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## ESTIMATION OF SUSPENDED SEDIMENT CONCENTRATION USING SENTINEL-2 BAND FUNCTIONS IN MULA RESERVOIR, RAHURI, INDIA

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### Abstract

To understand how the physical, chemical, biological, and environmental components interact, it is important to know what the suspended sediment concentration (SSC) is. To assess the suspended sediment concentrations in oceans, lakes, rivers, and coastal waterways remotely sensed spectral radiant energy collected by satellite sensors can offer a different, synoptic, quick, and affordable technique. Therefore, various sentinel-2 satellite band functions after observing spectral signature of suspended sediments in Mula dam reservoir were calibrated against observed SSC at various locations in Mula dam reservoir located at Rahuri, Maharashtra during October 2021 and February 2022. Observed SSC ranged between 15.62 and 137.65 mg/L during this period. Widely used linear, power, quadratic, exponential and logarithmic functions of various band combinations/ratios were calibrated using 80% data set. Best performing power function of  $(\text{Red} + \text{Green}) / 2$  ( $R^2=0.8$ ),  $\text{Red} + \text{NIR}$  ( $R^2=0.79$ ), polynomial function of  $\text{Red} / \text{Blue}$  ( $R^2=0.71$ ) and logarithmic function of  $\text{Red Edge 1} / \text{Blue}$  ( $R^2=0.62$ ) were further validated to estimate SSC. Estimated SSC and observed SSC of validation dataset were compared using visual interpretation and further subjected to linear regression t-test and student t-test. Statistical error and efficiency models (Root Mean Square Error (RMSE), Mean Absolute Percentage Error (MAPE) and Nash-Sutcliffe Efficiency (NSE)) were applied after validation to find out most suitable band combination for estimation SSC in Mula dam reservoir. Power function of  $(\text{Red} + \text{Green}) / 2$  with  $R^2=0.73$ ,  $\text{RMSE} = 16.185$ ,  $\text{NSE}=0.728$  and  $\text{MAPE} = 26.70\%$  of validation is selected for spatio-temporal mapping of SSC in Mula dam reservoir. The results demonstrate that the applicability of calibration/validation technique developed for the empirical modelling of suspended sediment in Mula dam reservoir using high resolution sensor. Temporal variation of SSC over the period of six months shows the increased SSC towards the portion where river enters the reservoir than in the central portion of reservoir. Moreover, average SSC in Mula dam reservoir immediately after rainy season (October month) was found more than that in summer months. This highlights the applicability of SSC mapping using empirical band function.

**Key words:** band combination/ratios, remote sensing, spectral reflectance, suspended sediment concentration

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