

COPULAS: FIGURES

An aerial photograph of a residential neighborhood that has been completely inundated with floodwater. The water is a murky, brownish-grey color, covering the streets, yards, and surrounding areas. Numerous houses with various roof colors (brown, grey, red) are visible, partially submerged. Green trees are scattered throughout the landscape, their lower branches and leaves underwater. A central street runs vertically through the middle of the image, with a few cars visible in the water. In the upper right corner, a green golf course is partially visible, also surrounded by floodwater. The overall scene depicts a severe flooding event in a suburban area.

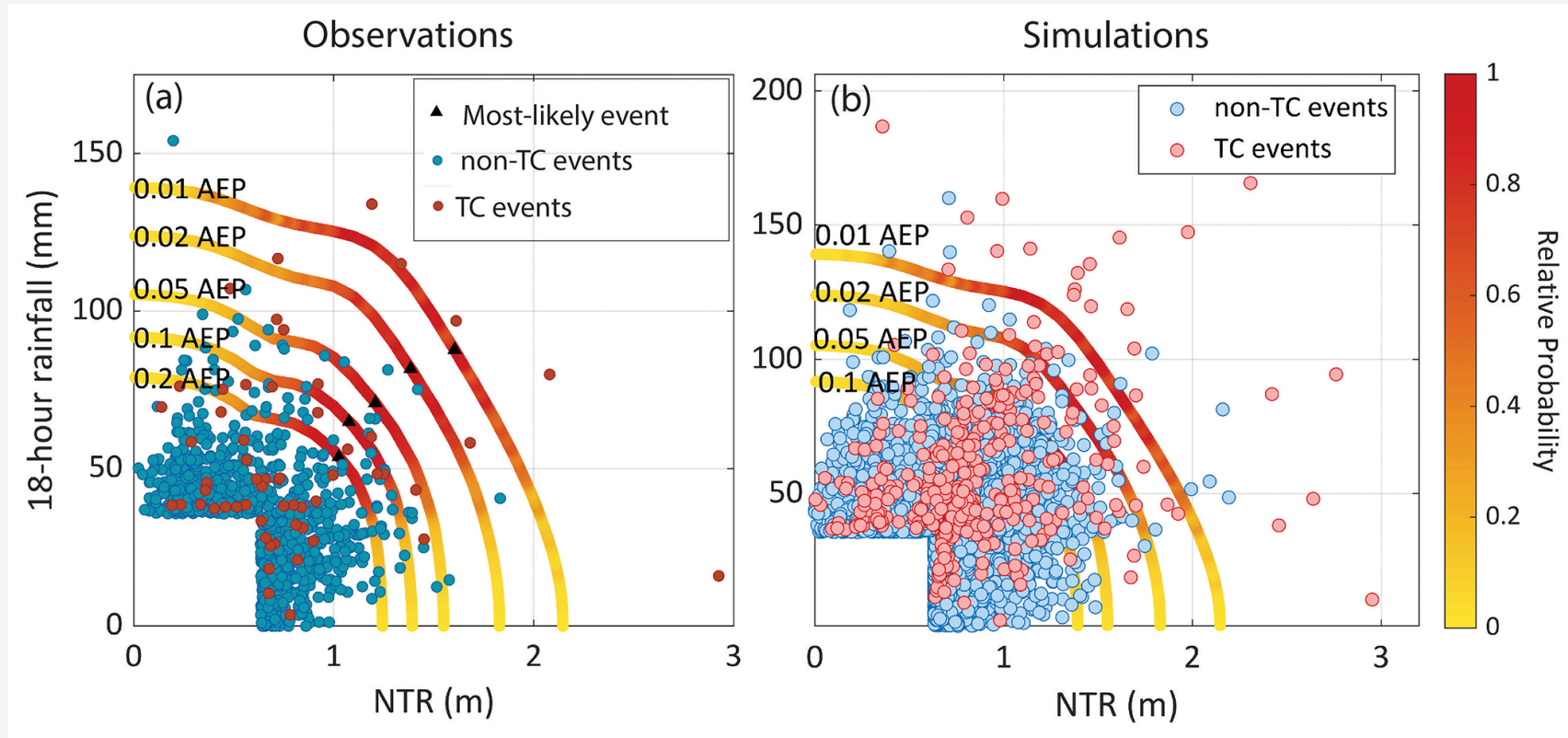
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CEVE 543

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Draft. This page is unfinished and will change.

