Near-real time burned area mapping at global scale

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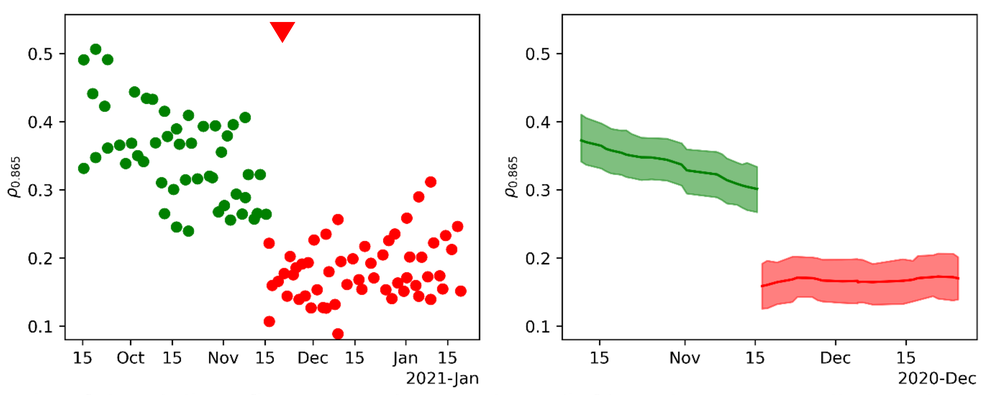
Achievements at the Copernicus Global Land Service (CGLS)

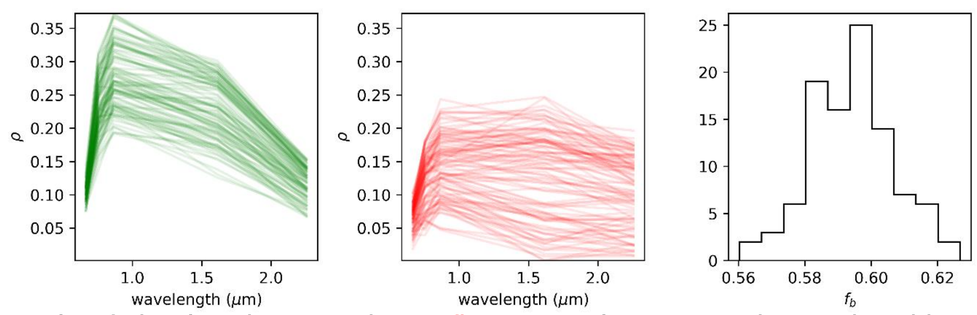
- Burned area (BA) products available at non-time critical (NTC) and at near-real time (NRT) at similar accuracies to other global products
- All non-CGLS global products are available at NTC, several months or even years from the present date
- Implementation with Sentinel-3 OLCI&SLSTR imagery and VIIRS active fire data
- NRT derived 1 day after current day, NTC 50 days after
- Release expected on 1 July at https://land.copernicus.eu/global

Reflectance modelling & deep learning

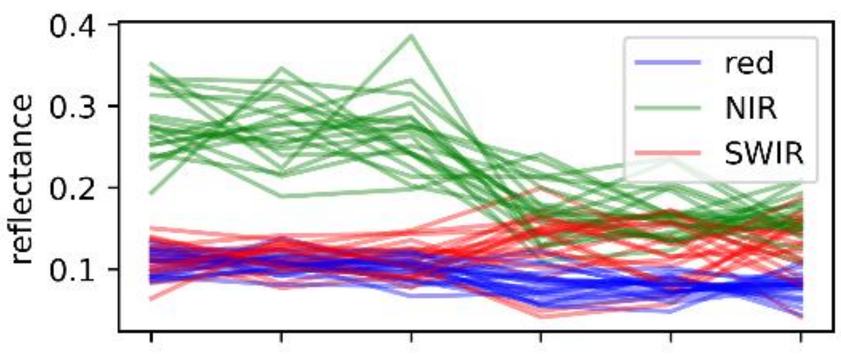
- A convolutional neural network, trained with synthetic and real data, designed to use time series of reflectance data
- Simulations from two semi-empirical models: 1) Spectral model of fire effects and 2) Bidirectional reflectance model
- Models calibrated separately at each active fire detection (▼)



