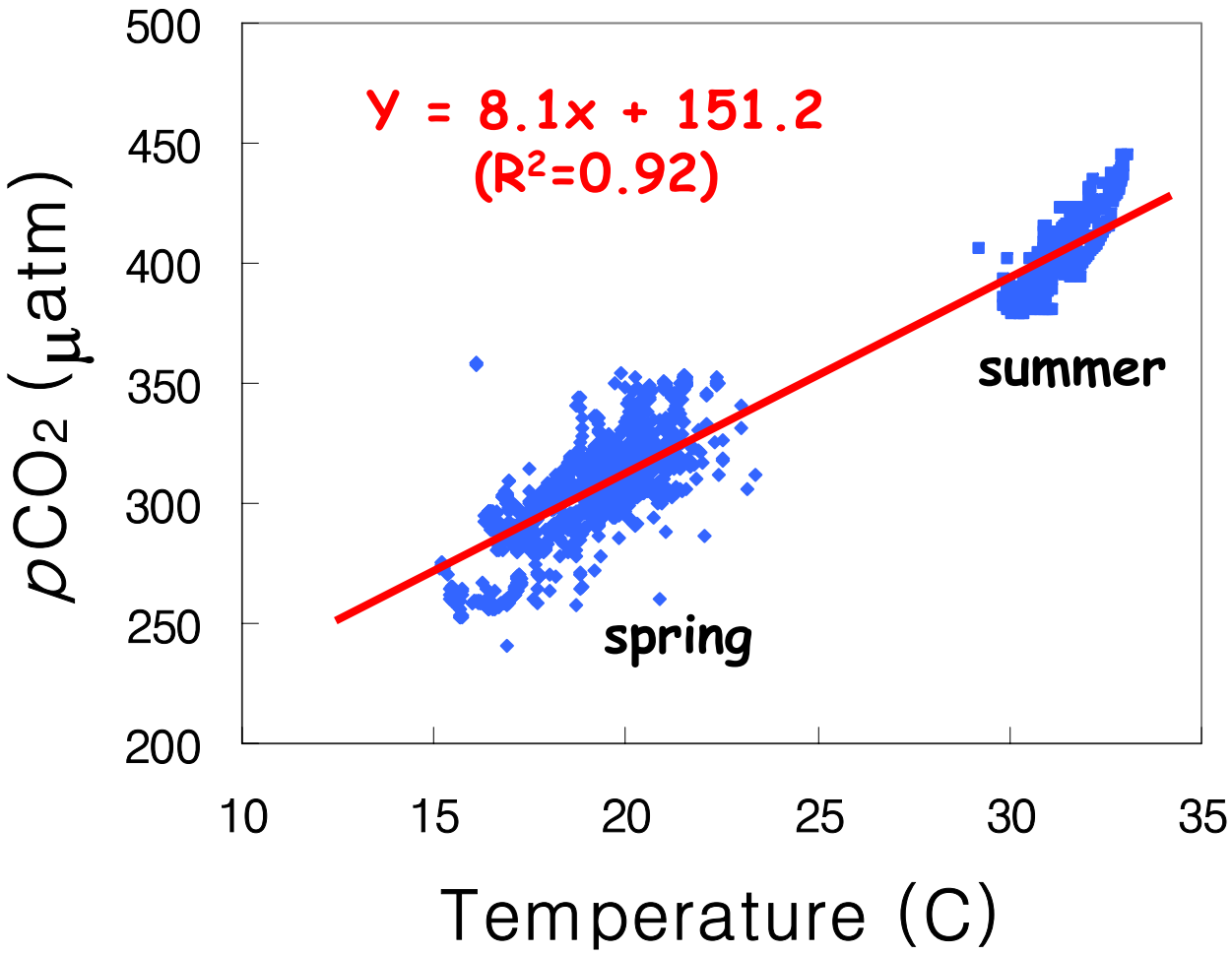
Correlation for pCO_2 & temp at east part



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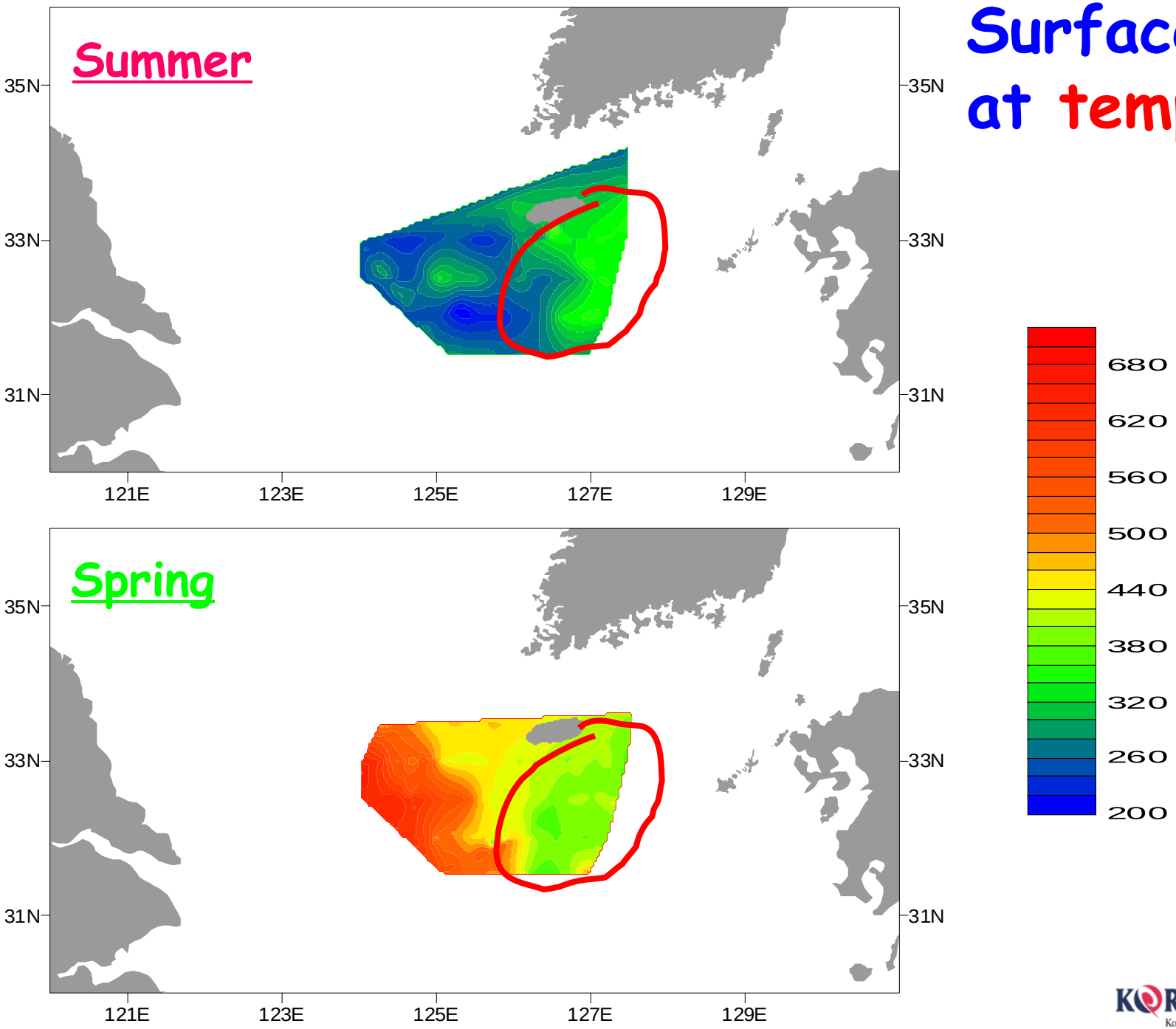
Surface pCO_2 at temp=25°C



