

Supplementary Materials

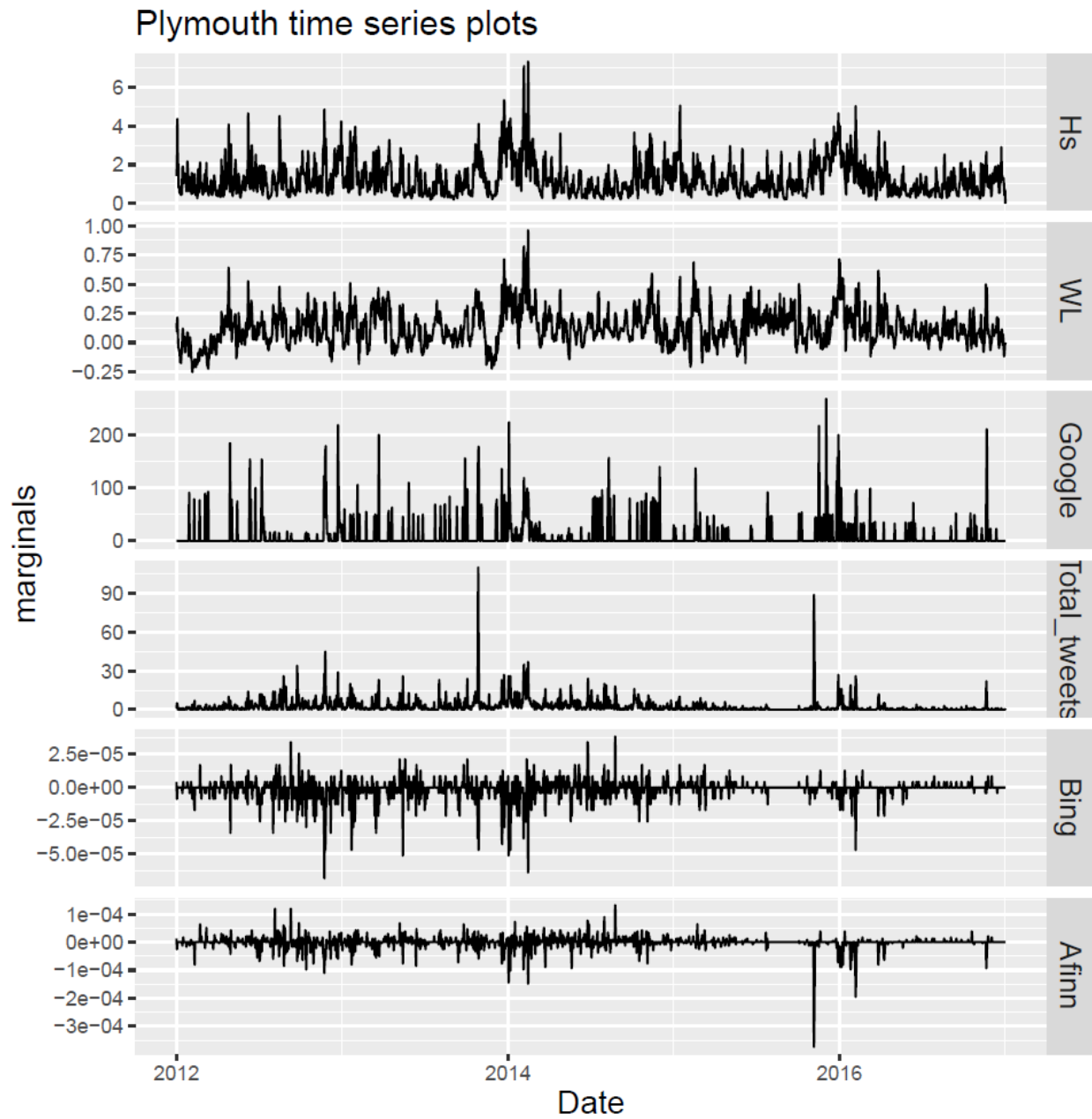


Figure S1. Trace plots of Plymouth data.

