On the Cosmetics of Exceedance Point Process and Related Theory since 1983

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Abstract: The time surrounding the seminal Vimeiro meeting was one of considerable activity for the development of limit theory for exceedances of extreme levels by stationary sequences, extending the Poisson limiting results listed for example in the monograph [1]. In particular T. Hsing, J. Huesler, and the present speaker) extended the Poisson results to deal with stationary sequences having higher local dependence. These included, for example, Compound Poisson limits for exceedances when the “extremal index” exists but may be less than one, the multiplicities then arising from coalescing of exceedance clusters. The toolkit for these results (published in 1988 and 1990) was largely provided by the account of Random Measure theory provided in the then quite recent comprehensive (indeed “biblical”) work and book by O. Kallenberg. Since that time we have incorporated these and a variety of subsequently developed related results, into lectures on Extreme Value Theory given periodically for graduate students. These include for example discussions of cluster positions, of excess values in clusters (relevant to tail estimation), maximum values in clusters (“Peaks over Thresholds”) and their relationships with domain of attraction criteria. This body of related results now has a “geodesic treatment” which seems natural to us, extending certain topics in [1]. We take this opportunity to revisit this sequence of results in its more complete form, recognizing that others may use similar or more extended treatments in their classes (or even publications of which we are unaware!).

References