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Irrigation Tank Detection and Monitoring through Remote Sensing Application

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Irrigation Tank Detection and Monitoring through Remote Sensing Application

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Abstract: In water scarce regions irrigation farming is challenged by the capability of water supply facilities to fulfill the crop water demand with appropriate timing and reliability. At the farm-scale, technical constraints to irrigation practices may depend on the performance of collective irrigation systems and/or the limited yield of groundwater wells. To respond to farmers’ needs in terms of irrigation schedules, water storage tanks made of earth bunds with plastic linings are built to provide farms with adequate water stocks. A case study in Southern Italy is investigated where a rapid diffusion of irrigation tanks has been observed with increasing concerns for water resources. The Capitanata plain, an intensive agricultural district covering about 5,000 Km\textsuperscript{2}, creates an opportunity to employ multispectral images to develop suitable tools for the detection and monitoring of widely distributed irrigation tanks. To this goal, an automatic Matlab\textsuperscript{®} add-on app has been developed, exploiting the three RS indices NDVI, NDWI, and NDWI\textsubscript{2} modified, applied to different optical images with 50cm to 10m of spatial resolution. A real-time comparison and validation between results and ground-truth data, help user to choose the best configuration to adapt this approach to the actual case study, allowing the weekly monitoring of the state of farm-scale water storage in both ordinary and drought conditions. As preliminary results, in August 2017, about 10,000 active tanks were detected with an average surface of 300 m\textsuperscript{2}. Moreover, a specific function to retrieve the spatial nexus between storage tanks and surrounding irrigation fields has been developed.

Keywords: Geoscience and remote sensing; irrigation tanks detection; NDVI; NDWI