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What are major controlling factors ?

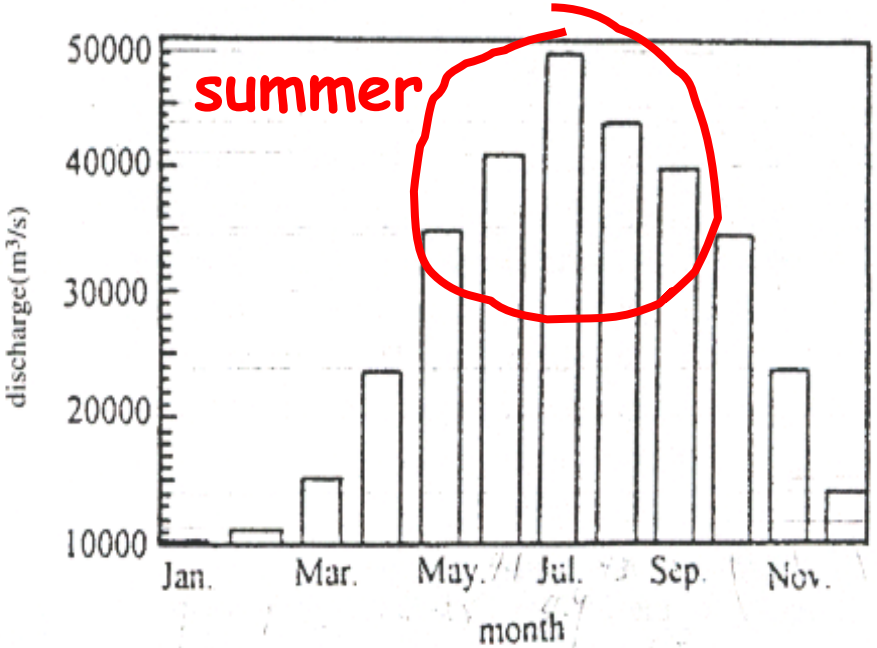
Temperature

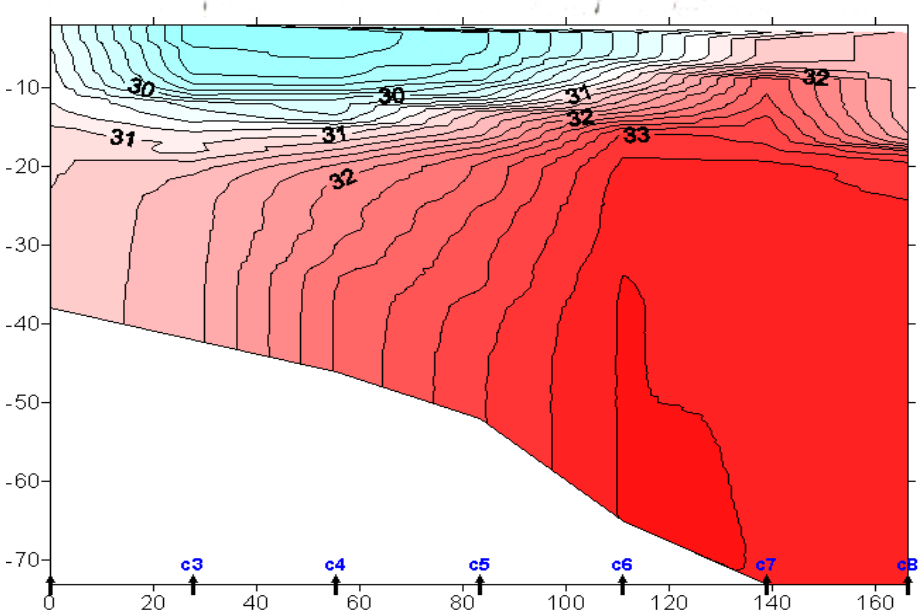
	west	east
summer		yes
spring		yes

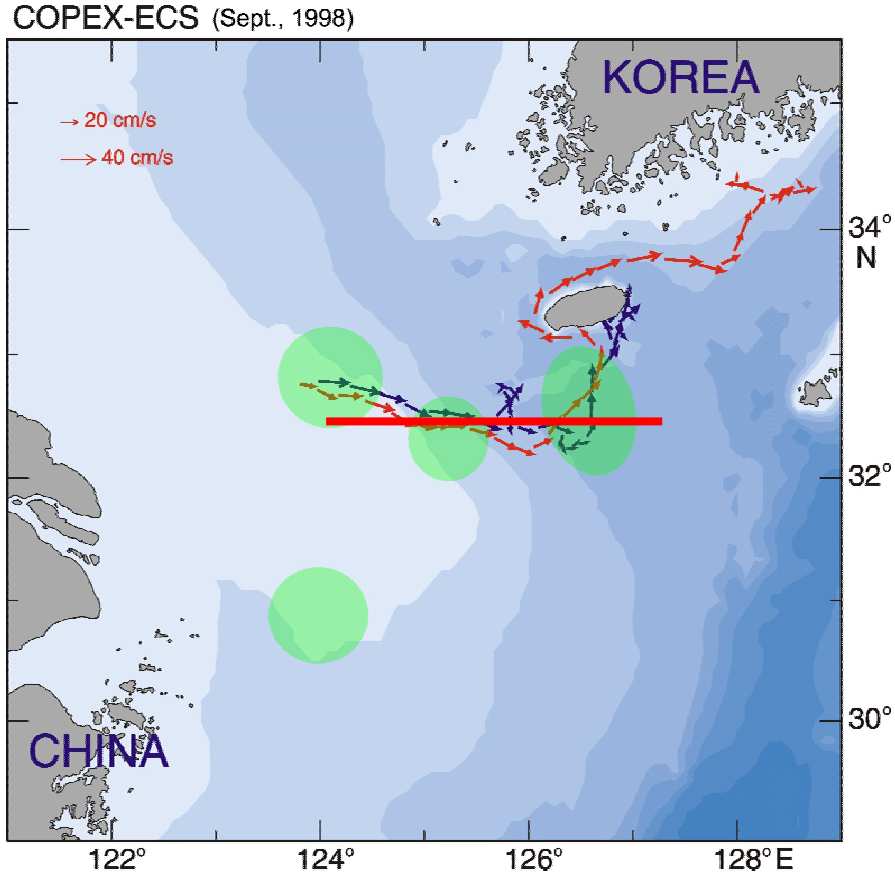
Tsushima Warm Current (Kuroshio)

