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Net ecosystem carbon exchange of a dry temperate eucalypt forest

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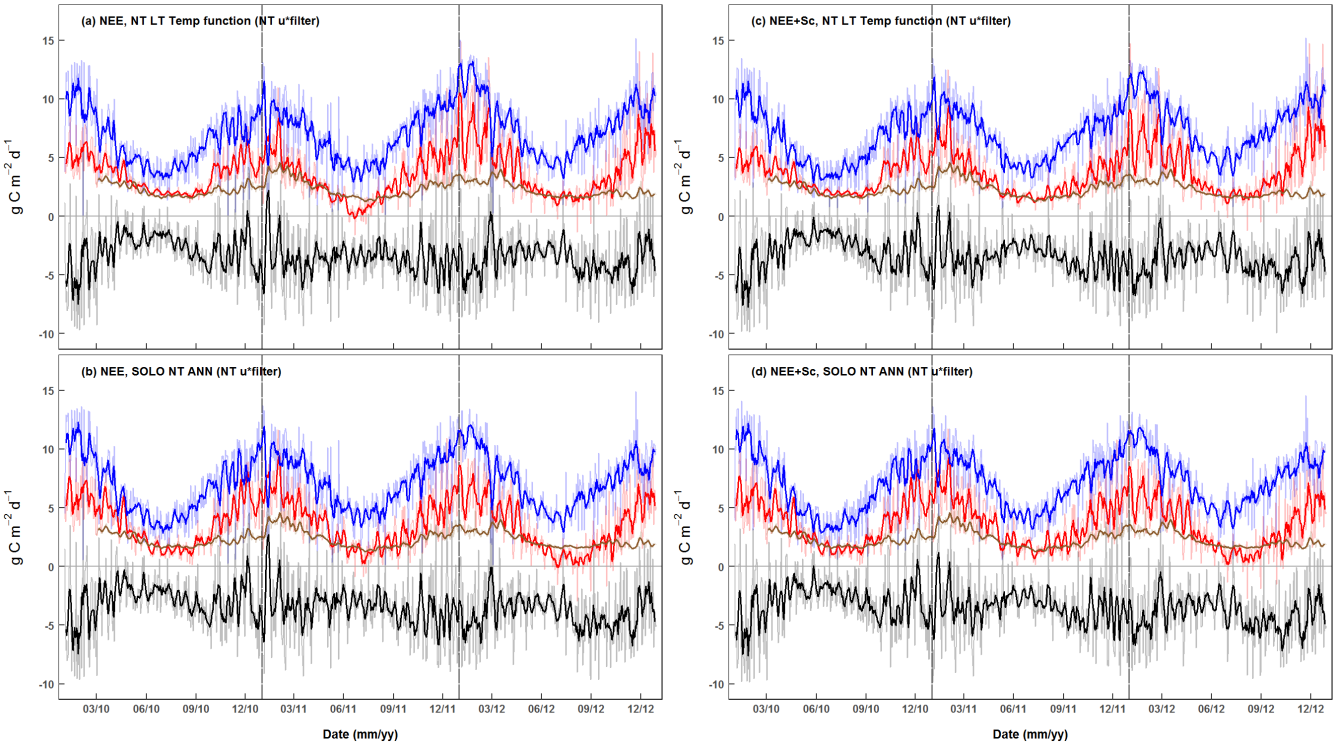

Figure S1: Time series of ecosystem carbon fluxes of the Wombat State forest OzFlux site from 2010 to 2012 from different partitioning and filter methods: (a) and (c) night time approach with Lloyd and Taylor (1994) temperature response function and night time NEE u* filtered after u* threshold; (b) and (d) neural network SOLO (Isaac et al., 2016) and night time NEE u* filtered after u* threshold; left panels show ecosystem carbon fluxes, right panels show ecosystem carbon fluxes including storage term; ecosystem respiration (ER, red lines), gross primary productivity (GPP, blue lines), net ecosystem carbon exchange (NEE, black lines) and soil respiration (RS, brown lines), displayed are daily totals (g C m^{-2} d^{-1}) of ecosystem carbon fluxes (shaded lines) and 7-day running means of daily totals (bold lines) for better illustration.

