The integration of ground investigations and radar images on rice yield prediction

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Rice is the staple food and the largest crop in terms of area in Taiwan. Developing the real-time and accurate methods to predict rice yield of large area is important for food security. However, due to the size of rice fields is small and fragmented, and the disturbed weather in Taiwan. It difficult to acquire the information of cropping area and rice yield by optical satellite data, such as SPOT and FORMOSAT-2, because of the cloud cover commonly observed in the region. In contrast, the RADARSAT image data can overcome such problems due to which can penetrate through cloud. The aim of this study is to integrate the data of ground investigations and radar images to predict the rice yield of large area. We used the data of rice yield (ground investigation) and radar images to do regression analysis, and then predict the rice yield of large area. The results of ground investigation indicated that there were high correlation between sample sites yield and real harvest yield ($R^2 = 0.99$), it reveals the investigating method has a high representativeness. The results of the prediction of rice yield by multi-temporal radar images indicated that there was high correlation between ground trust and yield estimation ($R^2 = 0.68$, proof data, 6 fields), and the yield estimation accuracy is higher than 85%. Therefore, this study suggests the application of multi-temporal radar image data can effective and accurate to predict the paddy rice yield in Taiwan.