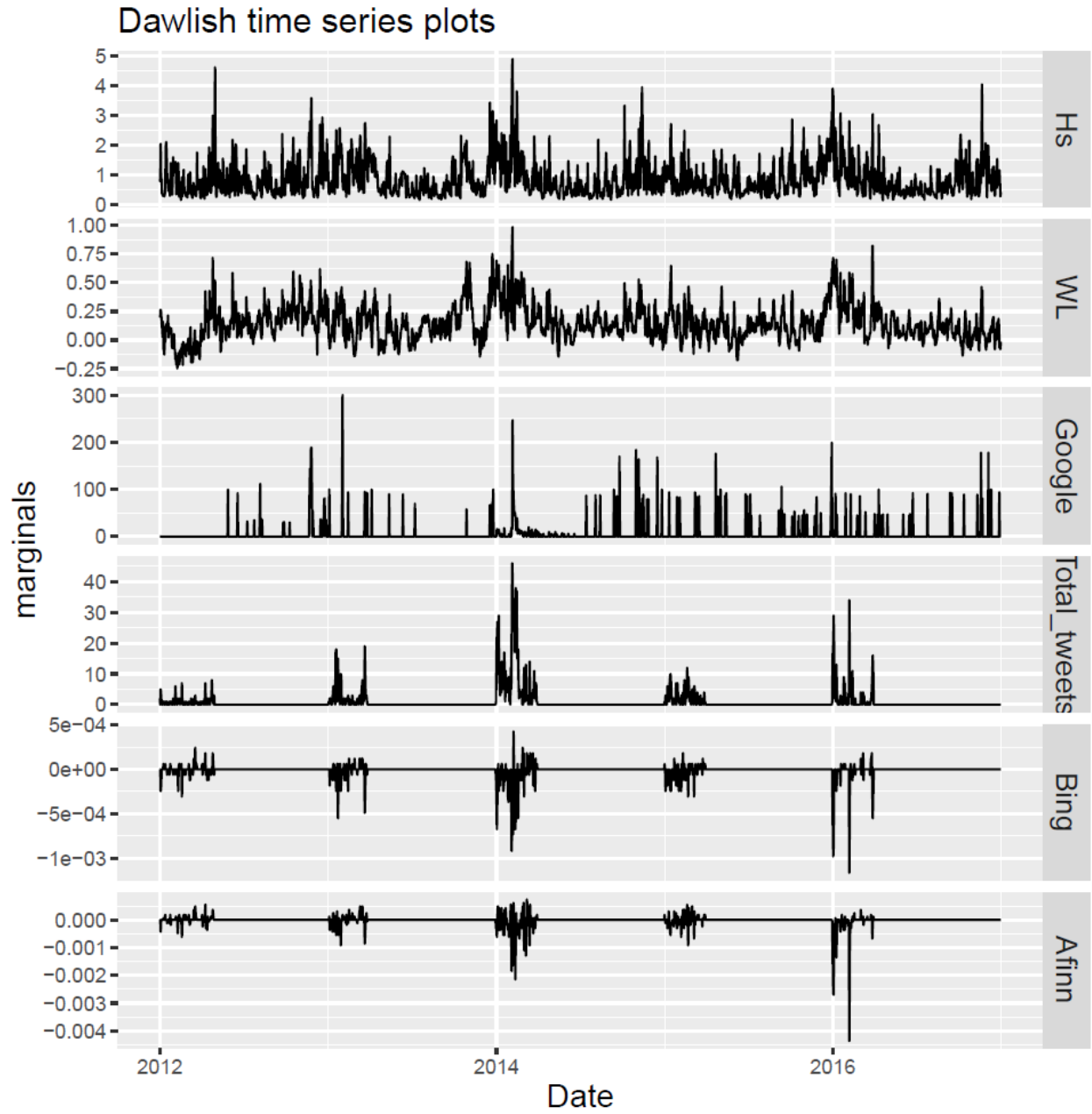


Figure S2. Trace plots of Dawlish data.

