Validating the agricultural drought impacts in the Philippines during the 2019 El Niño

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Abstract: In this study, drought-affected areas in the Philippines during the 2019 El Niño were identified using the Standardized Vegetation and Temperature Ratio (SVTR) index. One of the drought areas selected for validation is in Mamburao, Occidental Mindoro, which has varying damages on rice and corn crops. Mild to moderate vegetation stress were observed in the municipality from February to April 2019, based on monthly SVTR values. This was further supported by looking at the dynamics of rainfall, soil moisture, vegetation, and land surface temperature using the satellite data from TRMM, Sentinel-1 and -2, and MODIS, respectively. The lack of precipitation started in January and extended up to March as reflected in the TRMM monthly rainfall data. NDVI and soil moisture during the vegetative and reproductive stages of the crops decreased after a month absence of rainfall. SVTR values in the damaged farm areas also followed the trend of drought progression, which started in February, peaked in March, and ended in May 2019, whereas SVTR values in undamaged farm areas remained relatively close to normal throughout the drought period. Due to the insufficient water supply during the growing and maturing stages, crop yield loss amounted to 50 to 60% for corn and 35 to 100% for rice, according to the crop damage reports. Results from the study not only demonstrate the capability of satellite based SVTR in capturing the duration and intensity of drought but also produce important insights on the influence of rainfall and soil moisture on drought related rice and corn yield in the Philippines.

Keywords: SVTR, NDVI, validation, crop damage reports