

Supplementary material for
**“Space-time interactions in Bayesian disease mapping
with recent tools: making things easier for practitioners”**
by Arantxa Urdangarin, Tomás Goicoa, María Dolores
Ugarte

Introduction

This supplementary material contains tables and figures to complement the paper entitled “Space-time interactions in Bayesian disease mapping with recent tools: making things easier for practitioners”.

Table A.1. Mean deviance ($\overline{D(\theta)}$), effective number of parameters (p_D), DIC and WAIC for spatio-temporal models with an ICAR and a BYM spatial prior and the set of hyperpriors **H2**.

		ICAR spatial prior				BYM spatial prior			
		$\overline{D(\theta)}$	p_D	DIC	WAIC	$\overline{D(\theta)}$	p_D	DIC	WAIC
Type I	R-INLA	7603.4820	214.0369	7817.5190	7825.0270	7602.2280	215.9365	7818.1650	7824.2920
	Nimble 1	7605.1050	215.6115	7820.7170	7829.7650	7606.4940	213.1343	7819.6280	7828.1740
	Nimble 2	7608.1640	210.4046	7818.5690	7828.5620	7604.4650	212.3013	7816.7660	7825.1430
Type II	R-INLA	7551.0570	160.9670	7712.0240	7714.4540	7550.0980	161.2665	7711.3650	7713.7950
	Nimble 1	7554.1190	161.9542	7716.0730	7720.6500	7551.7440	162.6510	7714.3950	7718.0410
	Nimble 2	7550.8400	164.6176	7715.4580	7718.4830	7552.3060	160.7408	7713.0470	7716.0380
Type III	R-INLA	7608.3230	182.4803	7790.8040	7801.3280	7607.3880	183.5559	7790.9440	7800.6290
	Nimble 1	7611.9600	181.5406	7793.5010	7805.8850	7611.7120	181.3514	7793.0640	7804.1160
	Nimble 2	7603.8980	189.1573	7793.0550	7803.9930	7610.9670	183.7092	7794.6760	7807.4970
Type IV	R-INLA	7560.3550	143.6618	7704.0170	7706.7050	7559.2620	144.4739	7703.7360	7705.9290
	Nimble 1	7562.8260	144.1419	7706.9680	7710.7630	7561.3760	143.7267	7705.1020	7708.7370
	Nimble 2	7557.6240	149.8634	7707.4880	7711.3580	7560.6600	144.3094	7704.9690	7708.2910

Table A.2. Mean deviance ($\overline{D(\theta)}$), effective number of parameters (p_D), DIC and WAIC for spatio-temporal models with an ICAR and a BYM spatial prior and the set of hyperpriors **H3**.

		ICAR spatial prior				BYM spatial prior			
		$\overline{D(\theta)}$	p_D	DIC	WAIC	$\overline{D(\theta)}$	p_D	DIC	WAIC
Type I	R-INLA	7603.3559	214.1094	7817.4653	7824.9643	7601.8410	214.7837	7816.6250	7824.0930
	Nimble 1	7607.7301	212.1685	7819.8986	7830.2154	7608.8370	210.6310	7819.4680	7828.5590
	Nimble 2	7607.0330	211.5730	7818.6060	7828.5590	7607.1920	212.4161	7819.6090	7828.5040
Type II	R-INLA	7550.9084	161.0542	7711.9626	7714.3817	7549.1380	161.9340	7711.0720	7713.4560
	Nimble 1	7553.3957	161.9452	7715.3409	7718.4217	7552.8830	160.5058	7713.3890	7717.0800
	Nimble 2	7551.7970	158.2855	7710.0830	7712.9970	7552.0320	161.0963	7713.1280	7716.1560
Type III	R-INLA	7608.2090	182.5368	7790.7458	7801.2679	7606.4920	183.4056	7789.8970	7800.4370
	Nimble 1	7611.9792	184.0053	7795.9845	7808.3194	7609.0680	181.9525	7791.0200	7803.1340
	Nimble 2	7608.6500	182.5053	7791.1560	7803.6660	7608.9170	181.8855	7790.8030	7803.4300
Type IV	R-INLA	7560.2337	143.7245	7703.9582	7706.6419	7558.4520	144.6587	7703.1110	7705.8110
	Nimble 1	7563.5695	144.5272	7708.0967	7712.1708	7561.6870	144.0091	7705.6960	7709.2910
	Nimble 2	7563.5600	143.3191	7706.8790	7710.8980	7562.0640	144.67530	7706.7400	7711.0160

Table A.3. Posterior means and standard deviations of the intercept and the hyperparameters for the model with the BYM spatial prior, Type IV interaction and the three sets of hyperprior distributions.

