

Knaappila A., Lindberg H., Tanskanen H., Aakala T. (2026). Ignition probability and fire size in Finnish boreal forests: a nationwide analysis of 10 years of rescue services data. *Silva Fennica* vol. 60 no. 3 article id 26006. <https://doi.org/10.14214/sf.26006>

Supplementary file S3. Spatial sensitivity analyses

As a sensitivity analysis, additional models including a two-dimensional smooth of spatial coordinates, s(easting, northing), were fitted for both ignition probability and fire size. Inclusion of the spatial term reduced the magnitude of autocorrelation, but the distance-dependent pattern remained largely unchanged. It had little influence on the estimated effects of the explanatory variables and did not alter the main conclusions. Some attenuation of the effects of population density and distance to nearest road was observed, particularly in the ignition probability model, suggesting potential spatial confounding between the terms. Therefore, the non-spatial models are reported as the primary models.

1 Relative ignition probability

Table 1. Comparison of non-spatial and spatial ignition probability models.

Model	Non-spatial		Spatial	
Deviance explained	51.6%		54.5%	
Classification accuracy	83.7%		85.1%	
	χ^2	p-value	χ^2	p-value
s(population density)	1567.8	<0.001	474.7	<0.001
s(day of year)	1565.6	<0.001	1491.3	<0.001
s(canopy cover)	679.3	<0.001	723.7	<0.001
s(easting, northing)	—	—	707.6	<0.001
trafficability	317.9	<0.001	256.4	<0.001
distance to nearest road	147.0	<0.001	40.5	<0.001
s(slope)	126.3	<0.001	88.6	<0.001
dominant species	0.5	0.918	2.8	0.426

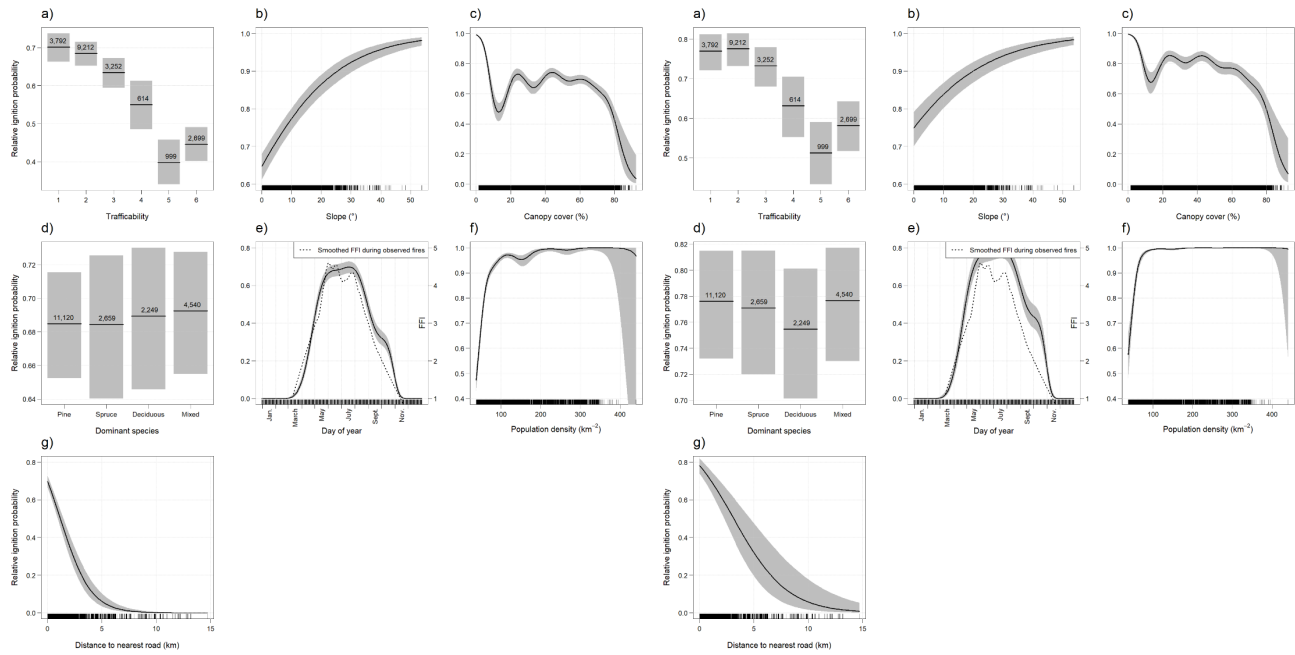


Fig 1. Response of relative ignition probability to predictor variables. The non-spatial model is shown in the left panels and the spatial model in the right panels.

