

Supplementary material of “ATDT v1.0 - Attribution Tool for Daily-to-monthly Temperatures and its application to record-breaking Northern European heatwave of July 2025”

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Supplementary tables

Table S1. The CMIP6 simulations that were used in calculating the regression coefficients B_n and D_n (see Eqs. 2 and 3). Model acronyms follow those in <https://metagrid.esgf-west.org/search/cmip6/>. Historical simulations for the years 1900-2014 were concatenated with the SSP-scenarios of the same realization for the years 2015-2100. The default scenario used in this article is **Hist+SSP2-4.5**. The choice of models and realizations was based on data availability in the summer of 2025. Letter **X** corresponds to the realization given in the column **Realization** and letter **O** corresponds to the realization r4i1p1f1. Colors blue, black and red correspond to daily minimum, mean and maximum temperatures, respectively.

Model	Realization	Hist+ SSP1-1.9	Hist+ SSP1-2.6	Hist+ SSP2-4.5	Hist+ SSP3-7.0	Hist+ SSP5-8.5
ACCESS-CM2	r1i1p1f1		X X X	X X X	X X X	X X X
ACCESS-ESM1-5	r1i1p1f1		X X X	X X X	X X X	X X X
AWI-CM-1-1-MR	r1i1p1f1		X X X	X X X	X X X	X X X
BCC-CSM2-MR	r1i1p1f1		X X X	X X X	X X X	X X X
CAMS-CMS1-0	r2i1p1f1	X X	X X	X X	X X	X X
CanESM5	r1i1p1f1	X X X	X X X	X X X	X X X	X X X
CESM2	r1i1p1f1		X	X	X	X
CESM2-WACCM	r1i1p1f1		X	X	X	X
CMCC-CM2-SR5	r1i1p1f2		X X X	X X X	X X X	X X X
CNRM-ESM2-1	r1i1p1f2		X X X	X X X	X X X	X X X
EC-Earth3	r1i1p1f1	O O O	X X X	X X X	X X X	X X X
EC-Earth3-Veg-LR	r1i1p1f1	X X X	X X X	X X X	X X X	X X X
EC-Earth3-Veg	r1i1p1f1	X X X	X X X	X X X	X X X	X X X
FGOALS-g3	r1i1p1f1	X X X	X X X	X X X	X X X	X X X
GFDL-ESM4	r1i1p1f1	X X X	X X X	X X X	X X X	X X X
HadGEM3-GC31-LL	r1i1p1f3		X X X	X X X		X X X
INM-CM4-8	r1i1p1f1		X X X	X X X	X X X	X X X
INM-CM5-0	r1i1p1f1		X X X	X X X	X X X	X X X
IPSL-CM6A-LR	r1i1p1f1	X X X	X X X	X X X	X X X	X X X
KACE-1-0-G	r1i1p1f1		X X X	X X X	X X X	X X X

MIROC6	r1i1p1f1	X X X	X X X	X X X	X X X	X X X
MIROC-ESL2	r1i1p1f2	X X X	X X X	X X X	X X X	X X X
MPI-ESM1-2-HR	r1i1p1f1		X X X	X X X	X X X	X X X
MPI-ESM1-2-LR	r1i1p1f1	X X X	X X X	X X X	X X X	X X X
MRI-ESM1-2-0	r1i1p1f1	X X X	X X X	X X X	X X X	X X X
NESM3	r1i1p1f1		X X X	X X X		X X X
NorESM2-LM	r1i1p1f1		X X X	X X X	X X X	X X X
NorESM2-MM	r1i1p1f1		X X X	X X X	X X X	X X X
TaiESM1	r1i1p1f1		X X X	X X X	X X X	X X X
UKESM1-0-LL	r1i1p1f2	X X X	X X X	X X X	X X X	X X X
Number of models		13 14 14	28 31 29	28 31 29	26 29 27	28 31 29

