Multivariate flood analysis based on copula and parametric and non-parametric distributions

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flood data: flood is described by three variables: volume, peak and duration

Use 17 marginal distributions:

the Kolmogorov-Smirnov goodness-of-fit test

Is the distribution acceptable?

No — Choose another distribution

Yes — Choose the main marginal distribution for each flood variable

26 Copula functions

Employing the goodness-of-fit metrics for evaluation of the copula families: AIC, BIC, MLE, NSE and RMSE

Flood pairs		Copula	AIC	BIC	MLE	NSE	RMSE
peak-duration	1	Raftery	-600.45	-598.07	301.23	0.9906	0.2072
	2	BB1	-596.65	-591.89	300.33	0.9904	0.2095
	3	Fischer-Kock	-590.74	-585.98	297.37	0.9897	0.2174
	4	AMH	-588.93	-586.55	295.46	0.9892	0.2226
	5	Fischer-Hinzmann	-587.36	-582.60	295.68	0.9892	0.2220
peak-volume	1	Roch-Alegre	-612.03	-607.27	308.02	0.9937	0.1903
	2	BB1	-611.20	-606.44	307.60	0.9937	0.1913
	3	Plackett	-605.56	-603.18	303.78	0.9931	0.2006
	4	Tawn	-592.69	-585.55	299.35	0.9922	0.2121
	5	BB5	-591.20	-586.43	297.60	0.9919	0.2168
duration-volume	1	BB1	-611.20	-606.44	307.60	0.9913	0.2288
	2	Raftery	-590.02	-587.64	296.01	0.9905	0.2389
	3	Roch-Alegre	-612.03	-607.27	308.02	0.9901	0.2432
	4	Plackett	-553.20	-550.81	277.60	0.9871	0.2783
	5	Fischer-Hinzmann	-549.59	-544.83	276.80	0.9868	0.2811

Choose the best copula for each variable

Copula functions

Flood data

Create conditional probability distributions

The Bayesian method

Analyse flood data