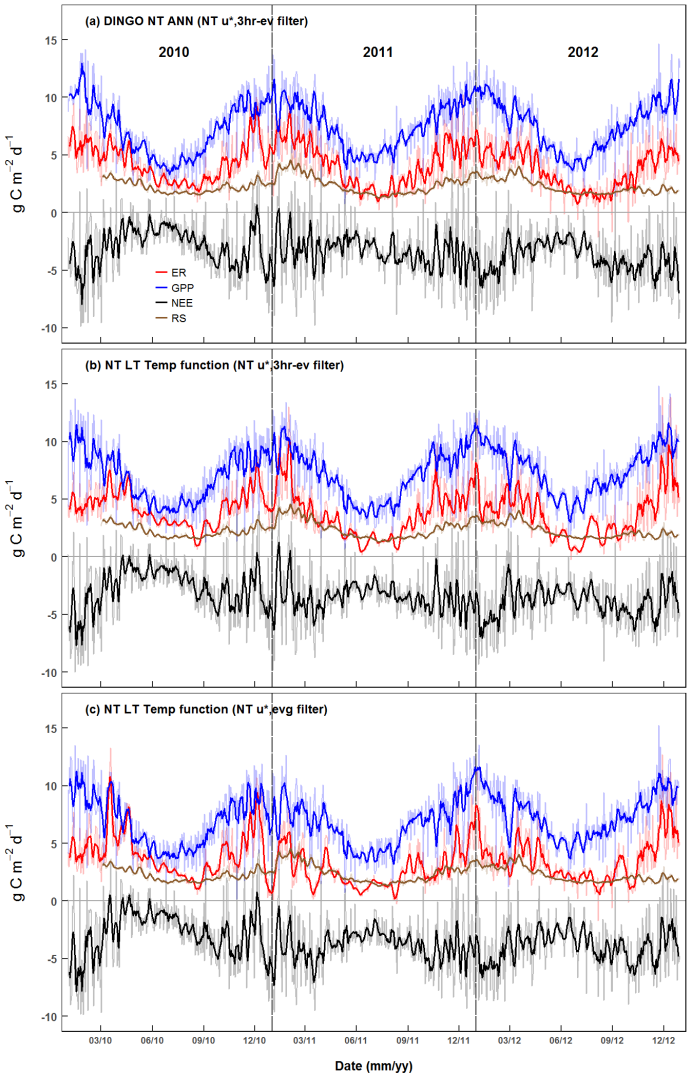

Figure S2: Time series of ecosystem carbon fluxes including storage term of the Wombat State forest OzFlux site from 2010 to 2012 from different partitioning and filter methods: (a) DINGO procedure with neural network (NN), night time NEE u* filtered after u* threshold and selection of the first three hours after sunset (Beringer et al., 2016), (b) and (c) OzFluxQC procedure with night time approach with Lloyd and Taylor (1994) temperature response function, night time NEE u* filtered after u* threshold (Isaac et al., 2016), (b) selection of the first three hours after sunset and (c) selection of the first evening hours until u* falls below threshold (evg-filter); ecosystem respiration (ER, red lines), gross primary productivity (GPP, blue lines), net ecosystem carbon exchange (NEE, black lines) and soil respiration (RS, brown lines), displayed are daily totals (g C m^{-2} d^{-1}) of ecosystem carbon fluxes (shaded lines) and 7-day running means of daily totals (bold lines) for better illustration.

