Geophysical Research Abstracts,
Vol. 10, EGU2008-A-05708, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-05708
EGU General Assembly 2008

Comparison of IDF estimation methods at selected locations of mainland Portugal.

D. Veneziano (1), C. Lepore (2,5), M. I. P. de Lima (3,5), A. Langousis (1) and J.L.M.P. de Lima (4,5)

(1) Department of Civil and Environmental Engineering, MIT, Cambridge, U.S.A., (2) Dipartimento di Ingegneria Civile, Università degli studi di Salerno, Fisciano, Italy, (clepore@unisa.it) (3) Departamento Florestal/ESAC, Instituto Politécnico de Coimbra, Bencanta, Portugal, (iplima@mail.esac.pt) (4) Departamento de Engenharia Civil, Universidade de Coimbra, Portugal, (5) Instituto do Mar-Centro Interdisciplinar de Coimbra, Portugal

Rainfall extremes are typically represented by means of Intensity-Duration-Frequency (IDF) curves. Different methods have been developed to estimate these curves from historical rainfall records. These include methods based on annual maxima series (AMS), peaks over threshold (POT) values and marginal distribution information. While annual maximum values are most directly relevant to the IDF values, they have the drawback of reducing one year worth of data to a single value. By contrast, POT and marginal-distribution methods utilize the data more fully, but rely on simplifying assumptions to estimate the IDF curves.

The AMS approach, which is widely used in hydrology, can have different complexities depending on the parameterization and estimation procedure. The method assumes a parametric or nonparametric dependence of the extremes on the return period T and the duration d. There is theoretical and empirical evidence that certain assumptions of the method (e.g. that the multiplicative effect of T is the same for different d) are incorrect.

The POT approach produces results that may be sensitive to the threshold. Also this method requires assumptions, most critically on the type of distribution of the POT values.

Marginal distribution methods assume independence of the rainfall process in non-overlapping d intervals. This assumption generally overestimates the IDF values but is accurate for very long return periods T. Another assumption concerns the form of the marginal distribution, in particular in the upper tail. We have significant empirical evidence that this tail has a lognormal shape. If the rainfall process displays multi-fractal scale invariance, then this condition can be used to regularize the dependence of the marginal distribution on d. In a "hybrid" variant of the marginal method it is possible to include information on the annual maxima.

We compare the above IDF estimation methods at selected sites of mainland Portugal. The rainfall records typically include 20 or more years of high-resolution data and about 60 years of daily precipitation values.

The work is funded by project RISK (High Speed Rail) of the M.I.T.-Portugal Program (MPP) and project POCI/GEO/59712/2004 of the Portuguese Foundation for Science and Technology (FCT).