

# RAINBOW

## A software package for hydrometeorological frequency analysis and testing the homogeneity of historical data sets



A common problem in many areas of water resources engineering is that of analyzing hydrological and meteorological events for planning and design projects. For these purposes, information is required on rainfall events, flow depths, discharges, evapotranspiration levels, etc. that can be expected for a selected probability or return period. With the help of the software package RAINBOW the magnitudes for such events can be estimated by means of a frequency analysis on historical data.

**Frequency analysis:** When opting for a frequency analysis, a menu is opened which contains various folders where a probability distribution can be selected, the data transformed, and results can be viewed or saved on disk:

- Apart from graphical methods (Probability plot and a Histogram of the data superimposed by the selected probability function) for evaluating the goodness of fit, RAINBOW offers also statistical tests for investigating whether data follow a certain distribution (Chi-square and the Kolmogorov-Smirnov test);
- When the goodness-of-fit is inadequate, one can either select another distribution or attempt to normalize the data by selecting a mathematical operator to transform the data;
- RAINBOW allows also to analyse time-series with zero or near zero events (the so called nil values) by separating temporarily the nil values from the non-nil values. By calculating the global probability, the nil and no-nil rainfall are combined again;
- When the probability distribution can be accepted, the user can view the calculated events that can be expected for selected probabilities or return periods.

**Homogeneity test:** Frequency analysis of data requires that the data be homogeneous and independent. The restriction of homogeneity assures that the observations are from the same population. RAINBOW offers a test of homogeneity which is based on the cumulative deviations from the mean.

The RAINBOW software itself is easy to install and use. It is menu driven and no specific computer knowledge is required. The software is freely available on the web.

TO DOWNLOAD: <http://www.iupware.be>  
and select downloads and next software and manuals

For further information please contact [dirk.raes@ees.kuleuven.be](mailto:dirk.raes@ees.kuleuven.be)

### **References:**

- Raes, D., Willems, P. and GBaguidi, F. 2006. RAINBOW – a software package for analyzing data and testing the homogeneity of historical data sets. Proceedings of the 4th International Workshop on ‘Sustainable management of marginal drylands’. Islamabad, Pakistan, 27-31 January 2006: 41-55.
- Raes, D., D. Mallants and Z. Song. 1996. RAINBOW – a software package for analysing hydrologic data. In W.R.Blain (Ed.) Hydraulic Engineering Software VI. Computational Mechanics Publications, Southampton, Boston: 525 – 534.