Japan Geoscience Union Meeting 2015
(May 24th - 28th at Makuhari, Chiba, Japan)

ACC28-09 Room:201B Time:May 25 11:15-11:30

Winter speed-up of polythermal surging glacier in West Kunun Shan

YASUDA, Takatoshi[1*] ; FURUYA, Masato[1]

[1]Natural History Sciences, Hokkaido University

Glacier surging is a short-lived rapid flow punctuated with a years-decades long quiescent phase in which a glacier stream become stagnant or relatively slower than those of non-surge type glaciers. It is consider that the surging flow is triggered by high basal water pressure. It reduces overburden ice pressure and the yield stress of basal till, which can be attributed to enhance the basal slip. Two possible mechanisms are proposed according to velocity development during the surging. The detailed surging mechanisms, however, remain uncertain because temporal observations of surging flow are still limited.

We examined the spatial-temporal evolution of the surface velocities at the two surging glaciers in West Kunlun Shan, northwestern Tibet, applying the offset-tracking method to both ALOS/PALSAR and TerraSAR-X SAR imageries. West Kunlun Shan is one of the driest and the coldest region around Tibetan Plateau. Accumulation and ablation mainly concentrates during May-September (Zhang et al. 1989). An ice cap is frozen to the bed (Thompson et al., 1995), whereas many glaciers are found to be polythermal type glaciers (Aniya 2008).

Two surging had already activated by 2007 and still continued by 2014, gradually changing their flow speed. Furthermore, we detected the surging flow modulated seasonally that the flow speeds increased up to ∼180-200% in late fall to winter against in spring to early summer. Pressure melting and frictional heating have been proposed to explain the years-long surging flow at poly-thermal glaciers. But the observed seasonal modulation strongly suggests that the influx of surface meltwater influenced the surging flow, indicating that the hydrological processes play an important role under the sub-polar environment.

Keywords: glacier surging, SAR, West Kunlun Shan, winter speed-up