Quantifying parameter uncertainty in a coral reef model using Metropolis-Coupled Markov Chain Monte Carlo: Supplementary data

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The tables below give starting points and proposal distributions for the MCMCMC algorithms described in the Methods of the main paper: Table 1 for the 3-state model, and Table 2 for the 6-state model.

Table 1: Starting points, proposal distributions, acceptance probabilities, posterior means, and posterior standard deviations for parameters of the three-state model.

Chain[a]	l[b]	$p_1(0)$[c]	$p_2(0)$	$p_3(0)$	a_{12}[d]	a_{13}	a_{21}	a_{23}	a_{31}	a_{32}
1	-1.3602e+04	0.52	0.0052	0.48	0.31	0.99	66	67	1.6e-13	66
2	-1.3602e+04	0.52	0.0051	0.48	1.4	0.98	68	67	1.5e-06	66
3	-1.3602e+04	0.52	0.0052	0.48	1.9	0.98	67	66	3.5e-11	65
4	-1.3603e+04	0.52	0.0051	0.48	2.4	0.98	68	67	0.00061	66
5	-1.3604e+04	0.52	0.0054	0.48	5.6	0.93	65	60	1.2e-25	59
6	-1.3605e+04	0.52	0.0056	0.48	5.5	0.93	62	57	2.4e-07	56
7	-1.3606e+04	0.52	0.0055	0.48	7.7	0.91	65	58	4.1e-06	57
8	-1.3606e+04	0.52	0.0060	0.48	0.22	0.98	55	56	0.0024	55
9	-1.3606e+04	0.52	0.0058	0.48	5.5	0.92	60	55	5.3e-06	54
10	-1.3607e+04	0.52	0.0062	0.48	2.9	0.94	55	53	4.2e-07	52
11	-1.3608e+04	0.52	0.0062	0.48	3.7	0.93	54	52	2.7e-06	51
12	-1.3609e+04	0.51	0.0050	0.48	19	0.83	75	57	1.3e-95	56
13	-1.3610e+04	0.51	0.0060	0.48	3.8	0.93	53	50	0.024	49
14	-1.3611e+04	0.51	0.0057	0.48	14	0.84	64	50	5.3e-31	49
15	-1.3611e+04	0.51	0.0060	0.48	7.7	0.89	55	48	0.023	47
16	-1.3613e+04	0.51	0.0057	0.48	17	0.82	64	49	5.7e-09	48
17	-1.3613e+04	0.51	0.0050	0.48	25	0.79	78	54	0	53
18	-1.3613e+04	0.51	0.0059	0.48	4.4	0.92	51	47	0.048	46
19	-1.3614e+04	0.51	0.0057	0.48	18	0.81	65	48	0	47
Proposal mean		0	0	0	0	0	0	0	1e+02	0
Proposal variance		0.0034	0.0025	0.091	0.00013	6.4e-05	3.2e-08	1.2e-08	1e+04	3.5e-09
Cold chain acceptance[e]		0.24	0.28	0.22	0.30	0.25	0.22	0.30	0.27	0.31
Posterior mean[e]		0.52	0.0053	0.48	2.0	0.98	66	66	5.5e-05	64
Posterior standard deviation[e]		0.014	0.00038	0.014	1.7	0.03	2.0	3.0	0.00064	3.0

[a]Temperature parameter $\Delta T = 0.5$, gave chain swap acceptance probability 0.44 excluding self swaps.
[b]Log likelihood.
[c]$p_j(0)$ is the initial proportion of state j in the system (dimensionless). States are ordered: (1) corals; (2) algae; (3) free space.
[d]a_{ij} is the interaction coefficient for transitions from state j to state i, units years^{-1}.
[e]Sampled over 112799 iterations, following 1×10^5 iterations of burn-in.

Table 2: Starting points, proposal distributions, acceptance probabilities, posterior means, and posterior standard deviations for parameters of the six-state model.

