

## **Near-surface Monsoonal Circulation of the Vietnam East Sea from Lagrangian Drifters**

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### **LONG-TERM GOALS**

The overall goals are to:

- 1) Contribute to the study of coastal and open ocean current systems in sparsely sampled regions such as the South China Sea (SCS), using a Lagrangian approach;
- 2) Make significant improvement of observational tools for model forecasting;
- 3) Foster partnership with Vietnamese scientists.

### **OBJECTIVES**

We intend to make new Lagrangian and Eulerian observations to measure the seasonal circulation 1) in the coastal waters of Vietnam and 2) in the SCS at times and locations where only sparse direct current observations exist today. These data will also be used to test and improve hydrodynamic circulation models of the SCS and its coastal waters.

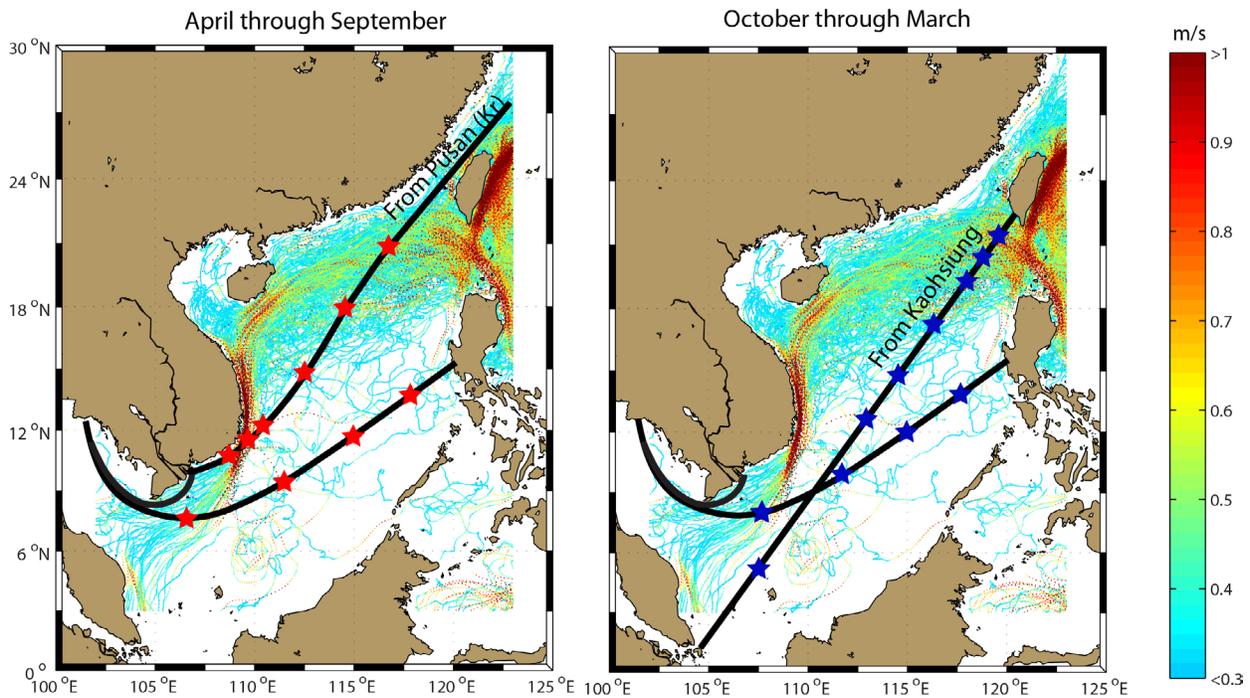
### **APPROACH**

- 1) Deploy SVP drifters in the SCS to resolve the seasonal basin scale near-surface circulation.

