Automatic Identification of Potential Severe Hydrogeological Disaster Areas through Radar Observations

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The potential severe hydrogeological disaster areas are highly related to convection, which usually result in heavily rain. Doppler weather radar is a useful tool to identify such potential areas due to the advantages of high temporal and spatial resolution of radar. A new algorithm is proposed to identify the potential severe hydrogeological disaster areas by segregating convection, stratiform and bright band (BB). This algorithm works for single radar volume scan data in its nature coordinates. This new algorithm consists of 3 steps: first is to identify convective cores based on the difference of convective and stratiform characteristics in radar observation using several critical criterions such as vertically integrated liquid water (VIL), reflectivity at several levels and horizontal gradient of VIL. Then the whole convective region is delineated using seeded region growing method based on reflectivity and vertical gradient of reflectivity. The rest precipitation area is classified as stratiform. Finally, the BB is delineated out of the stratiform based on the reflectivity. The new algorithm is tested on many events against rain gauges to evaluate the performance of it. When identifying the cases that are relatively easy (e.g. squall line cases), it performs little difference from previous schemes. But when dealing with the challenging cases, such as when the convection is embedded with BB, it performs constantly better than the previous schemes, correctly identify the convective area instead of misclassifying BB as convection. Then the convection areas depicted are the potential severe hydrogeological disaster areas because of the large rain rate caused by convection.

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