Estimation of Rainfall Amount from Images Toward Strengthening River Basin Monitoring

(Research period: FY 2020 – FY 2022)

Sabo Department, Sediment Disaster Risk Management Division (Sabo Risk-Management Division)

Head TAKIGUCHI Shigetaka Senior Researcher (Ph.D. in Environmental Science) KANAZAWA Akito

(Keywords) river basin monitoring technology, rainfall intensity, image analysis

1. Introduction

In order to construct an effective warning and evacuation system for sediment disasters, it is important to monitor the condition of mountain river basins, which are sites where slope failure, mudslides and other sediment movement phenomena occur. Because interval cameras, which are installed outdoors to monitor the surrounding area, can be obtained at a comparatively low cost, in recent years, research has been carried out in an attempt to detect changes in the flow condition of rivers and rainfall, and to detect sediment movement by analyzing images obtained by interval cameras. NILIM is studying a technology for the estimated amount of rain in mountain river basins by analyzing images obtained by interval cameras by image processing technology.

2. Study of Technology for Estimating Rainfall Amount from Images

Images acquired during rainfall have features which are different from those taken when it is not raining. For example, the background appears whitish and hazy, and white lines which are the tracks of raindrops are superimposed on the background.

The characteristics that appear in images taken during rainfall also change depending on the intensity of the rain. Therefore, in this research, we examined a technology for estimating the amount of rainfall from the degree of haziness that appears in images by quantifying the haziness of the background. In this study, 3 interval cameras (A, B, C) were installed at observation points in a mountain river basin, and image processing was performed using the images captured by the cameras. As the degree of white haze, here, transmittance, which expresses the degree of transmission of light in the atmosphere, was used as an index, and was calculated by an image processing program. The results of estimations of rainfall intensity using the transmittance showed similar intensities and time-series changes to those observed with tipping-bucket rain gauges installed at the same points (**Fig.-1**), demonstrating the possibility of estimating the amount of rain by using images captured with cameras.

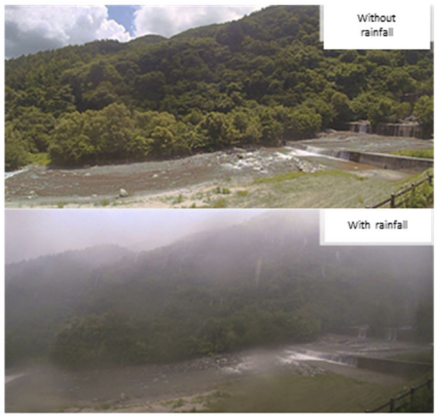

Photo-1 Example of images without and with rainfall

3. Conclusions

This study is still in the initial stage, and errors caused by various factors have also been discovered in the estimated values. Therefore, in the future, we will work to improve estimation accuracy, for example, by factor analysis, etc.

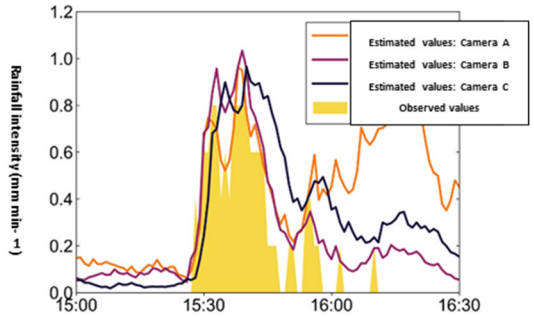

Fig.-1 Time-series fluctuations of estimated values and observed values of rainfall intensity