Japan Geoscience Union Meeting 2014
(28 April - 02 May 2014 at Pacifico YOKOHAMA, Kanagawa, Japan)

ACG06-22 会場:315 時間:4 月 29 日 14:30-14:45

Upwelling events at the western African coast related to atmospheric structures: An analysis with satellite observations

Upwelling events at the western African coast related to atmospheric structures: An analysis with satellite observations

DESBIOLLES, Fabien[1*] ; BLANKE, Bruno[1] ; BENTAMY, Abderrahim[2]
DESBIOLLES, Fabien[1*] ; BLANKE, Bruno[1] ; BENTAMY, Abderrahim[2]

[1]Laboratoire de Physique des Oceans (LPO), UMR 6523 CNRS-Ifremer-IRD-UBO, Brest, France, [2]Laboratoire d'Oceanographie Spatiale (LOS), IFREMER, centre de Brest, France
[1]Laboratoire de Physique des Oceans (LPO), UMR 6523 CNRS-Ifremer-IRD-UBO, Brest, France, [2]Laboratoire d'Oceanographie Spatiale (LOS), IFREMER, centre de Brest, France

Satellite scatterometers provide continuously valuable surface wind speed and direction estimates over the global ocean on a regular grid both in space and time. The Level 3 data derived from the Advanced Scatterometer (ASCAT), available at 1/4^o spatial resolution (hereafter AS25), and Quick Scatterometer (QuikSCAT), available on 1/2^o and 1/4^o horizontal grids (QS50 and QS25 respectively), are studied at regional scales in both the Benguela and Canary upwelling systems. They are compared to the European Center for Medium-Range Weather Forecast surface wind analysis, with insight into their intrinsic and effective spatial resolutions. In the coastal band, the finest spatial patterns are found in the QS25 winds and are O(75km). This demonstrates the sensitivity of the high-resolution satellite-derived winds to coastal processes related to sea surface temperature (SST) perturbations and land-sea transition. More specifically, mesoscale coupling processes between SST and winds play a leading part in structuring the wind stress curl in both the Canary and Benguela upwelling systems. These processes act especially over the upwelling extension zone (O(100km) off the coast). Next, short-lived upwelling episodes (SUEs) calculated from SST anomalies are defined consistently with the QS25 effective resolution. These cold events refer to local, short-lived perturbations that add to seasonal upwelling variability. We characterize concomitant atmospheric synoptic conditions for SUEs identified at chosen latitudes and highlight two subregions in both upwelling systems, with contrasted patterns for the alongshore wind stress component and curl. The complexity of the latter patterns is closely linked to local, short-term SST variability. Closer to the shore, wind stress curl patterns derived from QS25 are only loosely related to SST/wind interactions and, as a working hypothesis, can also be associated with orographic effects that may play an important role in cooling processes. The derivation of a realistic coastal wind drop-off from satellite observations is an almost impossible task, first because a blind zone at the coast, second because the horizontal scales of pure orographic effects (a few tens of kilometers) are finer than the effective resolution of the satellite-derived product (~75km). However, an alternative assessment can be given by evaluating the ocean response to contrasted coastal wind profiles. Numerical sensitivity experiments show that the imbalance between Ekman transport and Ekman pumping has an impact on ocean dynamics: a reduction of the wind in the QS25 forcing, partly induced by orography, contributes to SST cooling.

キーワード: scatterometry, upwelling dynamics, SST/Wind Interactions, orography effects, air-sea coupling
Keywords: scatterometry, upwelling dynamics, SST/Wind Interactions, orography effects, air-sea coupling