

【Grant-in-Aid for Scientific Research (S)】
Science and Engineering (Engineering)



**Title of Project : Integrated Research on State-of-the-art Multi-sensors
 In-situ Observation of Storm Genesis and Reduction
 of Serious Disaster due to Heavy Rainfall**

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Research Project Number : 15H05765 Researcher Number : 70183506

Research Area : Civil Engineering, Hydraulic Engineering, Hydrometeorology

Keyword : Multi Remote Sensing, Radar, Video Sonde, Rainfall Prediction, Early Warning

【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) and back-building type localized 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 storm genesis and growth using various type of radars with various wave lengths, and vide sonde. Also, this research aims to develop methodologies for reducing serious disaster due to localized heavy rainfall by developing early warning systems.

【Research Methods】

- 1) In-situ campaign observations of storm genesis and its growth by MP meteorological radar, phased array meteorological radar, boundary layer radar, cloud radar, lider, GPS, and video sonde focusing on behavior of vortex tube.
- 2) Preliminary observation in Okinawa and main observation in Kobe-Osaka-Kyoto urban area.
- 3) Improving an atmospheric mesoscale and hydrologic surface combined model, and its blending with LES atmospheric model.
- 4) Finding a behavior and mechanism of generation and growth of vortex tube
- 5) Developing earlier detection and prediction system of guerrilla heavy rainfall based on behavior of vortex tube, and its connection with in-situ warning system by emergency siren.
- 6) Advancing flood forecasting system and land slide risk information system
- 7) Developing a system of providing real-time rainfall information through mobile-phone

【Expected Research Achievements and Scientific Significance】

- 1) Clarifications of mechanism of generation and development of the suddenly generated heavy rainfall (so called guerrilla heavy rainfall) and the back-building type localized heavy rainfall
- 2) Improvement of forecasting accuracy.
- 3) Developing a prototype of future operational observation system by multi-radars with various wave lengths and GPS.
- 4) Reduction of disaster by heavy rainfall

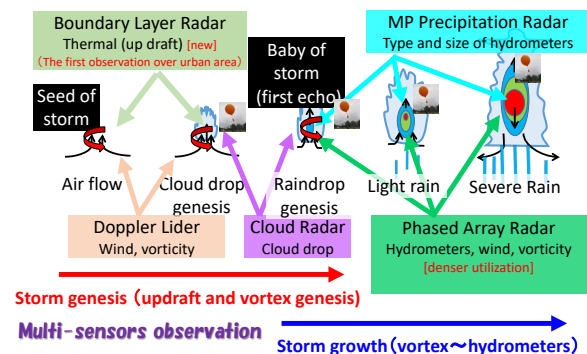


Figure 1 Multi-sensors observation of storm genesis

【Publications Relevant to the Project】

- 1) Nakakita, Eiichi, Ryuta Nishiwaki, Hiroyuki Yamabe, and Kosei Yamaguchi, Research on the prognostic risk of baby cell for guerilla-heavy rainfall considering by vorticity with Doppler velocity, Journal of Japan Society of Civil Engineers, Ser. B1 (Hydraulic Engineering), Japan Society of Civil Engineers, Vol.57, pp.325-330, 2013.
- 2) Suzuki, Kenji, Midori Matsuo, Eri Nakano, Shunsuke Shigeto, Kosei Yamaguchi, Eiichi Nakakita, Graupel in the different developing stages of Baiu monsoon clouds observed by videosondes, Atmospheric Research, pp.11, Available online 7 October 2013.

【Term of Project】 FY2015-2019

【Budget Allocation】 159,500 Thousand Yen

【Homepage Address and Other Contact Information】

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