Comparison of Estimated Transplanting Dates
Derived from MODIS Data and COSMO-SkyMed Data

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Abstract: A transplanting date is one of important factors for rice yield prediction. It is required for yield prediction to estimate geographical distribution of transplanting date on regional and global scale. An optical satellite sensor, especially Moderate Resolution Imaging Spectroradiometer (MODIS), is often used to estimate transplanting dates. Since rice paddy fields have the unique spectral features in transplanting season, the relationships between the Land Surface Water Index (LSWI) and the Normalized Difference Vegetation Index (NDVI) have been used in order to estimate transplanting dates. In transplanting season, the reflectance values of the paddy fields in the short wave infrared range become smaller because the paddy fields are flooded. Therefore, the places where LSWI values are larger than NDVI values are extracted as the flooded paddy fields in the existing methods. However, MODIS has mainly two problems associated with extracting paddy fields. First, MODIS is affected by clouds and cloud shadows, especially in rainy season. Second, the spatial resolution of MODIS data (500m) is not enough to extract several paddy fields, especially in the case that the paddy fields are located around some houses or streets. In order to overcome these problems, Synthetic Aperture Radar (SAR) can be considered useful because it is well-known that SAR is able to extract the water areas accurately and is not affected by clouds. Moreover, SAR has higher spatial resolution than MODIS. Until recently, it was difficult to obtain high temporal resolution SAR data because of its orbital characteristics, but COSMO-SkyMed has enabled to supply high spatial and high temporal resolution data by operating 4 satellites on the same orbit. Therefore, availabilities of

COSMO-SkyMed data and MODIS data to extract the flooded paddy fields and to estimate the transplanting dates are examined by comparing each result of extraction. The multi-temporal COSMO-SkyMed HH polarization data (16 days interval) and MODIS data (8 days composite) were used in this study. The flooded paddy fields were extracted by observing time-series changes in backscattering (σ^0) derived from COSMO-SkyMed data. After extracting the flooded paddy fields from COSMO-SkyMed data, the land-cover map was made by combining the result of extraction from COSMO-SkyMed data and the land-use map derived from ASTER data in order to compare with the result derive from MODIS data. This land-cover map consists of five states; flooded paddy fields, planted paddy fields, soil, vegetation, and artificial objects such as houses or streets. As the results, (1) the flooded paddy fields could be extracted accurately from COSMO-SkyMed compared with MODIS, (2) the accuracy of extraction from MODIS data was likely to depend on the places and the ratio of the flooded paddy fields in a pixel. Further studies may be necessary to explain the clear correlation between the land-cover and the result of extraction from MODIS data.