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# BIOMASS ESTIMATION OF SHRUB USING THE POLARIMETRIC SAR DATA

**Abstract**

Biomass estimation of shrub is important for better understanding Mediterranean and semi-arid/arid ecosystem changes and their response to desertification and global warming. However, field information on shrubland biomass is scarce due to technical limitations regarding data collection, which, when combined with the high geodiversity of desert fringe ecosystems, hamper characterizing biomass changes over wide regions which are characterized by both spatial and temporal dimensions. Remote sensing may provide an adequate means for mapping biomass by the recent availability of multi-sensor systems with improved spatial, and temporal resolutions based on long-term monitoring and repetitive data. The Normalized Difference Vegetation Index (NDVI) based on multi-spectral have been widely used for biomass estimation at semi-arid/arid regions. However, the NDVI have several disadvantages; influence by atmospheric influences, limitation of monitoring the top of the canopy, and saturation problem at some level of vegetation densities. The low frequency of radar sensor (L-, P-band) penetrates deeper into canopy layer so it provide wider dynamic range of saturation than optic sensor. Especially, the polarimetric SAR (Pol-SAR) characteristics make them very useful for indicating volume scattering from vegetated regions and it contain information about geometrical structure and geophysical features. However, most of existing remote sensing techniques for biomass estimation were tested for forest area and agriculture crop having a homogenous characteristic or simple structure of forest, not tested for semi-arid natural scenes having high geodiversity because of their complexity. Accordingly, the aim of this study was to develop modeling shrublands biomass using L-band polarimetric SAR data. Every radar parameters (Intensities, Intensity ratios, polarization parameters, phased differences, radar vegetation indices) were examined based on multiple regression technique. For evaluation/validation, three different types of biomass model were used: patch pattern biomass model from high resolution orthopoto, NDVI:R model from multi-spectral imagery with rainfall, and allometric measurement from filed measurement.