**Japan Geoscience Union Meeting 2011**
(May 22-27 2011 at Makuhari, Chiba, Japan)


U022-P01 Room:Convention Hall Time:May 22 10:30-13:00

# X-band Polarimetric Doppler Radar Network in the Tokyo Metropolitan Area (X-NET)

Masayuki Maki[1*], Tsuyoshi Maesaka[1], Koyuru Iwanami[1], Ryohei Misumi[1], Shin-ichi Suzuki[1], Atsushi Kato[1], Shingo Simizu[1], Namiko Sakurai[1], Dong-Soon Kim[1], Yukari Shusse[1], Kohin Hirano[1], Tadashi Yamada[2], Fumiaki Kobayashi[3], Tetsuya Sano[4], Kengo Sunada[4], Takeshi Moriya[5], Akihiko Yamaji[5], Soichiro Sugimoto[6], Hiromaru Hiraguchi[6], Shinya Kawada[7], Mamoru Yoshii[7], Dong-In Lee[8], Kaori Kieda[9], Ayumi Hoshi[9]

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Since 2006, the National Research Institute for Earth Science and Disaster Prevention has been implementing an advanced X-band radar network, named X-NET, to mitigate urban disasters caused by severe storms. The research radars comprising the X-NET are five polarimetric Doppler radars and three Doppler radars. The goals of X-NET are to develop real-time processing of networked radar data and to provide end-users with the high-resolution precipitation and wind data that are necessary to understand severe storm development mechanisms, improve forecasting accuracy, and develop new urban disaster warning systems. The characteristic of the X-NET are; 1) radar network utilizing an advanced telecommunication network in urban areas, 2) immediate and economical ef?ciency using existing research radar facilities, 3) the test-bed is the Tokyo Metropolitan Area, where around 30 million people reside, 4) collaboration with end-users (scientists, administrative of?cers at the disaster prevention coordination divisions of national and local governments, private weather companies, etc.) through an interactive exchange of information, 5) contribution to the operational polarimetric radar networks of the Ministry of Land, Infrastructure, Transport and Tourism, which will be in operation in the Tokyo, Nagoya, Osaka metropolitan and Hokuriku areas in 2010.

Keywords: multi-parameter radar, network, torrential rain, precipitation, strong wind

**Japan Geoscience Union Meeting 2011**
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U022-P02 Room:Convention Hall Time:May 22 10:30-13:00

# Data processing of MLIT X-band MP radar

Takeshi Maesaka[1*], Masayuki Maki[1], Koyuru Iwanami[1], Shuichi Tsuchiya[2], Kaori Kieda[3], Ayumi Hoshi[3]

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Flood disasters caused by localized heavy rainfall frequently occurred in July and August 2008. National Research Institute for Earth Science and Disaster Prevention's (NIED's) results on monitoring of the heavy rainfall and severe wind by using X-band multi-parameter (MP) radar boosted Ministry of Land, Infrastructure, Transport and Tourism (MLIT) to start deploying the X-band MP radars in Japan. They deployed 11 radars in Tokyo, Nagoya, Kinki, Hokuriku areas in FY 2009, and are deploying 15 radars in other areas in FY 2010. NIED developed an operational data processing system, which estimates the rainfall intensity from the radar data, and which creates regional composite data every one minute, under a commission from National Institute for Land and Infrastructure Management (NILIM), MLIT.

The observed radar data are transferred to two data processing centers in Kanto and Kinki Regional Development Bureaus, MLIT, and the same processing is done for redundancy in these two centers. After a quality control of the received radar data is performed, $K_{DP}$ is estimated by a differentiation of $PHI_{DP}$, which is filtered by two different FIR filter for removing the local phase shift by strong backscattering and smoothing. As radio wave attenuation by rainfall is not negligible in X-band, the attenuation is estimated from the $K_{DP}$ to correct $Z_H$ and $Z_{DR}$. The attenuation is also used for determining radio wave extinction areas, where the radar cannot detect the received power from the precipitation by the rainfall attenuation. Finally, the precipitation intensity is estimated with Z-R and $K_{DP}$-R relationships.The estimated rainfall data are immediately sent to compositing server. The data of radars that belong to the same area are composited into a quarter third mesh (with a resolution of about 250 m). For this compositing, the modified Cressman interpolation method, which also considers with a weight that becomes greater with the decrease of the height above the ground, is used. These procedures are performed with parallel computing to finish the calculations in several seconds.