		H1		H2		H3	
		Mean	SD	Mean	SD	Mean	SD
α_0	R-INLA	-0.0353	0.0106	-0.0349	0.0096	-0.0353	0.0116
	Nimble 1	-0.0344	0.0102	-0.0350	0.0082	-0.0354	0.0136
	Nimble 2	0.0566	0.0152	0.0567	0.0135	0.0553	0.0167
σ_u	R-INLA	0.1454	0.0360	0.1436	0.0276	0.1206	0.0289
	Nimble 1	0.1483	0.0404	0.1577	0.0530	0.1236	0.0415
	Nimble 2	0.1543	0.0378	0.1840	0.0310	0.1226	0.0305
σ_v	R-INLA	0.0686	0.0173	0.0573	0.0135	0.0779	0.0150
	Nimble 1	0.0591	0.0255	0.0359	0.0335	0.0792	0.0240
	Nimble 2	0.0559	0.0250	0.0202	0.0234	0.0762	0.0143
σ_γ	R-INLA	0.0246	0.0052	0.0217	0.0040	0.0219	0.0044
	Nimble 1	0.0240	0.0052	0.0221	0.0047	0.0222	0.0045
	Nimble 2	0.0252	0.0063	0.0219	0.0042	0.0220	0.0045
σ_δ	R-INLA	0.0389	0.0046	0.0373	0.0045	0.0374	0.0045
	Nimble 1	0.0389	0.0046	0.0373	0.0043	0.0370	0.0045
	Nimble 2	0.0388	0.0047	0.0379	0.0043	0.0372	0.0045

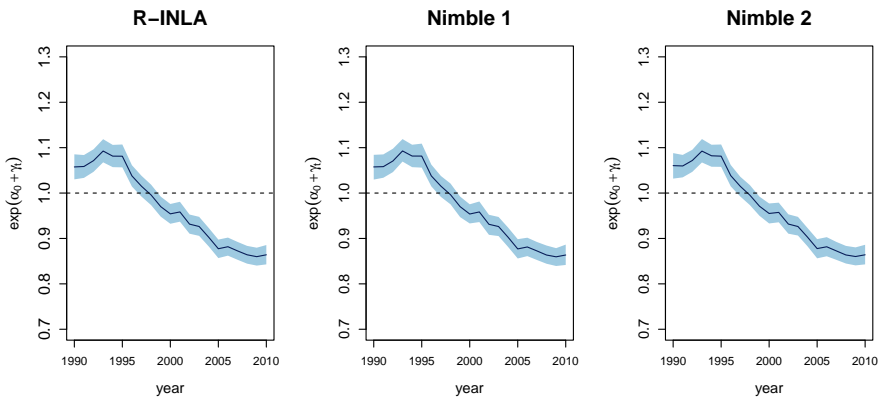


Figure A.1. Posterior means of $\exp(\alpha_0 + \gamma_t)$ estimated with R-INLA, Nimble 1 and Nimble 3 for ICAR model with H1 hyperpriors.

