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Uncertainty Estimation of a global Remote Sensing Water Surface Time-Series: the DLR Global WaterPack

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Large-scale remote sensing products offer opportunities to address global society relevant questions. One of the most vital resources of our planet is fresh water. To monitor dynamics, the application of water surface time-series has proven to be an effective tool, but to access reliable information, validation efforts are essential. Furthermore, increased utilization of remote sensing time-series products can be seen in modelling applications. In this process, uncertainty estimation of input datasets is typically required. Especially for large-scale remote sensing products with high temporal resolution, common validation approaches as comparison to in situ data or intercomparison to similar products is hardly viable. Here we propose the use of supervised- and unsupervised outlier detection methods to yield pixel-wise uncertainty estimates in an internal validation. Therefore, several algorithms are applied on a global, MODIS (Moderate Resolution Imaging Spectroradiometer) based daily accessible water surface product (DLR Global WaterPack). Two main sources have been identified to introduce uncertainty to the binary classification of cloud free observations. As mixed pixels (water/non-water) and water impurities contribute to changes in the RED-NIR profile, we evaluate their effects by utilizing classified Landsat 8 images to determine water subpixel fractions and identify turbid water. Results are analyzed and compared in initial test regions across the globe.