Vegetation-induced occlusions in agricultural ditches: rapid, low-cost and flexible mapping by UAV-SfM

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**Abstract.**

Drainage networks represent a crucial aspect for controlling the floods generation, reducing waterlogging and water erosion, improving groundwater recharge and supporting water supply in cultivated areas. Therefore, the assessment of the network storage capacity plays a key aspect to consider in water resource and flood management risk. Drainage network efficiency can be reduced by the uncontrolled growth of vegetation that can modify the ditch cross-section altering the hydrological response and network functionality. Consequently, the continuous monitoring of the potentially critical areas, where vegetation could obstruct the section, become a fundamental point that can be solved by the advanced in the high-resolution topographic technologies. In the last few years, the Structure from Motion (SfM) photogrammetry technique in parallel with Uncrewed Aerial Vehicles (UAVs) have increased the possibilities for the realization of rapid, low-cost and very detailed Digital Elevation Models (DEM). UAV-SfM surveys are fundamental to generate accurate and high-resolution DEM used to derive geomorphometric features of the agrarian landscape. This research aims to present a flexible and low-cost workflow to realize an accurate and high-resolution UAV-SfM DEM, in a large agrarian area of Taiwan, that can be used to automatically detect the drainage network and to map the vegetation into the ditches through the roughness index. To validate and assess the methodology, the high roughness index values due to the presence of vegetation in the ditches were identified and compared with corresponding measurements in the field. The results confirm the effectiveness of the approach used and underline how the developed workflow could provide, on a farm scale and with an unusually high level of detail, useful, rapid and low-cost information to map vegetation obstruction in channel network. This information could be help to precisely intervene on obstruction points, planning the ditches maintenance, and identify some numerical benchmarks to be included in flood risk models and in the computations of the storage size of the drainage network, essential for stakeholders.