A Web-based Precipitation Frequencies Atlas and High Risk Flash Flood Rainstorm Mapping Platform in Xiamen

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To overcome the difficulties in building flash flood early warning system, a method of specifying those sub-areas that are at high risk subject to flash flood in a relatively large region is proposed in this study. The concept of High Risk Flash Flood Rainstorm Area (HRFFRA) is introduced. A HRFFRA is defined as the area potentially under threat by the highest intense-precipitation for a given duration with certain return period that may cause a flash flood event in the region. This paper has presented in detail the development of the High-Risk Flash Flood Rainstorm Area through the application of the Regional L-moments Approach (RLMA) to precipitation frequency analysis in combination with the technique of spatial interpolation. Among others, the concept of hydrometeorologically homogenous region, the precision of frequency analysis in terms of parameter estimation, the accuracy of quantiles in terms of uncertainties and the consistency adjustments of quantiles over durations and space, etc., have been addressed. An example to develop the HRFFRA is demonstrated based on 23 rain-gauge data in Xiamen City in South-East China. The synoptic analysis of prevailing local storm rainfalls as well as field survey of local historical flash flood events are also addressed. An elaborated online visualization system based on Browser/Server (B/S) structure and ASP.NET MVC (Model View Controller) is then designed to display the HRFFRA of Xiamen. HTML5 and JavaScript are used to form the front-end web while C# and SQL are employed as rear-end programming language and database. The visualization system is enabled to interpolate and plot by invoking Surfer, show maps by Baidu map API and demonstrate charts by Highcharts API. Due to simple and friendly interface, the whole system gives a clear and comprehensive way to gain the outcome of frequency analysis by RLMA. By using this system, hydrologic design study investigators and hydrometeorological researchers can improve their work efficiently.