Supplementary Materials: Evaluation of the Sensitivity of SMOS L-VOD to Forest Above-Ground Biomass at Global Scale

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1. Analysis Per IGBP Land Cover Classes

Figure S1 presents the relationship between AGB (Saatchi left column, GlobBiomass right column) and L-VOD for the IGBP classes belonging to the low vegetation. The correlation between L-VOD and AGB range from 0.3 to 0.7 for most classes and similar for both AGB maps except for the open shrubland class (top row), the L-VOD being better correlated to Saatchi (R = 0.63) than to GlobBiomass (R = 0.44) and the Savannas (3rd row from the top) for which it is the other way around, e.g., the L-VOD being more correlated to GlobBiomass (R = 0.68) than to Saathi15 (R = 0.57).

The analysis for the dense forest classes is shown in Figure S2. The L-VOD presents a similar relationship with GlobBiomass and Saatchi for the two evergreen classes (top 2 rows, i.e., evergreen needleleaf and broadleaf). The L-VOD for evergreen broad leaf forests (2nd row from top) is slightly more correlated with the GlobBiomass AGB (R = 0.64) than with Saatchi (R = 0.55). The deciduous needleleaf class (middle row Figure S2) does not have a sufficient number of points to conclude on the observed behavior. A noticeable difference between Saatchi and GlobBiomass is obtained for the mixed forest class (bottom row) for which the L-VOD is moderately correlated with AGB estimates by GlobBiomass (R = 0.44) whereas it is negatively correlated to the AGB estimates by Saatchi (R = –0.16).

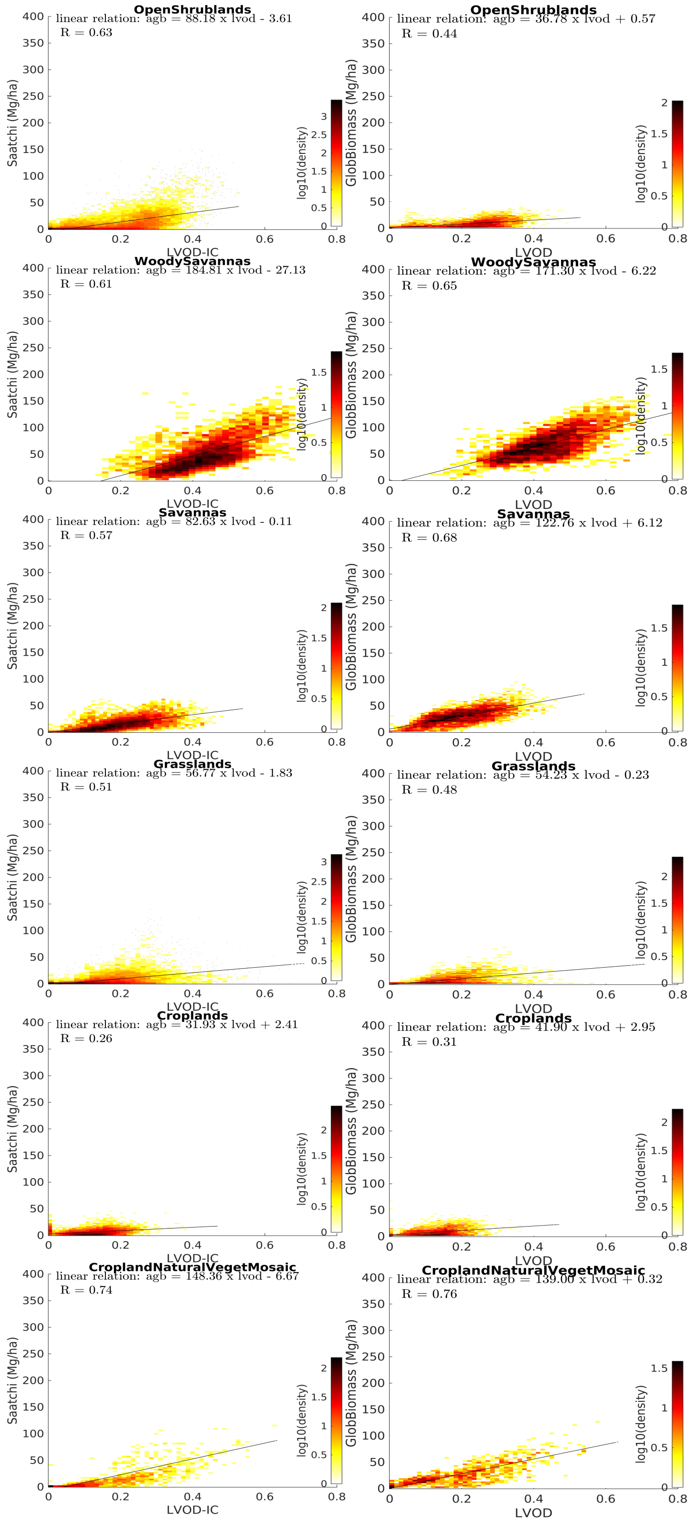

Figure S1. L-VOD versus AGB at global scale ; AGB from Saatchi *et al.* is presented on the left panel side and AGB from GlobBiomass *et al.* on the right panel. IGBP classes belonging to the low vegetation group are shown here.

