

1 – Introduction and objective

Sustainable Aviation Fuels (SAF) offer the most promising option for reducing greenhouse gas (GHG) emissions in international civil aviation in the short term (ICAO, 2021). Brazil has significant potential for SAF production from renewable crop-based biomasses due to favorable edaphoclimatic conditions, ample land availability, and its expertise in biofuel production. Inspired by this potential, a partnership between the University of Campinas (UNICAMP), Agroicone, and The Boeing Company has led to the development of the SAFmaps platform. This paper aims to present the SAFmaps platform, an open-access geospatial database containing information on the most promising feedstocks for SAF production, their associated supply chains, and a set of mapped information pertinent to the CORSIA sustainable criteria in Brazil.

2 - Material and Methods

The development of maps with original information and the compilation of data to be made available on the platform were carried out through an extensive literature review and consultation of public databases, including governmental, national, and international research organizations and institutes. The geographic coverage of the data corresponds to thirteen Brazilian states with the greatest potential for the production of feedstocks that can be used in three certified routes for SAF production (Fischer-Tropsch (FT), Hydrotreated Esters and Fatty Acids (HEFA) and Alcohol-to-Jet (ATJ)). The addressed feedstocks include eucalyptus, soybean, palm, macaw palm, sugarcane, corn, beef tallow, and steel off-gases.

The platform's database was structured into three main parts: (i) several background maps termed "Support maps", (ii) spatialized information for the eight feedstocks and their supply chain; and (iii) maps relevant to the CORSIA sustainable criteria in Brazil, within the "sustainable criteria" tool.

3 - Results and Discussions

The support maps provided by SAFmaps platform (Fig.1) include base information used in the construction of the feedstock maps (i.e., biophysical conditions, land use prices), data on existing and planned infrastructure (i.e., roads, railways, pipelines, energy conversion units, etc.) and others.

The available geospatial information about the feedstocks includes original maps of agricultural suitability, expected yields, estimated costs for different biomasses, as well as the availability and potential of bio-based residues for producing SAF in Brazil. Additionally, it is possible to integrate this

information with existing infrastructure for the sustainable production of biojet fuels, as can be seen in Fig.2.

In addition to geospatial information, the platform provides reports and results of six case studies developed to illustrate the use of the information available in the SAFmaps database to evaluate the potential of SAF production (Fig.3).

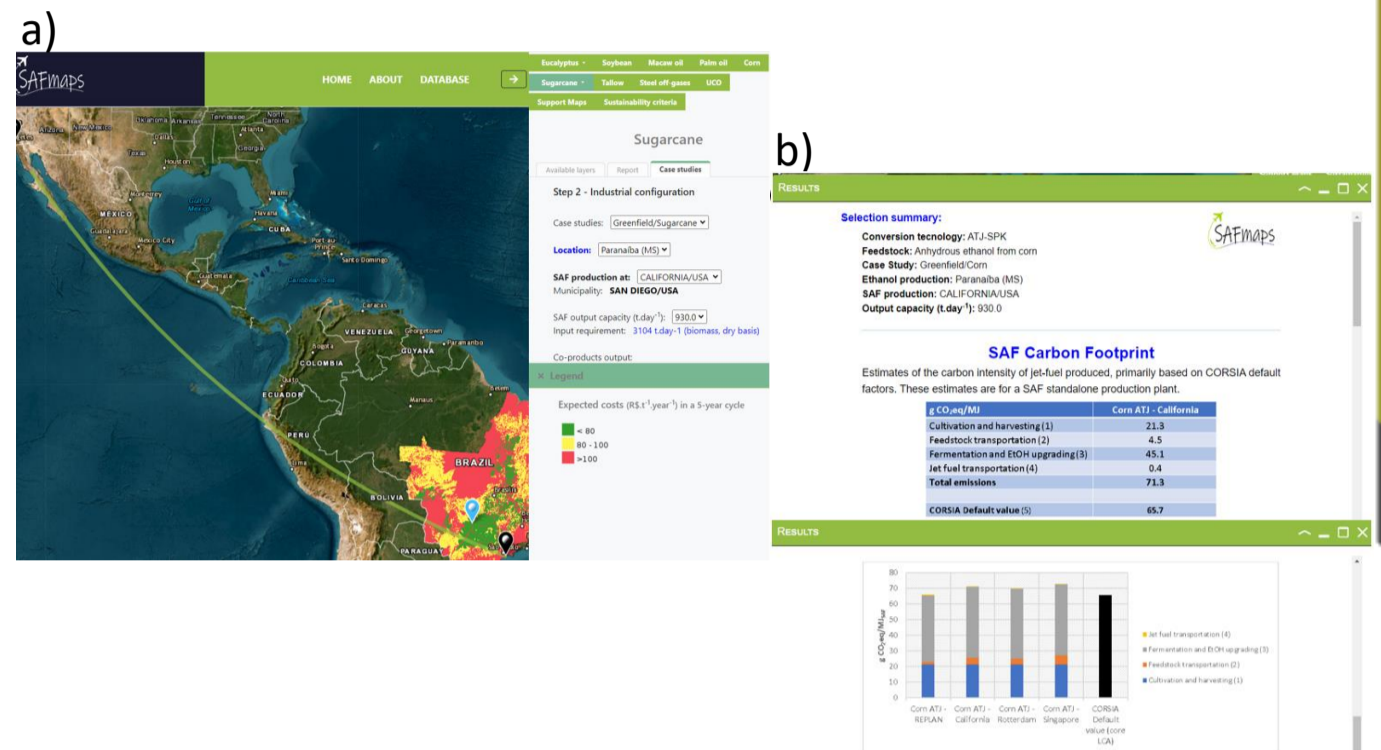


Fig.3. Simulation (a) and some of the results (b) of one of the six case studies implemented at SAFmaps.