Salinity (river discharge) ?

Yangtz River discharge







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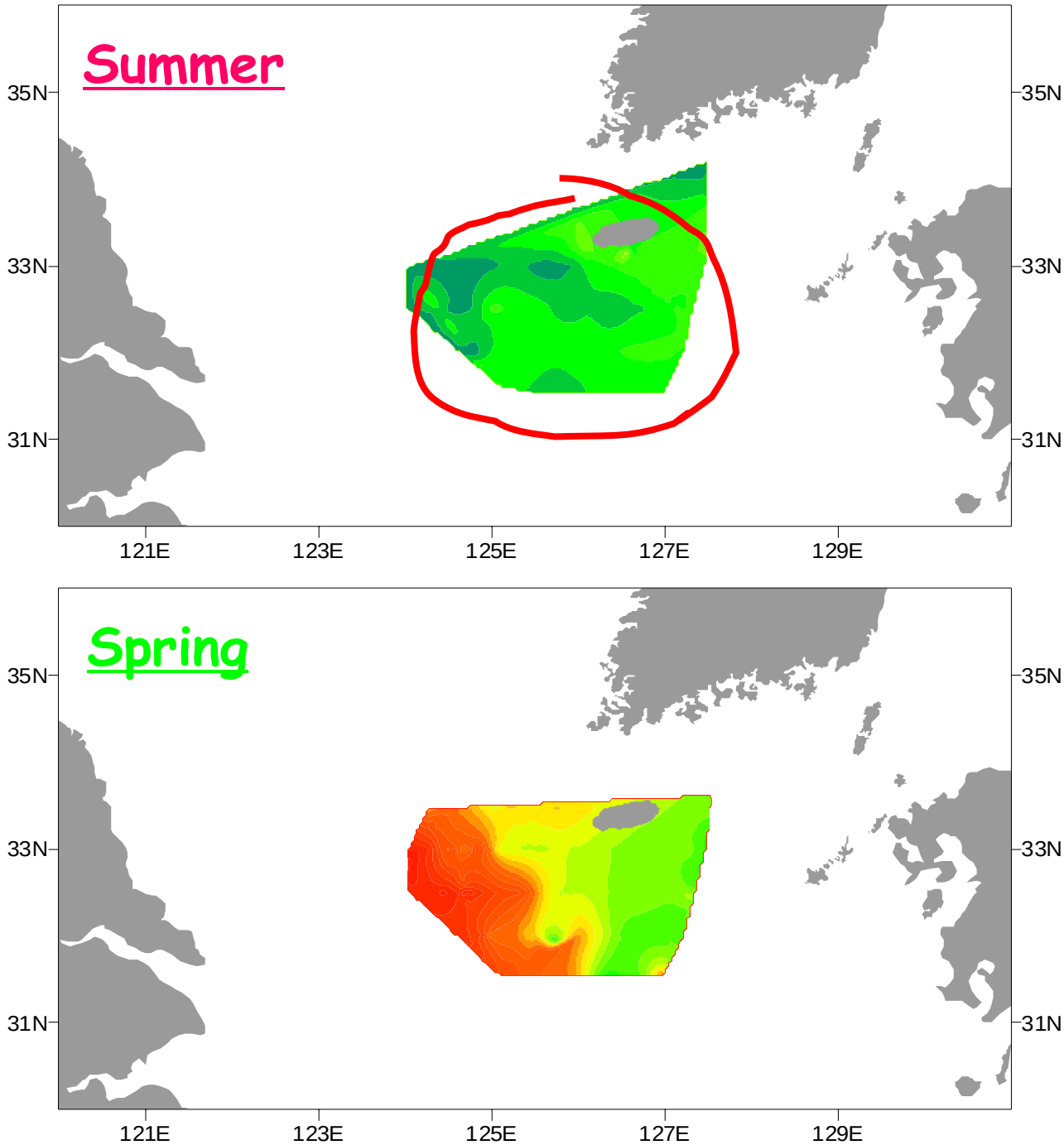
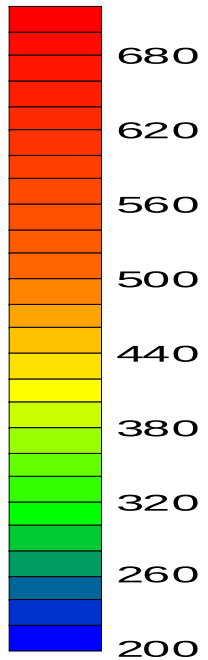
Surface pCO_2 at temp=25°C & sal=33





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What are major controlling factors ?