Supplementary figures

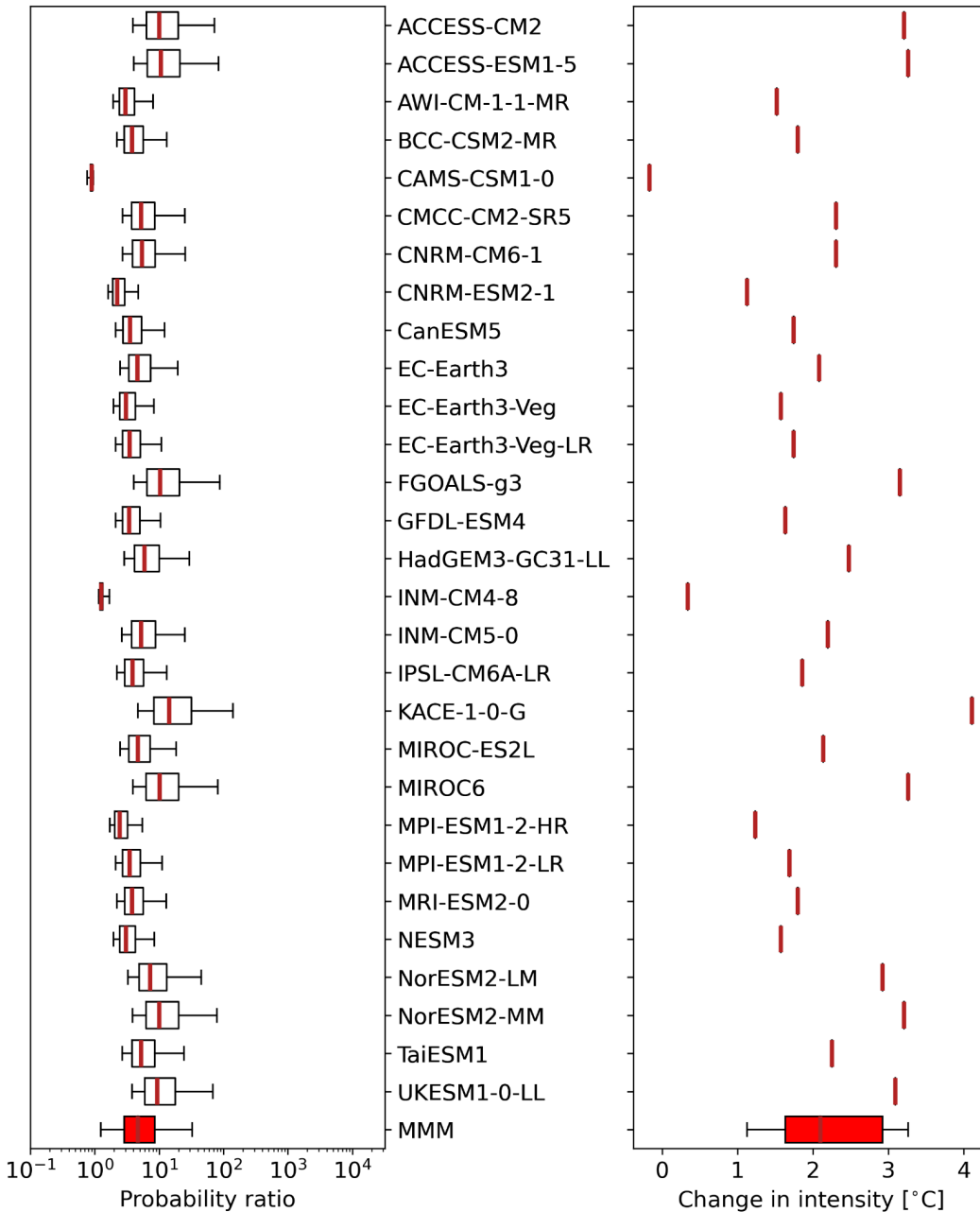


Figure S1. Model-specific probability ratios and intensity changes of 14-day average maximum temperature for the time-period of 12-25 July, 2025 in Sodankylä, Finland. The uncertainty in the probability ratio values results from bootstrap sampling of quantiles. No uncertainty estimates are provided for the intensity changes in the individual models because only one realization per model was used to calculate the regression coefficients. The boxes show the first and third quartiles and whiskers show the 5-95th percentiles of the realization. MMM at the bottom row refers to the multi-model mean estimate.

