林冠が疎なアラスカのクロトウヒ林を対象とした
植生フェノロジーの年々変動の高精度な検出

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Accurate detection of year-to-year variability of plant phenology in an open-canopy black spruce forest in Alaska

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To accurately evaluate the spatio-temporal variability of ecosystem functioning (e.g. photosynthesis and evapotranspiration) in Alaska under rapid meteorological and climate changes, long-term continuous phenological observations are required. Towards this aim, integration of *in situ* and satellite observations is important but challenging task. To validate and obtain the ground-truthing for satellite remote-sensing observations, we installed interval camera system in an open-canopy black spruce forest in Alaska (Poker Flat Research Range site; 65°07'24.10"N, 147°29'14.8"W) in 2011 and then obtained daily canopy surface images more than four years. These images were provided by the Phenological Eyes Network (PEN) and are publicly available at http://www.pheno-eye.org. We found that (1) the timing of snow melting was the latest in 2013; (2) the timing of leaf-expansion in understory vegetation in 2013 and 2014 was later than that in 2011 and 2012, while the timing of leaf-fall in understory vegetation did not show clear year-to-year variability during four years; and (3) the timing of start and end of growing season detected by analysing daily Terra/Aqua MODIS satellite-observed green-red vegetation index (GRVI) showed the timing of leaf-expansion and leaf-fall in understory vegetation, respectively.