

A Case of Utilizing Results

Technical matters for introduction of X-band MP Radar observation

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1. Introduction

In recent years, scattered heavy rain and localized heavy rain frequently occur all over Japan and they generated flood damages and water accidents. It is important to understand the heavy rain situation accurately for disaster control measures and weather radars which can receive real time precipitation information in the whole area are highly effective.

Water and Disaster Management Bureau of Ministry of Land, Infrastructure, Transport and Tourism have deployed X-band MP (multi parameter) Radars, the recent model weather radars, and have built a radar observation network called XRAIN intending to enhance image resolution of radar precipitation information and to improve real time processing, thereby enhancing heavy rain observation system and high precision of flood forecasting are underway. XRAIN started its trial operations in 2010 with a network of 11 radars and additional radars were deployed every year thereafter. As of now (2012) a network of 27 radars is implementing trial operations.

2. Establishment of technical matters to introduce X-band MP Radar observation

Radars are the equipment to transmit radio waves and receive the radio waves reflected from precipitation particles group and they do not directly measure the precipitation. The data directly obtained from radars are the strength of radio waves propagated through and reflected from the precipitation particles group and the phase information. Rainfall observation by radars utilizes the characteristics that such information is relevant to the intensity of rainfalls of precipitation particles group. In order to observe precipitation with high precision by radars, it is required to study scan mode such as the elevation angle of antennas and the rotation speed and to conduct the identification operation of calculation parameters of the precipitation and so forth. Manufacture and installation of radars only never achieves precipitation observation with high precision.

There is no precedent in the world to put X-band MP Radars to practical use. Therefore, NILIM, in introducing them, in cooperation with experts of radar

observation, have been conducting studies on design of radar network, building of data processing and delivery system, scan mode and parameter tuning, etc. and also, enhancement of decay compensation and synthesis method. Thus we have been contributing to securement of the specified accuracy of X-band MP Radar observation, to improvement of the accuracy and to establishment of technical matters.

3. Preparation of technical data

Three years have passed since the construction of XRAIN and it is scheduled to proceed to an official operation from the trial operations. Accordingly, the technical data which summarized technical knowledge obtained through the trial operations and assembled the information about observation system by X-band MP Radar, calculation method of precipitation and various study methods were prepared this time.

The first half of the technical data describes the principle specifications of radars, transmission method, signal processing, system structure of XRAIN and calculation method of rainfall intensity as matters related to hardware and software composing XRAIN. The latter half describes selection of radar installation locations, ideas about observation configuration, initial adjustments, various verifications and study methods as matters related to introduction of X-band MP Radars and initial adjustments and verifications.

The technical data are scheduled to be published as NILIM papers. It is expected that the data will be of some help toward technical development concerning future introduction of radars by Regional Development Bureaus and local governments, radar observation and utilization of radar precipitation information.

Moreover, in the future, depending on the progress of research and development of technology, specifications of equipment to be employed by XRAIN and precipitation calculation methods, etc. will possibly be amended and improved and on this occasion, the technical data will be revised accordingly.