Temperature

Salinity (river discharge)

	west	east
summer	Yes	yes
spring	???	yes

Yangtz river discharge

↓

after three-Gorge Dam in 2009 ?

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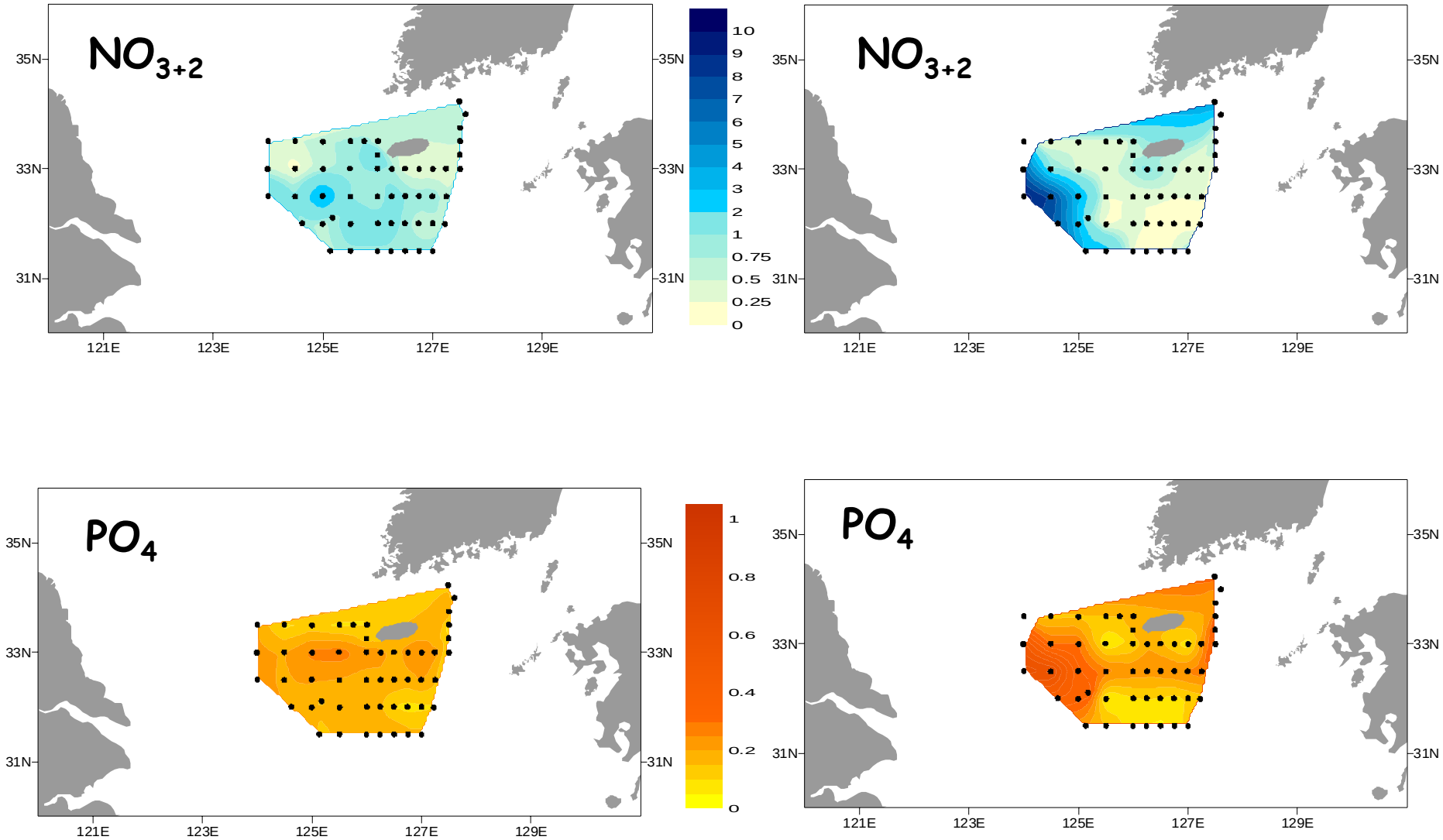
Nutrients (NO_{3+2} & PO_4)