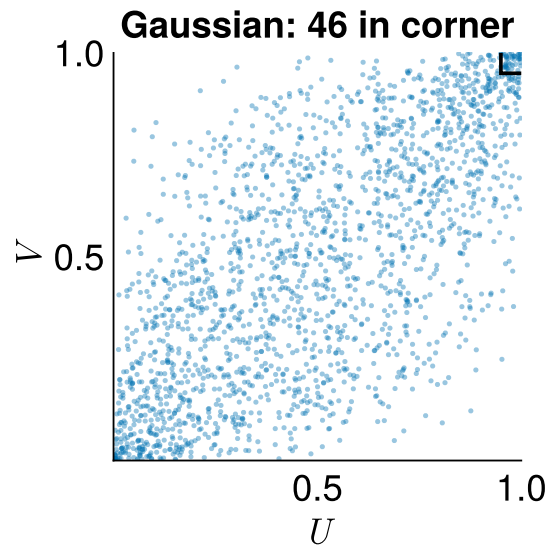
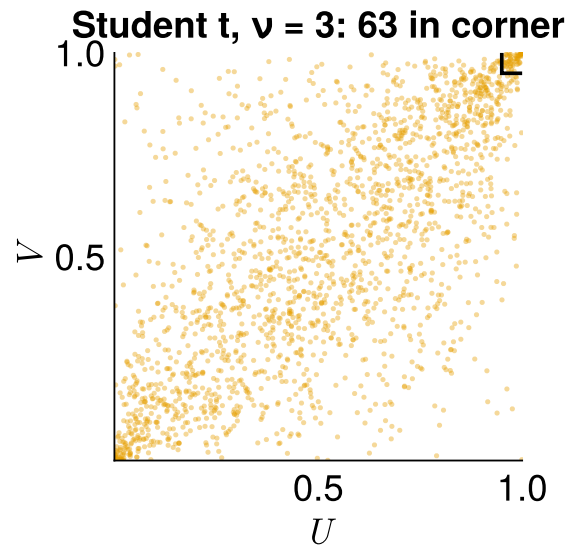
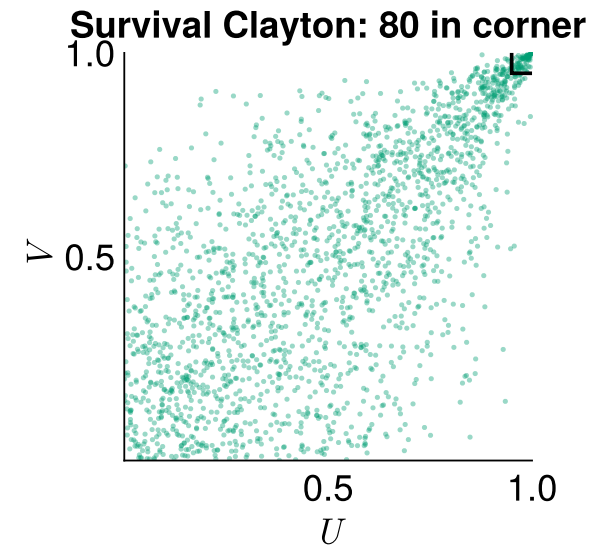
EQUAL-EXCEEDANCE CURVES AND THE DENSITY ALONG THEM



Joint exceedance isolines at Gloucester City, NJ. Maduwantha et al. (2026), Fig. 3 (CC BY 4.0).

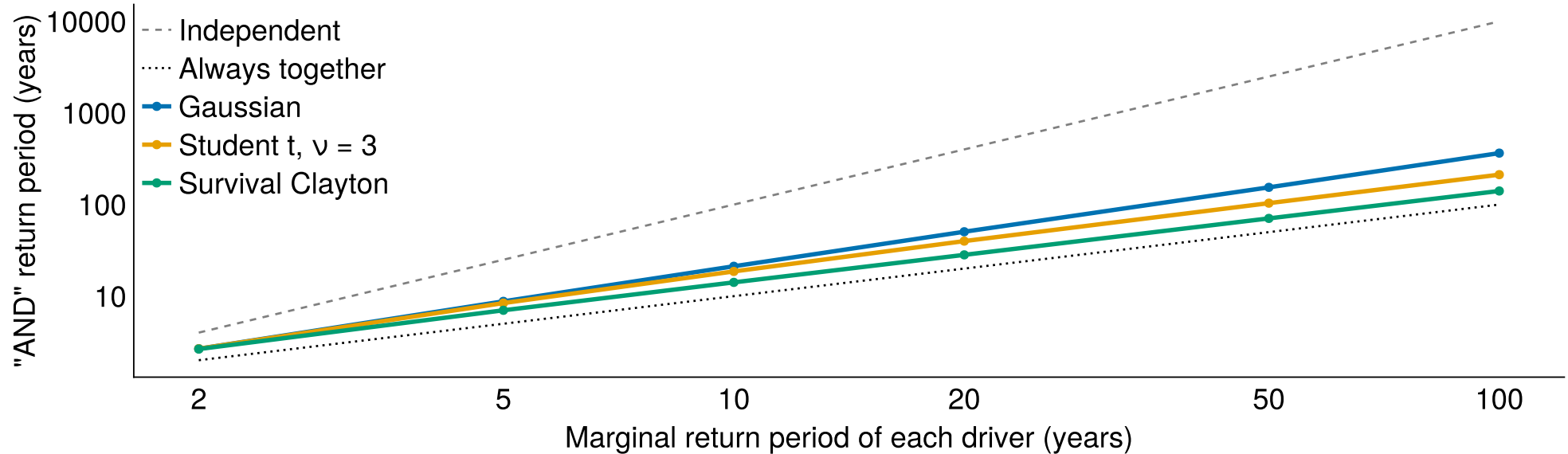
COPULAS WITH EQUAL KENDALL'S τ DIFFER IN THE UPPER CORNER

2000 pairs per copula, all with Kendall's $\tau = 0.5$. The box is where both pass their 95th percentile; independence would put about 5 there. Adapted from Papalexiou et al. (2023), Fig. A1.



“AND” RETURN PERIODS DIVERGE IN THE TAIL

All three copulas have Kendall's $\tau = 0.5$, with a million simulated pairs each. Couasnon et al. (2020), Fig. 7, finds the same pattern for river discharge and storm surge.



COPULA FAMILIES DIFFER IN THEIR TAILS

Group	Family	Upper tail	Lower tail
Elliptical	Gaussian	none	none
	Student t	yes	yes, equal
Archimedean	Clayton	none	yes
	Gumbel	yes	none
	Frank	none	none

Rotating a copula by 180° , using $1 - U$ and $1 - V$, swaps its tails, so survival Clayton has upper tail dependence.