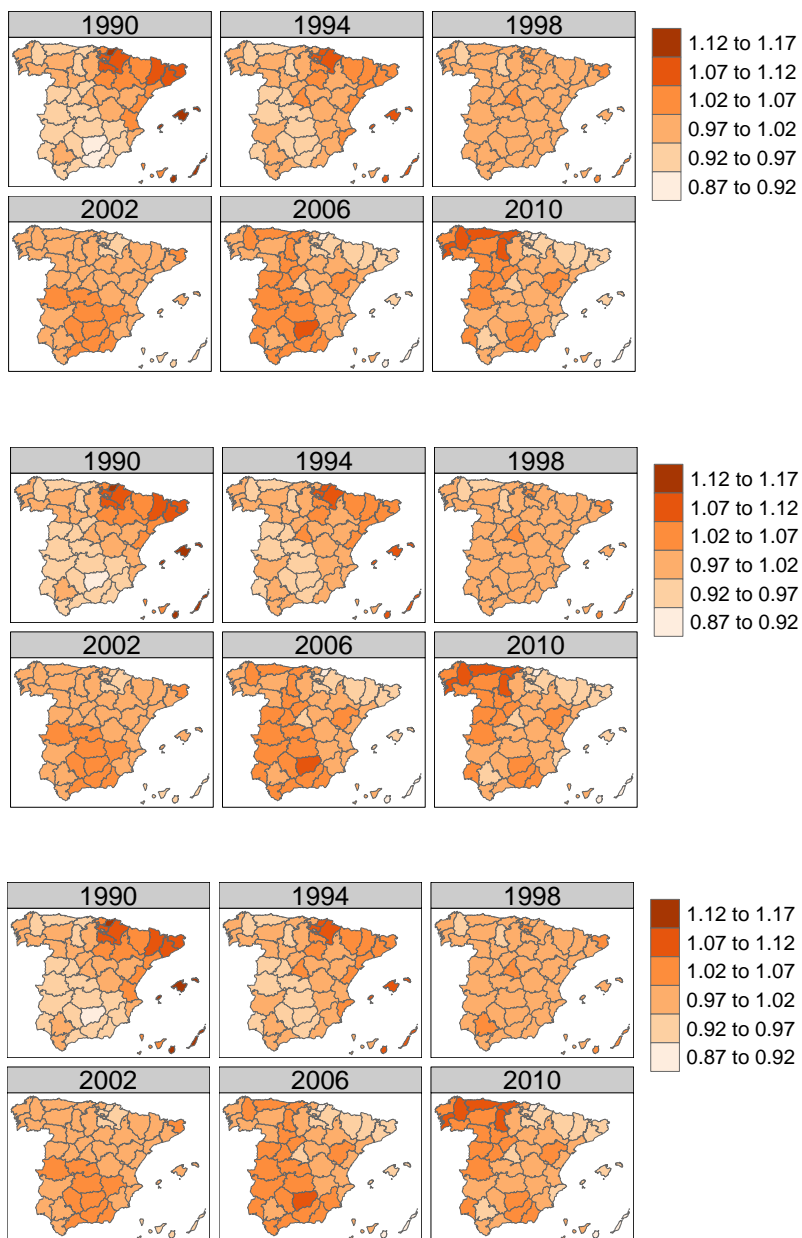


Figure A.2. Spatio-temporal patterns (posterior means of $\exp(\delta_{it})$) estimated with R-INLA (top), Nimble 1 (middle), and Nimble 2 (bottom) for ICAR model with H1 hyperpriors.

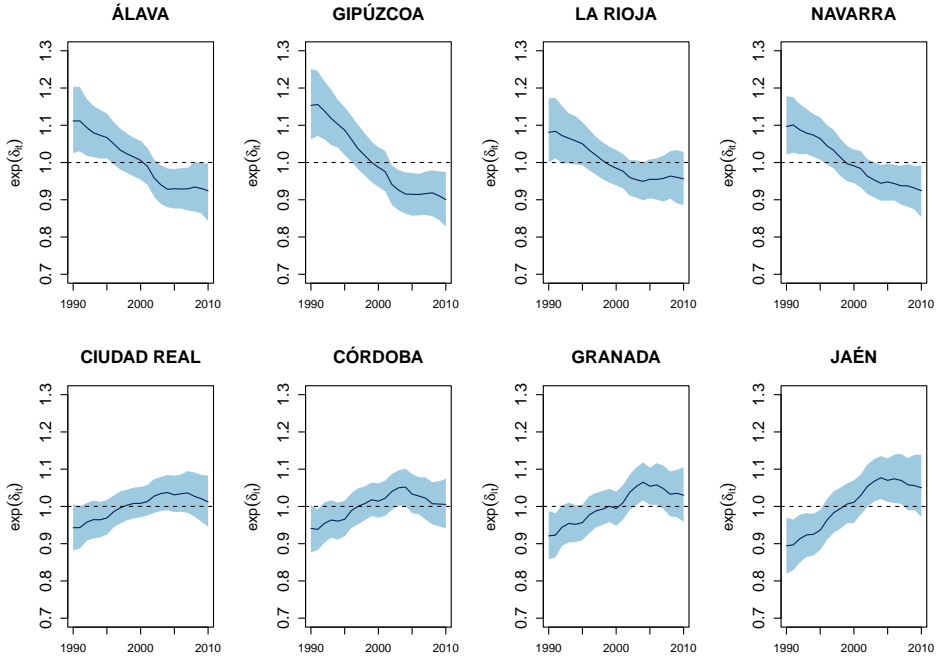


Figure A.3. Type IV space-time interaction random effects (posterior means of $\exp(\delta_{it})$) estimated with Nimble 1 and their credibility bands. Top row corresponds to neighbouring provinces in the north and bottom row displays neighbouring provinces in the south.

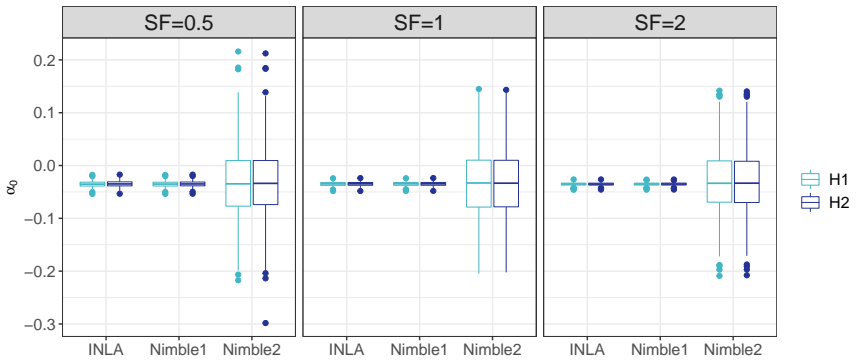


Figure A.4. Boxplots of the posterior means of the intercept in the 500 simulations.