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Multi-sensors SSC retrieval, A Case Study over the Yangtze Estuary

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The amount of suspended sediment plays an important role in the morphological development of the Yangtze River estuary. The sediment load in the Yangtze River estuary decreased dramatically in the half past century due to the dam construction and human activities. Such change leads to a fundamental environmental and geomorphological impact on the Yangtze delta and consequently influences the agriculture and economy in this area. So it is important to investigate how the SSC changed in the Yangtze River estuary. Several studies have therefore focused attention on retrieval of SSC.
Most of the researches have focused on using MERIS imagery, as this sensor was specifically designed for retrieving ocean parameters. While these researches have successfully retrieved SSC, extra research should be performed due to the revisit time of MERIS. MERIS only has a revisit time of three days while SSC changes every day. Therefore it is necessary to increase the frequency of observation to better monitor SSC variation. This can be done by using multiple satellites. However using a multi-sensor approach requires the retrieval of SSC is homogeneous for the different sensors.
In the retrieval of SSC, several steps are most important 1) atmospheric correction 2) ocean parameters retrieval from the reflectances acquired in step 1. Correct atmospheric correction is important because more than 90% of radiance that received by the sensor is contributed by the atmosphere.
Within the atmospheric correction for ocean applications, haze is especially important. Haze, in the form of visibility, has bigger influence on the atmosphere path radiance than other atmospheric parameters. Additional, haze is spatially varied. However, most researches take haze as homogeneous and consequently lead to increased uncertainties SSC product.
The aim of this research is to improve the quality of SSC estimation using a multi-sensor approach that integrates both atmosphere correction and water parameter retrieval.
Atmospheric correction per pixel is performed by LUT inversion of MODTRAN. Afterwards retrieval of sediment concentration is performed by the Duntley water radiative transfer model. This model is going to be used on two different sensor MODIS and MERIS.

We compared reflectances from our MODTRAN runs and from MERIS L2 Case2 Regional Processor (C2RP) against forward simulations by the Duntley model. Preliminary results show that in ‘clean’ water MODTRAN and C2RP good agreement with each other but low agreement in high SSC areas. In these areas, MODTRAN showed good agreement with the Duntley simulations. More investigation is performed to get better agreement between the three reflectances in order to retrieve SSC from MERIS.
Finally we analyzed implementation of the model on MODIS data. We found that within MODIS images, many bands signal for sediment retrieval is saturation due to high sediment loads. It turned out that these images cannot be used for sediment retrieval in Yangtze River study area.