AAS23-P01 : :5 23 18:15-19:30

Formation of Heavy Rainfall over Mountain Slopes Surrounding an Inner Basin Associated with the Passage of a Typhoon

[1*], [2], [3], [1]

Tetsuya Sano[1*], Satoru Oishi[2], Kengo Sunada[3], Tadashi Suetsugi[1]

[1] , [2] , [3]

[1]International Research Center for River Basin Environment, University of Yamanashi, [2]Research Center for Urban Safety and Security, Kobe University, [3]University of Yamanashi

Heavy rainfall over mountainous regions is often associated with a typhoon (e.g. Misumi 1996 and Yu and Cheng 2008). However, the formation process of such heavy rainfall has not been known enough. On 21 September 2011, heavy rainfall occurred over the inner mountain slopes surrounding Kofu Basin with the passage of Typhoon Roke (2011) (hereafter, T1115), which was observed by the X-band multi-parameter radar installed in Kofu Campus of University of Yamanashi on Kofu Basin (hereafter, the UYR). In the present study, from a case study of the particular event, we investigated the formation process of heavy rainfall over the inner mountain slopes associated with the passage of a typhoon.

T1115 moving toward northeast made landfall near Hamamatsu about 100 km southwest of Kofu Basin at 1400 LST (Local Standard Time = UTC + 9 hours). The center of T1115 moved to Kofu Basin from 1400 LST to 1600 LST; it passed on the south part of Kofu Basin from 1600 LST to 1800 LST.

When the center of T1115 was approaching to Kofu Basin from 1400 LST to 1600 LST, rainfall amount, derived by the UYR observation at 1.5 km above the mean sea level, was large over the inner slopes of Mts. Koma. Many precipitating cells (hereafter, cells) existed continuously over the slope of Mts. Koma on the west side of Kofu Basin. The heights of cells were lower than the altitude of the melting layer in the stratiformed precipitating system associated with T1115. On Kofu Basin, positive Doppler velocity (DV) appeared at the lower elevation angle with surface wind toward Mts. Koma, namely toward the center of T1115. At that time, surface equivalent potential temperature at Kofu was high with east-northeasterly wind. We consider that the air with high equivalent potential temperature transported by the lower wind toward the center of T1115 and was lifted over the slope of Mts. Koma.

Then, rainfall amount was largest over Mts. Misaka on the south side of Kofu Basin when the center of T1115 was passing on the south part of Kofu Basin from 1600 LST to 1800 LST. The heights of cells were also lower than the altitude of the melting layer. On Kofu Basin, DV increasing from northwest to southeast appeared at the lower elevation angles with surface wind toward Mts. Misaka, namely toward the center of T1115. At that time, surface equivalent potential temperature at Kofu decreased with northwesterly wind. We consider that the air with high equivalent potential temperature over the slope was lifted when the lower wind with the air with low equivalent potential temperature arrived at the slope of Mts. Misaka.

The appearance distribution of the cells was varied with the variation of the surface wind associated with the pass of T1115, which contributed to the distribution shift of the heavy rainfall. It is mentioned that the appearance and development of precipitating cells over the mountain slopes controlled by the lower wind blowing to the center of T1115 contributed to the formation of the heavy rainfall.

: , , , X-MP
Keywords: Heavy rainfall, Typhoon, Mountain slopes, X-MP radar