The precipitation information calculated by this system is tentatively provided by MLIT since July 2010. The accurate information updated every minute is sure to contribute to the monitoring of extreme weather in urban areas.

Keywords: MP radar, X-band, MLIT

**Japan Geoscience Union Meeting 2011**
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U022-P03 Room:Convention Hall Time:May 22 10:30-13:00

# Correction of Radar Reflectivity and Differential Reflectivity for Rain Attenuation at X-band

Dong-Soon Kim[1*], Masayuki Maki[1], Dong-In Lee[2], Shingo Shimizu[1], Maesaka Takeshi[1], Koyuru Iwanami[1]

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Rain attenuation correction is very important to obtain accurate radar reflectivity $Z_H$ and differential reflectivity $Z_{DR}$, particularly with the X-band wavelength radar. In the case of a dual-polarized radar, $Z_H$ and $Z_{DR}$ can easily be corrected by differential propagation phase measurement ($K_{DP}$ or $PHI_{DP}$), because phase measurements are not affected by attenuation or calibration errors. In the self-consistent method with constraints proposed by Bringi et al. (2001), an optimal value (alpha) for the specific coefficient between $K_{DP}$ and specific attenuation at h-polarization $A_H$ ($A_H$ = alpha$*K_{DP}$) is determined by employing a minimization process for each beam of the radar. However, the specific coefficient alpha can vary widely, mainly as a result of natural variations in DSD, temperature, and drop shape in a precipitation system.

The shifted self-consistent (SSC) algorithm based on the self-consistent method for rain-attenuation correction of reflectivity $Z_H$ and differential reflectivity $Z_{DR}$ are presented for X-band polarimetric radar. This SSC algorithm calculates the optimum coefficients for the relation $A_H$-$K_{DP}$, every 1 km along a slant range. The advantage of this method is that the natural distribution of DSD along the range of radar can be represented by the optimum alpha distribution. The attenuation-corrected $Z_{DR}$ is calculated from reflectivity at horizontal polarization and from reflectivity at vertical polarization after attenuation correction. The SSC algorithm is applied to RHI (range-height indicator) scans as well as PPI (plan position indicator) volume scan data observed by X-band wavelength (MP-X) radar, as operated by the National Research Institute for Earth Science and Disaster Prevention (NIED) in Japan. The corrected $Z_H$ and $Z_{DR}$ values are in good agreement with those calculated from the drop size distribution (DSD) measured by disdrometers. The developed attenuation correction algorithm can be applied to various situations observed by the NIED MP-X radar.

Keywords: Rain attenuation correction, X-band Polarimetric radar, Reflectivity, Differential reflectivity, Specific attenuation, Differential propagation phase

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U022-P04 Room:Convention Hall Time:May 22 10:30-13:00

# A plan of experimental flights to observe atmospheric conditions for study of severe weather over Kanto area

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A research project (2010 ? 2014) for development and society experiments of avoidable systems against severe weather disasters around Tokyo metropolitan area is now conducted in cooperation of over twenty organizations (the representative organization: National Research Institute for Earth Science and Disaster Prevention). This project is supported by a grant from the Ministry of Education, Culture, Sports, Science and Technology and consists of three subthemes, which are study of growth mechanism of disturbances with a dense observational network (Subtheme 1), development of disaster prediction system (Subtheme 2) and society experiments (Subtrheme3). ENRI participates in Subthemes 1 and 2 and has a plan to observe atmospheric conditions by ENRI's experimental aircraft (Beechcraft 99 Airliner) in Subtheme 1 especially to investigate spatial distribution of water vapor over Kanto area before severe weather occurs in summer. Flight experiments with a cooperation of ground-based measurement systems are coordinated. In this presentation, summary of aircraft equipment and flight plans for metrological observation will be shown.

