Response to the comments of Dr. Wang.

Interactive comment on "Decadal variability of heat content in the South China Sea inferred from observation data and an ocean data assimilation product" by W. Song et al.

Q. Wang

wqveryok@163.com

Received and published: 10 October 2013

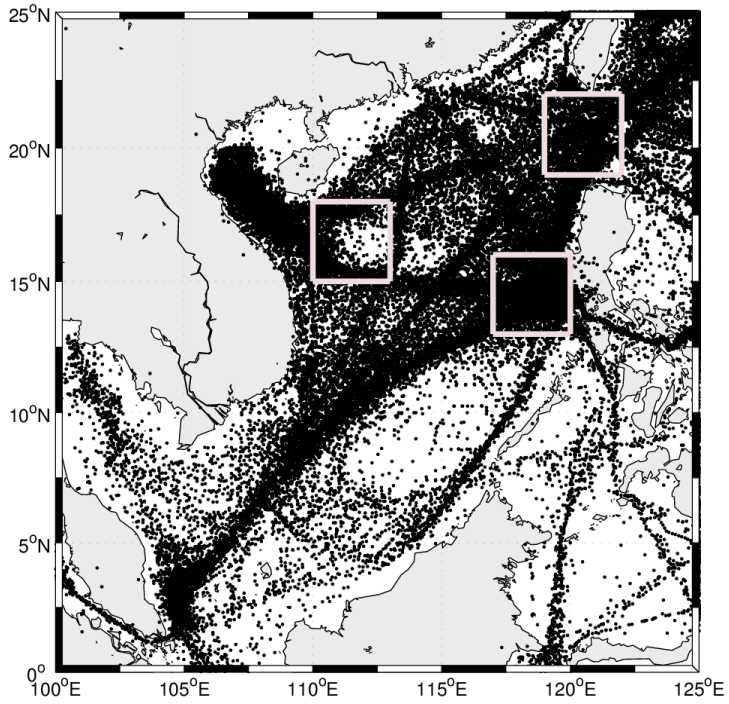
This paper discussed the decadal variability of the OHC of SCS, and tried to found the main mechanism. It is a very interesting issue.

- Thanks for your recommendation and valuable comments. Below are our responses to the comments.

This paper selected three boxes to discuss the spatial differences, while the reasons are not indicated. Each box should be related to key physical oceanography phenomena, and I want the authors point out the behind phenomena and whether this phenomena determines the local decadal variability.