summer

spring



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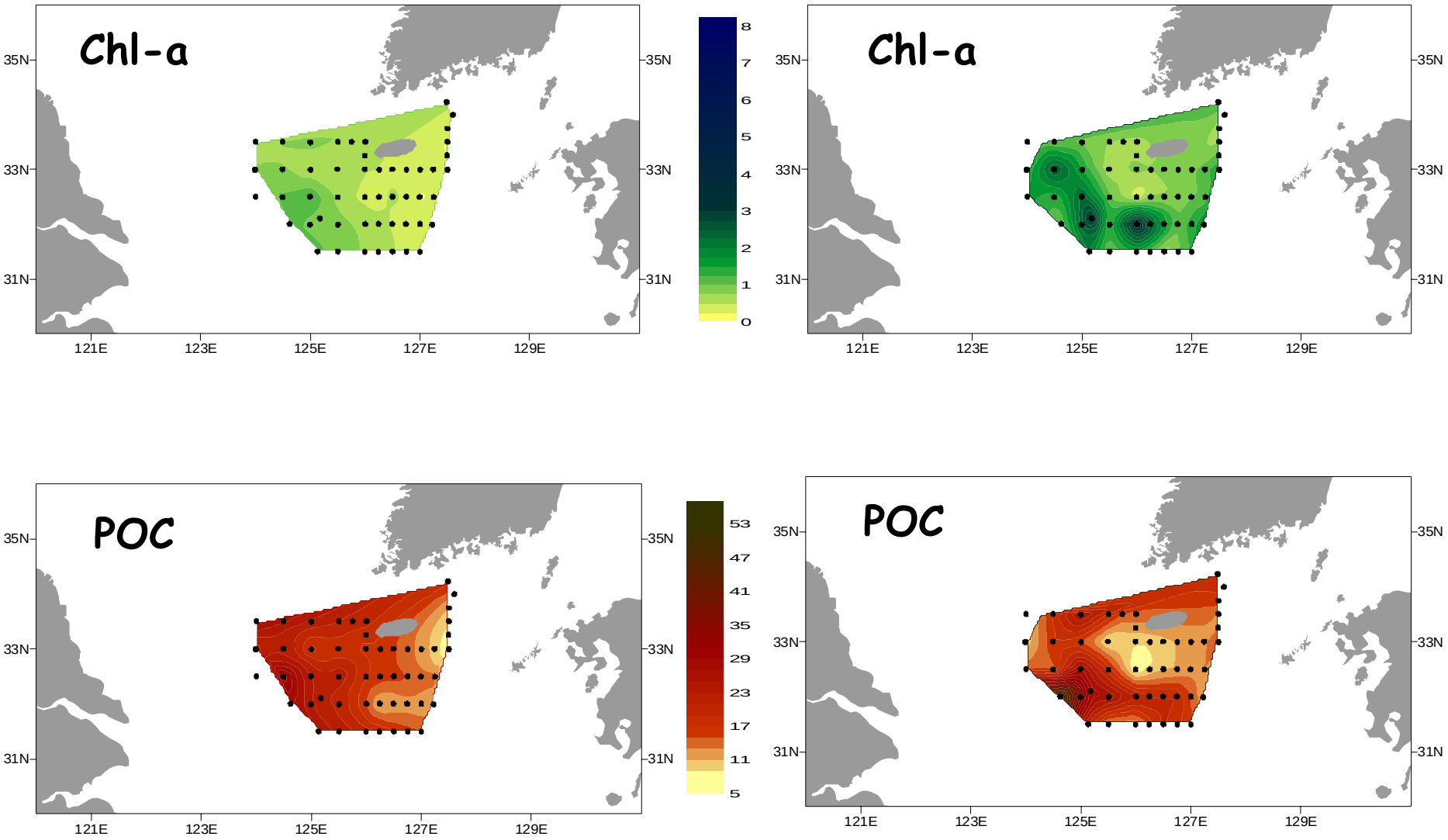
Chl-a and POC

summer

spring



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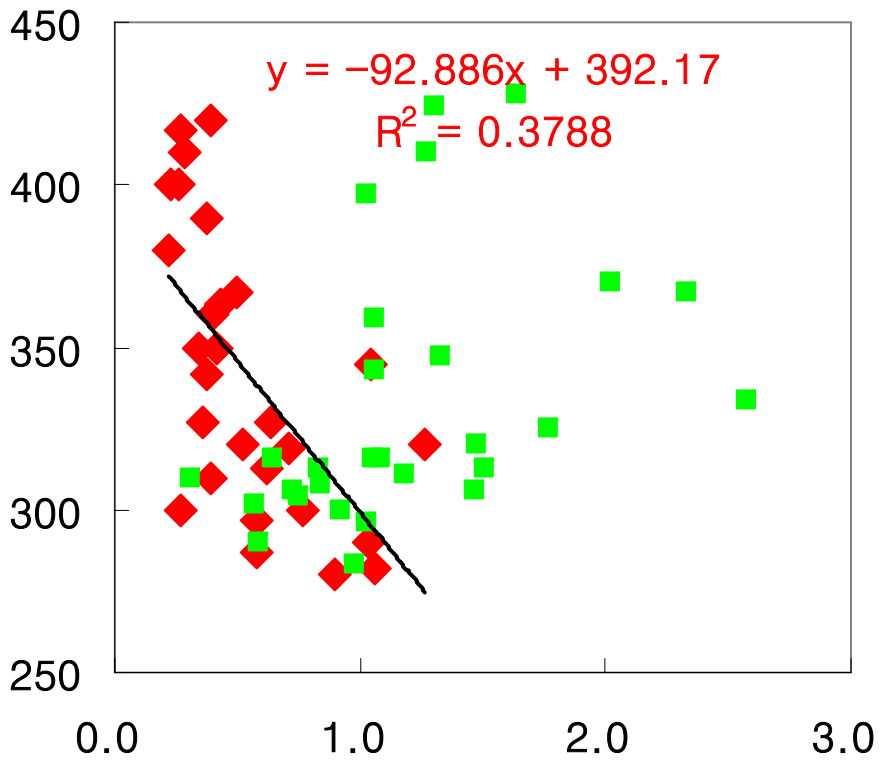
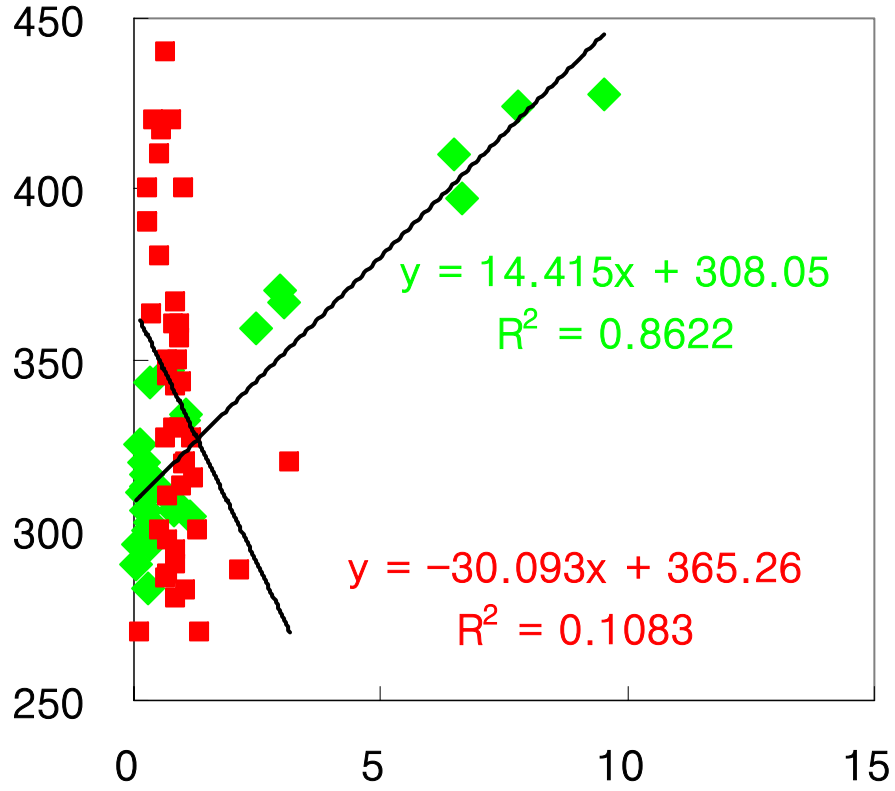
Correlation for pCO_2 & Chl-a and NO_3