Keywords: Severe weather, Atmospheric observation, Experimental flight, Water vapor, Spatial distribution

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U022-P05 Room:Convention Hall Time:May 22 10:30-13:00

# Wind field disturbances in the boundary layer over Tokyo suburban area observed with NICT coherent Doppoler lidar

Yasuhiro Murayama[1*], Hironori Iwai[1], Ryoko Oda[1], Shoken Ishii[1], Kohei Mizutani[1], Shin'ya Sekizawa[1]

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Coherent Doppler lidar is capable of detecting radial wind velocity with error of 0.1-0.2 m/s which is comparable to wind profiler radar errors, by using aerosols in the boundary layer as scsatterer or laser beam's target. Laser beam scan enables us to monitor temporal evolution of disturbed wind fields in the height range from the ground surface to several kilometers. In this study we have analyzed radial wind velocity fluctuation components at the 0-2 km heights, extracted from the Doppler lidar observation on 2 February 2009. Beam scan was carried out in the vertical plane in the north-east direction.

Time series of the height-range cross-section of radial wind speed show that a structure with the 800-m depth standing up from the ground moved toward the lidar with the speed similar to the background wind of 2-3 m/s. The structure may be a thermal or plume flown by the back ground wind field. Associated wind velocity fluctuations are larger around the height of 0.8-1.2 km, where the background wind (radial component) has larger wind shear in the beam scan azimuth direction.

Further analysis is planned to clarify wind disturbance inhomogeneity and/or anisotropy, which may cause significant bias error in wind profiling or VAD technique and dual-beam method of momentum flux estimation used in wind profiler radar and Doppler lidar observations.

Keywords: boundary layer, Doppler lidar, thermal, turbulence

**Japan Geoscience Union Meeting 2011**
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# Structure of nocturnal turbulent mixing in Tokyo

Ryoko Oda[1*], Hironori Iwai[1], Shinsuke Satoh[1], Shinya Sekizawa[1], Shoken Ishii[1], Kohei Mizutani[1], Yasuhiro Murayama[1]

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Localized heavy rain is one of the serious atmospheric environmental issues in urban area. Some recent studies have indicated a possibility that vertical wind velocity is enhanced in the build-up area due to their large roughness and trigger localized heavy rainfall. However, the contribution of the building roughness on the turbulent process is not fully understood especially concerning the height of the mechanical mixing and its time-scale since the field observation has not been enough conducted.

In this study, Doppler lidar measurement was conducted in urban area to investigate the characteristics of the turbulent mixing process during nocturnal periods. The Doppler lidar developed by National Institute of Information and Communications Technology (NICT) is stationed on the rooftop of NICT's building at Koganei-shi, Tokyo.

Vertical distribution of the vertical velocity was measured above 150m from the ground. This experiment was carried out in February and October 2010. The horizontal wind and temperature profile were also measured by radiosonde during the same experimental period.

The timescale of the mechanical turbulence was about seconds to few minutes up to 300m from the ground, in which nocturnal jet has a maximum wind speed (neutral case). In case of the stably thermal stratification which extends from 100 to 300m at close to the ground, the mixing height cannot be explicitly determined from the turbulent signals obtained by the Doppler lidar measurement. These results indicate that the mixing height determined by the Doppler lidar measurement depends strongly on the meso-scale atmospheric condition.

In the presentation, a nocturnal turbulent mixing determined from the Doppler lidar measurement and that from the in situ sonic anemometer measurement at 60m on the NICT's tower are compared.

Keywords: nocturnal turbulent mixing, Doppler Lidar, roughness, urban

**Japan Geoscience Union Meeting 2011**
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# Mitigation effect of small paddy fields in urban area on summer temperature

Fumie Toda[1*]

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Because of development of building lots, mixing of paddy fields and building estates is distinguished in rapid population growth area. Since paddy fields have high effect on mitigation of temperature, now urban heat island is viewed with suspicion, it is the critical issue how maintain paddy fields and how to make effective use of them. To solve these problems, it may make more sense for us to reveal the scale and layout of paddy fields that effective for mitigation of temperature. So this report intends to reveal the feature of mitigation effect on temperature of small paddy fields that exist in urban area.

