

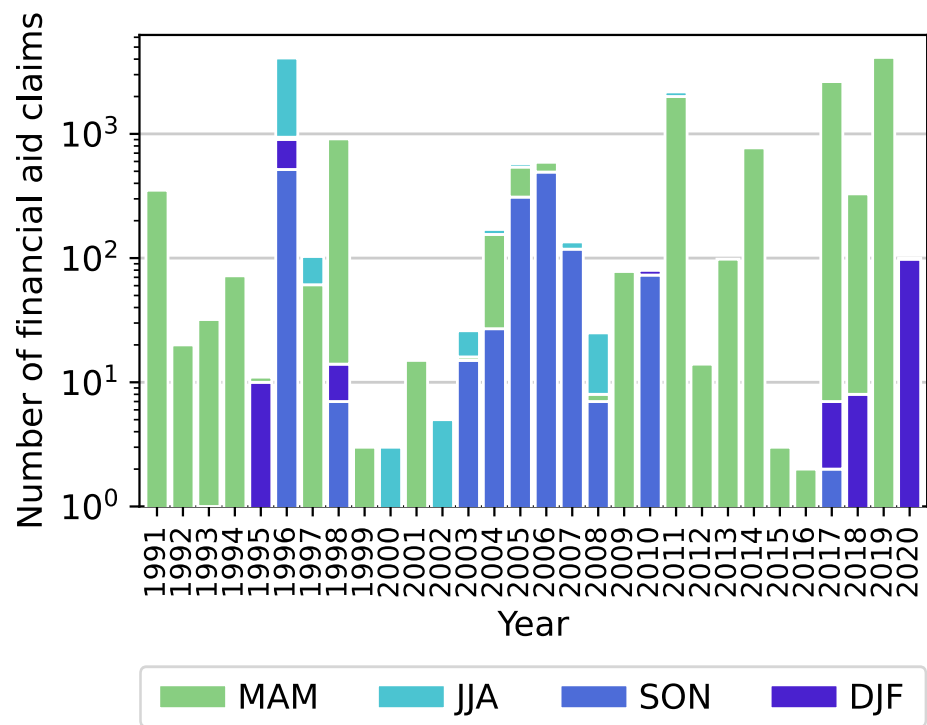


Figure S1. Financial aid claims in the EVE database by year and season between 1991 and 2020

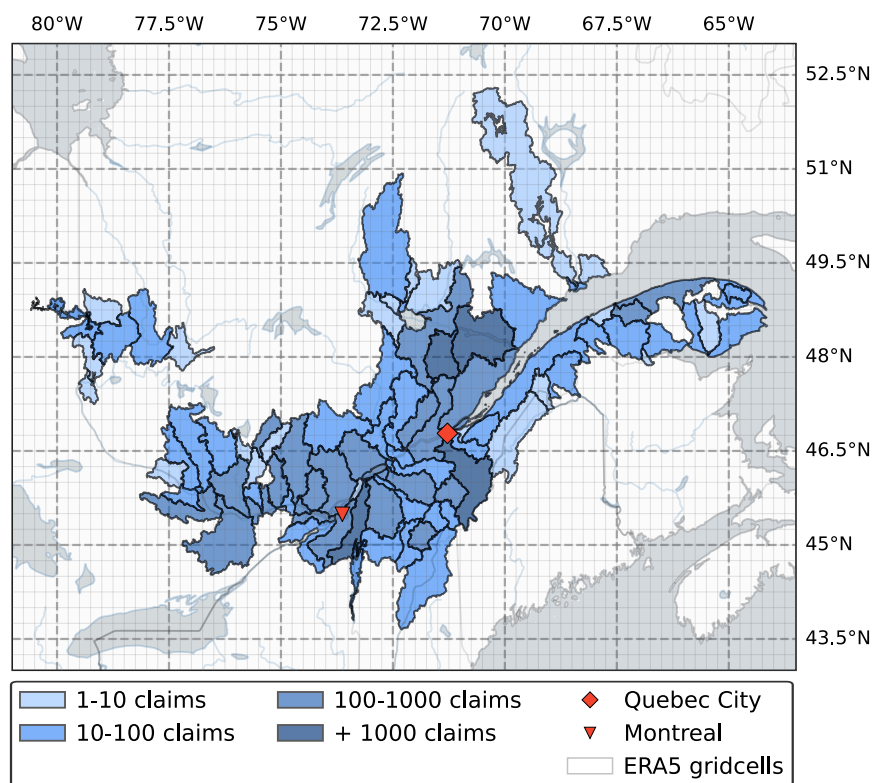


Figure S2. Watersheds used in the study and their financial aid claims and most populous cities of the province of Quebec

Table S1. Scenarios and their variables for the sensitivity analysis, differences in variables from the control case are shown in bold.