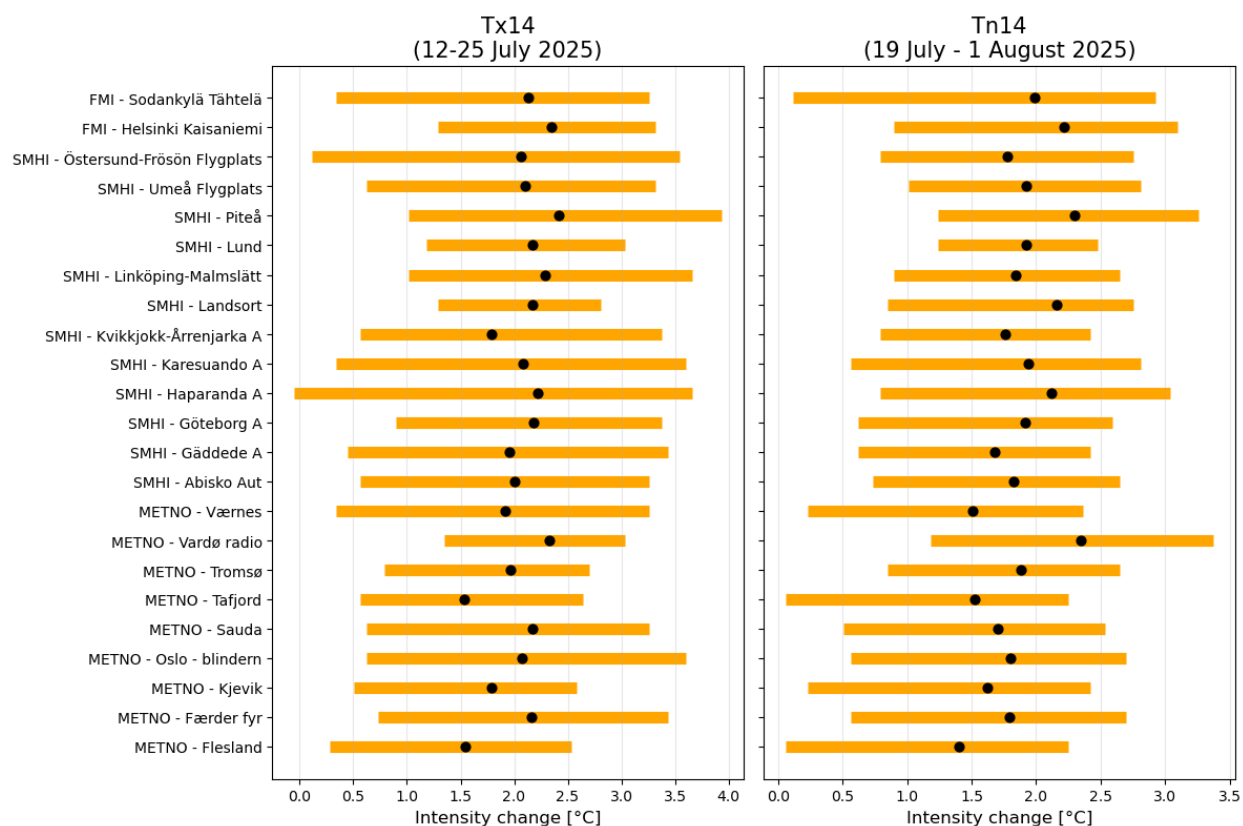


Figure S2. Station-specific ΔI s (black dots) and their 5-95 % confidence intervals (orange shading) for the Tx14 and Tn14 events. Confidence limits were obtained from 29,000 bootstrap samples.

