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Remote Sens. **2014**, *6*, 1-x manuscripts; doi:10.3390/rs60x000x

OPEN ACCESS

remote sensing

ISSN 2072-4292

www.mdpi.com/journal/remotesensing

Article

Monitoring of Irrigation Schemes by Remote Sensing: Phenology versus Retrieval of Biophysical Variables

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Received: 18 February 2014 / Accepted: /
Published:

Abstract: The appraisal of crop water requirements (CWR) is crucial for the management of water resources, especially in arid and semi-arid regions where irrigation represents the largest consumer of water, such as the Doukkala area, western Morocco. Simple and (semi) empirical approaches have been applied to estimate CWR: the first one is called K_c-NDVI method, based on the correlation between the Normalized Difference Vegetation Index (NDVI) and the crop coefficient (K_c); the second one is the analytical approach based on the direct application of the Penman - Monteith equation with reflectance-based estimates of canopy biophysical variables, such as surface albedo (r), leaf area index (LAI) and crop height (h_c). A time series of high spatial resolution RapidEye (REIS), SPOT4 (HRVIR1) and Landsat 8 (OLI) images acquired during the 2012/2013 agricultural season has been used to assess the spatial and temporal variability of crop evapotranspiration ET_c and biophysical variables. The validation using the dual crop coefficient approach (K_{cb}) showed that the satellite-based estimates of daily ET_c were in good agreement with ground-based ET_c, i.e. R^2=0.75 and RMSE=0.79 versus R^2=0.73 and RMSE=0.89 for the K_c-NDVI respectively the analytical approach. The assessment of irrigation performance in terms of