

Estimation for Chlorophyll a concentration excluding the impact of aquatic plants in Lake Biwa using Landsat-5 TM data

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Lake Biwa is freshwater lake that is the source of drinking water of Shiga, Kyoto, Osaka, and Hyogo area. However of expanding blue-green algae or aquatic plant are anxious about the influence of the lake in recent years.

Therefore, various monitoring methodology of those mechanisms is examined. The satellite remote sensing is expected as a leading monitoring tool. The concentration Chlorophyll-a of Lake Biwa is a challenging environment of remote sensing because its concentration is too low and blocked by aquatic plant

The utility of satellite imagery for water quality studies in Lake Biwa is investigated.

The main purposes of this study are to present Chlorophyll-a mapping of Lake Biwa and exclude aquatic plant influence and the accuracy was checked. Moreover, the Chlorophyll-a distribution characteristic in this lake was considered using the proposed algorithm.

The satellite data used is five scenes from 1984,1989,1994,1997 and 2002 The Landsat-5 TM Level 1 product data was downloaded through the Internet site "Earth Explorer." The value of water observation point of Band1 (0.45 - 0.52 μm), Band2 (0.52 - 0.60 μm), Band3 (0.63 - 0.69 μm), Band4 (0.76 - 0.90 μm), Band5 (1.55 - 1.75 μm) and Band7 (2.08 - 2.35 μm) in these lakes was extracted from the obtained satellite data. On the other hand, the Chlorophyll-a data was obtained from the Water Information System of Ministry of Land, Infrastructure and Transport. And Water quality data are compared to imagery from the Landsat TM data.

The Chlorophyll-a value were compared with Digital Number values of Landsat 5 bands using different band combination of empirical algorithms.

Generally, the results of analysis showed significant correlation between these models and water quality parameters.

Moreover, the value of Digital Number is increasing by 1.3(B1), 0.75(B2), 0.2(B4), 0.2(B5) and 0.55(B7) respectively when the coverage of aquatic plant is decreasing 25%.

Keywords: Chlorophyll-a, satellite, remote sensing, lake, acatic plant