Characteristics of Sediment Discharge in the Tokachi Region, Hokkaido, due to Continuous 4 Typhoons in August, 2016

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INTRODUCTION

For the first time since JMA weather observation began in 1951, three typhoons (Chanthu, Kompasu and Mindulle) hit Hokkaido from August 16 to 23, 2016. Then Typhoon Lionrock caused a large discharge of sediment and affected railway, expressway, national high way, etc., on the eastern slopes of the Hidaka Range from August 29 to 31 (**Fig. 1**). Hokkaido usually receives less precipitation (e.g., an annual average of approx. 1,700mm in Japan, 934 mm in Obihiro) and experiences fewer sediment disasters than the rest of Japan. Because huge quantities of unstable sediment were left in river beds and banks of branch streams where the debris flows happened, it will be necessary to monitor sediment movement there during the snowmelt and summer seasons in several years to support disaster management in Hokkaido where arrival of typhoons may be increasing by climate change. In this paper, we report the sediment discharge caused by Typhoon Lionrock and kept monitoring the Pekerebetsu River, where huge sediment discharge happened.

THE RESULT OF SURVEY

The sites of sediment discharge happened (e.g., Totsutabetsu, with a total precipitation of 530 mm, and Nissho, with 367 mm) coincided not with the heaviest precipitation (e.g., Notsuka, with 713 mm), but with granite geology. From the Panke-Shintoku River to the Totsutabetsu River on the eastern slopes of the Hidaka Range, 9 branch streams of the Tokachi River discharged huge volumes of sediment caused by debris flows. In particular, the Pekerebetsu River discharged at least 0.63 million m^3 of sediment, the first such discharge in approximately 50 years. As a result, bank erosion and flooding caused by aggradation of the river bed and blockage at bridges due to sediment and drift wood, inundated in approximately 160 ha, washed away 10 houses in the center of Shimizu Town. The sediment was mainly composed by granite boulders and fine materials which came from gently sloping periglacial terrain. (**Fig. 2**, Osanai *et al*., 2017)

MONITORING AFTER SEDIMENT DISCHARGE

At the Pekerebetsu River, we kept monitoring in the main stream since sediment discharge happened. **Fig. 3** shows 24 h precipitation, maximum snow depth and maximum temperature at the Shintoku AMeDAS station. Photos of a main stream at the Pekerebetsu River around No. 13 groundsill were taken by digital camera and Time lapse camera BrinnoTLC200. The photos show that the stream water had turbidity soon after sediment discharge happened (September 5). But, turbidity of the stream water disappeared one month later (October 19). Then, ground survey indicate that, as of April, 2017, water discharge did not change widely and it is continuing less turbidity even during the snowmelt season.

Fig. 1 The study area and the path of Lionrock

Fig. 2 The sediment discharge in the Pekerebetsu River (Left: debris flow at upper stream, Right: bank erosion and flooding at in the center of Shimizu town, 2016/9/12)

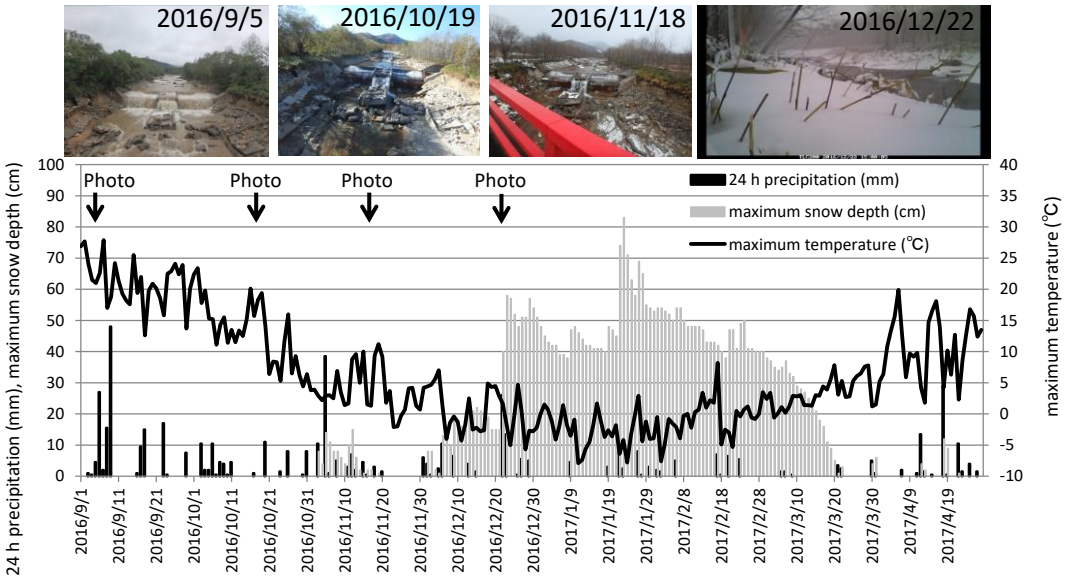

Fig. 3 24 h precipitation, maximum snow depth, maximum temperature at Shintoku and photos of a main stream at the Pekerebetsu River around No. 13 groundsill

CONCLUSIONS

Typhoon No. 10, Lionrock, brought a large amount of orographic rainfall on the eastern slope of the Hidaka Range from August 29 to 31. As the result, the substantial discharge of sediment happened on gently sloping periglacial terrain on granite geology. We keep monitoring the streams where sediment discharge happened to support disaster management in next several years.

REFERECES

Osanai *et al*., (2017): Journal of the JSECE, Vol. 69, No.6, pp. 80-91

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