

3.4 NEW OPERATION STRATEGIES FOR NATIONWIDE WEATHER RADAR NETWORK IN KOREA

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Operational efficiency of nationwide weather radar network depends on the design of radar operation strategy that involves a combination of various radar scanning strategies and an efficient data processing. Over the last decades, Korea Meteorological Administration (KMA) has employed two fixed scanning strategies with 10 minutes update cycle, which is composed of the volumetric scan (~240km) with 10 12 elevation angles and long-range scan (~480km) of single elevation angle. The elevation angles in the conventional scan strategies were subjectively designed by human experiences. These scanning strategies shows the weakness such as failing to detect a shallow convection or an initiation of convective system that occurred at low altitude below 1km above the ground while they provide three-dimensional structure of deeply developed weather system successfully. In addition, the existing data processing chain is also not suitable for providing an early monitoring of rapidly developing convective system because they start processing a radar data after completion of volumetric scan over all elevation angles. For more effective operation of radar network, we evaluated the current scanning strategies and proposed new scan strategies that are objectively determined based on radar beam propagation simulation. The existing scanning strategies can only cover 24% area below 1km above ground while the coverage of new strategies occupied 47%. New strategies employed more rapid update cycle of 5 minutes and negative elevation angles for more effective monitoring of low level convection. For removal of second trip echo and calibration of system biases in reflectivity and differential reflectivity, we employed an efficient combination of long-, short-range, and vertical pointing observation, and we set up suitable sampling number, quality parameters, and dual-PRF at each elevation angle. The data processing procedure is also changed into fast processing chain based on single sweep in volume scan instead of full volumetric scan. First accessible time of final radar product such as nationwide mosaic was reduced from 20 minutes to 5 minutes after beginning time of radar observation. Furthermore, to increase low level coverage over Seoul metropolitan area, three X-band radar networks have been installed. By combination of S- and X-band radar network, the low coverage of radar network below 1km above ground would be increase from 22% into 94%.

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