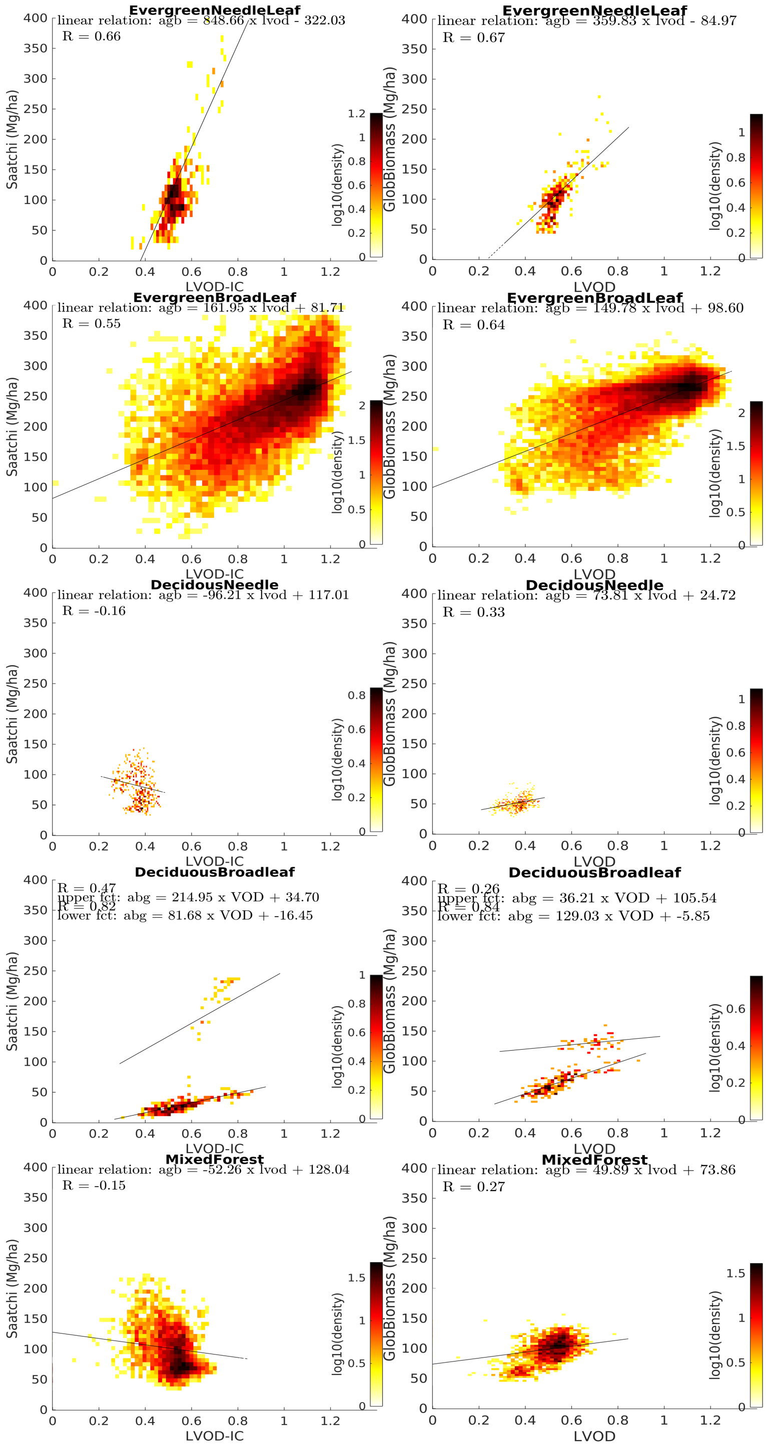

Figure S2. same as Figure S1 for the IGBP classes belonging to the forest group

For the deciduous broadleaf class (Figure S2), we identified two clusters of observations that are considered separately (i.e., two relationships are depicted). These two groups of data (2nd row from bottom Figure S2) characterize two distinct regions -not shown here- with different vegetation types. Indeed, the lower linear relationship corresponds to a region in South America that includes the Gran Chaco, which is characterized by tropical dry forests [1,2]. The linear correlation is very similar to the one obtained for the savannah, grassland and cropland (Figure S1) confirming that the L-VOD captures very well the AGB estimates range for the dry forests. The upper linear relationship (2nd row from bottom Figure S2) corresponds mainly to regions in the USA and in particular in the North East

