[JJ] Evening Poster | M (Multidisciplinary and Interdisciplinary) | M-GI General Geosciences, Information Geosciences & Simulations

[M-GI25]Environmental changes in mountainous area

convener:Keisuke Suzuki(Department of Environmental Sciences, Faculty of Science, Shinshu University), Yoshihiko Kariya(Department of Environmental Geography, Senshu University), Chiyuki Narama(新潟大学理学部理学科, 共同), Akihiko SASAKI(Department of Geography and Environmental Studies, Kokushikan University)

Tue. May 22, 2018 5:15 PM - 6:30 PM Poster Hall (International Exhibition Hall7, Makuhari Messe)

Mountainous areas provide water resources to the populated downstream areas, protecting the diversity of ecosystem and providing tourism attraction. To access the mountain environment changes and mitigate the impacts of global warming influences, a cross-cutting session is proposed to share the scientific knowledge among various fields; such as climatology, hydrology, geography, glaciology, water/carbon/material cycle, eco-diversity, etc.

[MGI25-P05]Temporal and spatial variations in the phenology of alpine plants at Tateyama Murodo and Senjojiki by image analysis of time-lapse cameras

*Reiko Ide[1], Hiroyuki Oguma[1], Takashi Hamada[2] (1.National Institute for Environmental Studies, 2.Nagano Environmental Conservation Research Institute)

Keywords:RGB colors, Greenness index, Green-up, Green-down, Snowmelt timing, Microtopography

In alpine ecosystems, changes in the vegetation habitat and phenology, such as green-up, flowering, autumnal leaf color and fall, have been reported, due to recent global warming. Alpine ecosystems are particularly vulnerable to the effect of climate change, and the necessity for monitoring of alpine ecosystems is recognized. The snow fall and snow melt are the key factors for the growth of alpine plants in Japanese alpine ecosystems. Therefore, we have launched continuous monitoring of snowmelt timing and vegetation phenology in Japanese alpine zone since 2011 by using automatic time-lapse camera. In this present study, our objectives are to detect spatial and temporal variations of the phenology at a local scale by means of image analysis. And then we investigate the relationships between the phenology and environmental factors.

We used hourly images taken at Tateyama Murodo (2450m a.s.l) in Japanese Northern Alps during 2011-2017, and at Senjoujiki (2650m a.s.l) in Japanese Central Alps during 2013-2017. The images were recorded with about 21M pixels and 16M pixels, respectively, in jpeg format. RGB (red, green, blue) digital counts were derived from each pixel, and the vegetation phenology was quantified by using a greenness index (green ratio) calculated from the ratios of green against the sum of RGB. An increase and a decrease in time-series of the green ratio indicated green-up and green-down of the plants.

By using pixel-based analysis of the temporal variations of the green ratio, local distributions of the dates of green-up and green-down were illustrated at the plant species level. Our results suggested that the spatial diversities in the snowmelt timing and green-up dates strongly corresponded to the complex micro-topographic features in alpine zones. In addition, the green-up dates and green leaf periods showed large annual variations in relations to the annual variation of snowmelt timing depending on meteorological conditions. Thus, image analysis using time-lapse cameras enabled us to understand the snowmelt timing and plants phenology in alpine ecosystems at high temporal and spatial resolutions. Further long-term monitoring will help to assess and to predict the influence of future climate change.

©Japan Geoscience Union