

EGU2020-19945

<https://doi.org/10.5194/egusphere-egu2020-19945>

EGU General Assembly 2020

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Constructing Mediterranean wetland open water dynamics using a new 18-year MODIS-derived surface water fraction dataset

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Wetlands are among the most biodiverse ecosystems in the world, due largely to their dynamic hydrology. Frequent observations by satellite sensors such as the Moderate Resolution Imaging Spectrometer (MODIS) allow for monitoring the seasonal, inter-annual and long-term dynamics of surface water extent. However, existing MODIS-based studies have only demonstrated this for large water bodies despite the ecological importance of smaller-sized wetland systems. In this paper, we constructed the temporal dynamics of surface water extent for 340 individual water bodies in the Mediterranean region between 2000 and 2017, using a previously developed 8-day 500 m MODIS surface water fraction (SWF) dataset. These water bodies has a wide range of size, specifically 0.01 km² and larger. We then compared the water extent time series derived from MODIS SWF with those derived from a Landsat-based dataset. Results showed that MODIS- and Landsat-derived water extent time series showed a high correlation ($r = 0.81$) for more dynamic water bodies. Our MODIS SWF dataset can also effectively monitor the variability of very small water bodies (<1 km²) when comparing with Landsat data as long as the temporal variability in their surface water area was high. We conclude that MODIS SWF is a useful product to help understand hydrological dynamics for both small and larger-sized water bodies, and to monitor their seasonal, intermittent, inter-annual and long-term changes.