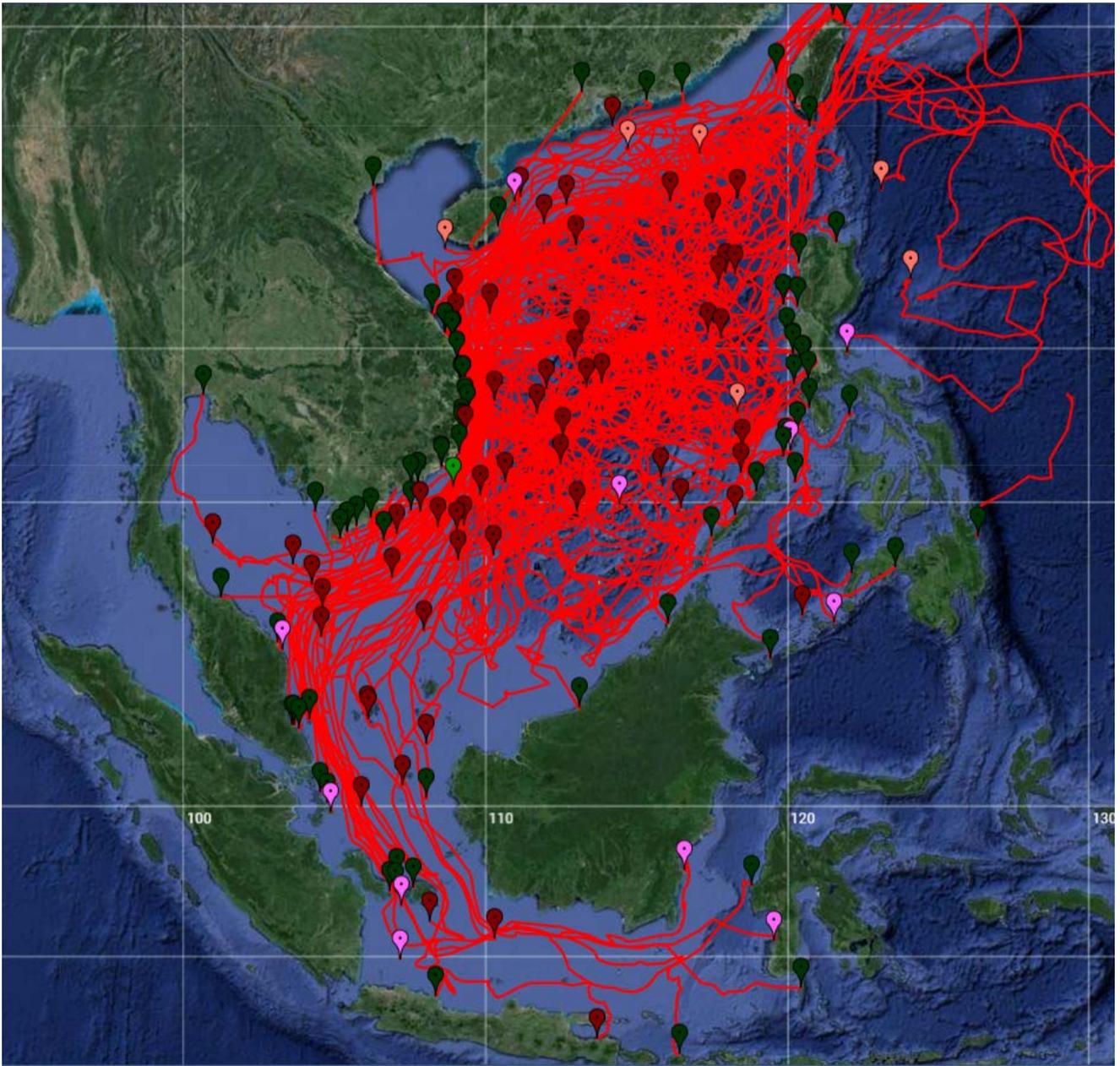
### **WORK COMPLETED AND RESULTS**

- 1) Dr. Luca Centurioni and Dr. Dongkyu Lee visited VASI's deputy director, Dr. Cong and Mr. Huen in Hanoi in November 2013 in the attempt to engage the Vietnamese colleagues in a drifter experiment in the South China Sea with shared science goals. It was determined that the times are not yet right for engaging with Vietnam administrations .
- 2) Meanwhile the deployment of drifters in the South China Sea is continuing. Dr. Ruo-Shan Tseng of the NSYSU in Kaohsiung, Taiwan is managing the logistics of drifter deployments in the SCS from Kaohsiung, Taiwan.
- 3) The deployment of drifters will end in December 2015.

The deployment of drifters begun in May 2013. Drifters are being deployed primarily with VOS (Figure 1). The chosen ships routes allow deployments of drifters in the VES during the northward phase of the Vietnam Jet of the SWM; the Laem Chabang-Manila leg will allow deployments during both monsoon phases in the southern SCS where no drifter observations were available before this effort begun. All drifters moving southward in the Vietnam Jet during the NEM tend to exit the SCS through the Karimata strait and the cyclonic circulation that is described/postulated by several authors (Hu et al. 2000; Xue et al. 2004) in the southern SCS has never been observed. The Evergreen Line also has frequent services between Kaohsiung and Singapore that is being employed during the NEM phase starting in September 2013. A total of 240 drifters will be available for this effort. An extra 10 drifters were deployed in May 2013 from the R/V Revelle SW of Taiwan. The deployment plan for the NEM phase is designed to also collect observations within the submesoscale box SW of Taiwan and in the central and southern part of the SCS where observations are scant. With this plan the emphasis is removed from sampling the southbound Vietnam jet for which many observations already exist. However, this seasonal current will also be mapped by the drifters deployed in the submesoscale box.



**Figure 1: Nominal deployment locations of drifters for the SWM (left) and for the NEM (right) phases, superimposed to the drifter positions color-coded according to the 6-hourly speed of the drifters.**



*Figure 2: Drifter tracks from the beginning of the project as of 10/10/14.*

The deployment plan was changed in spring 2014 for the following reasons:

- 1) Hyundai has discontinued the Pusan Saigon line and currently a similar line is covered by Evergreen on the Kaohsiung-Singapore route.
- 2) The number of drifters deployed each month was reduced to 7 (instead of the 10 planned) to accommodate a possible re-direction of resources to different ONR funded projects.

To date, 185 drifters were deployed.

### **IMPACT/APPLICATIONS**

- The seasonal circulation of the entire SCS is being measured for the first time;
- Validation of regional and global circulation models;
- Fostering US-Vietnam cooperation;
- All drifter data are available in real-time through the Global Telecommunication System.

### **RELATED PROJECTS**

Global drifter program