

# Guidance Notes to Accompany the Oil Palm Data Set

## Overview

This map was developed based on Copernicus Sentinel-1 microwave backscattering imagery and Landsat multispectral time series, and the oil palm extent was validated using visual interpretation of very high-resolution satellite imagery using a random stratified sample. The method developed to generate this map outperforms other methods that use only optical data for oil palm plantation classification. Frequent clouds in the tropical regions obstruct useful information. One of the steps of the data preprocessing of the optical data is cloud removal, which leaves some areas with very few or no observations. Unlike optical data, synthetic aperture radar data (e.g., Sentinel 1) allows for increased observation in cloudy areas, as larger wavelengths enable easier penetration through the clouds.

## Technical caveats

We note that in-situ ground truth data were not used in the validation of this map because it was not possible to collect a rigorous statistical sample on the ground for Indonesia, Malaysia and Thailand as the costs would be prohibitive and some locations are simply inaccessible. Instead, we used visual interpretation of very high-resolution satellite imagery. In general, ground data usage is important in mapping changes that involve complex processes such as tree defoliation and tree-toppling, as reported by Copass et al. (2019). On the other hand, visual interpretation is effective in mapping clear structures or abrupt canopy changes, as is the case of oil palm plantations. However, we acknowledge that a dedicated validation study is further required to gain more understanding on the confidence of the map, particularly taking into account the characteristics of oil palm trees of different ages.

We recommend that the accuracy of the map be considered for each region separately, particularly in terms of false positives, i.e., oil palm detected in the map but not present, as well as omission errors, i.e., oil palm not detected. For example, undetected confusion with other palms (e.g., coconuts) are possible in some areas. These accuracy figures can be found in Danylo et al. (2021).

## Usage of the map

This map can be used to: (i) estimate first-approximation numbers of oil palm area and average age by region in Indonesia, Malaysia and Thailand; (ii) gain insights into the dynamics of oil palm expansion by region; (iii) provide estimates of age frequency distributions by region; (iv) estimate oil production potentials as a function of plantation age.

Due to the above technical caveats, this map should not be used as a standalone product in assessing the extent of oil palm plantations, but it would need to be combined with a reference dataset of sample plots to derive accurate estimates of area extent (GFOI, 2020; Olofsson et al. 2014). Moreover, this data set does not provide information on the date of clearance or conversion of a site from previous land uses to oil palm. Therefore, assessing the sustainability of palm oil production requires the map to be used in combination with other maps that compensate for the aforementioned shortcomings on the objective extent of oil palm plantations and historical land cover/use. Finally, the map product does not necessarily represent the full extent of oil palm plantations as very young palms might be missing.

We kindly request consideration of the aforementioned caveats in using this map.

## References

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