Geophysical Research Abstracts
Vol. 16, EGU2014-16181-4, 2014
EGU General Assembly 2014

Investigation of Lake Water Salinity by Using Four-Band Salinity Algorithm on WorldView-2 Satellite Image for a Saline Industrial Lake

Murat Budakoğlu (1), Muhittin Karaman (2), Z. Damla Uça Avcı (2), Mustafa Kumral (1), and Serpil Geredeli (Yılmaz) (1)

(1) Istanbul Technical University, Department of Geology, Turkey (budak@itu.edu.tr, kumral@itu.edu.tr,geredeliserpil@gmail.com), (2) Istanbul Technical University, Center for Satellite Communications and Remote Sensing, Turkey (mkaraman@itu.edu.tr, damla@cscrs.itu.edu.tr)

Salinity of a lake is an important characteristic since, these are potentially industrial lakes and the degree of salinity can significantly be used for determination of mineral resources and for the production management. In the literature, there are many studies of using satellite data for salinity related lake studies such as determination of salinity distribution and detection of potential freshwater sources in less salt concentrated regions. As the study area Lake Acigol, located in Denizli (Turkey) was selected. With it's saline environment, it's the major sodium sulphate production resource of Turkey.

In this study, remote sensing data and data from a field study was used and correlated. Remote sensing is an efficient tool to monitor and analyze lake properties by using it complementary to field data. Worldview-2 satellite data was used in this study which consists of 8 bands. At the same time with the satellite data acquisition, a field study was conducted to collect the salinity values in 17 points of the laker with using YSI 556 Multiparametre for measurements. The values were measured as salinity amount in grams per kilogram solution and obtained as ppt unit. It was observed that the values vary from 34 ppt - 40.1 ppt and the average is 38.056 ppt. In Thalassic serie, the lake was in mixoeuhaline state in the time of issue.

As a first step, ATCOR correction was performed on satellite image for atmospheric correction. There were some clouds on the lake field, hence it was decided to continue the study by using the 12 sampling points which were clear on the image. Then, for each sampling point, a spectral value was obtained by calculating the average at a 11*11 neighborhood.

The relation between the spectral reflectance values and the salinity was investigated. The 4-band algorithm, which was used for determination of chlorophyll-a distribution in highly turbid coastal environment by Wei (2012) was applied.

Salinity α $(\lambda_i^{-1} / \lambda_j^{-1})$ * $(\lambda_k^{-1} / \lambda_m^{-1})$ (i,j,k,m=1..8) (i≠j≠k≠m)

By using each band of WV-2 and possible combinationsfor 4-band algorithm, 1680 band combinations were used to get the correlation with the in-situ measured salinity values. As a result the highest correlation (R=0.926) was found. The correlation coefficient of the 4-band algorithm indices $(\lambda_{Coastal}^{-1} / \lambda_{NIR2}^{-1})$ * $(\lambda_{Red}^{-1} / \lambda_{Green}^{-1})$ and the salinity values was R^2=0.86.