Scenario	Search radius (km)	Time interval between SSP and SOF (days)	Minimum threshold for flood ETCs	Number of flood ETCs identified	Median ETC Contribution to floods
Control	1,000	15	10 %	158	66.1 %
Radius	750	15	10 %	131	44.6 %
Days	1,000	10	10 %	157	63.9 %
Threshold	1,000	15	15 %	133	66.1 %

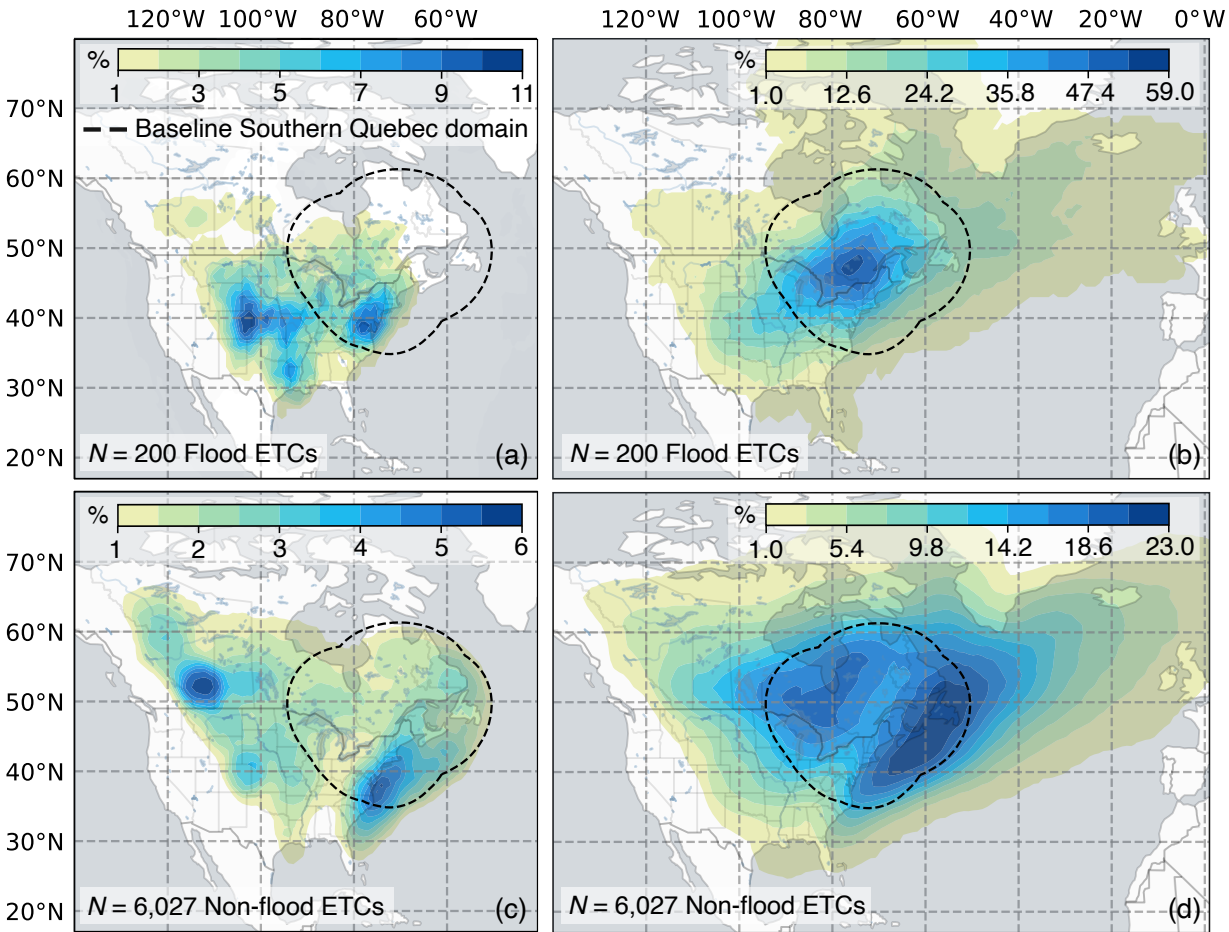


Figure S3. (a) Cyclogenesis locations density map for flood ETCs. (b) Track density map for flood ETCs. (c) Cyclogenesis locations density map for non-flood ETCs. (d) Track density map for non-flood ETCs. The Baseline Southern Quebec search domain is shown in dashed black; the colour scale indicates the density (as a percentage of total storms for the sub-plot tracking/generating within 350 km of grid points) from highest (dark) to lowest (light).