Chl-a



NO_3



●summer ●spring

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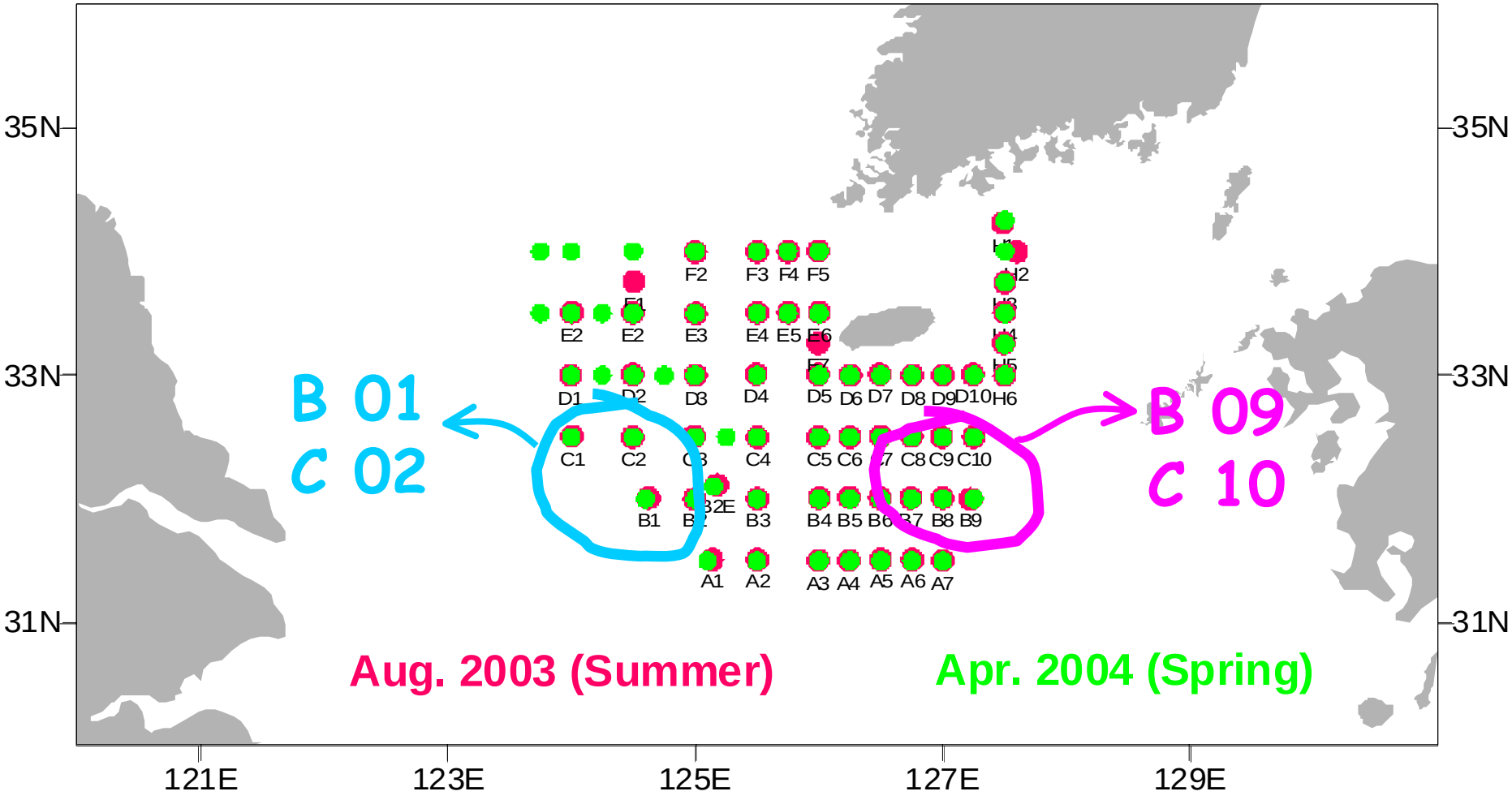
Hydrocasting station



