INFLUENCE OF RAINFALL ON THE CROPPING SEASON OF RICE IN THE PHILIPPINES

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ABSTRACT

Rainfall is imperative in starting the cropping season of rice. It serves as an indicator of when to start planting crops. However, rainfall can also be a factor in delaying the production activities of farmers. In this study, the influence of rainfall on the cropping season of rice in the Philippines was investigated by determining the rainfall profile and phenological parameters from 2001-2017 using satellite remote sensing. The rainfall profile includes the (a) accumulated rainfall amount (days before SOS), (b) number of rainy days before SOS, (c) accumulated rainfall amount, and (d) number of rainy days for LOS. It was determined using daily GPM rainfall data (GPM_3IMERGDF) at 10 x 10 km resolution from 2001-2017. On the other hand, phenological parameters like (a) the start of season (SOS), (b) the middle of season (MOS), (c) the end of season (EOS), and (c) the length of season (LOS) were determined using NDVI time series employed in TIMESAT. The NDVI was computed using 8-day composite surface spectral reflectance from the Terra MODIS product (MOD09Q1) from 2000-2017 at 250-meter resolution. The influence of rainfall on the cropping season of rice was established using correlation analysis and was further analyzed per climate type. Cropping calendar maps, rainfall profile maps, and correlation maps were the outputs of this study. Moreover, this study provides a method for investigating the influence of rainfall on the cropping season of rice in the Philippines as observed from space. Thus, the results of this study can be used as a guide for farmers to anticipate their cropping schedule.

It was found that the derived phenological parameters follow the expected rainfall in every climate type, irrigated or rainfed areas. The relationships between accumulated rainfall before SOS and phenological parameters were found to get stronger with rainfall days and the percentage of

significant correlations increase also with rainfall days. This implies that a higher amount of rainfall influences the cropping season of rice. However, the majority of areas in the country are observed to have a very weak relationship which could mean that other factors influence the cropping season. In addition, the percentage of significant correlations is observed to be higher in season 1 compared with season 2. The same observation is also found between the number of rainy days before SOS and phenological parameters which means that a higher number of rainy days is also an influencing factor. For the relationship between accumulated rainfall and the number of rainy days for length of season and phenological parameters, the majority of areas in the country are observed to have moderate to very strong positive relationships with EOS 1 and LOS (both seasons) while very weak relationships with SOS 1 and MOS 1. This implies that the amount of rainfall and number of rainy days for the season drives the EOS 1 and LOS. In addition, SOS 2 responds negatively to the number of rainy days before SOS 2 which implies that a higher number of rainy days within the season influence earlier SOS 2. The very weak relationship with SOS2 (and accumulated rainfall for LOS 1), MOS 2, and EOS 2 imply that other hydrometeorological variables and farmer's practices might be a driving factor.

Keywords; rainfall profile, phenological parameters, NDVI, MODIS, GPM, TIMESAT

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