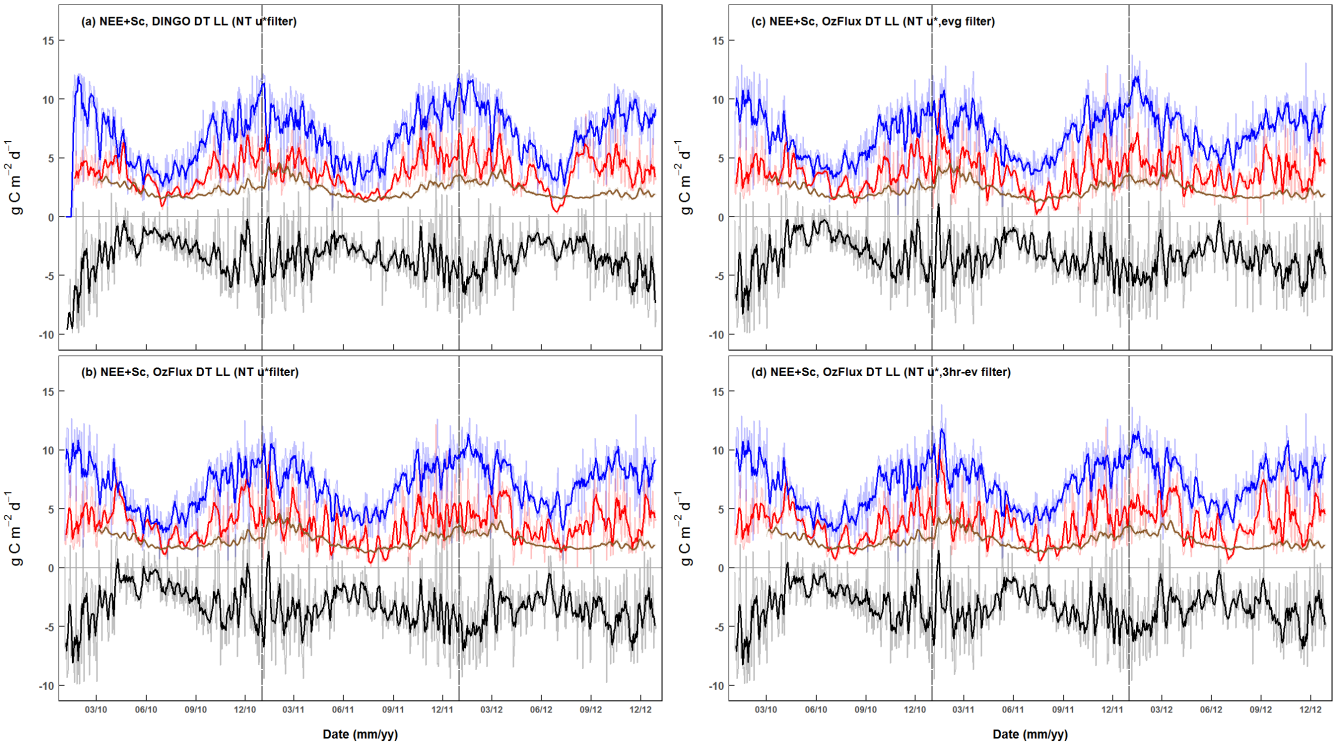

Figure S3: Time series of ecosystem carbon fluxes of the Wombat State forest OzFlux site from 2010 to 2012 from different partitioning and filter methods: (a) DINGO procedure with day time Lasslop (2010) light response function, night time NEE u* filtered after u* threshold (Beringer et al., 2016), (b) OzFluxQC procedure with day time Lasslop (2010) light response function, night time NEE u* filtered after u* threshold (Isaac et al., 2016), (c) as in (b) but selection of the first three hours after sunset and (d) as in (b) but selection of the first evening hours until u* falls below threshold (evg-filter); ecosystem carbon fluxes with storage term and (c) without storage term from OzFluxQC procedure with day time Lasslop (2010) light response function, night time NEE u* filtered after u* threshold (Isaac et al., 2016); ecosystem respiration (ER, red lines), gross primary productivity (GPP, blue lines), net ecosystem carbon exchange (NEE, black lines) and soil respiration (RS, brown lines), displayed are daily totals (g C m^{-2} d^{-1}) of ecosystem carbon fluxes (shaded lines) and 7-day running means of daily totals (bold lines) for better illustration.

Table S1: Annual estimates of ecosystem carbon fluxes (ER: ecosystem respiration, GPP: gross primary productivity, NEE: net ecosystem exchange) derived from different gap filling & partitioning procedures (DINGO, OzFluxQC), partitioning methods (NN: neural networks, LT: night time approach with Lloyd & Taylor temperature function, LL: day time approach with Lasslop light response function), and filters (u* filtering after u* threshold: night time (NT), evg-filter, 3hr-evening filter), Fc+Sc: ecosystem carbon fluxes including storage terms;

partitioning method & filter	Years	ER_NN*	ER_LL	ER_LT	GPP_NN*	GPP_LL	GPP_LT	NEE_NN*	NEE_LL	NEE_LT
DINGO, Fc+Sc, u* filter NT, 3hr eve filter	2010	1603	-	-	2649	-	-	-1046	-	-
	2011	1534	-	-	2764	-	-	-1231	-	-
	2012	1346	-	-	2770	-	-	-1424	-	-
DINGO, Fc+Sc, u* filter NT	2010	-	1320	-	-	2343	-	-	-1178	-
	2011	-	1401	-	-	2533	-	-	-1246	-
	2012	-	1463	-	-	2709	-	-	-1314	-
OzFlux, Fc+Sc, u* filter NT	2010	1383	1400	1298	2463	2415	2369	-1080	-1015	-1071
	2011	1384	1270	1266	2632	2539	2543	-1248	-1270	-1276
	2012	1259	1411	1529	2741	2779	2902	-1482	-1367	-1373
OzFlux, Fc+Sc, u* filter NT, evg filter	2010	-	1325	1483	-	2412	2503	-	-1087	-1020
	2011	-	1327	997	-	2574	2411	-	-1247	-1414
	2012	-	1428	1307	-	2794	2743	-	-1366	-1436
OzFlux, Fc+Sc, u* filter NT, 3hr eve filter	2010	-	1336	1538	-	2428	2529	-	-1091	-991
	2011	-	1354	1341	-	2592	2609	-	-1238	-1268
	2012	-	1495	1346	-	2812	2775	-	-1317	-1428