Chain[a]	l[b]	$p_1(0)$[c]	$p_2(0)$	$p_3(0)$	$p_4(0)$	$p_5(0)$	$p_6(0)$
1	-1.6099e+04	0.49	0.00071	0.019	0.013	0.0033	0.47
2	-1.6103e+04	0.50	0.00099	0.021	0.013	0.0021	0.47
3	-1.6114e+04	0.50	0.00032	0.021	0.012	0.0024	0.47
Proposal mean		0	0	0	0	0	0
Proposal variance		1.2e-06	4.4e-06	5.1e-06	4.1e-06	4.7e-06	7.4e-06
Cold chain acceptance[d]		0.28	0.24	0.19	0.25	0.29	0.22
Posterior mean[d]		0.49	0.00074	0.019	0.013	0.0032	0.48
Posterior standard deviation[d]		0.0058	0.00012	0.0012	0.00025	0.00011	0.0071

Chain	a_{12}[e]	a_{13}	a_{14}	a_{15}	a_{16}	a_{21}	a_{23}	a_{24}	a_{25}	a_{26}	a_{31}	a_{32}	a_{34}	a_{35}	a_{36}
1	0.31	12	0.17	0.53	0.87	0.43	5e-24	0.70	10	0.46	50	3.8	46	2e+02	48
2	0.12	9.3	0.14	0.78	0.86	0.15	4.8e-51	0.92	5.8e+02	0.46	39	1.6e-22	30	1.9e+02	39
3	4.3e-24	12	0.00058	1.0	0.89	0.41	1.2e-13	0.53	1.5e+02	0.51	42	6.7e-153	28	1.9e+02	39
Proposal mean	0	0	0	0	0	0	10	0	0	0	0	0	0	0	0
Proposal variance	1.3e-06	4.7e-09	4.1e-06	1.9e-08	6.8e-10	3.9e-07	1e+02	3.5e-05	1.5e-07	1.1e-07	2.2e-10	1.4e-05	4.2e-09	8.6e-10	1.5e-10
Cold chain acceptance	0.21	0.33	0.27	0.47	0.33	0.27	0.32	0.22	0.45	0.33	0.36	0.22	0.39	0.35	0.37
Posterior mean	0.30	12	0.18	0.54	0.86	0.41	0.00063	0.73	30	0.46	49	3.6	45	2e+02	48
Posterior standard deviation	0.039	0.57	0.011	0.049	0.00065	0.052	0.0065	0.036	1e+02	0.0022	1.9	0.68	3.0	2.1	1.6

Chain	a_{41}	a_{42}	a_{43}	a_{45}	a_{46}	a_{51}	a_{52}	a_{53}	a_{54}	a_{56}	a_{61}	a_{62}	a_{63}	a_{64}	a_{65}
1	0.25	2.5e-06	8.8	0.04	0.91	0.046	14	0.32	2.7e-09	3.6	0.18	0.092	44	0.12	0.056
2	0.36	2.2e-117	2.8	0.77	0.98	6.9e-148	5.9e+02	6.2e-129	2.1e-107	4.0	0.21	0.094	35	0.27	2.6e-76
3	0.34	1.9e-30	6.3e-06	0.84	1.1	2.1e-268	1.6e+02	1.7e-32	6.2e-38	4.0	0.24	0.18	35	0.37	1.2e-45
Proposal mean	0	10	0	0	0	0	0	0	10	0	0	0	0	0	0
Proposal variance	2.7e-06	1e+02	3.8e-07	0.00035	4.5e-08	1.8e-05	9.5e-08	0.0016	1e+02	5.6e-10	4e-09	1e-06	4e-10	2.2e-07	2.7e-06
Cold chain acceptance	0.23	0.31	0.24	0.54	0.22	0.23	0.43	0.24	0.31	0.38	0.34	0.29	0.19	0.36	0.22
Posterior mean	0.26	9.6e-05	8.5	0.059	0.92	0.045	34	0.26	0.00026	3.6	0.19	0.093	43	0.13	0.052
Posterior standard deviation	0.018	0.0013	1.1	0.14	0.0098	0.0086	1.1e+02	0.071	0.0028	0.081	0.0043	0.0029	1.5	0.029	0.0099

[a]Temperature parameter $\Delta T = 0.5$, gave chain swap acceptance probability 0.16 excluding self swaps.

[b]Log likelihood.

[c]$p_j(0)$ is the initial proportion of state j in the system (dimensionless). States are ordered: (1) acroporid corals; (2) soft corals; (3) algae; (4) masive corals; (5) pocilloporid corals; (6) free space.

[d]Sampled over 505199 iterations, following 4×10^5 iterations of burn-in.

[e]a_{ij} is the interaction coefficient for transitions from state j to state i, units years^{-1}.