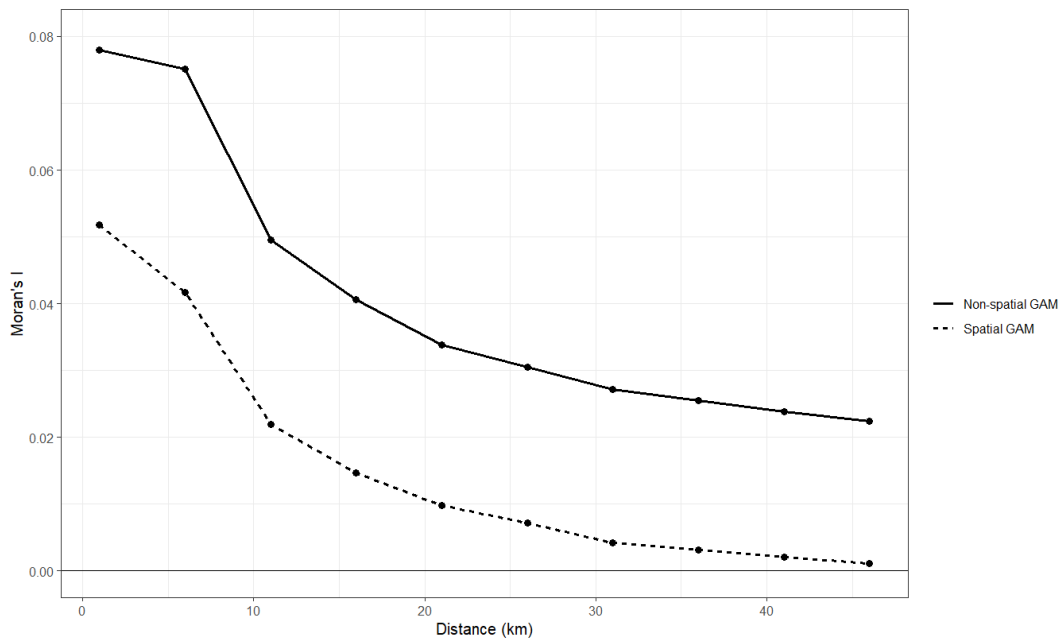


Fig 2. Moran's I correlograms showing spatial autocorrelation of residuals for the non-spatial and spatial ignition probability models.

2 Fire size

Table 2. Comparison of non-spatial and spatial fire size models.

Model	Non-spatial		Spatial	
Deviance explained	21.5%		24.0%	
	F	p-value	F	p-value
s(population density)	121.7	<0.001	85.7	<0.001
distance to nearest road	76.7	<0.001	52.7	<0.001
ignition cause	76.0	<0.001	62.8	<0.001
s(day of year)	48.2	<0.001	49.9	<0.001
s(Finnish Forest Fire Index)	22.7	<0.001	22.4	<0.001
s(easting, northing)	—	—	11.3	<0.001
trafficability	8.5	<0.001	8.0	<0.001
s(canopy cover)	6.8	<0.001	3.8	<0.001
dominant species	6.6	<0.001	8.0	<0.001
slope	1.0	0.309	2.2	0.140