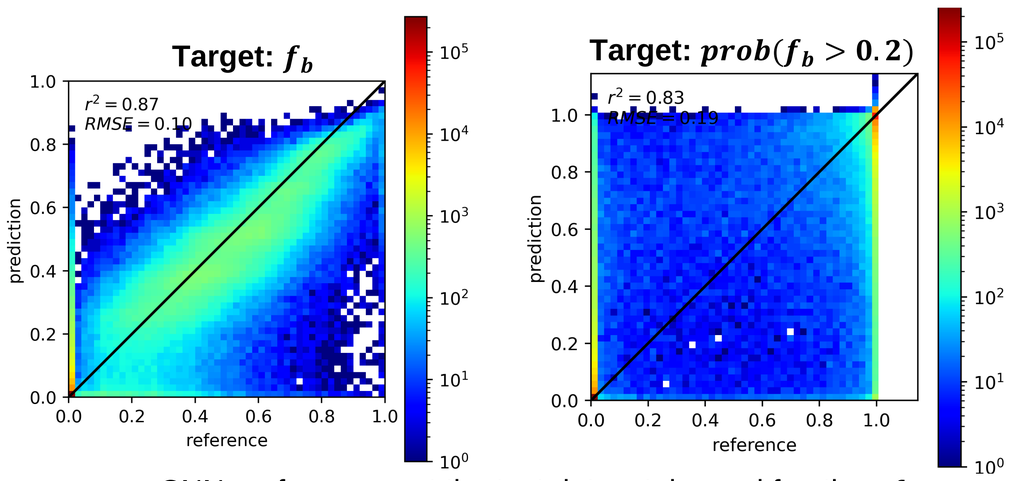
Example of the daily reflectance observations (left) and corresponding estimations at a common acquisition geometry (right; shaded area show 95% confidence intervals), before and after an active fire detection (▼)



Example of simulated pre- and post-fire spectral curves and associated burned fractions (f_b)

