Geophysical Research Abstracts
Vol. 13, EGU2011-2584, 2011
EGU General Assembly 2011

Progress in generalising a new model of rainfall depth-duration-frequency for the UK

Lisa Stewart, Dave Morris, David Jones, and Harry Gibson
Centre for Ecology and Hydrology, Wallingford, United Kingdom (ejs@ceh.ac.uk)

Recent research at the Centre for Ecology & Hydrology (CEH) has developed a new statistical model of point rainfall depth-duration-frequency (DDF) for the UK, to replace the current Flood Estimation Handbook (FEH) DDF model. The new model has been constructed to estimate rainfall depths falling over durations ranging from 1 hour to 192 hours (8 days) for return periods ranging from 2 years to 10,000 years, but in many locations it is capable of producing indicative estimates for higher return periods, up to 100,000 years.

The project was commissioned in response to concerns expressed by reservoir engineers about the apparently high estimates produced by the FEH DDF model when it was applied to return periods in excess of its recommended upper limit of 1,000 years. In many locations the FEH model was giving 10,000-year estimates considerably higher than the currently recommended estimates of probable maximum precipitation, which is used in the computation of the probable maximum flood as a statutory element of the spillway design procedure for major reservoirs. The project was led by CEH and involved collaborators from the Met Office and the Universities of Sheffield and Salford.

Comparisons have been made of rainfall estimates from the new model with those from the existing FEH model for many sites across the UK, including 35 which are close to impounding reservoirs. These show that, generally, estimated rainfalls for the longer return periods are lower in comparison with FEH. However, in Scotland, estimates for the shortest durations have increased. These changes are due, respectively, to an improved treatment of spatial dependence in rainfall extremes and improvements to the hourly rainfall dataset. In the majority of cases, the new 10,000-year estimates are lower than PMP.

The poster reports on ongoing work to generalise the new DDF model so that it can provide estimates of point and catchment rainfall at any location in the UK. A key element of this work is the mapping of a variable known as RMED, the median annual maximum rainfall of a given duration. The mapping exercise has been complicated by the fact that the UK network of daily storage raingauges is far denser than that of recording raingauges, and daily records tend to be longer and more reliable. Preliminary results are presented for an area in Cumbria, north-west England and some of the difficulties inherent in capturing the variability of rainfall in this upland region are demonstrated.