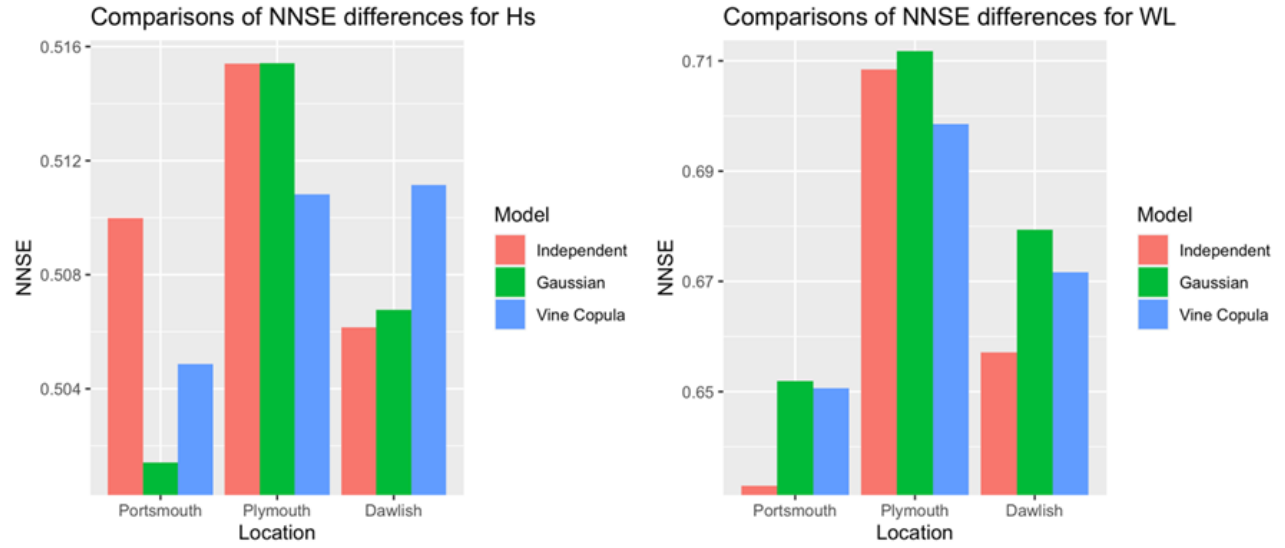


Figure S3. Grouped bar charts showing the differences between optimal fit for each model and the NNSEs for Hs (left panel) and WL (right panel) for each location. The red bars show the results assuming independence among variables, the green bars assuming all Gaussian pair-copulas and the blue bars assuming a vine copula model. Shorter bars indicate better fitting models.

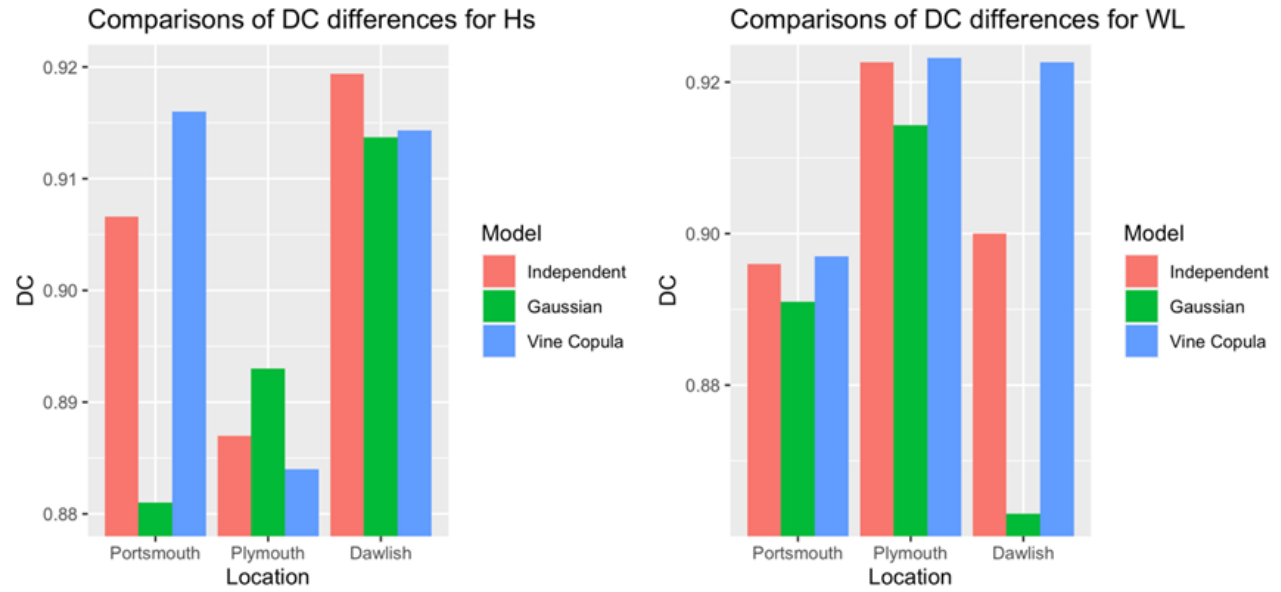


Figure S4. Grouped bar charts showing the differences between optimal fit for each model and the DCs for Hs (left panel) and WL (right panel) for each location. The red bars show the results assuming independence among variables, the green bars assuming all Gaussian pair-copulas and the blue bars assuming a vine copula model. Shortest bars indicate better models.

Table S1. Parameter Estimates of The Marginals for Each Location: Portsmouth (Top Panels), Plymouth (Middle Panels) and Dawlish (Bottom Panels)

