1. INTRODUCTION

- Currently, there is a lack of validation of the Normalized Difference Vegetation Index (NDVI) derived from satellite observations in Tropical Dry Forests (TDF).
- TDFs tend to respond dramatically to precipitation events during the dry or wet season. The infrequent satellite observations intervals cause an important loss of information on tracking of the TDF phenology.
- Here we explore the errors associated of NDVI satellite observations comparing with near-surface remote sensing between seasons and phenophases of vegetation.

2. METHODS

2.1 METHODS: Study sites

- Figure 1. Towers locations at three Tropical Dry Forests.

2.2 METHODS

- Hemispherical silicon pyranometers (Apogee SQ-110) and quantum sensors (Apogee SQ-110) at each tower were used to estimate the NDVI of a circular canopy footprint of 0.017 km².
- Near-surface NDVI observations were estimated following the methods of Wilson and Meyers (2007) in order to approximate red (ρRED) and near-infrared (ρNIR) reflectance.
- NDVI estimations with minimum incident PAR value of 1000 uE were used to create time series observations. Time series were gap filled and then were cleaned and filtered using Savitzky-Golay algorithm. The first derivative of this algorithm was used to determine the wet and dry seasons, while third derivative was used to determine four phenophases.
- NDVI observations from MODIS (Aqua and Terra, 250 m) and Proba-V (330 m) were used, and their errors comparing near-surface observations were addressed following:

\[ \text{Error} = \frac{\text{Satellite NDVI} - \text{Ground NDVI}}{\text{Ground NDVI}} \times 100 \]

Figure 3. Density distribution of errors comparing NDVI derived from near-surface and satellite observations (MODIS Aqua and Terra, and Proba-V) in different seasons (wet and dry season) and phenophases (greenup, maturity, senescence, and dormancy) at three Tropical Dry Forests. Density curves were created using a gaussian distribution with a bandwidth of 15. Vertical dotted lines represent the mean value of the overall errors per category. Mata Seca density curves were performed regardless the successional stage.

3. RESULTS: NDVI near-surface observations

Figure 2. NDVI from near-surface observations across the Americas at three Tropical Dry Forests.

3.2 RESULTS: NDVI satellite-near surface errors

4. KEY CONCLUSIONS

- There are temporal errors of satellite observations that differ between seasons and phenophases.
- During the wet season, maturity, greenup, and senescence there is an overestimation of the NDVI derived from Satellites, but during the dry season or dormancy there is an underestimation.

5. REFERENCES


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