Interannual variability of wide-spectral reflectance by in-situ measured quantum sensors and an albedometer at grassland (TGF)

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The activities of plants affect on not only the global budget of carbon dioxide by the uptake of CO2 gasses, but also on the water and heat budget by the evapotranspiration processes. Satellites observations products, characterized by pathfinder AVHRR over land (PAL), provide the spatiotemporal information about the vegetation activities. However, to validate or fully evaluate such products, in-situ measurements is essential. In this presentation, we show the three years measurement results derived from the combination of quantum sensors (PAR: photosynthesis active radiation, i.e., visible wavelength) and an albedometer (hereafter wide-spectral information, WSI). WSI's principle relied that residual radiation of PAR in shortwave radiation mainly contributed by near-infrared wavelength. Thus we can produce AVHRR's type spectral information by WSI. Observation site located on the experimental natural grassland field of Terrestrial Environmental Research Center (TERC; hereafter TGF) with a campus of University of Tsukuba, Japan. TGF consists of mixture field of C3 and C4 grasses.

Results could be summarized as follows:

1). WSI measured at TGF represents some kind of interannual variability of phenological cycles both in NDVI (normalized difference vegetation index) and SR (simple ratio), 2). also confirmed that burn timings of grasses (begging of growing season) were different during three years. 3). However, NDVI was not good indicator for the detection of phase change from mature season to senescence, due to a little time series changes in NDVI. 4). We proposed the new index, called as phenology index, conceptually based on the assumption of a big leaf in this study. Phenology index demonstrated seasonal phase changes (i.e., burn, growing, mature and two stages of the senescence) than those in NDVI.