The aim of study is to investigate the spatial and temporal variability of surface Chl-a in the entire South China Sea (SCS) to understand the physical processes in the SCS through the correlation between Chl-a and the physical forcing (sea surface temperature (SST) and surface wind (SW)).

South China Sea (Fig. 1)
- Connect to the East China Sea, the Sulu Sea, the Java Sea, the Indian Ocean, and the Pacific Ocean.
- Major rivers flowing into the SCS: the Pearl, Red, and Mekong Rivers.
- Located in the East Asian monsoon region: northeasterly from November - March; southwesterly from June - September.
- Surface circulation: a basin-scale cyclone in winter, a southern anticlyclone and a weak northern cyclone in summer.

Data and Method
- Ocean color data: gridded level 3, 8-daily, 4-km MODISA Chl-a and SST (2003-2016).
- SW: gridded, daily, 25-km cross-calibrated multiplatform (CCMP) v2.0 (2003-2016).

Method
- To fill in missing data of the MODISA Chl-a and SST. Data Discretizing Empirical Orthogonal Functions (DINEOF, Beckers and Riser 2003; Alvera-Azcárate et al. 2005). DINEOF was used to successfully reconstruct the long-term (1998-2009) daily AVHRR SST, with a very high percentage (~88%) of missing data, for the SCS (Huynh et al. 2016).

Monthly Climatology
- Chl-a is high along coastal regions (>0.5 mg/m³), except for the coast of Palawan and Philippine Islands due to steep slopes without shelves; and low in deep basin (<0.1 mg/m³).
- Chl-a in the entire SCS is highest in January.
- From December to February, a prominent feature is the high Chl-a (>0.4 mg/m³) in the deep basin, off the northwestern Luzon Island, corresponding to the strong upwelling favorable wind (Fig. 3), although there is insignificant decrease in SST (Fig. 4).
- Chl-a in the entire SCS is lowest in May when SW reverses from northeasterly to southerly and SST is highest.
- In summer, Chl-a is high in the southeastern Vietnam coast, the Malaysia coast, the Hainan Island, and the Taiwan Strait, corresponding to low SST and upwelling favorable SW.
- The monthly climatology of SST, SW, and Chl-a (Figs. 2-4 JUL-SEP) clearly presents a stretch of cold water with high Chl-a under the wind forcing from the southeastern Vietnam coast to the open sea in summer.

Conclusions
- The variability of coastal Chl-a reaches maximum values in November-December and minimum values in April-May and does not have a clear seasonal cycle.
- The variability of open sea Chl-a has a seasonal cycle and a correlation with the seasonal upwelling favorable SW.
- The seasonal upwelling occurs in the eastern SCS in winter and in the western SCS in summer. The intensity of upwelling in summer is stronger than that in winter.