CHARACTERISTICS OF SIGNIFICANT WAVE HEIGHT IN CHINA SEAS AND THEIR ADJACENT WATERS FROM MERGED ALTIMETRY DATA

Jingsong YANG, Xiaoyan CHEN, Rong ZHANG, Juan WANG, Weigen HUANG

State Key Laboratory of Satellite Ocean Environment Dynamics
Second Institute of Oceanography, State Oceanic Administration
36 Baochubei Road, Hangzhou, China, 310012
Email: jsyang@tom.com

1. INTRODUCTION

The merged data from multiple remote sensors is often used to increase the temporal and spatial resolution of data coverage. Since the launch of TOPEX/Poseidon in 1992, data from at least two satellite altimeters are available in a given period. This means it is possible to merge data (for example, sea surface lever data) from different satellite altimeters. But data fusion of ocean wave significant wave height (SWH) has rarely been studied. This paper is intended to merge SWH data from GFO, Jason-1 and Envisat altimeters and to analyze the characteristics of SWH in China Seas and their adjacent waters.

2. METHODOLOGY

As we have studied before, there is little difference between the merged results for different fusion methods in case the altimeter data are not sparse. In this paper, we use the inverse distance to a power method. This method is one of the most popular interpolation methods. It can be formulated as

$$C_{ij} = \sum_{s=1}^{n} Q_s W_s / \sum_{s=1}^{n} W_s \tag{1}$$

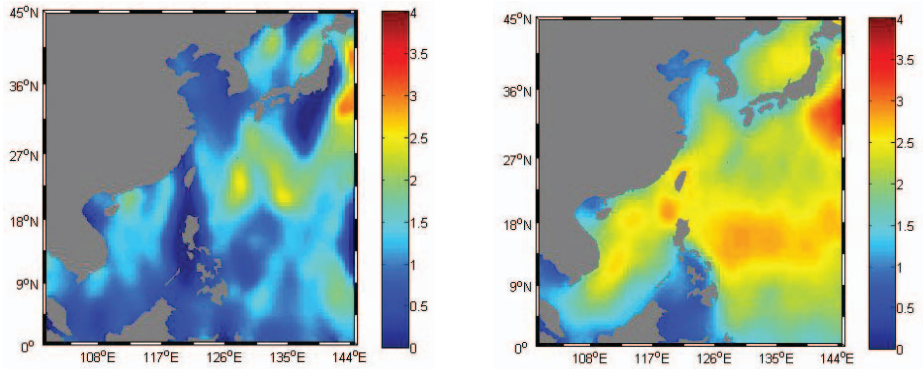
where C_{ij} the interpolation result at the center of grid cell (i, j), n the number of observation points in the grid cell, Q_s the value of the s th point, W_s the weight and $W_s = 1/d_s^m$, d_s^m the mth power of distance from the s th observation point to the grid cell.

3. DATA

GFO, Jason-1 and Envisat altimetry SWH data from 2002 to 2007 used in this study are from United States Naval Research Laboratory. These satellites have revisit periods of 17, 10 and 35 days respectively. Corrections are made to ensure the consistency of SWH data from different altimeters.

4. SOME RESULTS

The characteristics of SWH in spring (from March to May 2005) and winter (from December 2005 to February 2006) merged from GFO, Jason-1and Envisat altimetry data are shown in Fig.1. These maps have a grid size of 0.5°×0.5° and a filter template of 5×5. Fig.2(a) shows that in spring SWH in Bohai Sea and Yellow Sea is usually less than 1m, SWH in East China Sea is usually between 1 and 1.5m, SWH in South China Sea is usually about 1.5m, and SWH in the Open Ocean east of Luzon Strait is usually larger than 2m. Fig.2(b) shows that in winter SWH in Bohai Sea is usually less than 1.5m, SWH in northern Yellow Sea is usually about 1.5m, SWH in central and southern Yellow Sea is even as large as 2.5m, SWH in East China Sea is usually between 2 and 3m, SWH in South China Sea is relatively large and even reaches 3.5m, and SWH in the Open Ocean east of Luzon Strait is usually larger than 2.5m.



(a) (b)

Fig.1. Maps of merged SWH in (a) spring and (b) winter