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Verification of radar precipitation nowcasting of significant areas using the generalized Pareto distribution. Part 1: Elements of theory and methods for estimating parameters / Muravev A.V., Bundel A.Yu., Kiktev D.B., Smirnov A.V. // *Hydrometeorological Research and Forecasting*, 2022, no. 3 (385), pp. 6-41.

The assessments of nowcasting of large precipitation areas accumulated in the last few years at the Hydrometeorological Research Center of the Russian Federation are presented in two parts complemented by a discussion of methodological problems in the first part and application problems in the second part of the paper. The division is largely due to the sharp distinction between the theoretical modeling of extremes with a relatively free choice of assumptions and the statistical analysis of the distribution "tails" in rapidly "impoverishing" samples. The contrast between these parts is exacerbated by the responsibility we attribute to the statistical inference relating to extreme and, as a rule, dangerous events. The first part deals with the description of two classical models of the extreme value theory for independent one-dimensional random variables ("block maxima") and for threshold exceedances in stationary time series ("peaks over threshold"). The article explores problems arising from violation of the theoretical results and carries a brief overview of the methods of addressing such problems when extremes are modeled using real data, including those from the field of meteorology. Special attention is given to the distributions with "heavy" tails. Methods and formulas for estimating important characteristics, including the parameters of limiting distributions, are discussed that are borrowed from the references in the documentation of computational mathematical packages of the R language repository.

Keywords: precipitation nowcasting, extreme value theory, statistical modeling of extremes, heavy distribution tails, mathematical packages for fitting extreme value distributions

Tab. 2. Fig. 3. Ref. 63.