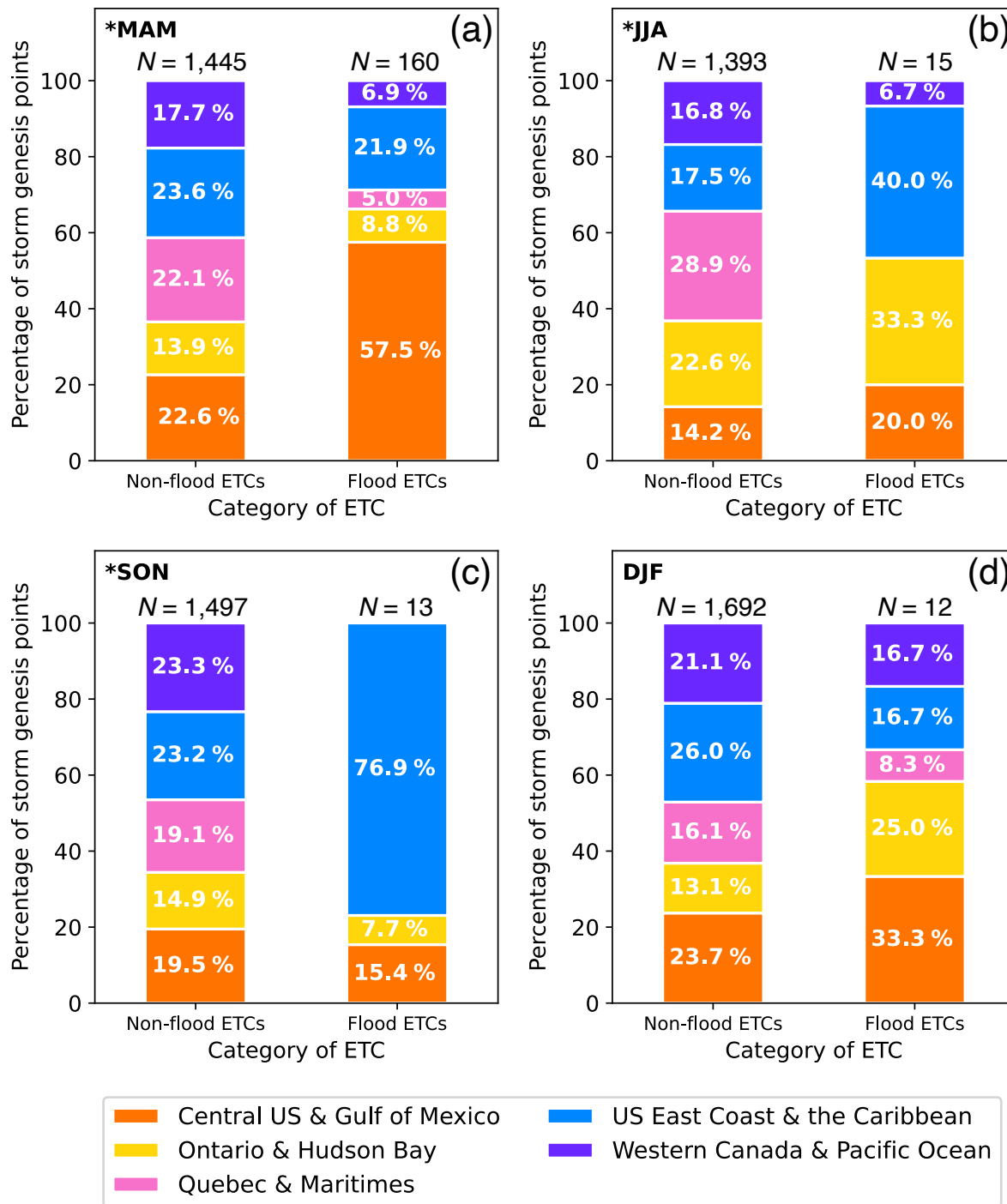


Figure S4. Comparison of the distribution of genesis location percentages for the two categories of ETCs, by season. Statistically significant differences between the two groups of storms (non-flood ETCs vs flood ETCs) by season are shown by an * preceding the season shown.