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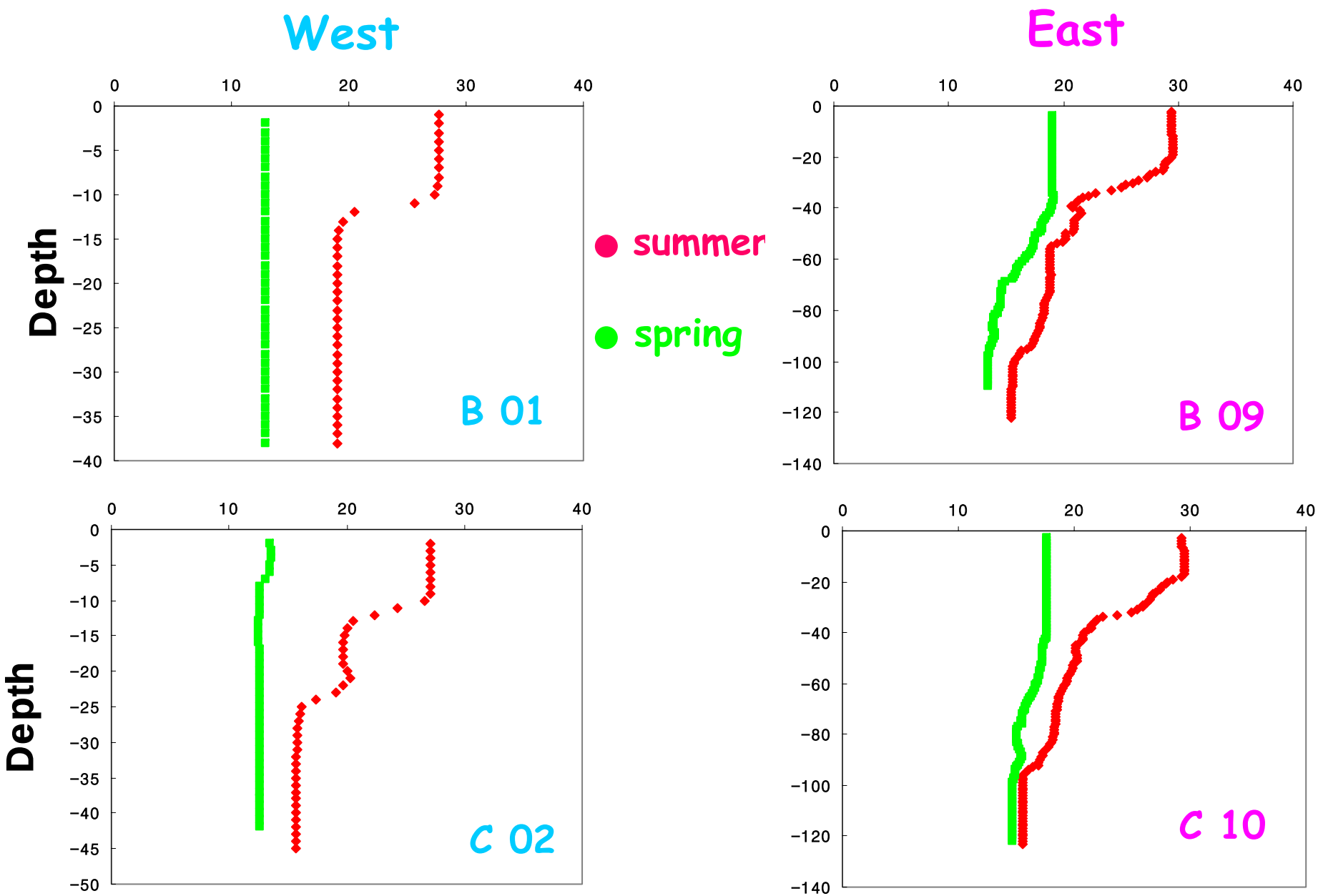
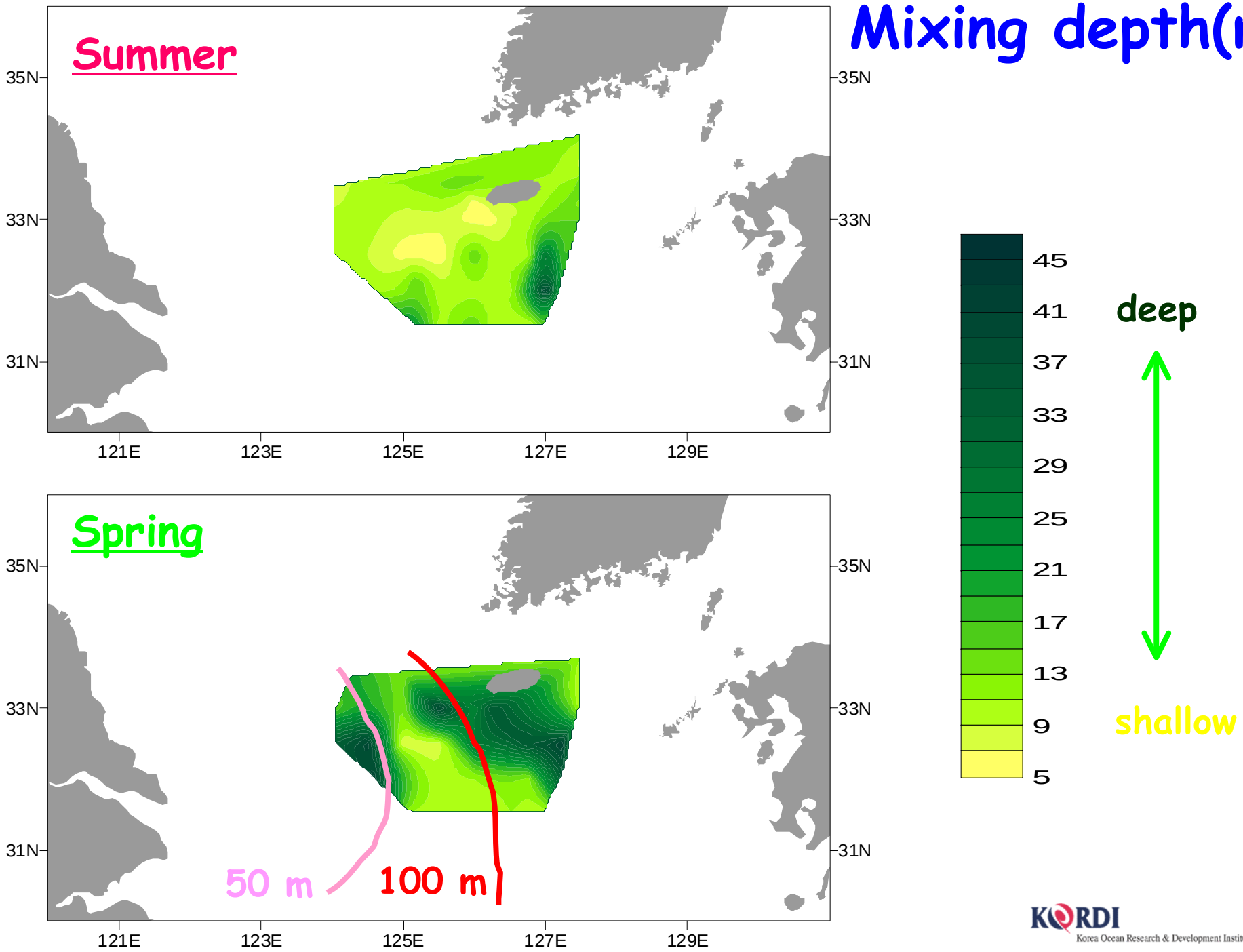
Vertical profile of temp.



