

Fig 1

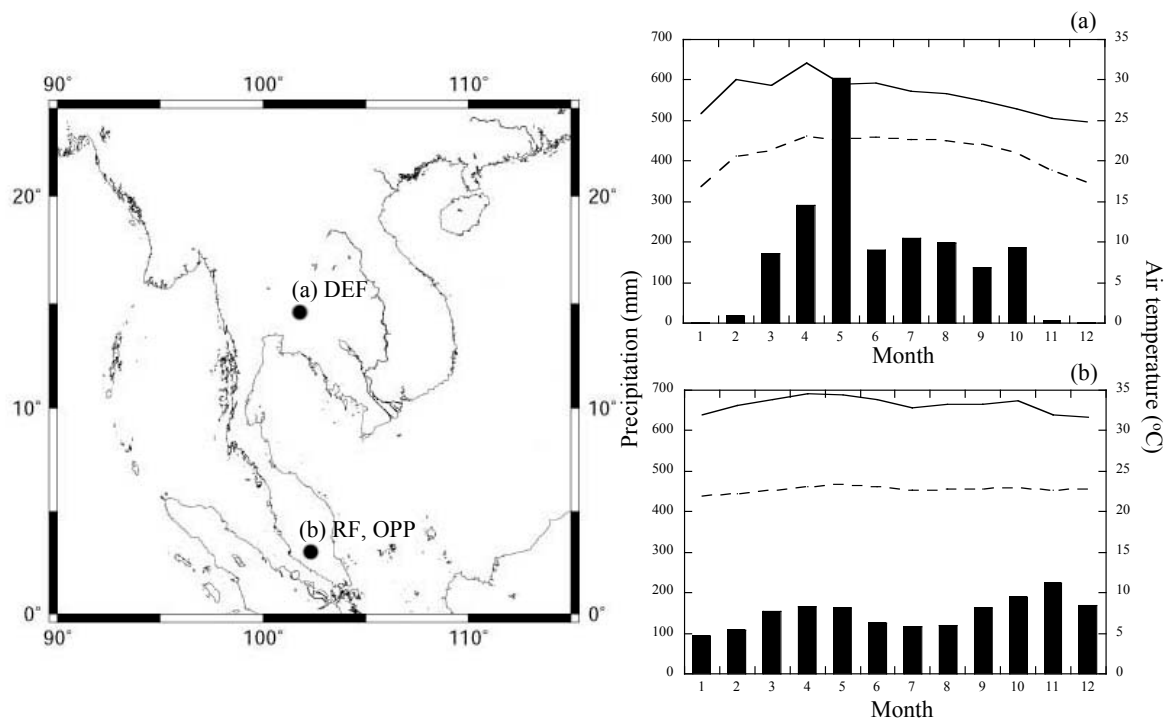
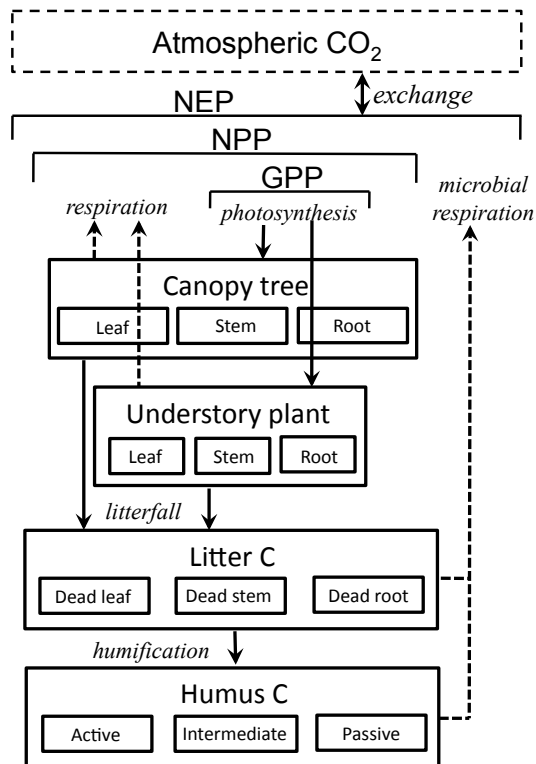