Moving temperature observation was conducted at the surrounding area of Nonoichi town hall, Ishikawa Prefecture where large suburban paddy fields and small paddy fields that are mixed with building estates. As a result, distinct low-temperature range appeared at night and it spread 7.5 times as large as the total area of paddy fields. Then it was revealed that even small paddy fields have efficient effect on mitigation of temperature, if they exist at proper intervals. Besides heat balance observations at the small paddy field suggest that small paddy field have a greater tendency to exert mitigation effect at night than during daytime, because advection from urban zone have greater influence on small paddy fields during daytime than during nighttime. Furthermore it was suggested that mitigation effect fluctuate by growing stage of rice plants. That is, the mitigation effect of small paddy fields that are scattered consecutively is very efficient but not constant. So, it is the most effective way for mitigation of temperature to spread small paddy field consecutively over the leeward side of large suburban paddy fields.

Keywords: paddy field, mitigation effect on temperature, urban heat island, heat balance, moving observation

**Japan Geoscience Union Meeting 2011**
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# Case study on the evolution of a severe thunderstorm observed in the south of Saitama Prefecture on 29 June, 2010

Namiko Sakurai[1*], shingo shimizu[1], Koyuru Iwanami[1], Takeshi Maesaka[1], Ryohei Misumi[1], Atsushi Kato[1], Shin-ichi Suzuki[1], Kaori Kieda[2], Masayuki Maki[1]

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The evolution and structure of the convective system that caused widespread power outages and heavy rainfall in the south of Saitama Prefecture, Kanto, Japan on 29 June 2010 were investigated using two X-band polarimetric radars, a C-band Doppler radar, and dataset of cloud-to-ground (CG) lightning strike locations.

The convective system developed from 1930 LT in the southwestern part of Saitama Prefecture and migrated eastward slowly at a speed of about 2.5 m/s. The system matured during 2030 and 2100 LT and caused heavy rainfall (62.5 mm/hr from 2020 to 2120LT) at Tokorozawa. The system decayed after 2100 JST, when its migration speed was accelerated than that in mature stage.

Three dimensional wind fields of the system in the mature stage were investigated by triple Doppler radar analysis. Northerly and easterly winds were dominant in the northern side of the system, and southerly wind dominated in the southern side of the system. These different winds converged around the center of the system, and caused updrafts to the south of the convergence region. In contrast, downdrafts were dominant in the northern side of the convergence region. Consequently, the system had suitable structure for maintaining the system for long time since updraft region and downdraft one were separated. After 2100 LT, the area of northerly wind associated with the downdraft was expanded and southerly wind became weaker, thereby causing the decay of the system.

Associated with the heavy rainfall around Tokorozawa, 1,068 CG lightning were observed during 2009 and 2209 LT. Most of the lightning had negative charge. The peak time of the number of the negative lightning (the positive lightning) was around 2040 LT (2035 LT), corresponding to the mature stage of the system and widespread power outages. The lightning was mainly observed in the north-side region of radar reflectivity core of the system where the downdraft was dominated.

This study provided preliminary results of the structure and evolution of the convective system observed in the southern part of Saitama Prefecture on 29 June, 2010 using triple Doppler radar analysis and CG lightning dataset. Utilizing these radar data, the relationship of CG lightning strikes to polarimetric radar parameters or the stages of updraft/downdraft evolution will be investigated.

Keywords: thunderstorm, lightning

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# Doppler lidar and wind profiler observation of a localized heavy rainfall event on 5 July 2010

Hironori Iwai[1*], Yasuhiro Murayama[1], Shinya Sekizawa[1], Katsuhiro Nakagawa[1], Ryoko Oda[1], Shoken Ishii[1], Kohei Mizutani[1]

[1]NICT

Heavy rainfall increasingly occurred last decades, and urban floods caused by those events. Localized rainfalls are often observed, which has been also increasingly of concern to the general society. Such heavy rainfall has small horizontal scales of 1-10 km, occurring in apparently a random manner in a course of cloud system development, thus forecasting those events is a subject of meteorological research. Doppler radars can observe regions and temporal development of the rainfall events in detail, however non-precipitation region around the rainfall region could not be studied because of little observation therein. Once we can observe wind field surrounding the rain region, air circulation in and out of the cloud and precipitation systems is expected to significantly improve the model, and thus would contribute to improvement of forecasting of the localized rainfall events. There have been significant advances in Doppler lidar and wind profiler, which can observe wind fields under clear air conditions or non-precipitation. So those instruments are expected to improve forecasting the small-scale cloud and precipitation systems. In this study, we will show the NICT Doppler lidar and wind profiler observation results of a localized heavy rainfall that occurred on 5 July 2010 in the Tokyo metropolitan area.