* NN: FFNET for DINGO, SOLO for OzFluxQC

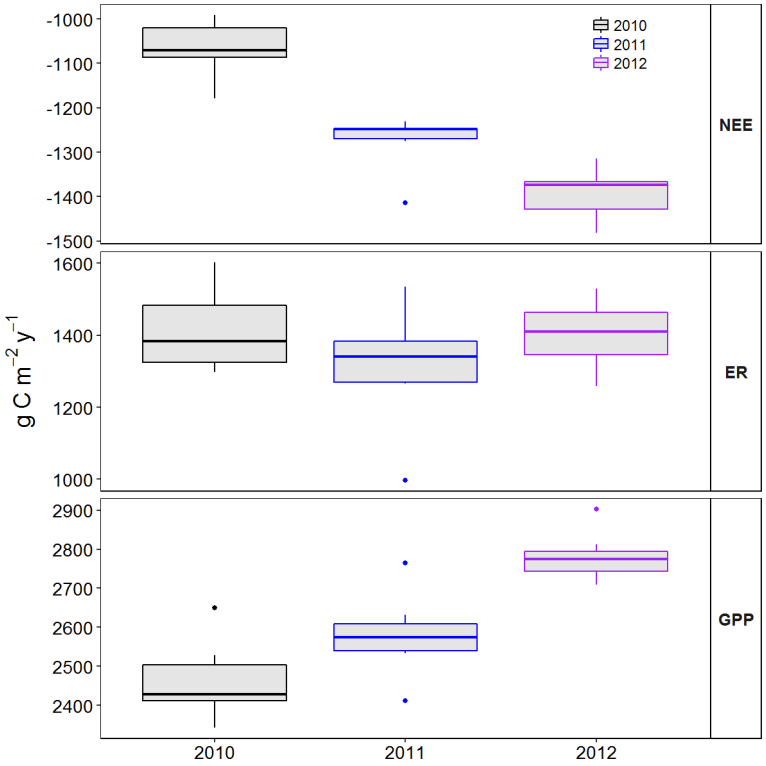

Figure S4: Variations of annual estimates of net ecosystem carbon exchange (NEE), ecosystem respiration (ER) and gross primary productivity (GPP) for each year derived from different partitioning and filter methods (see Table S1)

Table S2: Median, mean ± SE and coefficient of variation (%) of annual estimates of net ecosystem carbon exchange (NEE), ecosystem respiration (ER) and gross primary productivity (GPP) for each year derived from different partitioning and filter methods (see Table S1 and Fig. S4)

	Year	Median	Mean ± SE	CV(%)
NEE	2010	-1046	-1034 ± 21	7
	2011	-1247	-1261 ± 14	4
	2012	-1373	-1387 ± 16	4
ER	2010	1400	1474 ± 44	11
	2011	1384	1367 ± 40	10
	2012	1428	1416 ± 29	8
GPP	2010	2463	2496 ± 30	4
	2011	2609	2619 ± 28	4
	2012	2779	2798 ± 18	2

Table S3: Random, model and combined error uncertainties in g C $m^{-2}$$yr^{-1}$ for NEE excluding and including storage term (Sc) per calendar year

		Random error			Model error			All errors combined
	Year	DT	NT	Total	DT	NT	Total	
NEE	2010	7.3	5.8	9.3	20.2	20	28.8	29.8
	2011	8.1	7.6	11.4	35.2	103.1	109.5	110.6
	2012	8.6	7.9	11.8	30.8	63.4	70.9	71.7
NEE+Sc	2010	7.8	6.9	10.3	24.5	31.9	39.7	41.4
	2011	8.2	7.7	11.3	41.5	113	120.9	121.9
	2012	8.9	8.5	12.3	33.7	72.1	79.3	80.6

Table S4: Effect of uncertainties in u* thresholds (u^*_{th}) on annual NEE estimates by using the lower (5%) and upper (95%) confidence interval of the probability distribution of the mean u* threshold (Barr et al., 2013)

Year		u*	Data excl. (%)	Data excl. u* filter (%)	NEE (gC m^{-2} yr^{-1})
2010	5% CI of u^*_{th}	0.25	56	4	-1099
	u^*_{th}	0.53	63	11	-1080
	95% CI of u^*_{th}	0.81	69	17	-
2011	5% CI of u^*_{th}	0.37	44	8	-1275
	u^*_{th}	0.67	52	16	-1248
	95% CI of u^*_{th}	0.96	60	24	-
2012	5% CI of u^*_{th}	0.32	39	5	-1463
	u^*_{th}	0.66	50	16	-1482
	95% CI of u^*_{th}	1.00	59	25	-

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