



Assessment of soil water deficit for the middle reaches of Yarlung-Zangbo River from optical and passive microwave images

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The middle reaches of Yarlung-Zangbo River (YZR) and its two tributaries (Lhasa River and Nianchu River) is a main agricultural region in central Tibet Autonomous Region. Soil water deficit (SWD) estimation has significant relevance to local crop growth monitoring, crop yield assessment and disaster monitoring. It also has great theoretical importance for understanding the local energy and water balance status. In this study, AVHRR and MODIS data in April and October under nearly clear weather conditions are selected as the spring and autumn cases. Land surface parameters, such as land surface temperature, surface albedo, Normalized Difference Vegetation Index, emissivity, have been derived from different algorithms for AVHRR and MODIS data. In combination with meteorological data, the soil water deficit index is determined by applying Surface Energy Balance System. The R square values between SWDI and AMSR-E soil moisture are ranging from 0.457 to 0.607, with spring SWD being much more severe than that in autumn. The limited river runoff (less than 5% of the annual total) is the dominant factor for spring SWD. This study also reveals that the derived spring SWD from AVHRR and MODIS data is quite different on the same day. This phenomenon is caused by different satellite overpass times which influence the melting frozen soil. This also confirms the soil moisture may have diurnal variations. The spatial variations of SWD conditions in the middle reaches of YZR and its two tributaries have been clearly identified.