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Recent flash flood disaters in Japan, examples of flash floods caused by localized rainstorms

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In recent years, in Japan, localized torrential rainstorms triggered flash floods and often caused tragedic human loss. The authors investigated several typical exmaples of flash flood disaters which have occurred in Japan recently. Simple rainfall-runoff analysis has been executed in some of the cases. In most of the cases, the spatially and temporally precise, 1km x 1km and 5 min-interval, radar rainfall data seems to be capable of explaining the deadly rapid rise of the water stage. The interviews of witnesses or survivors show that the water level rise was so rapid and sudden that they could not predict nor imagine the arrival of flash flood. It is partly because there was no or little rainfall around the disaster sites in most of the cases. Sometimes the rainstorm was too localized or too sudden to provide an alarm even by the current Japanese radar system. In one of the cases, a flash flood attacked in shorter than 10 minutes after the detection of the outburst of localized torrential rain by the radar. In this case, considering the time necessary for processing and tranmitting data, an alerm could be provided only after the arrival of the flash flood. In the other case, a flash flood detector had been installed and helped workers in the downstreams averting a flash flood disaster. This could be one of the solutions in the cases of extreamly rapid or sudden flash flood.