UAV cryosphere monitoring at Ichinoseki, Iwate and Meili Snow Mountain, Yunnan

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The development and the application of UAV monitoring technique is important to overcome safety and logistical difficulties in the Cryosphere; such as avalanches, crevasses, blizard and heavy snowfall. It has been applied to snow depth and area monitoring, glacier velocity measurements, rescue-work in snow mountains or so. Here we present UAV monitoring in Ichinoseki, Iwate and Meili Snow Mountain, Yunnan.

Meili Snow Mountain (28.3 N, 98.4 E) is a mountain range in Deqen Tibetan Autonomous Prefecture, Yunnan China. Mingyong Glacier is the longest (11.7 km) and lowest (2700 m. a.s.l.) valley glacier in the mountain which is fed by Mt. Kawagabo (6740 m).

There is a weather station at Deqen (28.4 N, 98.9 E, 3320 m). Summer precipitation was almost half (48 %) of total precipitation in this fifty years. Summer precipitation decreases from 300 – 500 mm in 1950s – 60s to 250 – 350 mm in 2000s – 2010s. The wavelet frequency analysis shows that there is 4 – 8 years significant periods.

Before the glacier monitoring, it is also tested in Matsurube weather station (39.1 N, 140.5 E, 350 m a.s.l.), Ichinoseki, Iwate. The snow pit measurement is also conducted. Snow depth of the site is 70 cm in 14 March. A UAV, DJI Mavic Pro is used in this experiments. UAV pictures show that dust coverage on snow in this site.

The UAV monitoring is conducted in late March 2018. It is conducted in Meili Snow mountain National Park, around the icefall close to the glacier margin, around 3000 m a.s.l., which is ablation area of the glacier (the ELA is 5000 m a.s.l.). The UAV pictues show that this area of the glacier is widely covered by debris except for the upper side of the icefall. The fractures was significantly developed on the icefall. This fracture would be formed by its high driving force and water supply by rain and waterflow from the mountain, which increases crevasse depth. Frequent ice avalanch is suggested by its surface features shown by pictures.