Supplementary information:

Fig. S1. Satellite images of the monthly averaged surface seawater hydrological characteristics in the northwestern South China Sea. a. Surface seawater temperature (SST) in 2015 and 2016. b. Surface seawater salinity (SSS) in 2015 and 2016. The dates were labeled in each image.

Fig. S2. Satellite images of the monthly averaged surface seawater velocity (SSV) in the northwestern South China Sea in 2015 (a) and 2016 (b). Arrows point the water flow direction and color indicates the sea water velocity. The dates were labeled in each image.

Table. S1. The *t*-test for the hydrological and biogeochemical parameters of nearshore and offshore stations of Sections A1 and A2 above 125 m in September. The nearshore stations included A26 to A29 for Section A1 and A30 to A33 for Section A2.

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Table S1. The *t*-test for the hydrological and biogeochemical parameters of nearshore and offshore stations of sections A1 and A2 above 125 m in September. The nearshore stations included A26 to A29 for section A1 and A30 to A33 for section A2.

Section	T	S	σ_0	DO	Chl-*a*	Ammonium	Nitrite	Nitrate

A1	0.877	0.976	0.913	0.886	0.974	0.363	0.298	0.696
A2	0.837	0.230	0.691	0.267	0.392	0.047*	0.124	0.880
Section	DIN	DON	DOP	DIP	DSi	$\delta^{15}N_{Nitrate}$	$\delta^{18}O_{Nitrate}$	
A1	0.717	0.991	0.375	0.881	0.706	0.147	0.230	
A2	0.828	0.173	0.237	0.614	0.576	0.552	0.787	

*: Difference is significant (2-tailed) at the 95% confidence interval.