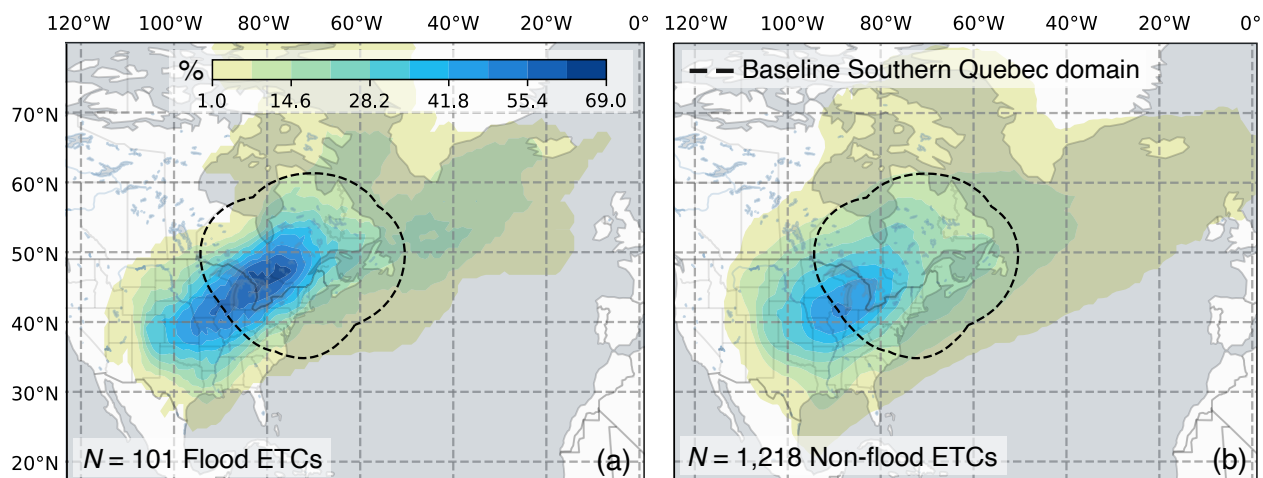


Figure S5. (a) Track density map for Central US & Gulf of Mexico flood ETCs. (b) Track density map for Central US & Gulf of Mexico non-flood ETCs. The Baseline Southern Quebec search domain is shown in dashed black; the colour scale indicates the density (as a percentage of total storms for the sub-plot tracking/generating within 350 km of grid points) from highest (dark) to lowest (light).