Mixing depth(m)



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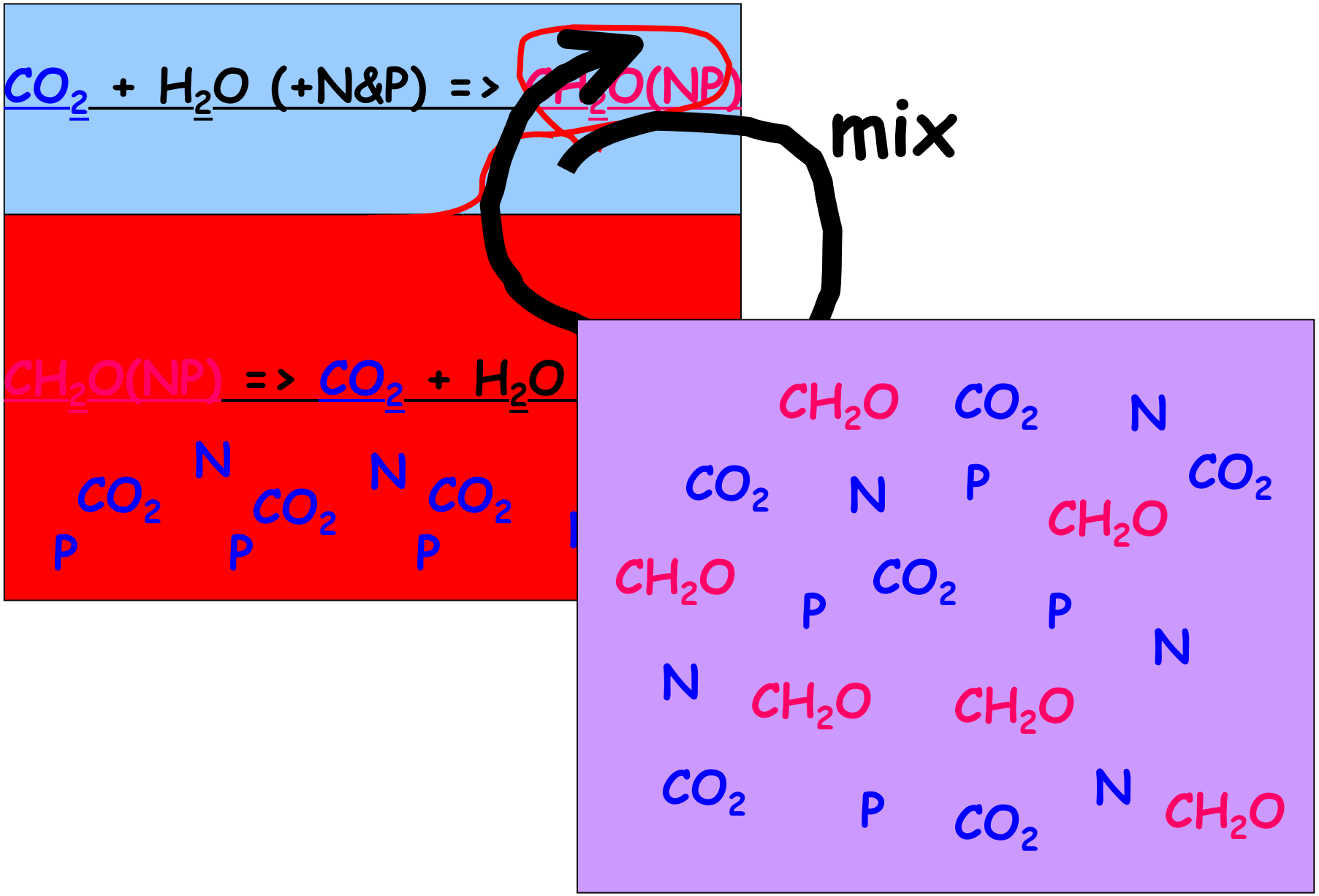
Biological process and mixing



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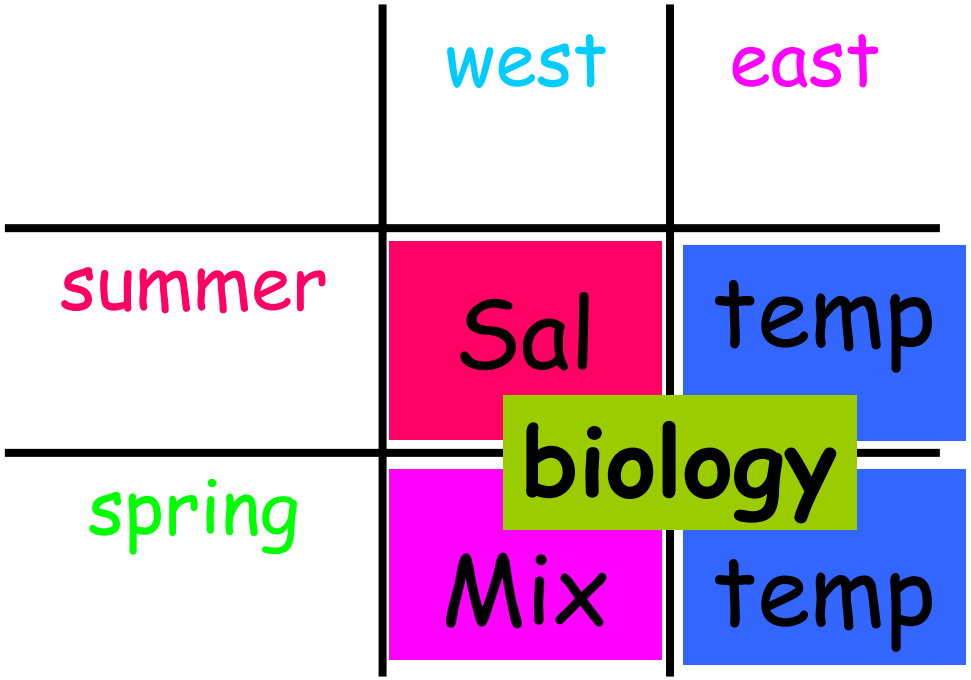
Surface pCO_2 variation in the East China Sea

- What are major controlling factors ?



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Conclusion

At the East China Sea in summer and spring

-Surface pCO_2 : 230~450 μatm, sink area

-Seasonal variation : opposite pattern at east and west part of the study area

-East part : temperature is main factor in summer and in spring

-West part : in summer, salinity (river discharge) in spring, mixing


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Thank you !!!