a

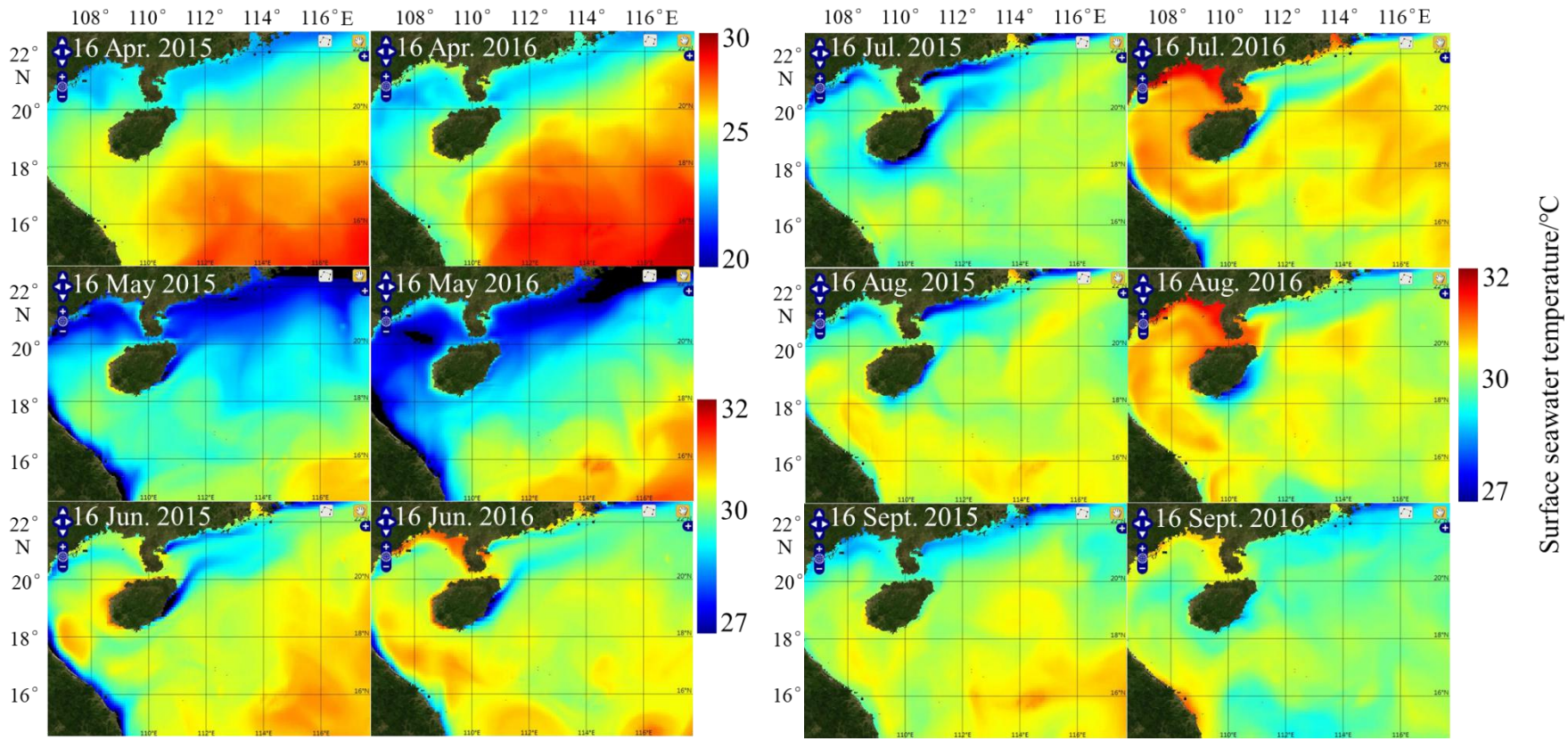

Fig. S1. Satellite images of the monthly averaged surface seawater hydrological characteristics in the northwestern South China Sea. (a) Surface seawater temperature (SST) in 2015 and 2016. (b) Surface seawater salinity (SSS) in 2015 and 2016. The dates were labelled in each image.