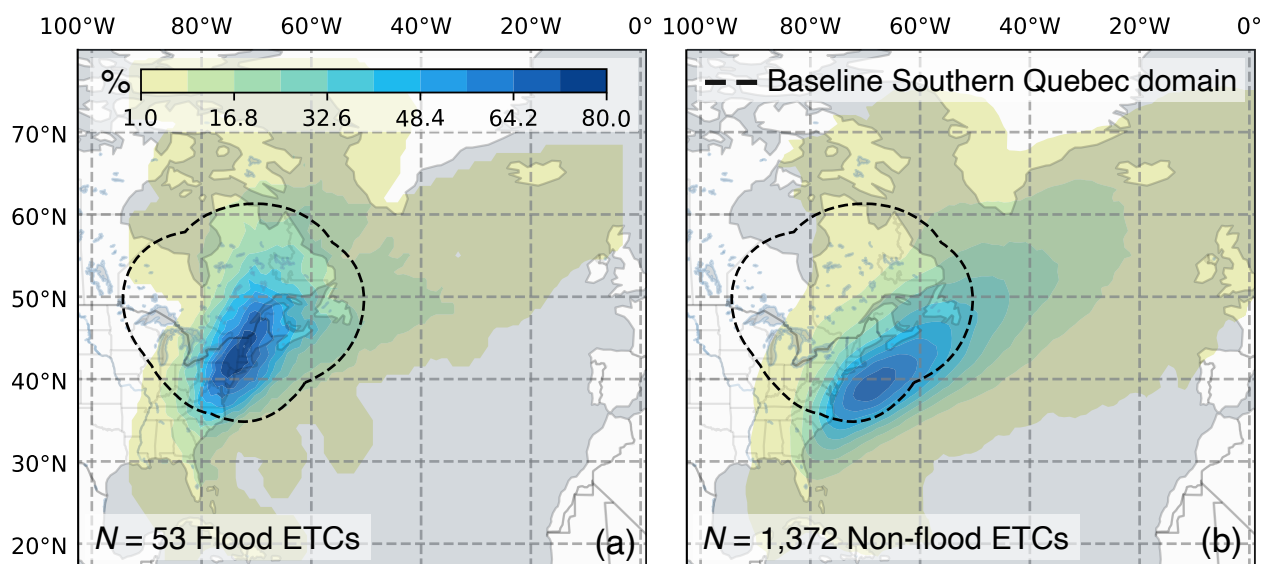


Figure S6. (a) Track density map for US east coast & the Caribbean flood ETCs. (b) Track density map for US east coast & the Caribbean non-flood ETCs. The Baseline Southern Quebec search domain is shown in dashed black; the colour scale indicates the density (as a percentage of total storms for the sub-plot tracking/generating within 350 km of grid points) from highest (dark) to lowest (light).

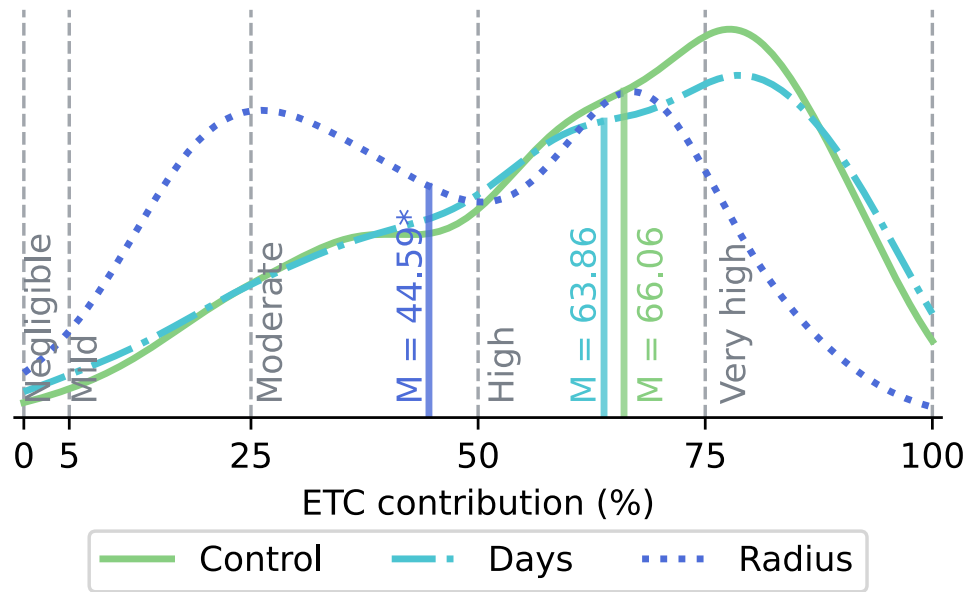


Figure S7. Distribution of ETC contribution for two scenarios (days and radius) compared to the control case for MAM floods ($N = 372$). Medians (M) per distribution are indicated by the vertical lines. An asterix (*) indicates a distribution statistically significantly unique from the others.

