Hydrol. Earth Syst. Sci. Discuss.,
https://doi.org/10.5194/hess-2019-5-RC2, 2019

Hydrology and Earth System Sciences
Discussions
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Interactive comment on "Development and Validation of a Dense 18-Year Time Series of Surface Water Fraction Estimates from MODIS for the Mediterranean Region" *by* Linlin Li et al.

Anonymous Referee #2

Received and published: 14 April 2019

This well-organized manuscript presents a valuable data set and an interesting method to monitor surface water fraction/extent variation in large spatial scale and high temporal resolution. The combination of a medium resolution MODIS surface reflectance product and a well-tuned Cubist regression model provided a sub-pixel estimation of water fraction with satisfactory performance compared with GSW and previous MODIS product on surface water. Apparently, the authors have made their efforts to further improve the quality of the data set by using ancillary data such as DEM and Land Cover to eliminate possible contaminated pixels. Besides the cross validation with GSW, the authors also compared the generated data set with altimetry data in certain lakes. Given the importance of high frequency monitoring of surface water in water management, it

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is positive that this work will benefit the scientific community as well as public decision makers.

In revising the manuscript, following issues were encountered and I suggest authors to provide further explanation:

1) In Page 11, Table 2, the author listed the input predictors for Cubist regression model. However, it seems to me that TCWI and TCBI might be redundant variables because they are linear combination of MODIS individual bands and the regression model is also linear. Have you ever tried to remove these two predictors to simplify the model input? If so, how did it work?

2) In Page 17, Table 5 listed the comparison results between water extent determined from GSW and MODIS at different thresholds. Though the author mentioned that the generated MODIS surface water product tends to overestimate the water extend due to mixed pixel effects at low water fraction thresholds, it's still confusing that the difference between the two products (MODIS and GSW) doesn't decrease with the increasing threshold higher than 40% or 50%. In fact, the generated MODIS product tends to underestimate the water extent compared with GSW when using larger thresholds.

3) In Page 20, figure 7 (c) and Page 21, figure 8 (c), the altimetry water levels and MODIS generated water areas were compared. However, it could be more convincing to compare two time series with same physical meaning. The altimetry water levels can be transformed into water areas using hypsometric curves (some can be found in existing data sets such as Hydroweb), vice versa. By doing this you can calculate some metrics to better describe the agreement of two data sources.

4) The potential of the data set in water management could be better illustrated. High temporal resolution surface water areas can benefit some studies that use water area information as input for hydrological modeling in ungauged basin, e.g., Huang et al. (2018) used river widths generated from Landsat and Sentinel-2 to calibrate the parameters of a distributed hydrology model in Upper Brahmaputra River.

Reference

Huang, Q., Long, D., Du, M., Zeng, C., Qiao, G., Li, X., Hou, A., and Hong, Y.: Discharge estimation in high-mountain regions with improved methods using multisource remote sensing: A case study of the Upper Brahmaputra River, Remote Sensing of Environment, 219, 115-134, 2018.

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