

LINEAR ALGORITHM FOR SALINITY DISTRIBUTION MODELLING FROM MODIS DATA

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1. INTRODUCTION

Measurements of sea surface temperature from aircraft and satellites have been available for decades, but until the advent of this “ salinity mapping” there was no way to accurately measure coastal salinity distributions, except by time consuming in situ sampling [2]. In this context, accurate analysis and prediction of ocean surface features due to the lack of capability to routinely map SSS are prevented [2]. There are a few studies used MODIS data for mapping sea surface salinity (SSS) [1,2,3], with RMSE value of ± 1.63 psu. The main hypotheses in this study is the fact of utilizing the capabilities of Moderate-resolution imaging spectrometer (MODIS) in mapping sea surface salinity (SSS). The main objective of this study is to modify the linear formula used by using least squares methods to retrieve SSS from MODIS data. It can be divided into following sub-objectives: (i) to utilize least squares to modify the a general linear algorithm for estimating SSS ; and (ii) to determine the vector of unknown parameters that involved in linear algorithm to acquire accurate SSS from MODIS data.

2. METHODOLOGY

2.1 Data Set

The study is conducted in three phases. The first phase is carried out in September 2002 whereas the second phase is carried out in October 2003, and the third phase was carried in March 2008 along east coast of Malaysia. In doing so, more than 100 sampling locations are chosen. The hydrolab equipment is used to acquire vertical water salinity profiles. For this study the in situ- surface (1 meter below sea surface) data are used. In fact, it is expected to have a higher correlation with MODIAS reflectance data than middle and bottom salinity column measurements. These data are used to validate the sea surface salinity distributions that derived from MODIS data. In situ measurements are collected in real time of MODIS satellite data overpass. Twenty four sets of Aqua/MODIS level 1 B images are acquired during the in situ salinity measurements.

2.2 Algorithm used for retrieving SSS

The multi-linear algorithm is modified by implementing least squares method. In doing so, linear model is expressed in matrix notation and the vector of unknown parameters estimated by least squares and certain assumptions are considered about the elements of error vector.

3. RESULTS AND CONCLUSION

The results show that the relationship between estimated SSS from MODIS data and in situ data has positive correlation as r^2 value is 0.96 with $p < 0.00007$ and root mean square error (RMSE) value of ± 0.37 psu. It can be concluded that the modification of SSS linear model by using least squares method can provide high accurately SSS mapping for MODIS satellite data. This a modification algorithm can be used in such tropical zone as Malaysia.

4. REFERENCES

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