b

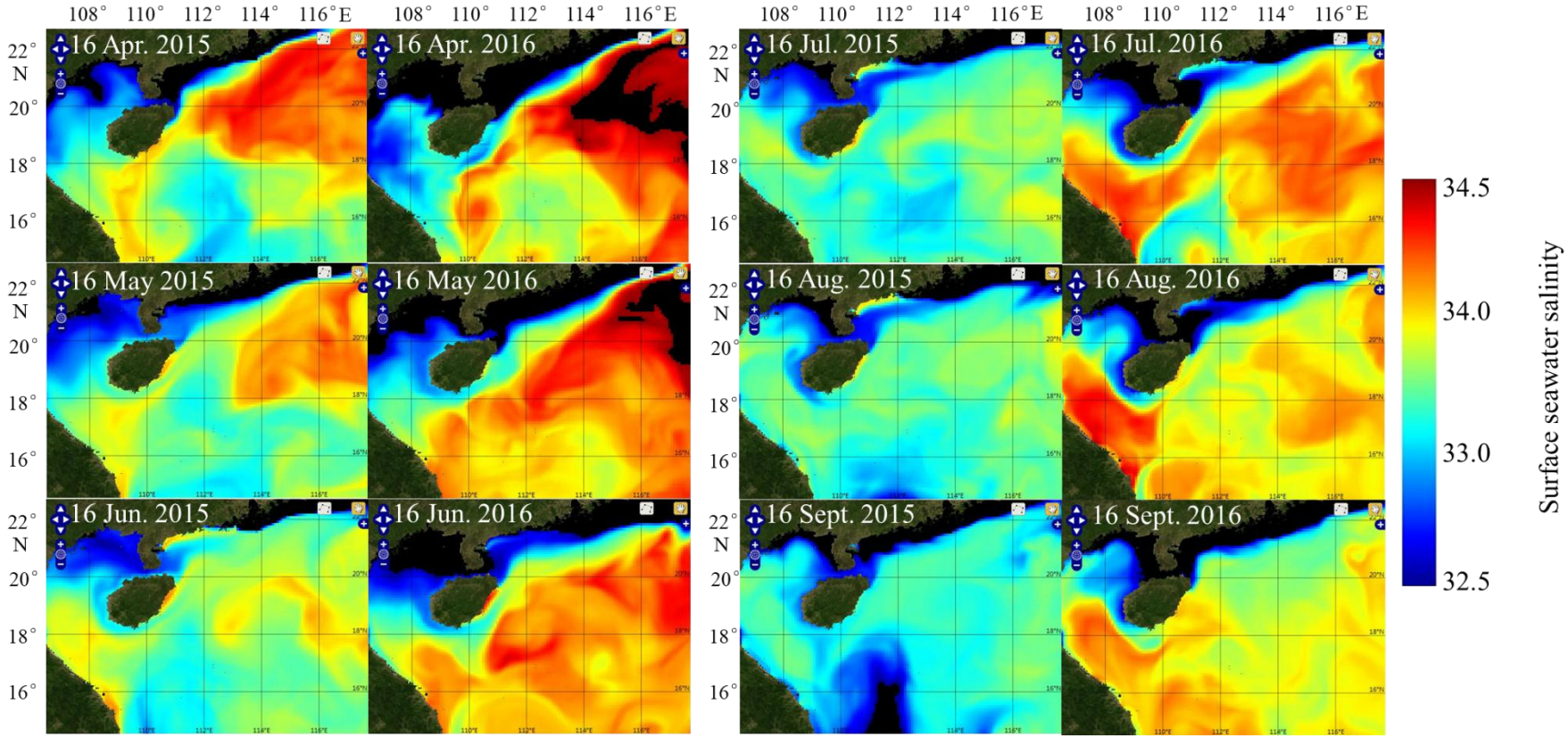

Fig. S1. Continued.

a

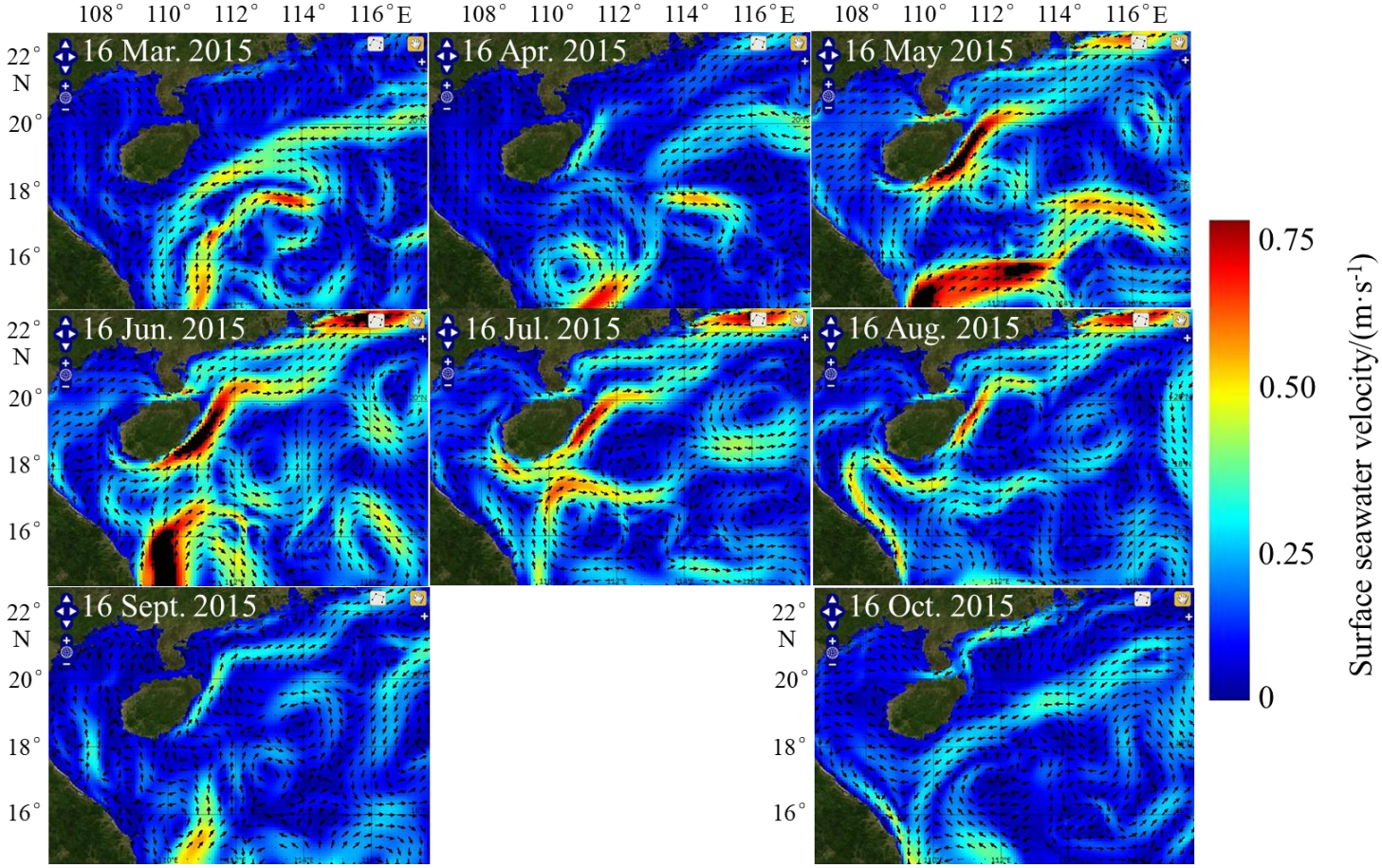

Fig. S2. Satellite images of the monthly averaged surface seawater velocity (SSV) in the northwestern South China Sea in (a) 2015 and (b) 2016. Arrows point the water flow direction and color indicates the sea water velocity. The dates were labelled in each image.

