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Development of Radar-Satellite Blended QPF (Quantitative Precipitation Forecast) Technique for heavy rainfall

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Abstract:
Due to the recent extreme weather and climate change, a frequency and size of localized heavy rainfall increases and it may bring various hazards including sediment-related disasters, flooding and inundation. To prevent and mitigate damage from such disasters, very short range forecasting and nowcasting of precipitation amounts are very important. Weather radar data very useful in monitoring and forecasting because weather radar has high resolution in spatial and temporal. Generally, extrapolation based on the motion vector is the best method of precipitation forecasting using radar rainfall data for a time frame within a few hours from the present. However, there is a need for improvement due to the radar rainfall being less accurate than rain-gauge on surface. To improve the radar rainfall and to take advantage of the COMS (Communication, Ocean and Meteorological Satellite) data, a technique to blend the different data types for very short range forecasting purposes was developed in the present study. The motion vector of precipitation systems are estimated using 1.5km CAPPI (Constant Altitude Plan Position Indicator) reflectivity by pattern matching method, which indicates the systems' direction and speed of movement and blended radar-COMS rain field is used for initial data. Since the original horizontal resolution of COMS is 4 km while that of radar is about 1 km, spatial downscaling technique is used to downscale the COMS data from 4 to 1 km pixels in order to match with the radar data. The accuracies of rainfall forecasting data were verified utilizing AWS (Automatic Weather System) observed data for an extreme rainfall occurred in the southern part of Korean Peninsula on 25 August 2014. The results of this study will be used as input data for an urban stream real-time flood early warning system and a prediction model of landslide.

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