

Development of Rice Yield Model Using C-Band Sentinel-1A Data

Patrick Lemuel P. Relativo^{1*}, Moises A. Dorado¹, Ronaldo B. Saludes¹, and Pompe C. Sta. Cruz²

¹Agrometeorology and Farm Structures Division, Institute of Agricultural Engineering, College of Engineering and Agro-Industrial Technology, University of the Philippines Los Baños (UPLB), College, Laguna 4031, Philippines;

²Institute of Crop Science, College of Agriculture and Food Science, UPLB, College, Laguna 4031, Philippines

*Corresponding author, pprelativo@up.edu.ph

Rice yield models were generated using C-band synthetic aperture radar (SAR) data from SENTINEL 1-A mission. Time-series vertical transmission-horizontal reception (VH) and vertical transmission-vertical reception (VV) backscatter data were collected from November 2015 to January 2017 in Laguna, Philippines to generate and evaluate rice yield models for dry and wet seasons. Different parameters of the time-series VH and VV backscatter were considered in the development of the models. These were single-day VH and VV backscatter, VH/VV ratio and slope of the time-series curve. During dry season, rice yields were significantly correlated with VV backscatter at 24 days after transplanting (DAT), VH/VV ratio at 24 DAT, and upward slope of VH/VV ratio curve. During wet season, rice yields were significantly correlated with VV backscatter at 60 DAT, VH/VV ratio at 60 DAT, and upward slope of VH/VV ratio curve. Based on R^2 and RMSE values, the equation $Y = -3.673 - 1.140 * VH/VV$ data provided the best estimate of rice yield at 24 DAT during dry season; while $Y = 1.793 - 0.495 * VH/VV$ data at 60 DAT during wet season. The study has shown the potential of VH/VV ratio in estimation of rice yield at varying phenological stages during dry and wet seasons.

Keywords: c-band, remote sensing, rice yield model, SAR, Sentinel 1A