b

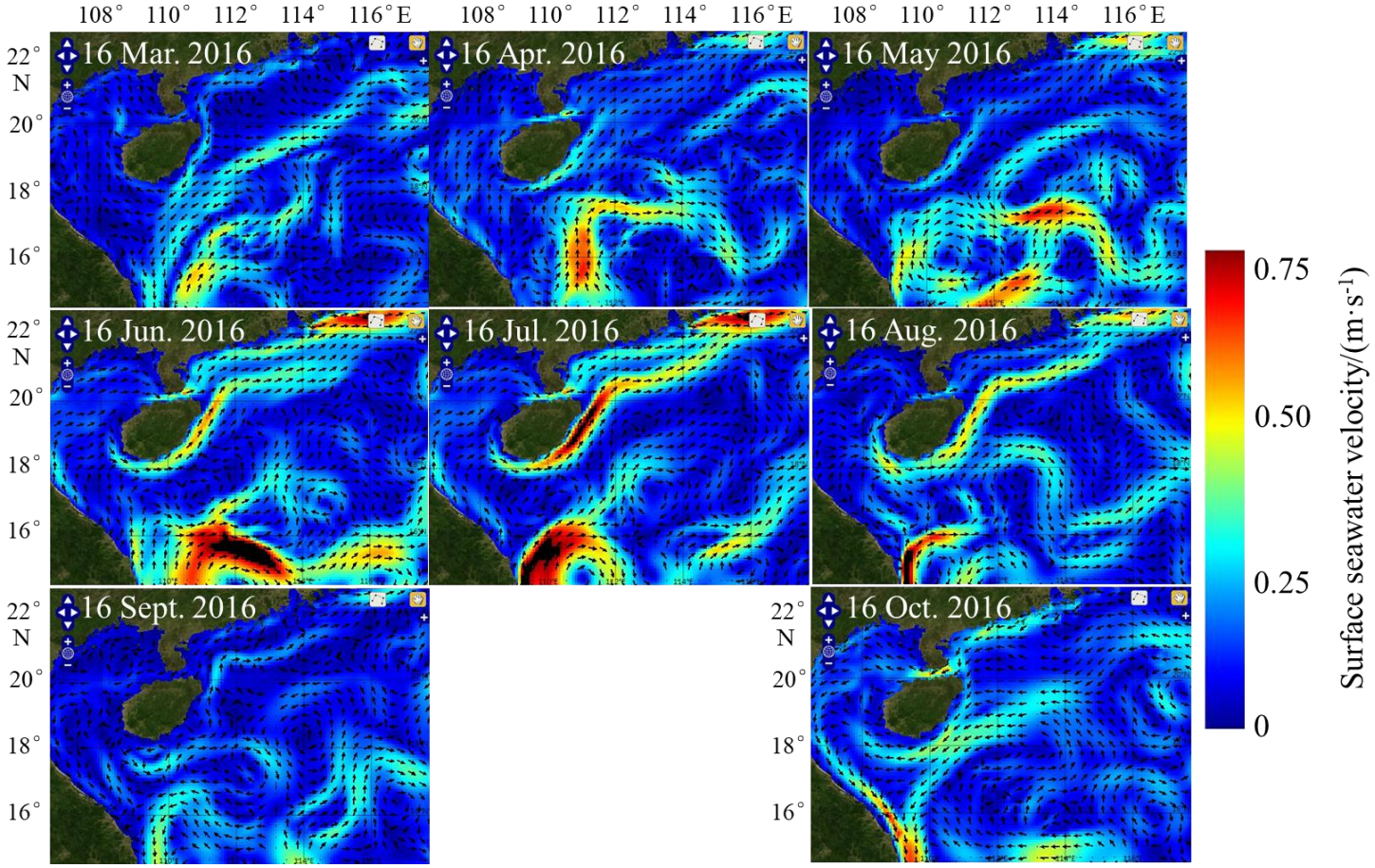

Fig. S2. Continued.