Title of Project : Scientific and Integrated Research by In-situ Campaign Observations Synchronizing Video-sonde and the Latest Polarimetric Radar, Heading for Reduction of Water Related Disaster

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Research Area : Civil Engineering, Hydraulic Engineering, Hydrometeorology

Keyword : Radar Hydrology, Polarimetric Radar, Video Sonde, Rainfall Estimation, Prediction

【Purpose and Background of the Research】

Recently, disaster due to localized heavy rainfall is noticeable under climate change and urbanization. Although prediction accuracy of heavy rainfall in large spatial scale is getting higher and higher, it is still difficult for localized heavy rainfall in smaller spatial scale to be even reproduced. Moreover, earlier detection and prediction of localized and suddenly generated heavy rainfall (so called guerrilla heavy rainfall) are very important, even if the time lag is five to ten minutes. Also, prediction and early warning of flash flood are expected. Under these circumstances, this scientific integrated research aims to execute in-situ campaign observations of precipitation using a video-sonde synchronized with the latest polarimetric Doppler radar which is expected to be effective in the rainfall estimation and prediction. Also, this research aims to develop methodologies for reducing water related disaster.

【Research Methods】

The Video-sonde is an expensive instrument which can take images of hydrometeors. In the autumn of 2010, preliminary campaign observations will be carried out in Okinawa and Shiga prefectures in order to develop a more compact and sophisticated general type of "video-sonde observation system". By this newly developed system, continuous video-sonde observations during various life stages of a precipitation system will be realized. For synchronization, COBRA by NICT in Okinawa and operational radars by MLIT in Shiga will be used as the polarimetric Doppler radars.

From 2011 to 2013, the timing of the campaign observations will be shifted to the Baiu-season. The MU radar and a cloud radar by RISH, Kyoto University will also be used for synchronization in Shiga prefecture. Based on these basic in-situ observations and obtained products, this research proceeds as follows: 1) Improving meso-scale atmospheric model by sophisticating model of cloud micro physics, 2) Developing assimilation methodology by establishing a polarimetric radar distinction algorithm of types of co-existing hydrometeoros, 3) Completing rainfall estimation procedure for operational use, 4) Developing earlier detection and prediction methodologies of guerrilla heavy rainfall, and improving warning system of flash flood.

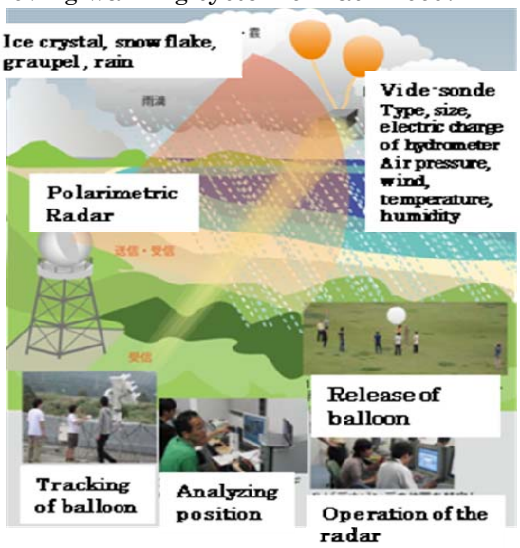

Figure 1　Schematic of campaign observation.

【Expected Research Achievements and Scientific Significance】

1) The first synchronized observation in the world. 2) Sophistications of the models of cloud physics, atmospheric, and rainfall prediction. 3) Reducing water related disaster such as flash flood.

【Publications Relevant to the Project】

Nakakita, et, al., Develpment of hydrometeor classification system using polarimetric radar measurements synchronized with video-sonde observation, Annual Journal of Hydraulic Engineering, JSCE Vol.53, pp.361-366, 2009.

【Term of Project】

FY2010-2014

【Budget Allocation】

169,700 Thousand Yen

【Homepage Address and Other Contact Information】

http://hmd.dpri.kyoto-u.ac.jp/nakakita/nakakita_Eng.htm