Fig 2

(a) Primary forest



(b) Land-use change + oil palm plantation

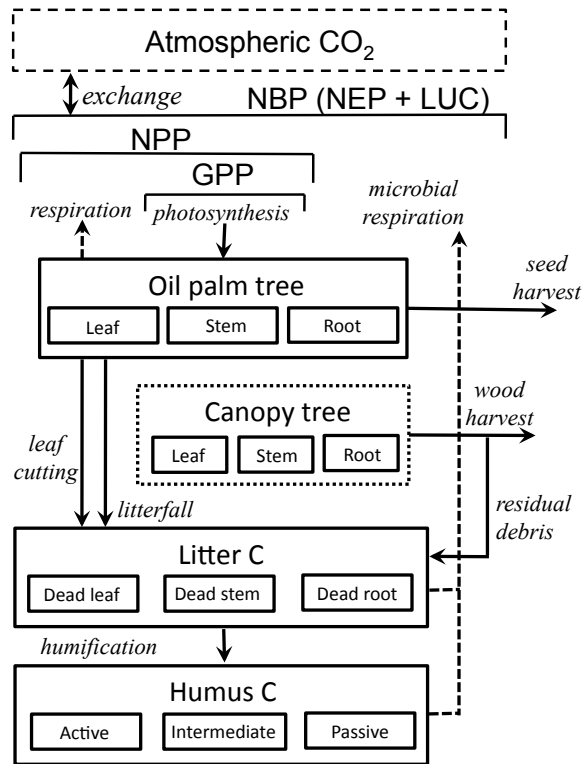


Fig 3

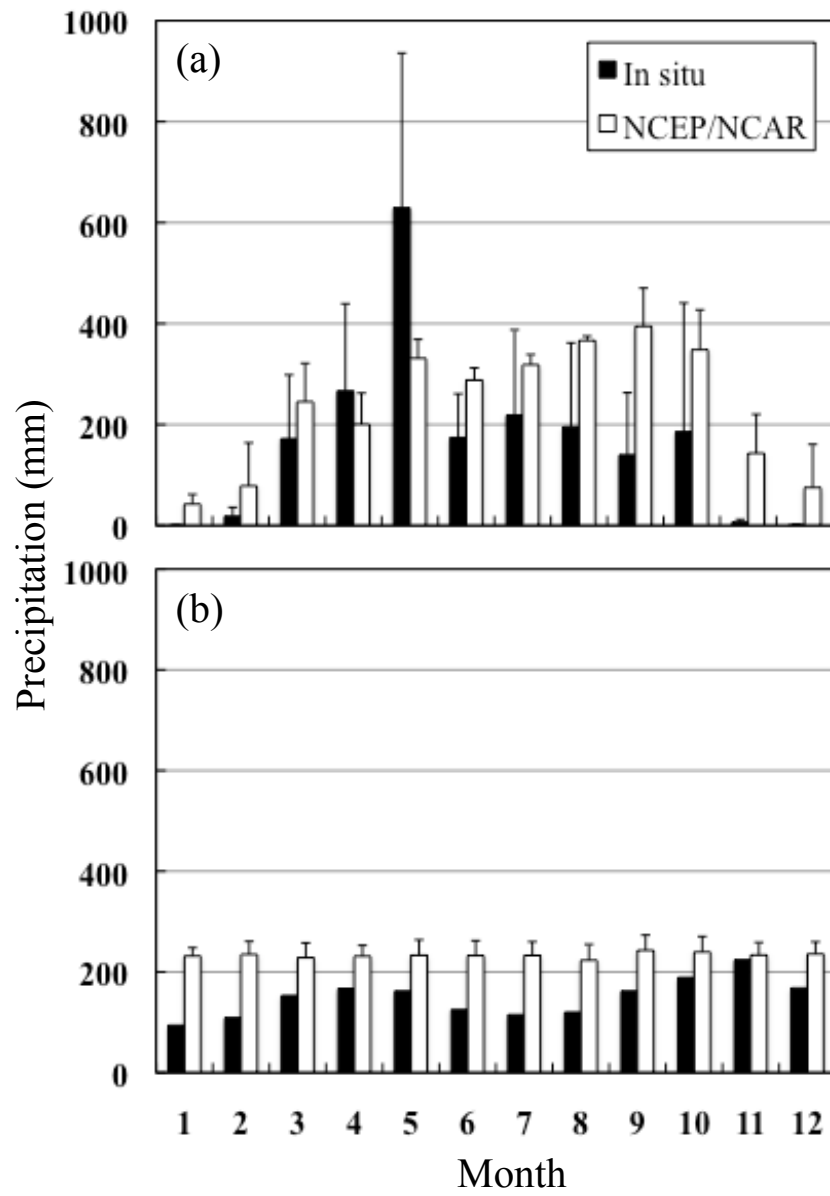


Fig 4

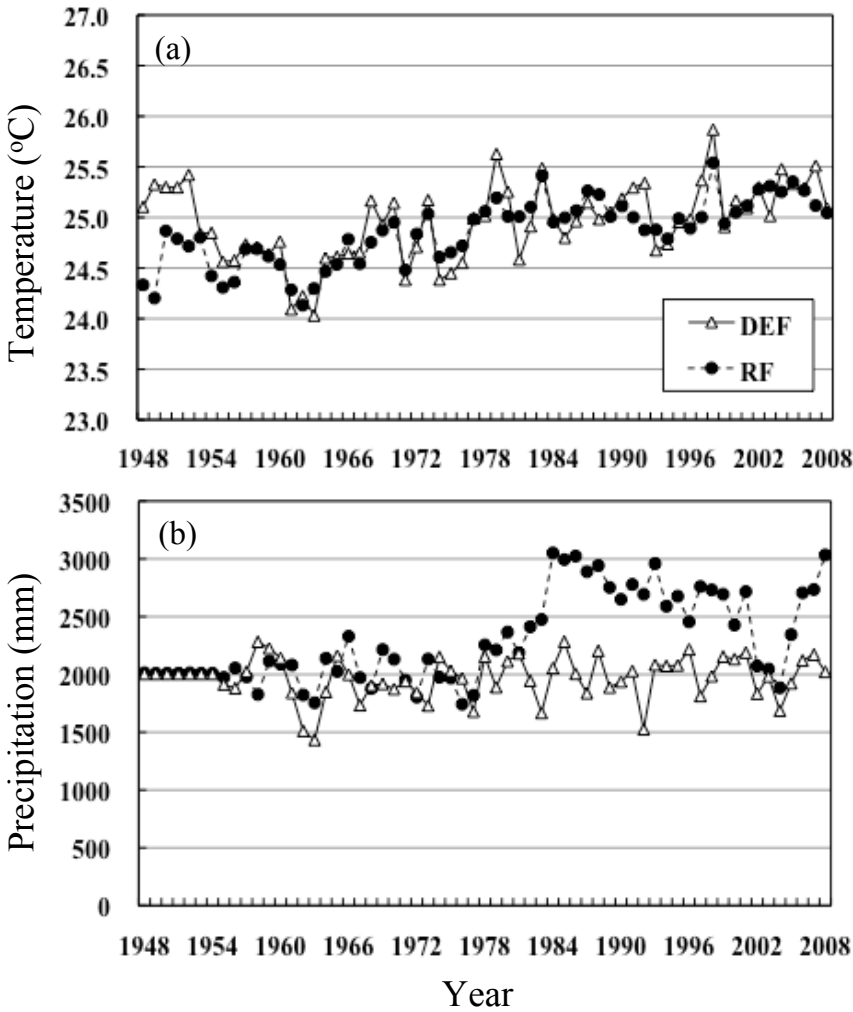


Fig 5

