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Near-Ground-Based Optical Plant Phenology Measurements at China Ecological Meteorology Sites

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Abstract Climate change is a hot issue in the global scale. The some varieties of phenological phase of plants (trees, grasslands and crops et al.) can directly and objectively reflected climate change and Commonly, the response of plant phenology to climate change is sensitive, especially to climatic factors such as precipitation, temperature, soil characteristics in the growing environment, and sometimes can be considered as an indicator of climate change. Those meteorology and soil factors must be taken into account when we build phenological model so as to quantitatively study the relationship between climate change and plant phenology. Beside of those factors, the high frequency and multi-scale acquisition of phenological observation data is also the basis for phenological model researches. Since February of 2020, China Meteorological Administration (CMA) has established 25 vegetation ecological observation sites in Inner Mongolia autonomous region, Shaanxi, Hebei, Sichuan, Guangxi, Fujian and Anhui provinces. The automatic vegetation eco-meteorological observation instruments, whichi are composed of image sensor (digital camera), multispectral sensor, laser altimeter, point cloud laser radar and sound sensor, have been installed in the sites. They can provide so much products as image of plant community, normal difference vegetation index (NDVI), plant height, canopy height and animal sound at present. Of all these products, image data of plant community can be further retrieved to generate the greenness chromatic coordinate (Gcc) data, which can be widely applied into the phenological studies and the validations of satellite terrestrial vegetation products. After months of experimental operation, these equipments show the great ability to monitor the growth and development of terrestrial plants in China. This ability also lays a foundation for the establishment of the plant ecological observation network in China (China Vegetation Ecological Meteorological Observation Network).

KEYWORDS Plant phenology, near-surface-based measurement, observation network