A coherent 2-micron differential absorption and wind Doppler lidar was developed by NICT to measure $CO_2$ concentration and radial wind velocity. Wind profilers to which the radio interference reduction techniques such as digital coding and frequency multiplexing are applied were also developed to measure radial wind velocity in the lower troposphere. The Doppler lidar and wind profilers were deployed at the NICT headquarters located in the Tokyo metropolitan area. The Doppler lidar performed plane position indicator scans (horizontal scan) at a 4-degree elevation angle which provided information about the horizontal variability below several hundred meters above ground level (AGL). The wind profilers were operated in Doppler beam swinging mode at a 14-degree zenith angle which provided information about the horizontal and vertical wind up to 8 km AGL. The rainfall data used for the present study comes from the operational X-band polarimetric radar networks of the River Bureau, Ministry of Land, Infrastructure, Transport and Tourism.

A heavy rainfall area moved eastward across the central part of Kanto Plain from 15 JST to 21 JST on 5 July 2010 and came close to the observation site at about 18 JST. Both Doppler lidar and wind profiler observed that the southeasterly wind blowing toward the heavy rainfall area gradually intensified at several hundred meters AGL. In presentation, we will show the results of detailed analysis of the heavy rainfall.

Keywords: Doppler lidar, Wind profiler, Localized heavy rainfall

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# Behavior of precipitation cores in the 5 July 2010 torrential rainfall system in northern Tokyo

Yukari Shusse[1*], Masayuki Maki[1], Koyuru Iwanami[1], Ryohei Misumi[1], Shinichi Suzuki[1], Atsushi Kato[1], Takeshi Maesaka[1], Shingo Shimizu[1], Kohin Hirano[1], Namiko Sakurai[1], Kaori Kieda[2]

[1]NIED, [2]A. E. S

Local torrential rainfall event occurred on 5 July 2010 in northern Tokyo. Shakujii river basin was flooded by the rainfall event. National Research Institute for Earth Science and Disaster Prevention (NIED) conducted two X-band polarimetric radar observation for a rainfall system that caused the local heavy rainfall.

The rainfall system appeared around 14 LST (LST = UTC + 9h) in the western Tokyo, and propagated eastward, then disappeared on around the border among Tokyo, Saitama, and Chiba Prefectures at around 22 LST. The rainfall system showed significant intensification at around 1730 and 1930 LST. Heavy rainfall in Shakujii river basin was associated with the development at around 1930 LST. Echo-top heights of 20 dBZ at these intense periods were about 7-km altitude each. The height of precipitation cores were from 2 to 3-km altitudes. Values of differential reflectivity ($Z_{DR}$) in the precipitation cores were larger than 3.5 dB, and those of specific differential phase ($K_{DP}$) were larger than 9deg $km^{-1}$. These values indicate that the precipitation cores in the intense periods of this rainfall system contained a number of large raindrops.

Horizontal distributions of accumulated rainfall amount in two periods, A) from 1520 to 1850 LST and B) from 1850 to 2120 LST which include two intense periods each, are compared to examine the characteristics of the rainfall system. In period B, intense rainfall area with accumulated rainfall amount more than 60 mm was concentrated in a smaller area (20km(east-west) x 5km(north-south)) than in period A. Around Nerima Ward, accumulated rainfall amount more than 100 mm was observed in period B. In this study, behavior of precipitation cores appeared and developed in the of concentrated heavy rainfall area in period B.

Three-dimensional distribution of polarimetric radar measurements and wind fields indicate that the multiple precipitation cores aligned in the east-west direction in the concentrated heavy rainfall area in period B. The precipitation cores in the area moved eastward slowly. But several new precipitation cores appeared in the west (upshear) side of the preexisted precipitation cores. In consequence, intense rainfall area in the precipitation system was stalled in the Shakujii river basin.

