

## **EXTREME VALUE AND MULTINOMIAL DISTRIBUTIONS FOR SCALING BIOSTRATIGRAPHIC EVENTS**

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The program RASC for automatic positioning of biostratigraphic events is based on first or last occurrences of characteristic fossils in logs, which are assumed to follow a gaussian distribution. The mean of the distribution associated to each fossil is identified with its relative position in time.

In practise, it is not possible to determine the real distribution of either first or last occurrences of a fossil due to scarcity of samples, but it can be assumed that it is in general non-symmetric and thus non-gaussian. Therefore, it seems reasonable to substitute the gaussian with extreme value distributions, which are considered in statistical literature to be the most adequate available models for modelling first and last occurrences. To do so, it is been necessary to use Fourier transforms and numerical integration. An alternative consists in using a multinomial distribution, where the unknown parameters are the position in time. Estimation can then be performed using a maximum likelihood approach. Using the multinomial model it is also possible to formulate a generalised likelihood-ratio test to compare different models.

The different models have been applied both to real and simulated data. As expected, results are very similar for small samples, while for larger samples significant differences can appear.