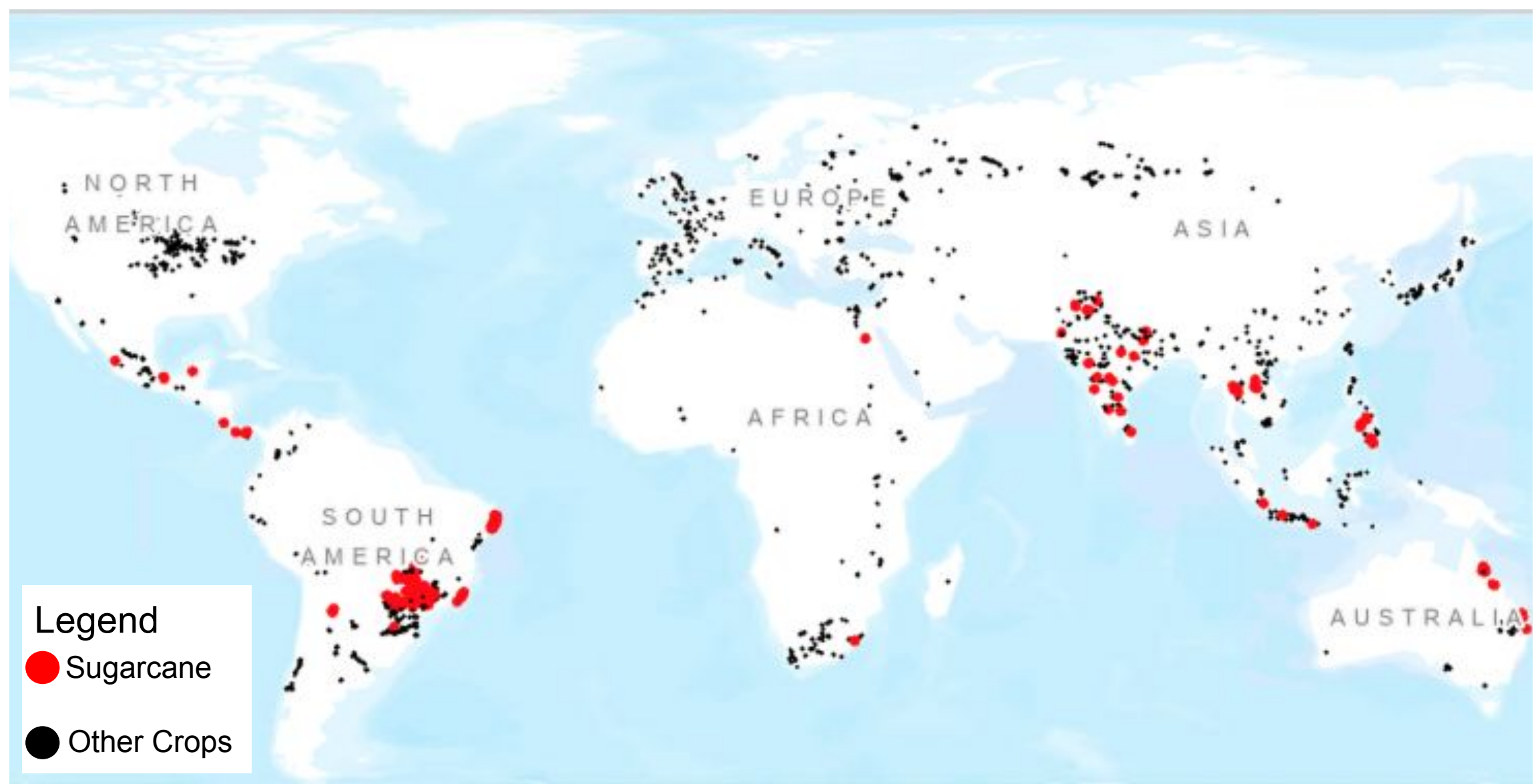


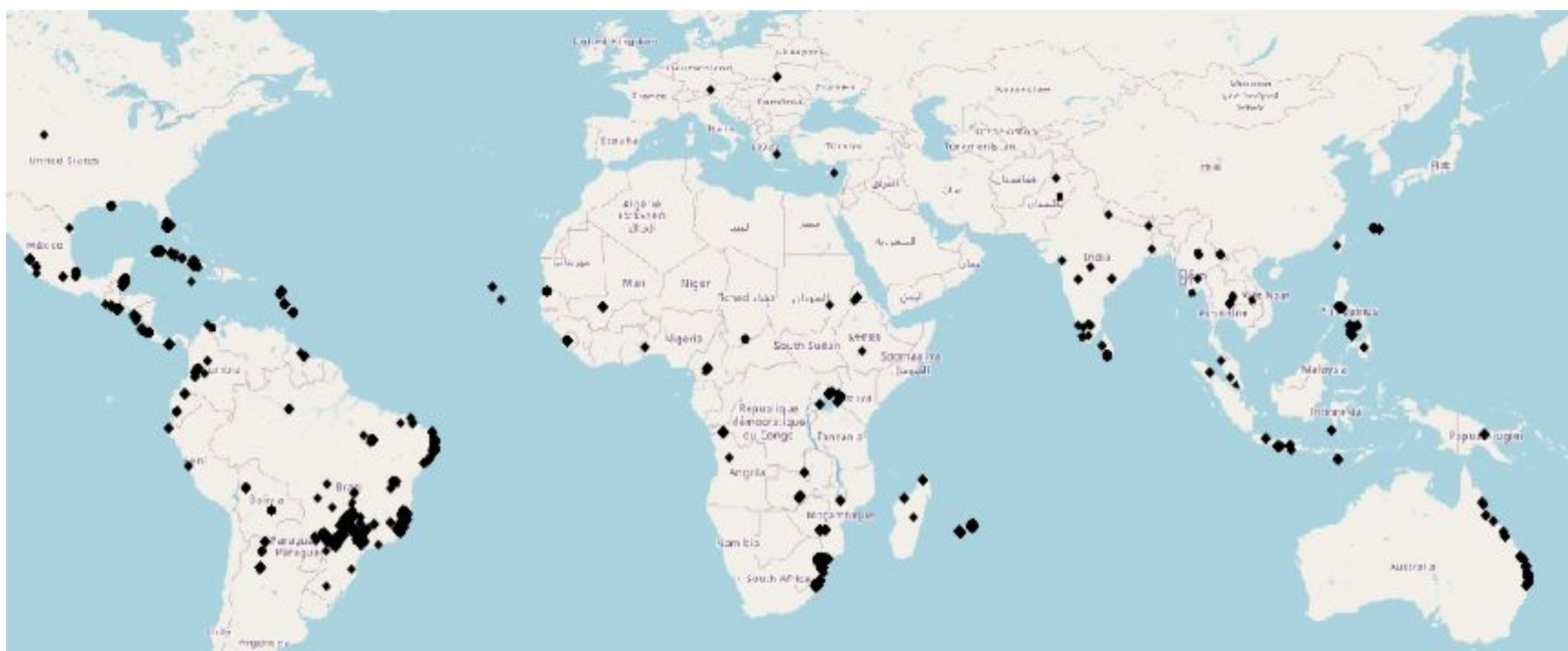
Introduction

Sugarcane is a crop grown in tropical and subtropical regions throughout the world. Knowing where sugarcane is grown and how much is being produced is important to be able to appropriately allocate water and other resources to it. However, crop labels in many countries are sparse and government data is often outdated and inaccurate. This project investigates using remote sensing methods, primarily Sentinel-2 (S2) and Global Ecosystem Dynamics Investigation (GEDI) to create sugarcane production maps. S2 are satellites managed by the European Space Agency that capture imagery and emitted radiation from Earth’s surface. GEDI is a NASA managed sensor that creates 3D maps of forest and plant heights.