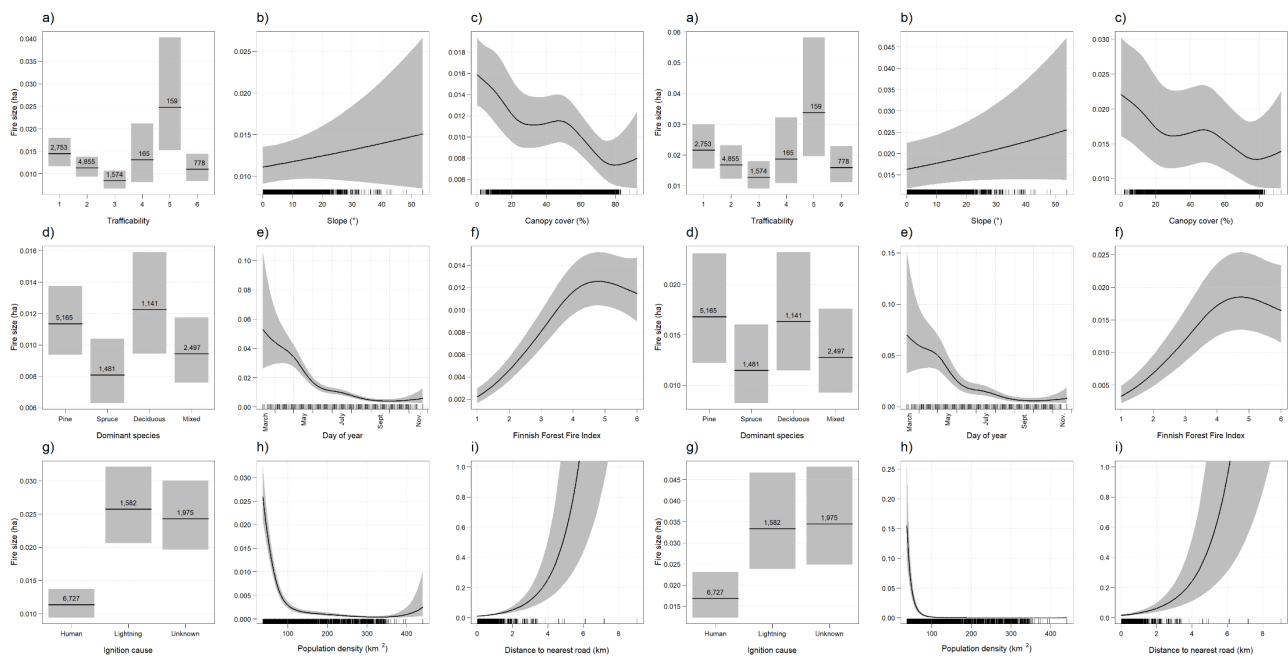


Fig 3. Response of fire size to predictor variables. The non-spatial model is shown in the left panels and the spatial model in the right panels.

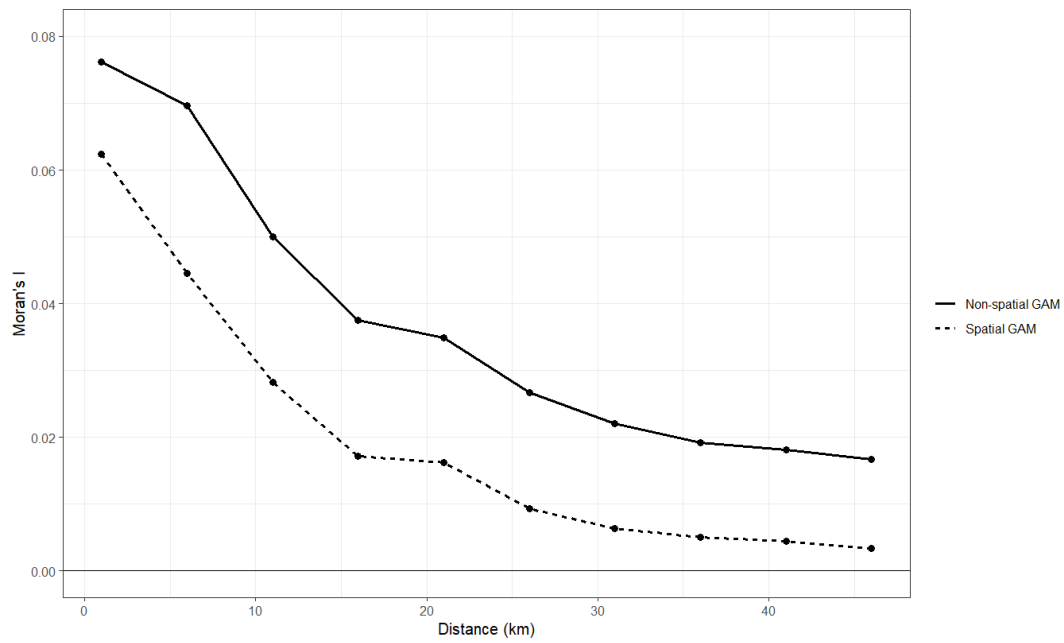


Fig 4. Moran's I correlograms showing spatial autocorrelation of residuals for the non-spatial and spatial fire size models.