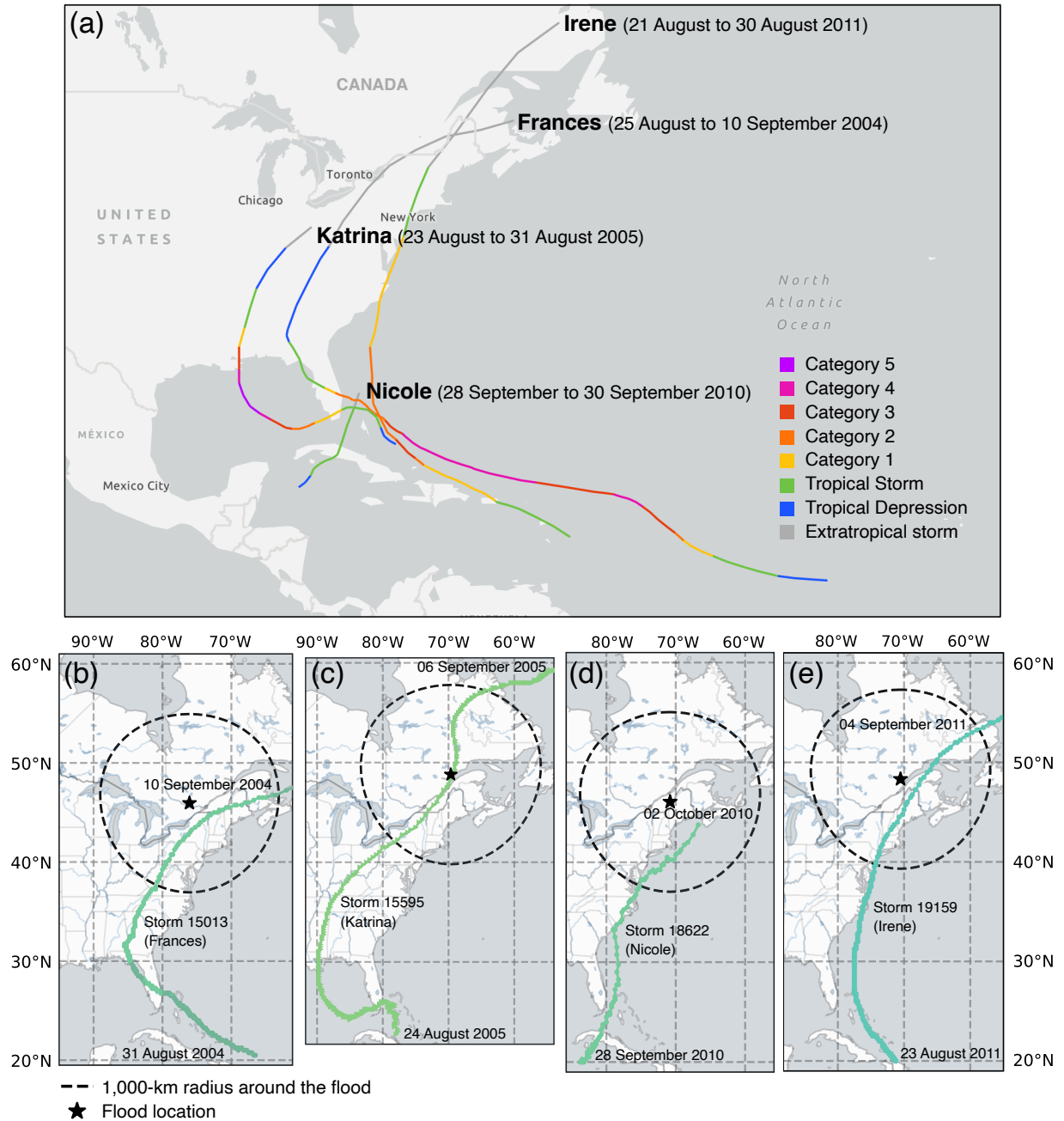


Figure S8: Extratropical transition storms among identified flood ETCs. (a) Tracks of Frances (2005), Katrina (2005), Nicole (2010), and Irene (2011) and their categories, adapted from (NOAA 2025a; NOAA 2025b; NOAA 2025c; NOAA 2025d). (b) Track of flood ETC 15013 (corresponding to Frances). (c) Track of flood ETC 15595 (corresponding to Katrina). (d) Track of flood ETC 18622 (corresponding to Nicole). (e) Track of flood ETC 19159 (corresponding to Irene). First and last lifetimes of storms from the NAEC Catalogue are indicated on figs (b)–(e).

References

NOAA. Frances 2004:

NOAA. Irene 2011: <https://coast.noaa.gov/hurricanes/#map=2.91/36.26/-68.25&search=eyJzZWZyY2htdHJpbmciOiJJUkVORSAyMDExIiwic2VhcnNoVHlwZSI6Im5hbWUiLCJtYXRjaCI6ImV4YWNoIiwie2F0ZWdvcmllcyI6WyJINSIsIkgtIiwidSdmIlCJMlMiIsIkxgX2VhcnNoVHlwZSI6Im5hbWUiLCJURCI6Im5hbWUiOjEwInRlcjEiOiJjbXBwMDMwXSswiaW5jbHkZVVua25vd25QcmVze3VyZSI6dHJlZX0sImJlZmZleGVuaXQiOlsiTWlsZXMiXSswic29ydFNlbG9jdGlvbml6eyJ2YWxlZSI6InllYXJzX25ld2VzdClmXHMvbmVsljojWWVhcioAoTmV3ZXN0KSJ9LChhcHBseVRvQU9JIjpmaW5kZSwiaXNTdG9ybUxhYmVsc1Zpc2libGUionOnRydWV9>, last access: 20 October 2025b.

NOAA. Katrina 2005:

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