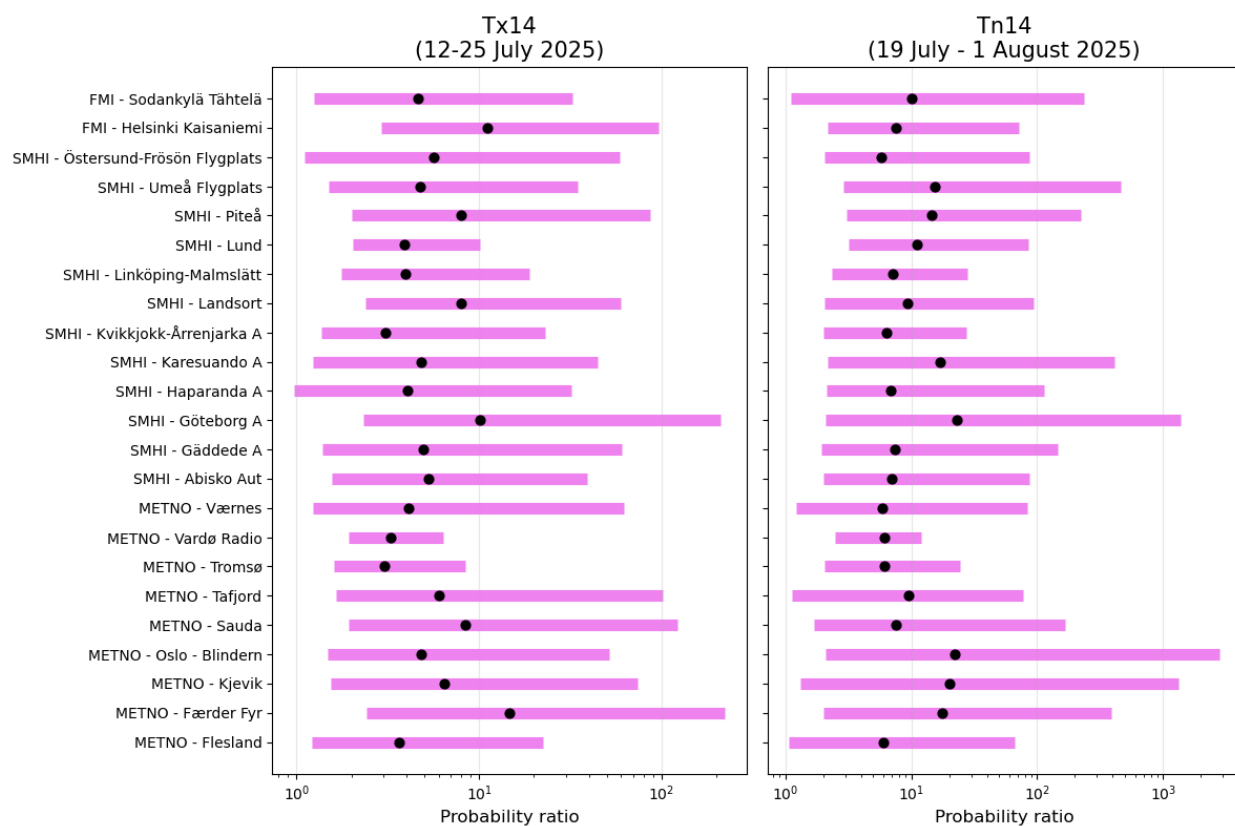


Figure S3. Station-specific PRs (black dots) and their 5-95 % confidence intervals (purple shading) for the Tx14 and Tn14 events. Confidence limits were obtained from 29,000 bootstrap samples.