Validation Datasets

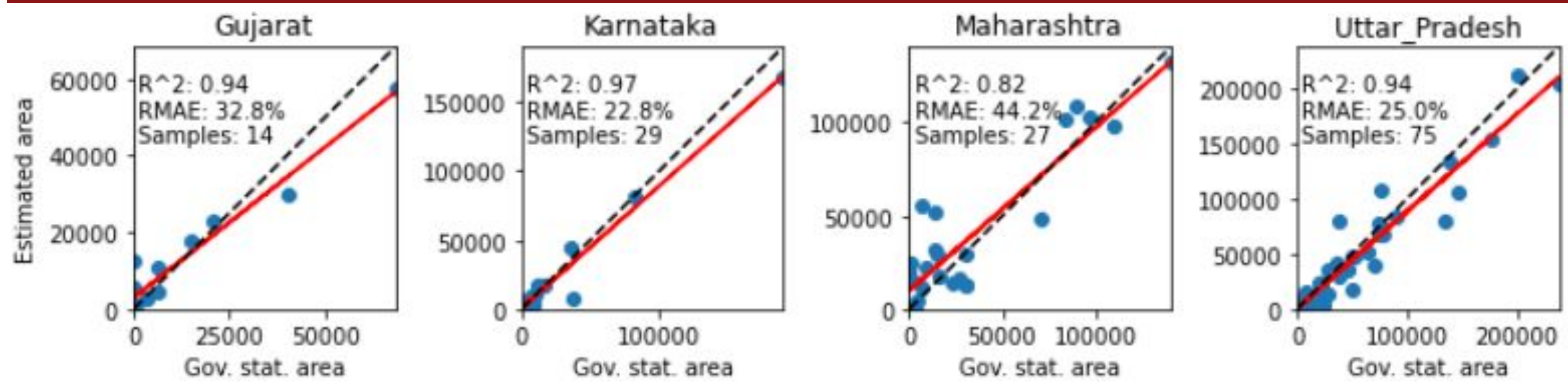


WorldCereal Reference Data Module [2]

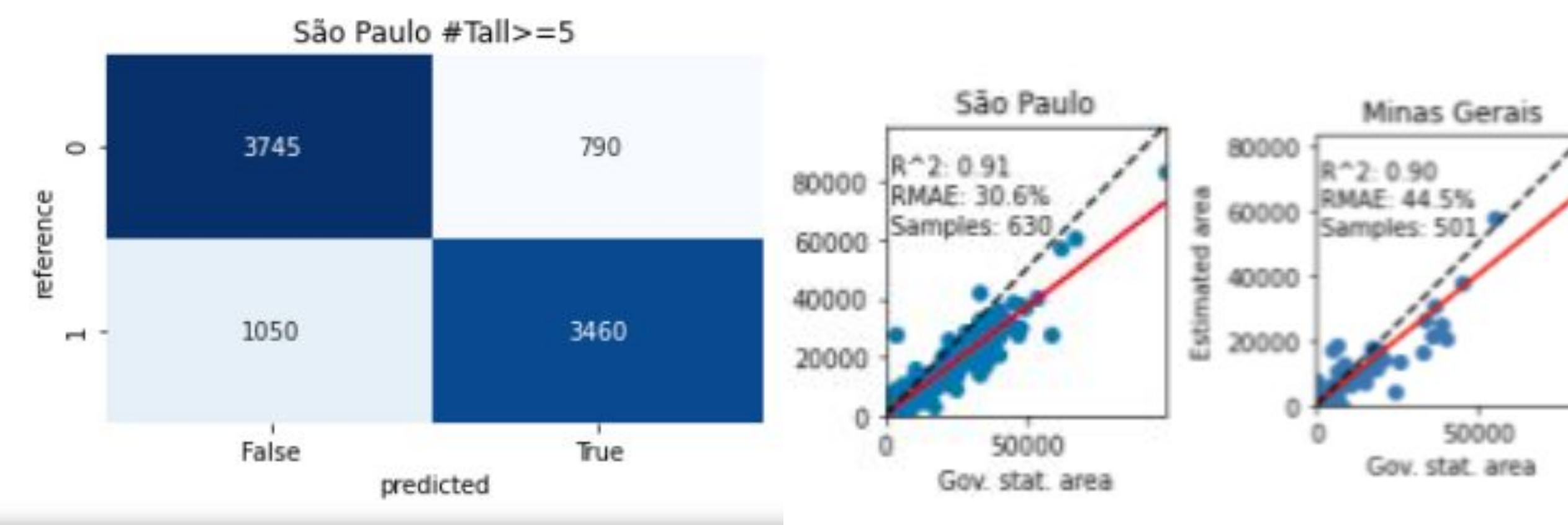


OSM Sugarcane Data Points

Results



Government vs. GEDI-S2 Sugarcane Map Comparison for States in India



Random Point Sampling for São Paulo State, Brazil
Government vs. GEDI Data Comparison for States in Brazil