- Box 1 for the Luzon Strait, Box 2 for west of Luzon Island, Box 3 for

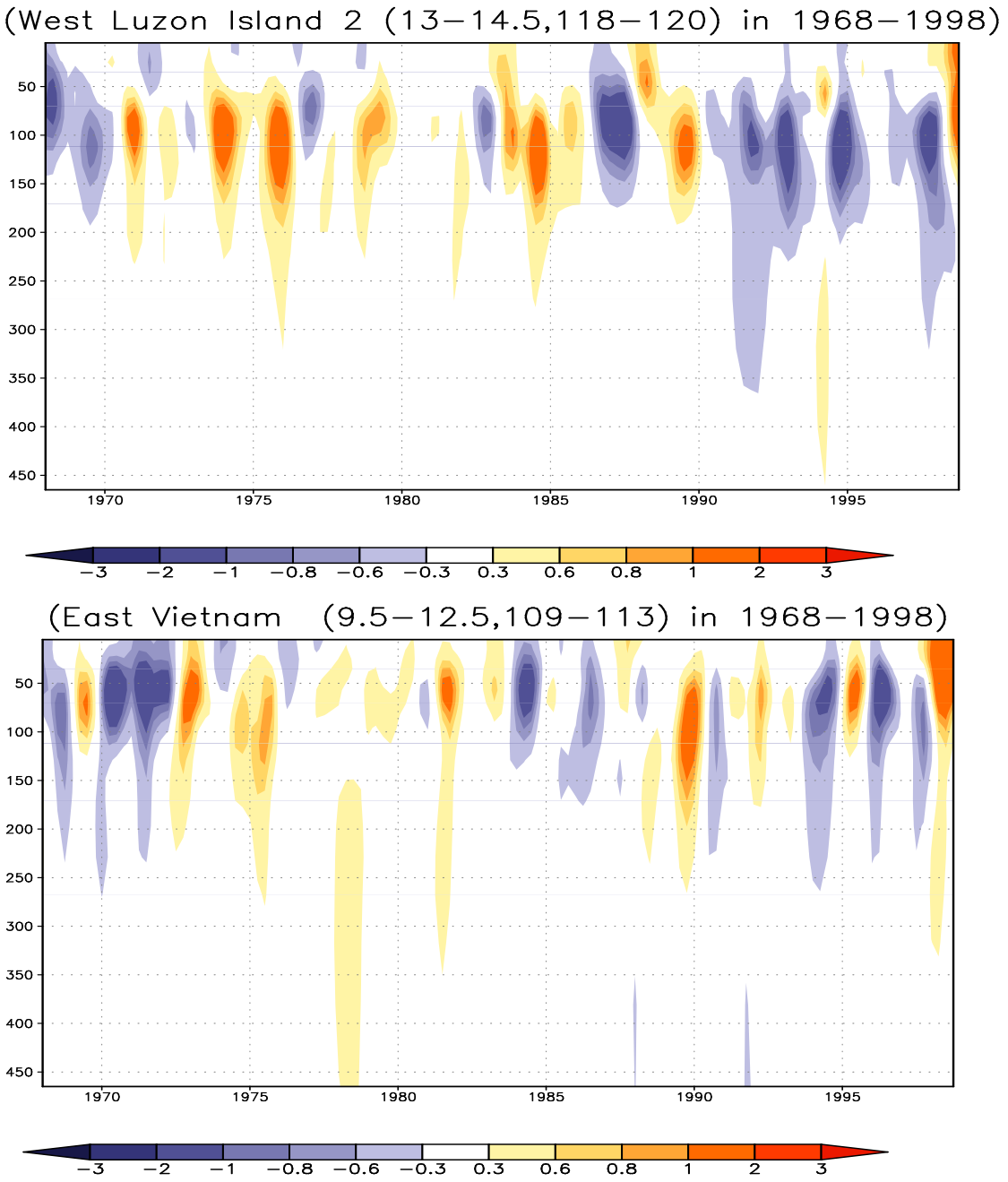
the Xisha warm eddy. The oceanic process in the box we choose in the Luzon Strait is complex, it mainly affected by the Pacific especially the Kuroshio, as for the decadal change, it may have great connection with the Pacific Decadal Oscillation (PDO). The box we choose in the Xisha warm eddy is the pathway of western boundary current of the South China Sea (SCS) and the SCS warm current, the heat content change here is mainly caused by the advection flux. The box we choose in the west of Luzon Island is connected with the Pacific Ocean through the Mindoro Strait and other marginal seas. There are some researches show that the Pacific water and signal can get into the SCS through the Mindoro Strait.



As the paper shown, the variability has spatial differences. Which area is

the mainly contribution to the integral variability character (fig 2) should be clearly.

- In the decadal time scale, the heat content change in different boxes has little difference, the anomaly in the east of the SCS is stronger than that in the west. It’s hard to say which box dominates the decadal change of the whole SCS. Here is the comparison of Temperature anomaly in two boxes, the location is given in the figure.



Temperature anomaly in different boxes, seasonal cycle removed, units: ºC;

In table1, this paper calculated the ADV, e.g. the strait flux. I suggest the author calculated the fluxes separately, which can give us more information.

- There are four channels we choose to calculate the advection flux: Taiwan Strait, Luzon Strait, Mindoro Strait and Sunda Shelf. But in this paper we didn't discuss the different contribution of the four straits, I will show the table here:

	HCC	QNET	TAI	LZ	SUN	MIN	ADV	R
Clim	*3.3835*	*67.69*					*-51.022*	*-13.28*
P1	*-18.72*	*2.53*	*-4.32*	*6.47*	*-8.79*	*-8.28*	*-14.92*	*-6.33*
P2	*14.36*	*-1.77*	*-1.4*	*18.39*	*-1.25*	*-2.51*	*13.23*	*2.90*
P3	*-15.53*	*-7.24*	*-3.54*	*4.29*	*-2.27*	*-3.35*	*-4.87*	*-3.42*
P4	*24.31*	*16.69*	*-1.56*	*7.19*	*-0.86*	*-1.32*	*3.45*	*4.17*

The terms of heat budget for the climatological mean and in the four periods shown in Figure 2. HCC denotes heat-content change in the upper 400 m. QNET (positive into the SCS) denotes the net surface heat flux, ADV (positive into the SCS) is the ocean heat advection, R is the residual heat flux (vertical advection, diffusion, etc.), TAI, LZ, SUN MIN represent the advection flux of Taiwan Strait, Luzon Strait, Sunda shelf and Mindoro Strait. Units: TW, where 1 TW=10^{12} W.