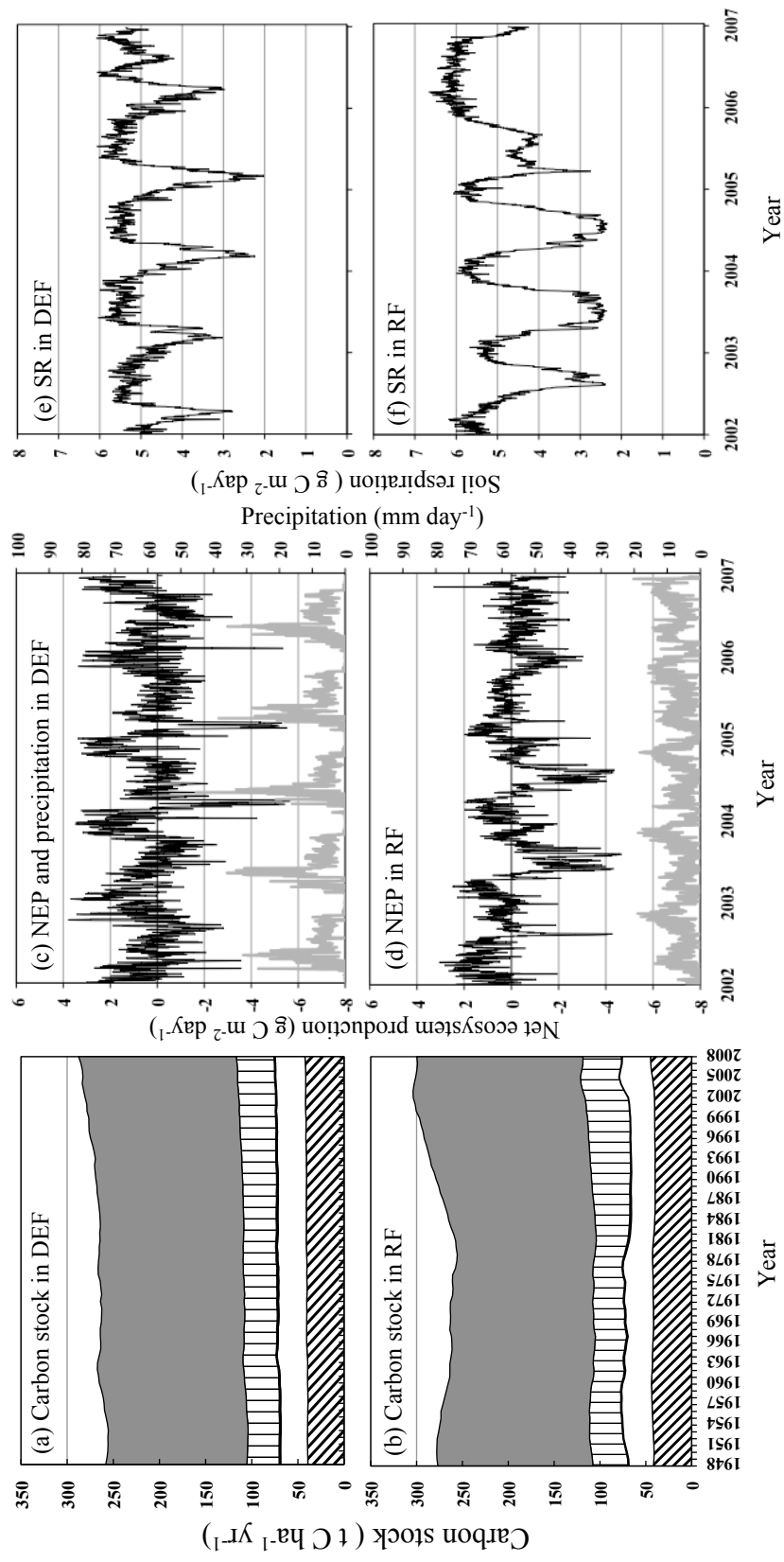


Fig 6

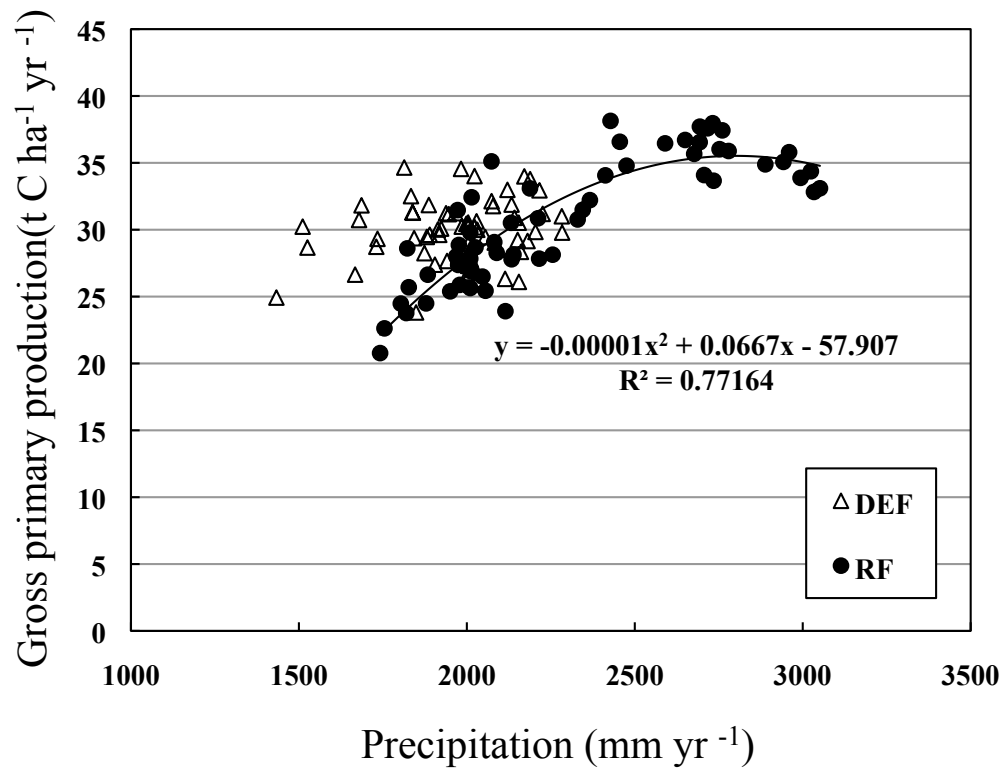


Fig 7

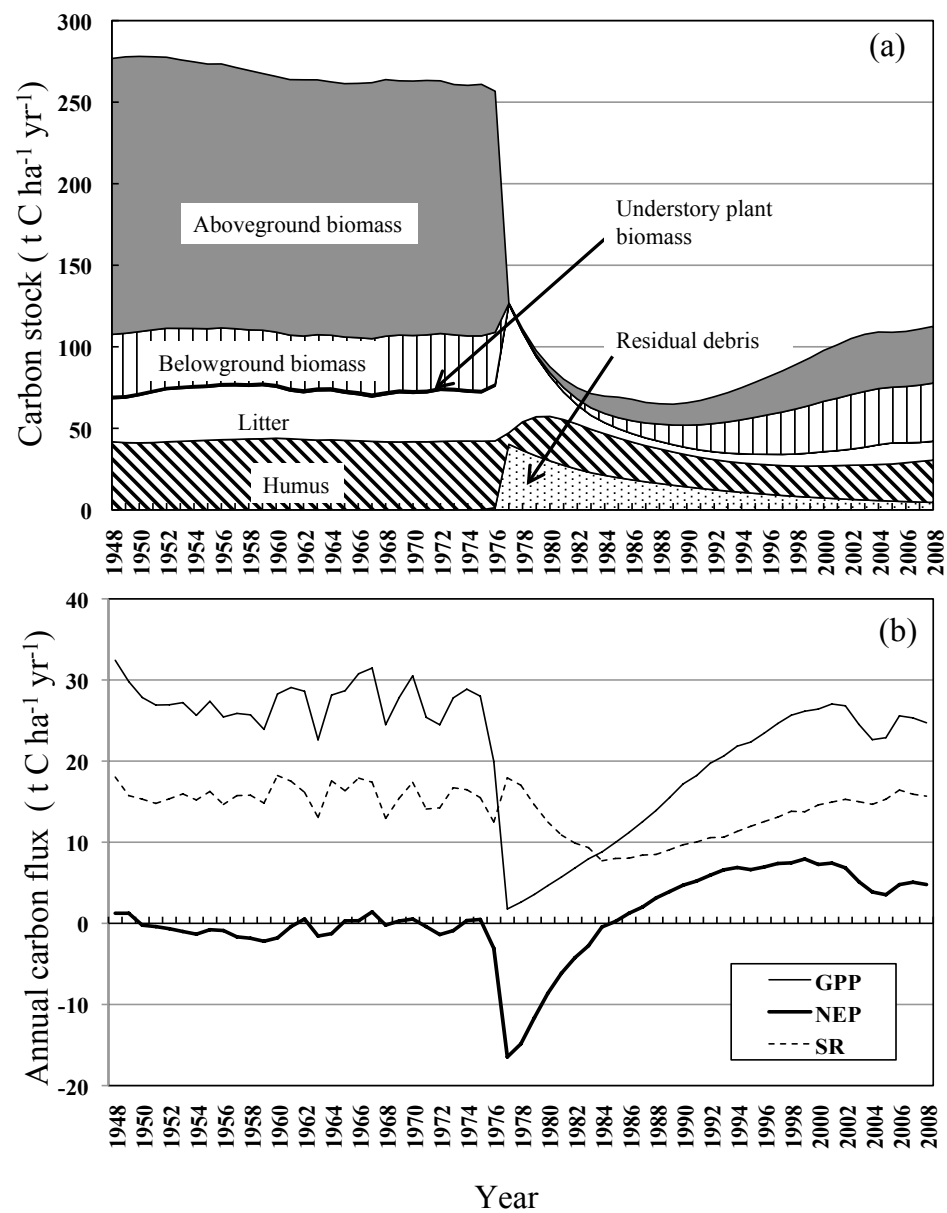


Fig 8

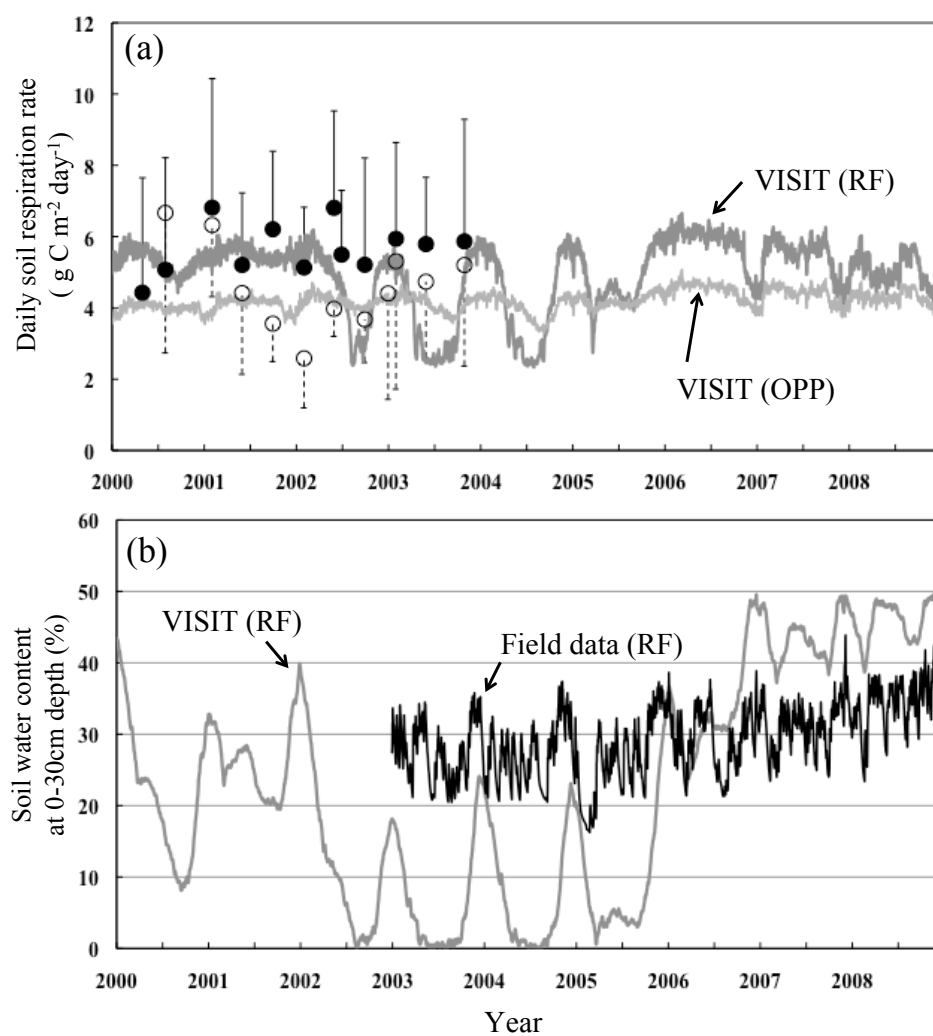


Fig 9

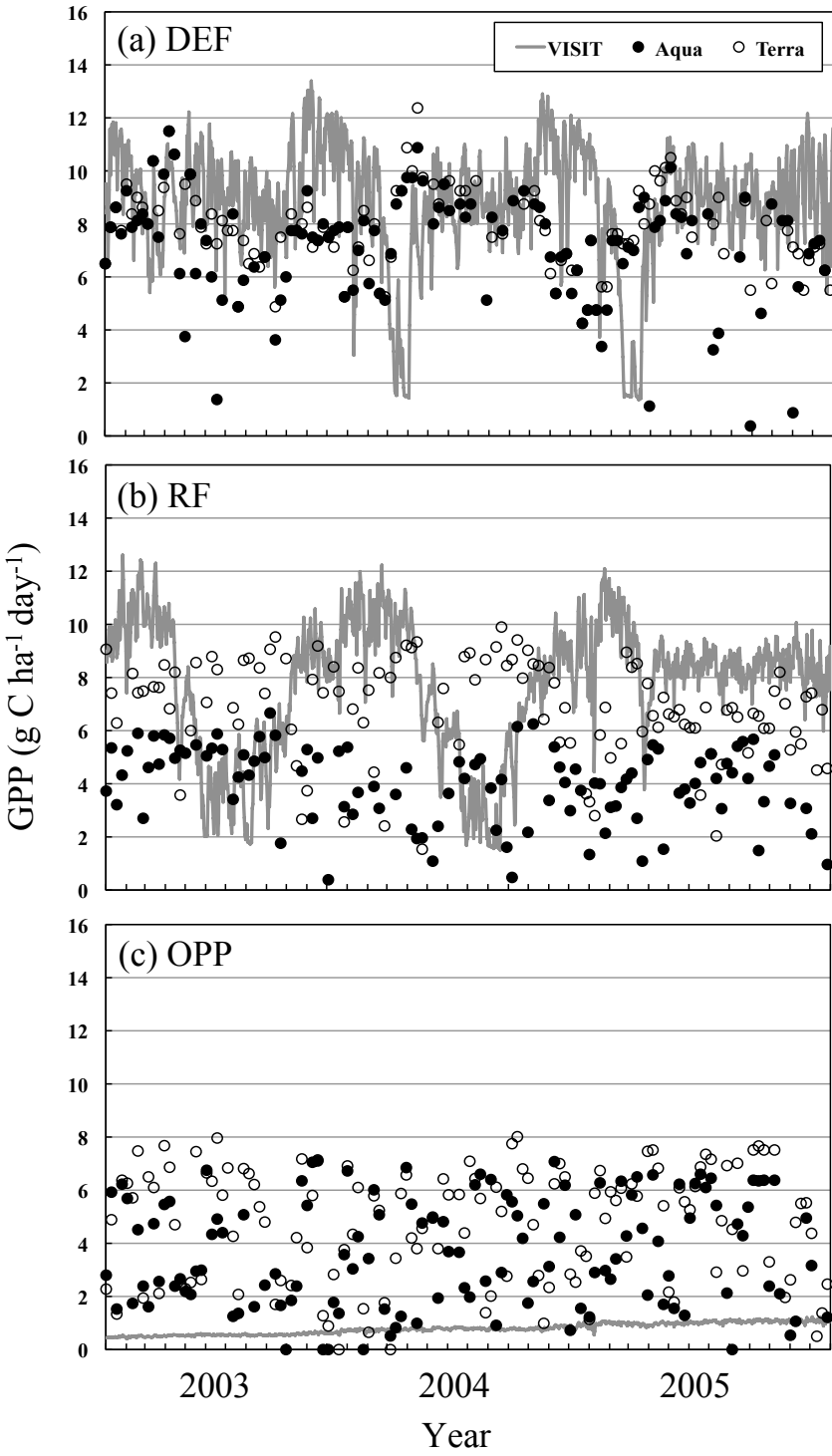


Table 1

Parameters	Unit	Forest	Oil palm plantation
Maximum photosynthetic rate	$\mu\text{mol CO}_2 \text{ m}^{-2} \text{ s}^{-1}$	20	20
Leaf allocation coefficient	fraction	0.1	0.2
Aboveground allocation coefficient	fraction	0.55	0.60
Specific leaf area	$\text{cm}^2 \text{ g}^{-1}$	170	150
Stem growth respiration coefficient	fraction allocated carbon	0.25	0.18
Root growth respiration coefficient	fraction allocated carbon	0.35	0.32
leaf maintenance respiration coefficient	0.001 fraction biomass (15°C)	1.57	1.30
Sapwood maintenance respiration coefficient	0.001 fraction biomass (15°C)	0.25	0.06
Fine root maintenance respiration coefficient	0.001 fraction biomass (15°C)	0.35	0.60
Heartwood maintenance respiration coefficient	0.001 fraction biomass (15°C)	0.014	0.008
Coarse root maintenance respiration coefficient	0.001 fraction biomass (15°C)	0.055	0.150
Harvest leaf every year ¹	% of leaves yr ⁻¹	--	5.0
Harvest oil palm (from stem) every year ²	t C ha ⁻¹ yr ⁻¹	--	3.3