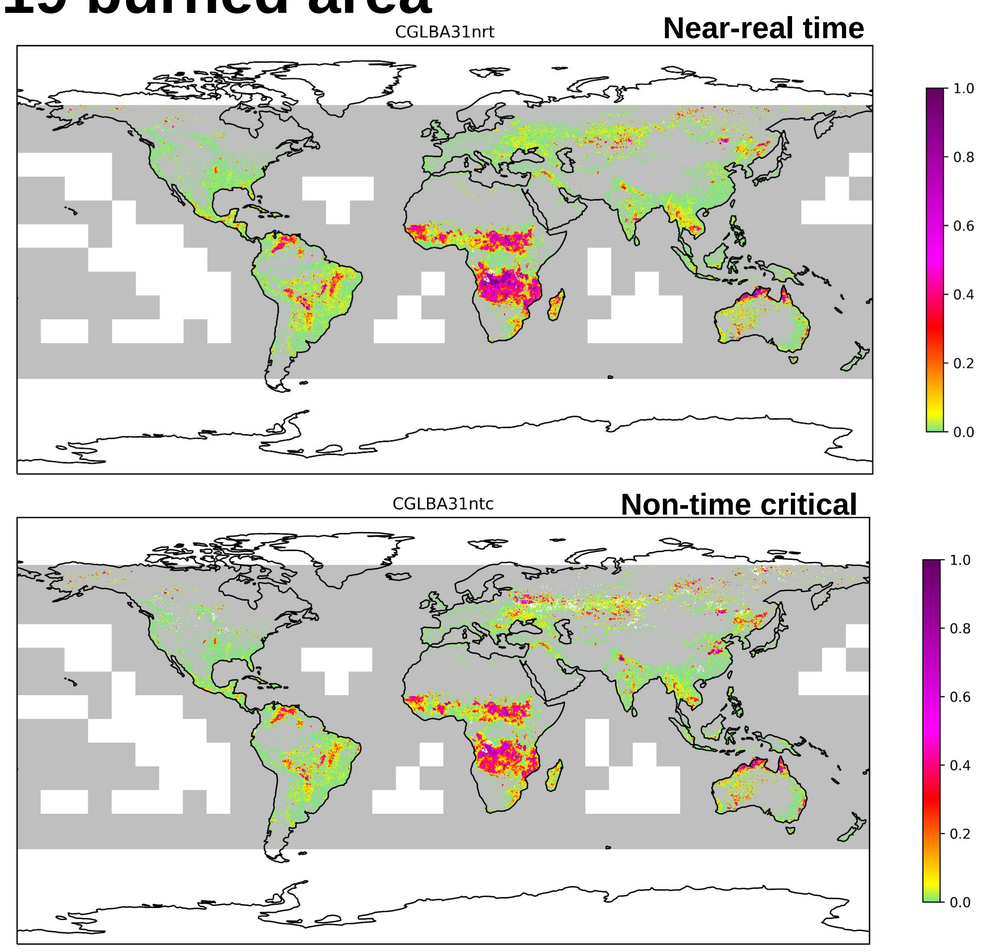


Models simulations

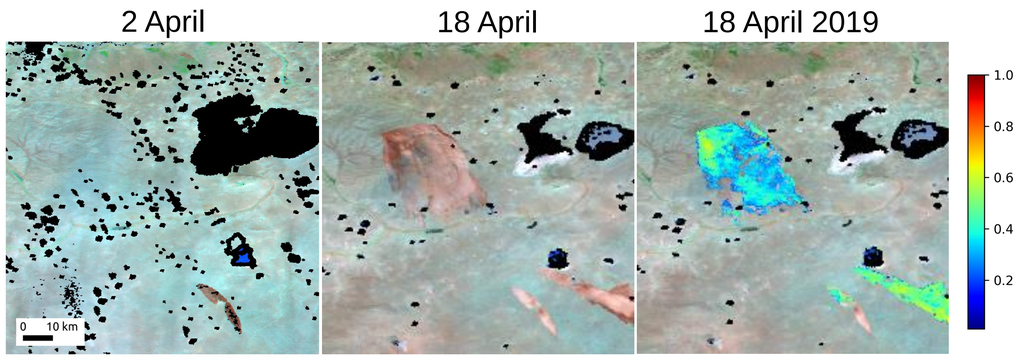


CNN performance at the test dataset. burned fraction: f_b

2019 burned area



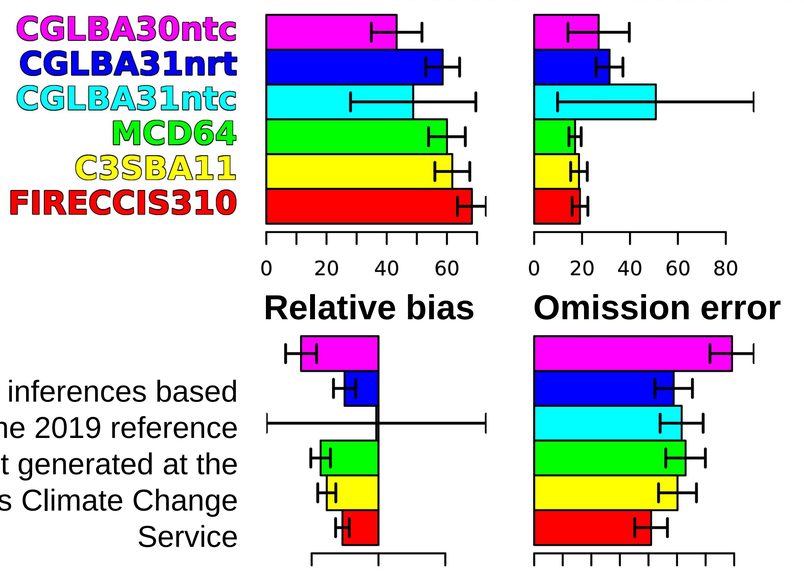
Proportion of burned area at 0.25º grid cells for 2019. Grey represents unburned area and white no-data in all pixels within a grid cell, in any monthly composite.



NRT burned fractions on April 2019, up to the 18th (right panel), over Temperate Savana in East Asia (upper-left coord.: lat. 50.83, lon. 114.17; at tile X29Y03). On the background, Sentinel-3 TOC reflectance images (SWIR/NIR/red) acquired on the 2 and 18 April. Unobserved pixels are represented as black.

Accurate BA at unprecedented timeliness, 1 day

- NTC and NRT **accuracies** (Dice of coefficient (DC) 43.3 and 58.6% respectively) just bellow NASA-MCD64 and Copernicus Climate Change Service C3SB11 (60.0 and 61.8%), although clearly bellow ESA Climate Change Initiative FIRECCIS310 (68.3%)
- A quality issue was identified on the NTC product: commission errors caused by vegetation senescence near agricultural fire activity, limited to East Europe and East Asia on October. For virtually the whole Globe, the accuracy of **NRT is just slightly lower than NTC (DC 57.9 vs 59.5%)**.
- Further work: 1) Increase accuracy; 2) Validate burned fraction and its associated uncertainty; 3) Implementation with **Sentinel-2**, Planet, etc.



Accuracy inferences based on the 2019 reference dataset generated at the Copernicus Climate Change Service

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