Marginals												
Portsmouth												
Hs			WL		Google		Total_tweets		Bing		Afinn	
ARIMA(3,0,2)			ARIMA(1,0,1)-GARCH(1,1)		ZAGA		ZAIG		ARIMA(1,d,1)-GARCH(3,1)		ARIMA(1,d,0)-GARCH(3,1)	
a	-0.1146	(0.0730)	a	0.1373 (0.0066)	μ	2.2579 (1.5760)	μ	8.8258 (1.3940)	a	1.0000 (0.00009)	a	1.0000 (0.00009)
φ_1	0.9810	(0.2135)	φ_1	0.7679 (0.0221)	β	0.0001 (0.00009)	β	-0.0004 (0.00008)	φ_1	0.8707 (0.0172)	φ_1	0.3832 (0.0435)
φ_2	0.2891	(0.3474)	θ_1	-0.1174 (0.0351)	σ	-0.5203 (0.0581)	σ	-0.6741 (0.0197)	θ_1	-0.7335 (0.0351)	d	0.2836 (0.1092)
φ_3	-0.2836	(0.1382)	ω	0.0001 (0.00006)	ν	2.5440 (0.0901)	ν	-0.8606 (0.0512)	d	0.3382 (0.0363)	ω	0.0000 (0.0000)
θ_1	-0.3112	(0.2060)	α_1	0.0651 (0.0162)					ω	0.0000 (0.0000)	α_1	0.0167 (0.0038)
θ_2	-0.5775	(0.1979)	β_1	0.9214 (0.0196)					α_1	0.0167 (0.0037)	α_2	0.0167 (0.0097)
			σ	5.9142 (0.7878)					α_2	0.0167 (0.0086)	α_3	0.0167 (0.0075)
									α_3	0.0167 (0.0072)	β_1	0.9000 (0.0111)
									β_1	0.9000 (0.0096)	σ	3.9999 (0.2633)
									σ	4.0000 (0.2617)		
Plymouth												
ARIMA(1,0,2)			ARIMA(4,1,1)		ZAGA		ZAIG		ARIMA(1,d,2)-GARCH(2,1)		ARIMA(1,d,1)-GARCH(2,1)	
a	0.0048	(0.0473)	φ_1	0.7204 (0.0240)	μ	4.927 (1.403)	μ	4.826 (1.371)	a	1.0000 (0.00005)	a	1.0000 (0.00009)
φ_1	0.8366	(0.0248)	φ_2	0.0582 (0.0289)	β	-0.00005 (0.00008)	β	-0.0002 (0.00008)	φ_1	0.9779 (0.0007)	φ_1	0.3229 (0.0882)
θ_1	-0.1016	(0.0368)	φ_3	0.0035 (0.0289)	σ	-0.3348 (0.0395)	σ	-0.6058 (0.0219)	θ_1	-0.8854 (0.0115)	θ_1	-0.1301 (0.0968)
θ_2	-0.1598	(0.0337)	φ_4	0.0112 (0.0239)	ν	1.7263 (0.0653)	ν	-0.2788 (0.0473)	θ_2	-0.0553 (0.0115)	d	0.3111 (0.0683)
			θ_1	-0.9919 (0.0055)					d	0.3076 (0.0490)	ω	0.0000 (0.0000)
									ω	0.0000 (0.0000)	α_1	0.0250 (0.0062)
									α_1	0.0250 (0.0068)	α_2	0.0250 (0.0057)
									α_2	0.0250 (0.0051)	β_1	0.9000 (0.0137)
									β_1	0.9000 (0.0069)	σ	4.0000 (0.5849)
									σ	4.0000 (0.3481)		
Dawlish												
ARIMA(2,0,3)			ARIMA(1,0,1)-GARCH(1,1)		ZAGA		ZAIG		ARIMA(2,d,1)-GARCH(1,1)		ARIMA(1,d,1)-GARCH(1,1)	
a	-0.3644	(0.0763)	a	0.1131 (0.0078)	μ	0.3969 (2.2670)	μ	-0.2273 (1.910)	a	1.0000 (0.00008)	a	0.9999 (0.00009)
φ_1	1.5597	(0.1241)	φ_1	0.8011 (0.0180)	β	0.0002 (0.0001)	β	0.0015 (0.0001)	φ_1	-0.2924 (0.0315)	φ_1	0.3049 (0.0268)
φ_2	-0.5674	(0.1208)	θ_1	-0.0023 (0.0297)	σ	-0.0928 (0.0463)	σ	-0.6471 (0.0399)	φ_2	0.2188 (0.0374)	θ_1	0.0760 (0.0225)
θ_1	-0.9812	(0.1285)	ω	0.00008 (0.00004)	ν	2.1713 (0.0772)	ν	1.5725 (0.0620)	θ_1	0.7206 (0.0459)	d	0.3967 (0.0146)
θ_2	-0.0680	(0.0586)	α_1	0.0496 (0.0102)					d	0.3139 (0.0028)	ω	0.0000 (0.0000)
θ_3	0.0998	(0.0627)	β_1	0.9394 (0.0116)					ω	0.0000 (0.0000)	α_1	0.0500 (0.0024)
			σ	5.4261 (0.6958)					α_1	0.0500 (0.0023)	β_1	0.8999 (0.0019)
									β_1	0.8999 (0.0022)	σ	3.9997 (0.1728)
									σ	3.999 (0.1399)		

Note: standard errors are in brackets