¹ Conducted 5 y after planting

² Conducted 10 y after planting

Table 2

Site	Sakaerate, Thailand	Pasoh, Malaysia	
	Dry evergreen forest	Evergreen forest	Oil palm plantation
Bulk density	1.05 ¹	0.74 ³	1.06 ³
Sand content (%)	61.2 ²	16.6 ¹	67.2
Clay content (%)	24.9 ²	57.8 ¹	21.0

¹ Measured in the present study

² Yamashita et al. (2010)

³ Yashiro et al. (2007)

Table 3

Parameters	Unit
Air temperature at 2m hight	K
Specific humidity at 2m	kg kg ⁻¹
Precipitation	kg m ⁻² s ⁻¹
Downward shortwave radiation	W m ⁻²
Cloud cover	%
Soil surface temperature	K
Soil temperature at 0-10 cm depth	K
Soil temperature at 10-200 cm depth	K
Soil temperature at 300 cm depth	K
U wind (component of west-east)	m s ⁻¹
V wind (component of north-south)	m s ⁻¹
Air pressure (Pa)	Pa

Table 4

t C ha ⁻¹ y ⁻¹	DEF site			RF site			OPP site		
	VISIT ¹	Field data	Year of data	VISIT ¹	Field data	Year of data	VISIT ¹	Field data	Year of data
GPP	32.5	35.6 ²	2002	26.5	32.6 ⁴	2003	6.3	nd	Average of 1-10 years old
	34.5	39.6 ²	2003	26.6	32.8 ⁴	2004	18.5	nd	Average of 11-20 years old
	31.8	nd	2004	31.5	32.0 ⁴	2005	25.2	nd	Average of 21-30 years old
NEP	1.0	-1.8 ²	2002	-1.9	-0.4 ⁴	2003	-6.4	1.06 ⁷	5 years old
	2.5	0.9 ²	2003	-1.9	2.4 ⁴	2004	5.2	nd	Average of 11-20 years old
	0.69	nd	2004	0.3	2.8 ⁴	2005	6.2	nd	Average of 21-30 years old
SR	18.2	nd	2001	20.1	18.1 ⁵	2001	14.9	14.4 ⁵	2001
AGB	160.4	226.3 ³	1993	182.8	201.5 ⁶	1998	34.9	33.9 ⁸	27.5 years old

¹ same year or period as field data

² Hirata et al. (2008)

³ half of above ground biomass; Kanzaki et al. (2009)

⁴ Kosugi et al. (2008)

⁵ Adachi and Koizumi (2009)

⁶ half of above ground biomass; Hoshizaki and others (2004)

⁷ Melling et al. (2008)

⁸ half of above ground biomass; Corley and Tinker (2003)

nd: no data

Table 5

Proportion remaining			Cumulative C flux induced by land use change (tC ha ⁻¹)					
Leaf (%)	Stem (%)	Root (%)	(a) Harvest (tC ha ⁻¹)	(b) 60 % of Harvest	(c) SR in 2 years ^a	Total C flux ((b) + (c))	(d) SR in 10 years ^b	Total C flux ((a) + (d))
100	100	100	0.0	0.0	74.4	74.4	209.3	209.3
80	80	80	36.9	22.1	63.2	85.3	181.5	218.4
60	60	60	73.8	44.3	52.1	96.4	153.8	227.6
50	50	50	92.3	55.4	46.5	101.9	140.0	232.3
40	40	40	110.7	66.4	40.9	107.3	126.1	236.8
20	20	20	147.7	88.6	29.7	118.3	98.4	246.1
0	0	0	184.6	110.8	18.5	129.3	70.7	255.3
100	40.7	100	123.6	74.2	35.0	109.2	116.0	239.6
No disturbance (Forest)			0.0	0.0	31.6	31.6	175.9	175.9

Disturbance year was 1976.

Harvest carbon was assumed to be released to the atmosphere, with 60% in 1 year and 100% in 10 years.

^a 1977 to 1978

^b 1977 to 1986