

EGU21-16015

<https://doi.org/10.5194/egusphere-egu21-16015>

EGU General Assembly 2021

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Near-real-time identification of the drivers of deforestation in French Guiana

Marie Ballere^{1,2,3}, Stephane Mermoz^{4,5}, Alexandre Bouvet^{4,5}, Thierry Koleck¹, and Thuy Le Toan⁵

¹CNES, Toulouse, France (marie.ballere@cnes.fr)

²World Wildlife Fund France, 93310 Le Pré-Saint-Gervais, France

³LaSTIG, University of Gustave Eiffel, IGN, 77420 Champs-sur-Marne, France

⁴GlobEO, 31400 Toulouse, France

⁵Centre d'Etudes Spatiales de la Biosphère, CNES/CNRS/INRA/IRD/UPS, 31400 Toulouse, France

Tropical forests account more than 50% of recorded terrestrial biodiversity and play an important role in carbon storage and the water cycle. The degradation of tropical forests presents an immediate danger for the global environment and biodiversity. Monitoring of deforestation and understanding its drivers are challenging tasks that are essential to measures of reduction of deforestation.

Many researches have been carried out on the detection of deforestation using remote sensing data, and there are several operational systems that work. Those systems are mostly based on optical data, but they show big delays in detections due to the persistent cloud cover in the tropics. Since 2014, Sentinel-1 provides SAR images every 6 to 12 days, insensitive to cloud cover. Deforestation detection methods based on SAR images have increased and start to be operational (Bouvet et al. 2018, Reiche et al. 2021). They allow for faster and more accurate mapping. For example, Ballere et al. 2021 shows that 80% of gold-mining-related deforestation in French Guiana is first detected by a SAR-based method, before the optical method, most often offset by several months.

However, the detection of disturbances in itself is not sufficient for measures to halt deforestation. Finer et al. 2017 defined a 5 steps protocol in order to help the near-real-time monitoring to be effective, the first step being the detection. Then comes the prioritization of data: this can be done by integrating spatial data such as protected areas or specific areas of interest. The third step is the identification of the drivers. This usually involves human-work.

We present here an automatic method for the identification of the drivers of deforestation in French Guiana (gold mining, urbanization, small-scale agriculture and forest exploitation), and show its results. It is based on geographical and morphological indicators, and makes it possible not to wait for another image after the detection step. The method has the potential to be integrated into an operational system for French Guiana.