In order to validate our sugarcane maps, we compared GEDI-S2 sugarcane maps with government statistics for each municipality, along with collecting random samples. These preliminary results show good correlation, with underestimation in some regions.

Next Steps

- Continue comparing government and GEDI-S2 sugarcane maps
- More work is needed to identify the causes of underestimated land use

Acknowledgements

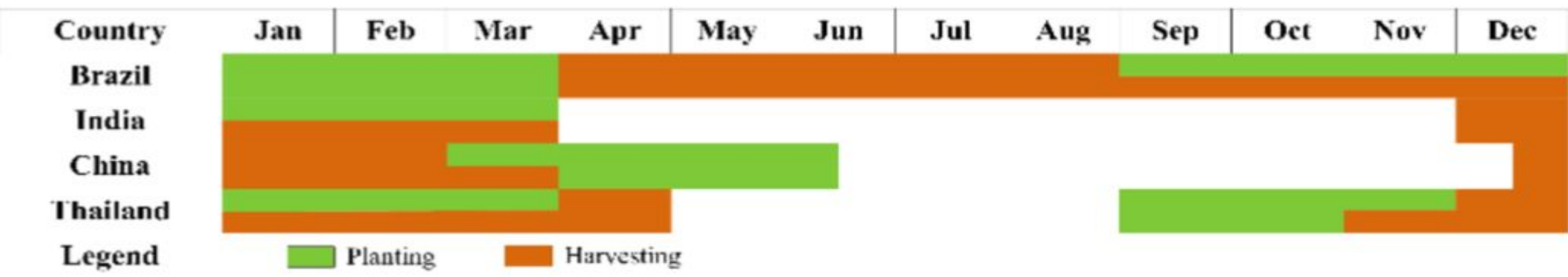
I would like to thank Stefania Di Tommaso and David Lobell for their mentorship and support. This project was funded by the Vice Provost of Undergraduate Education and the Sustainability and Earth Summer Undergraduate Research Program (SESUR) program.

References

[1] - Som-ard, Jaturong, et al. "Remote Sensing Applications in Sugarcane Cultivation: A Review." Remote Sensing, vol. 13, no. 20, Oct. 2021, p. 4040. Crossref, <https://doi.org/10.3390/rs13204040>
[2] - WorldCereal Dataset - <https://worldcereal-rdm.geo-wiki.org/collections/details/?id=2021goiasasvpoly111>
[3] - Brazil Reference Data - https://figshare.com/articles/dataset/30-m_sugarcane_harvest_maps_in_Brazil/14213909
[4] - Area and Production Statistics, India Ministry of Agriculture and Farmers Welfare - https://aps.dac.gov.in/APY/Public_Report1.aspx
[5] - Crops Area and Production District Wise 2021-22, Government of Pakistan Ministry of National Food Security and Research (Economic Wing) - <https://mnfsr.gov.pk/Sitelmage/Misc/files/Crops%20Area%20and%20Production%20%20District%20Wise%202021-22.pdf>

