

### **MODIS methodology**

We produce monthly composites of level 3 remote sensing Reflectance at 545-565 nm (Band 4) from MODIS Terra (MOD09A1) and MODIS Aqua (MYD09A1) 8-day L3 500m imagery. This band was used previously to define total suspended solids that help us to define the area of the river plume (Saldías et al., 2012, 2016, Masotti et al 2016). Each product pixel includes the optimal L2 observation obtained during an 8-day timeframe, chosen based on high observation coverage, low view angle, absence of clouds or cloud shadow, and minimal aerosol loading (Bezerra et al, 2022). The 8-day product minimizes cloud presence. We used the Quality Assessment Band to produce a binary cloud band and masked any pixels defined as clouds in Band 4. Then, we combined both MODIS products on an 8-day time scale to complete each other the data missing in the masking step. We tested some reflectance thresholds and defined any pixel with a radiance value greater than 0.2 as part of the river's plume and produced a binary band of the river's plume. We summarize the plume and cloud areas monthly to compare with discharge and model output. We run all the processes using Google Earth Engine, a platform for remote-sensing data with an extensive scientific catalog and MODIS datasets (Gorelick et al, 2017).

Bezerra, A. C., Silva, J. L. B. D., Moura, G. B. D. A., Lopes, P. M. O., Nascimento, C. R., Ribeiro, E. P., Galvêncio, J. D., Silva, M. V. D. 2022. Dynamics of land cover and land use in Pernambuco (Brazil)—Spatio-temporal variability and temporal trends of biophysical parameters. *Remote Sensing Applications: Society and Environment*

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