Keywords: Local heavy rainfall, Urban flood, Polarimetric radar

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# Short-range forecast using MPradar network and 3DVAR assimilation for the heavy rainfall in north Tokyo on July 5th 2010

shingo shimizu[1]*, Masayuki Maki[1], Takeshi Maesaka[1], Koyuru Iwanami[1], Seiichi Shimada[1]

[1]NIED

Title : Short-range forecast using MP-radar network and 3DVAR assimilation for the heavy rainfall in north Tokyo on July 5th 2010

National Research Institute for Earth Science and Disaster Prevention, Japan (NIED) designed a real-time radar network (X-NET) consisting of MP radars and Doppler radars over Kanto Plain, Japan. We developed a real-time 3DVAR assimilation system using radial velocity of radar and GPS precipitable water (PWV) for a short-range (up to 1-3 hours) forecast of severe weather. The 3DVAR assimilation procedure was developed in non-hydrostatic cloud-resolving storm simulation (CReSS) model. A thunderstorm observed in 5th July 2010 was simulated with radial velocity and precipitable water vapor derived from GPS assimilation.

The thunderstorm provided heavy rainfall (107 mm/hr) at Itabashi city from 19:30 to 20:30 Japan Standard Time (JST). The thunderstorm rapidly developed from 17:00 to 19:00 JST. We tried to forecast the heavy rainfall between 19:00 and 20:00 JST using initial condition obtained at 18:00 JST. From 18:00 to 18:30 JST, the thunderstorm was gradually dissipated, but it soon developed again after 18:30 JST. Therefore, short-range forecast around 18:00 JST such as a nowcasting that assumes the conservation of rainfall area and constant migration speed would be difficult for such thunderstorms with large temporal variation of rainfall. 3DVAR assimilation is one of most suitable method for the short-range forecast of such non-steady thunderstorms in terms of calculation cost.

Optimization for our 3DVAR was implemented by Limited-memory quasi-Newton method (L-BFGS), which provides optical state quickly with small iterations. It takes only a few minutes to obtain optical initial condition. CReSS users can optionally use Semi-Lagragian advection scheme to utilize large time-step for reducing calculation times for real-time forecasting. As a result, it takes 10-15 minutes for the forecast up to 4 hours with 3DVAR initialization. GPS-PWV dataset is available after about one-hour. Therefore, GPS-PWV-3DVAR provides forecast starting from 1 hour and a few tens of minutes to 4 hours.

Figure 1 shows radar observation (Fig. 1a), control run (no assimilation experiment: Fig. 1b), 3DVAR forecast (Fig. 1c) and increment of vapor by GPS-PWV 3DVAR (Fig. 1d) at 19:20 JST. The increment of vapor around Itabashi city (Fig. 1d) and wind convergence at lower level (not shown) improved the forecasted location of severe thunderstorm rather than CNTL (Fig 1b and 1c). Further improvements (e.g., assimilation of radar reflectivity) should be made for accurate forecast of severe thunderstorm.

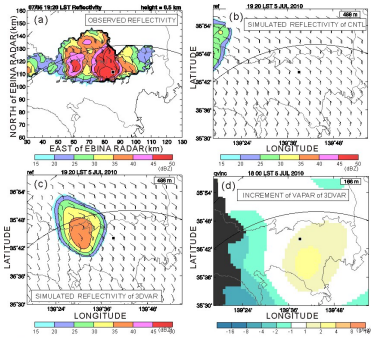


Fig. 1 (a): observed radar reflectivity at 19:20 JST at a height of 500 m, (b): simulated radar reflectivity in control run, (c): simulated radar reflectivity in GPS-PWV and WIND 3DVAR, and (d) increment of vapor at 166m at 18:00 JST in GPS-PWV 3DVAR

Keywords: MPradar, 3DVAR, Doppler velocity, GPS precipitable water

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# Typhoon Disaster Database System

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When typhoon disasters occurred, the organizations for disaster management of national and local governments corrected the disaster information, and published the disaster reports. Information on past typhoon disasters is important for mitigation of future disasters. The disaster reports published by the organizations are stored in the public libraries. Some reports are found on the Web page of the organizations. However, these reports are widely distributed, it is very difficult to see many reports. Therefore, we have developed the typhoon disaster database system (http://ccwd05.bosai.go.jp/DTD/) to store data on typhoons and associated disasters in Japan. Anyone can access the system through the internet.