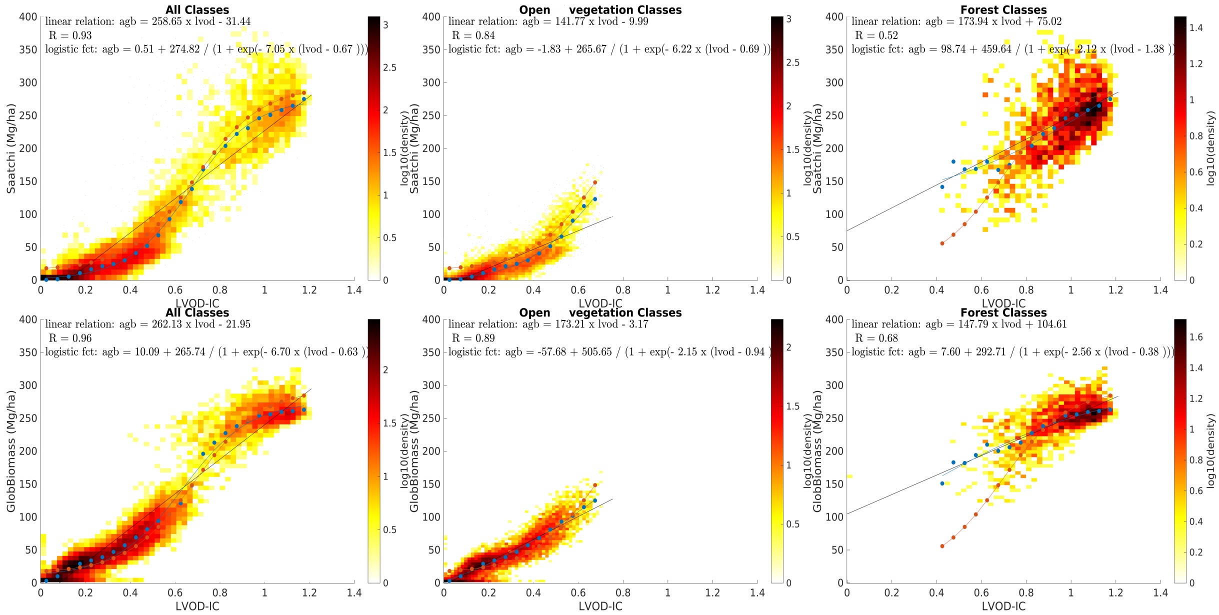

Figure S3. AGB Saatchi (top row) and GlobBiomass (bottom row) as a function of L-VOD over Africa. left column Figures are for all IGBP classes, middle column for low vegetation classes, and right column are for forest classes. On the left column the relation found by Rodríguez-Fernández *et al.* [3] is depicted as dark red dotted line.

(the George Washington and Jefferson forests) and in Wisconsin (Chequamegon-Nicolet forest). These regions are composed of ash, red spruce tree species. The linear fit for the ecosystems is close to the ones obtained for the evergreen needleleaf and broadleaf classes.

2. Comparison over Africa

As a comparison with [3], the case of Africa is reported in Figure S3 where the dark red dotted line corresponds to the fit found in [3] with respect to Saatchi *et al.* [4] AGB estimates. It is very close to the ones found in this study using Saatchi and GlobBiomass (blue dots Figure S3) supporting the good ability of the L-VOD to represent AGB in Africa and the robustness of the relationship previously found [3]. The L-VOD performs similarly with Saatchi and GlobBiomass for low vegetation classes (middle column Figure S3) with a correlation coefficient of 0.84 and 0.89 respectively. As observed at global scale and in the northern latitudes, the main differences occur for dense forests with the L-VOD being more correlated to GlobBiomass (R = 0.68) than to Saatchi (R = 0.52) and a distribution of points less scattered with GlobBiomass (Figure S3).

Table S1. Statistics over Africa.

AGB	R	nb pt
	All Classes	
Saatchi	0.928 (0.926 – 0.930)	16,934
GlobBiomass	0.956 (0.955 – 0.958)	15,004
	Forest Classes	
Saatchi	0.515 (0.488 – 0.541)	2956
GlobBiomass	0.681 (0.661 – 0.699)	2956
	Low veget. Classes	
Saatchi	0.844 (0.839 – 0.848)	13,978
GlobBiomass	0.893 (0.889 – 0.897)	12,048

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