

整合衛星影像與現場水文氣象數據之灌溉用水 估算研究

Research on Irrigation Water Estimation Integrating Satellite Images and On-site Hydrometeorological Data

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摘 要

本研究基於遙測技術，影像資訊以 Sentinel-2 衛星影像為主，Landsat-8 衛星為輔，依照雲覆狀況進行篩選後，分析判釋農田作物類別與面積分布。進一步配合即時水文氣象、土壤質地及作物資料，再以自行研發之 TaiCropWat 用水量模式估計農業灌溉用水量。應用區域為石門水庫水資源競用區，並以 2022 年資料進行評估。首先，就競用區總用水量而言，一期稻作之作物需水量為 485mm；滲漏量為 829mm；田間耗水量 1,770mm；有效雨量為 919mm；田間用水量 916mm。二期稻作之作物需水量為 571mm；滲漏量為 829mm；田間耗水量 1,821mm；有效雨量為 554mm；田間用水量 1,139mm。進一步與灌溉計畫用水進行比較，以各旬別的用水來看，在一期作與二期作大致能符合計畫用水趨勢，而在部分旬別，因用水量模式可將實際降雨量納入考量，能確實反映水文條件，可推估較為精準的灌溉用水量。

關鍵詞：農業水資源，遙測技術，TaiCropWat，灌溉用水量

Abstract

This study is based on telemetry technology. The image information is mainly based on Sentinel-2 satellite images, supplemented by Landsat-8 satellites. After filtering cloud cover conditions, the category and area distribution of farmland crops are analyzed and produced. Combining with real-time hydrometeorology, soil texture and crop data, the self-developed TaiCropWat water consumption model is used to estimate agricultural irrigation water

consumption. The application area is the Shimen Reservoir water resource competition area with 2022 data. First, the total water consumption in the competition area: the crop water demand for the first stage of rice cultivation is 485mm; the leakage amount is 829mm; the field water consumption is 1,770mm; the effective rainfall is 919mm; the field water consumption is 916mm. The crop water demand for the second stage of rice cultivation is 571mm; leakage is 829mm; field water consumption is 1,821mm; effective rainfall is 554mm; field water consumption is 1,139mm. Further comparison with the irrigation plan water use shows that in terms of water use in each ten-day period, the first and second periods of cropping can generally conform to the planned water use trend. In some ten-day periods, since the water consumption model can take actual rainfall conditions into consideration, It can truly reflect hydrological conditions and estimate more accurate irrigation water consumption.

Keywords: agricultural water resources, telemetry technology, TaiCropWat, crop water requirement