The system is composed of 3 servers, the database server, the geographic information system (GIS) server, Web server. The database server stores information on typhoons and associated disasters occurred in Japan since 1951, list of disaster reports, list of organizations for disaster management of local governments, and list of typhoon or disaster homepage. The GIS server provides GIS functions which display information with regard to typhoon tracks and disasters on a map through web browser.

The database stores the typhoon number, name, GLIDE number, track data, central pressure, maximum wind speed, outline, sea level pressure map, satellite image map, precipitation map for typhoon related information. The database also stores the affected area address, date, the kind of disaster, damage number, and outline of damage.

We can search the typhoon and associated disasters in Japan, and browse these information on web browser. We can select typhoon to specify typhoon number or name, period, the affected area, or typhoon passing points. The outline page of selected typhoon shows information of the description of typhoon, maps, and time series line graphs of the central pressure and the maximum wind speed. The geographical information page of selected typhoons shows typhoon tracks and the affected area and/or damaged points of associated disasters by using WebGIS functions.

We will continue to collect and store information of typhoon and associated disaster, and we have a plan to update the hardware and software to contribute to provide the typhoon disaster information.

Keywords: Typhoon disasters, Database, Internet, WebGIS

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# Marginary for the engineering works of the urban flood

Naomi Ando[1*]

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In our country where a lot of people have come to live from the convenience of traffic and the industrial production in the flood plain, the measure that confines the water as much as possible and flows out early has been taken. Moreover, the drainage road (newer rain water sewage separation type) is maintained upper and lower water service for the city resident's drinking water securing, usually decreases the river flow rate in normal circumstances.

River and sewage improvement have designed to have capacity to flow in probability rainfall according to regional importance. Probability rainfalls have have been calculated from rainfall data of meteorological observatory where the data of the amount of rainfall per hour becomes complete for years by the diagram and the expression is made to flow. According to the importance of the basin, kinematical wave method to reflect land-use, reservoir function to reflect dam, or the distribution type model considering saturation etc.

Such rivers have protected to overflow flood up to the probability rainfall , not a few concreted three sides, deep bed though is also the criticism on an environmental side. Where main stream banks are too high to flow down drainage the pumps must be operated to prevent inland water disaster. The city hardened with concrete evaporates at once the moisture of the soil, and becomes it is easy to cause the heat island phenomenon. After 1997 The river law mending, in main river basins plans are researched. Even the overall plan it is assumed to be a public works reduction in nonessential from financial matters, and it is the realities to require the long tract of years.

The flood control that doesn't depend on a dam alone is said, and as for the report of IPCC, an extreme phenomenon such as extremely big rain and winds comes to happen frequently by global warming, and correspondence to the flood that exceeds what decided in year of the probability is requested. Overflow bank, flood hazard maps, river rangers , etc. are taken for the river of general people becomes familiar, but many people are interesting only in own house soak down, own child drowned in a river to death or the purchase of the apartment house landscape etc.

Removing barrier earth science and engineering, it is quite important to catch hazard rainfall by the residents. In the education of the physical geography of the elementary school to be taken, and to change because of not only piling up and the transportation action but also the erosion of the river and diastrophism due to the earthquake. When the danger of becoming it impossibility for my house to run away by being flooded up to the second floor or the levee breach judged because there is a possibility that the house collapses high when hazard rain falls, where outside the house should run away or does it run away to the second floor and does it only have to be given the thing?

Catching and the forecast system of the rainfall go up by improving the concept and the physical forecasting of radar that can catch the narrow zone accuracy, there is a possibility to be able to use if regional reception facilities that can be used with resident's senses are installed. A real-time display of the rainfall and the water level is also advanced, and it is useful for the river user though the observation of the temperature and the wind is little in the diplomatic relation ministry.

Take shelter to a private building such as apartment houses and offices should be likely to be done if there is no public, high building to be near. It is necessary to set the right by sectional surface.

Ohtaki-Dam extreme rainfall experience and rescue training in canoe or fishing are useful to raise five senses to catch hazards rain and flow.

Considering more harmful debris hazards, ground water center flow notion which sucking out soil pore moving up water pressure is important.

Keywords: City flood flow, soil moisture, hazard rainfall, the five senses education, refuge compensation, ground water stream