

Adjusting the Seasonal Persistent Green Product for Green Grass Signal

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Introduction

While trees play a vital role in functioning grazing land systems (i.e. nutrient cycling, biodiversity), accurately monitoring woody vegetation foliage using remote sensing remains a challenge. One key complication is the presence of green grass beneath trees, which interferes with foliage detection. This paper builds on the Seasonal Persistent Green (SPG) product (DETSI, 2025a) by integrating spatial data from the SLATS woody extent (DETSI, 2025b) to isolate and remove the persistently green grass signal from the SPG. The result is an adjusted SPG product that better represents tree foliage by excluding the contribution of persistently green grass.

Methods

Each Landsat satellite scene is processed individually. The scene is spatially clustered and converted into polygons. A time series of SPG (1994–present) is loaded and masked to exclude crops, water, and areas with seasonally persistent non-green >80%. The seasonally persistent non-green is derived using the same method as the persistent green but focuses on the non-green fraction. For each polygon, the following steps are performed:

1. Using the SLATS woody extent, the median SPG of the cleared areas and the mean of the woody areas are calculated within the polygon.
2. A buffer (starting at 5 km and increasing to a maximum of 25 km) is applied to ensure sufficient cleared land for comparison. The mean SPG of the cleared area within the buffer is calculated.
3. The treed area is compared to the cleared area by analysing the differences in their time series and fitting a regression model.
4. The regression is used to reconstruct a time series of persistently green grass, which is then subtracted from the treed time series to isolate tree foliage.

Results

The distribution for the most recent SPG for Landsat path 94 row 74 is shown in Fig. 1. This is a coastal area with open woodlands and is expected to have a more significant change than other locations. The average reduction for woody and cleared areas were 11% and 14% SPG respectively. For woody areas, the average SPG decreased from 31% to 20%, and for cleared areas 17% to 2%.

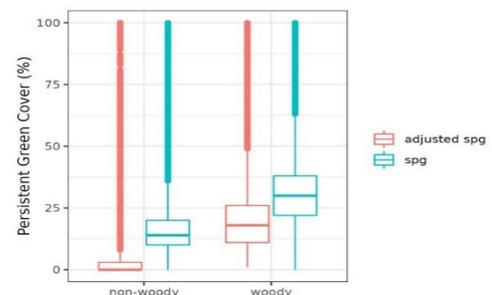


Figure 1 SPG Distribution

Discussion and Conclusion

The resultant regressions from this analysis effectively quantify how much of the SPG variation in treed areas can be attributed to persistently green grass in cleared areas. By removing this grass signal, the adjusted SPG product provides a clearer and more reliable measure of tree foliage, offering valuable insights for improving land management and ecological monitoring.

References

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