Objectives

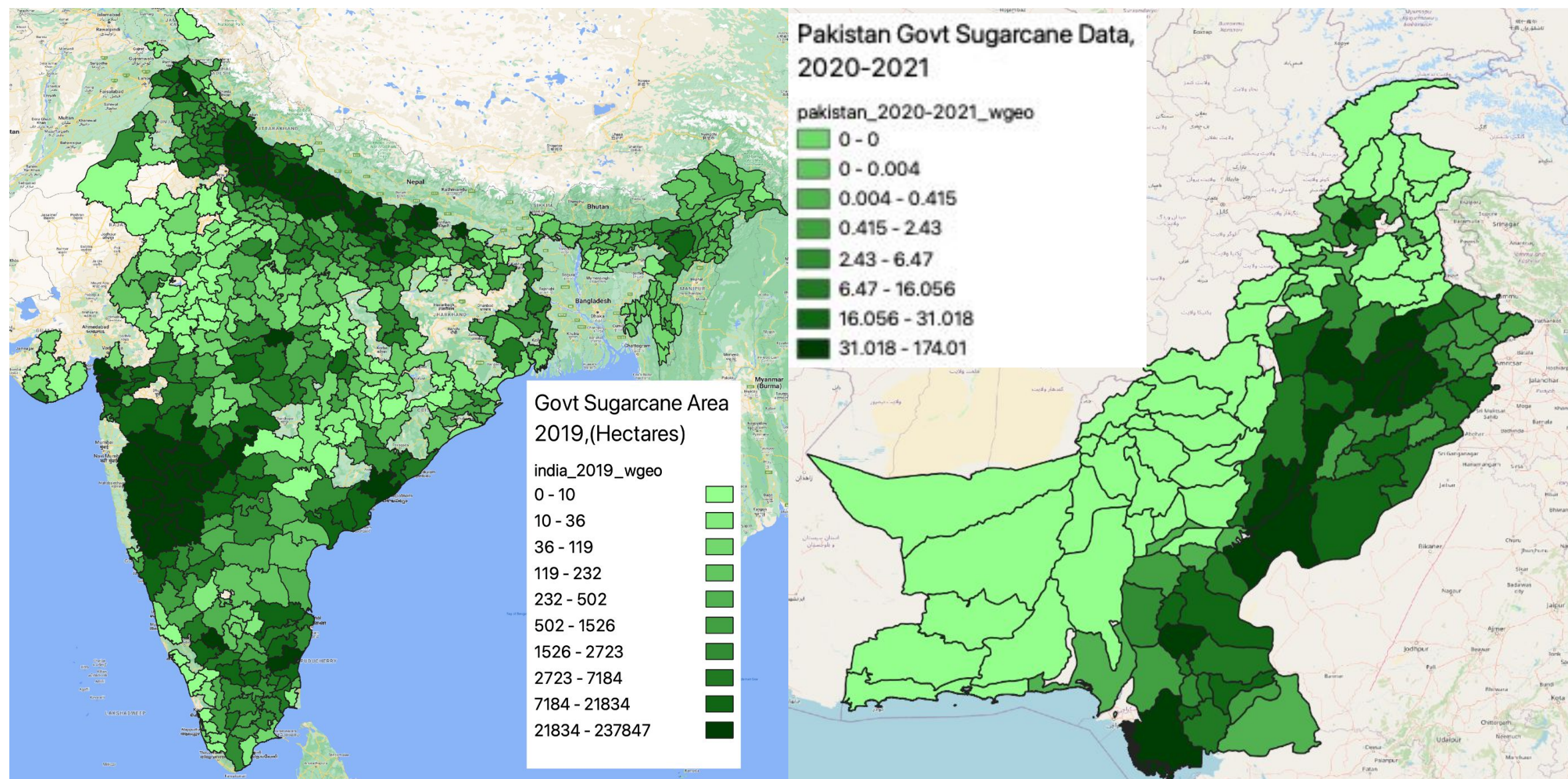
- Collect, organize, and analyze existing sugarcane data from governments of the top 10 sugarcane producing countries and other agricultural organizations.
- Create maps showing land used for sugarcane production.
- Compare government datasets with our own results.



Sugarcane Growth and Harvest Cycles in Different Countries [1]

Country	Total Data Points	OSM	WorldCe real
Brazil	7617	5119	1713
India	58	16	12
China	9	7	
Thailand	54	18	36
Pakistan	9	2	7
Mexico	167	107	54
Colombia	39	29	
Australia	498	395	95
Indonesia	54	42	6
Philippines	387	308	71

Brazil Reference Data 2016-19 [3]
Dataset Point Counts by Country



Indian Government Sugarcane Reported Area 2019 [4]
Pakistan Government Sugarcane Reported Area 2021 [5]