Maps related to 10 out of the 12 CORSIA Sustainability criteria are also available (e.g., Fig. 4) and can be used to guide strategies for SAF production regarding potential restrictions.

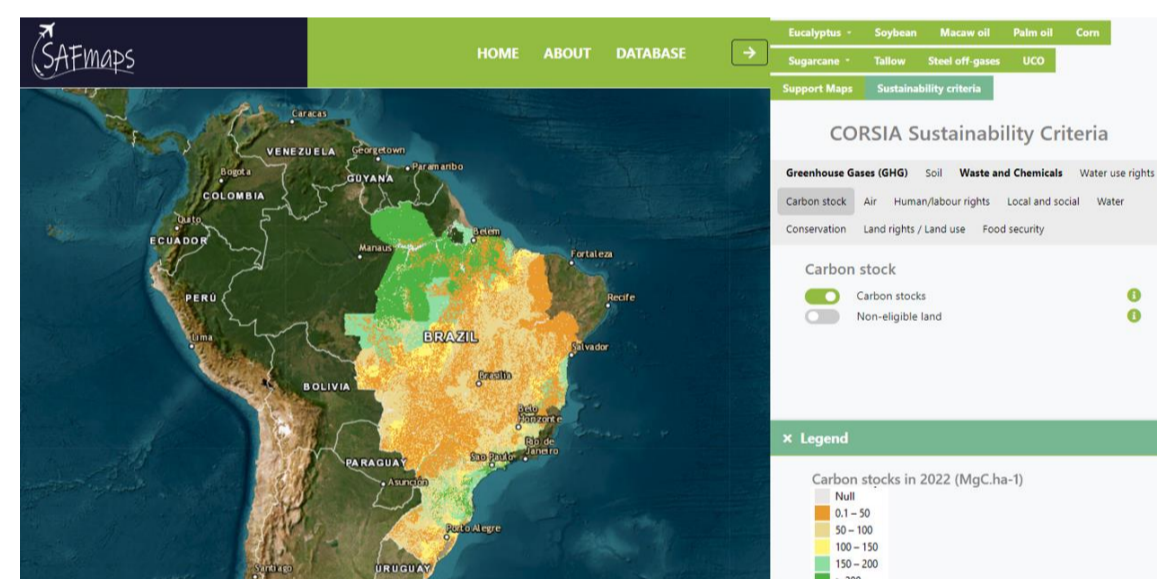


Fig. 4. Map of carbon stock by land use and cover in 2022, developed and available by SAFmaps – one of the “Sustainable criteria” maps available.

Details of each map are presented on the platform SAFmaps address www.safmaps.com, and other information is available in Walter et al. (2021a; 2021b; 2021c). The database developed by the project is available through Mendeley Data.

4 – Conclusions

SAFmaps was built to provide information to potential investors in SAF production, public policymakers, the civil aviation sector itself, researchers, and general users. The platform is open access and provides information that can be combined to assess sustainable production of biofuels.

5 – Acknowledges

The authors are grateful to The Boeing Company (Boeing Research & Technology division) for the financial support.

6 – References

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Fig. 1. Homepage of the SAFmaps platform

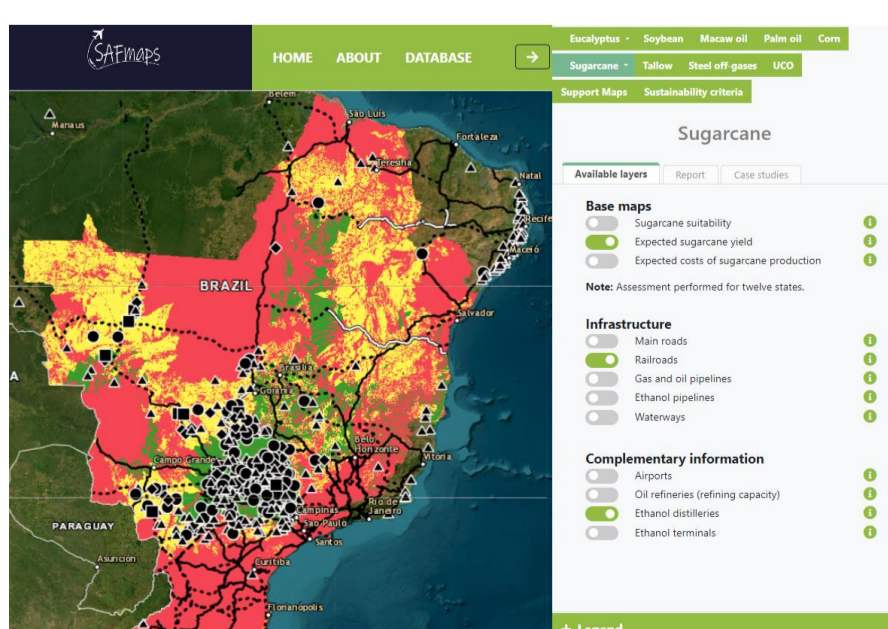


Fig. 2. Example of crop-based information: expected costs of sugarcane production, main railroads and ethanol distilleries in twelve Brazilian states.