Geophysical Research Abstracts, Vol. 9, 10031, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-10031

Scale and evaluation of a Poisson-GPD model

M.I. Ortego and J.J. Egozcue

Universitat Politècnica de Catalunya, ETSECCPB, Departament de Matemàtica Aplicada III, Spain. (ma.isabel.ortego@upc.edu)

Goodness of fit testing is a problem of general concern. In the case of hazard problems, extremal distributions are required, e.g. Generalized Pareto distributions (GPD). Then, additional difficulties arise due to the systematic scarcity of data. For instance, estimation of long return periods may strongly depend on the goodness of fit to the extreme model. In order to deal with the unavoidable uncertainty of the results, Bayesian methods are useful and, consequently, a Bayesian assessment of goodness of fit is appropriated.

At the same time, the selection of proper scales to describe phenomena arises as an important issue. Lots of phenomena are better described by a relative scale (e.g. positive data where the null value is unattainable) and are thus suitably treated in a logarithmic scale. Logarithmic scale has been used successfully for ocean-wave-height, and seems to be also adequate for daily rainfall data. A new question then arises: which scale, raw or logarithmic, does provide better fit of the GPD model to the data?

Validation of the results requires goodness of fit testing. In a Bayesian framework, two approaches are selected to check the model: the predictive$p$-value and the Bayesian$p$-value model checking. Both approaches evaluate discrepancies between the model and observed data. These issues are illustrated using a set of 30 years daily rainfall data from Vergel de Recons, Spain. Hazard assessment of the rainfall data set is carried out with a standard model. Time-occurrence of events is assumed to be Poisson distributed, and the magnitude of each event is modelled as a random variable which upper tail is described by a GPD. Independence between this magnitude and occurrence in time is assumed, as well as independence from event to event. A Bayesian joint estimation of parameters (Poisson rate, scale and shape of the GPD) using BGPE, is carried out. Results of goodness of fit are discussed with reference to data scaling and GPD domain of attraction.