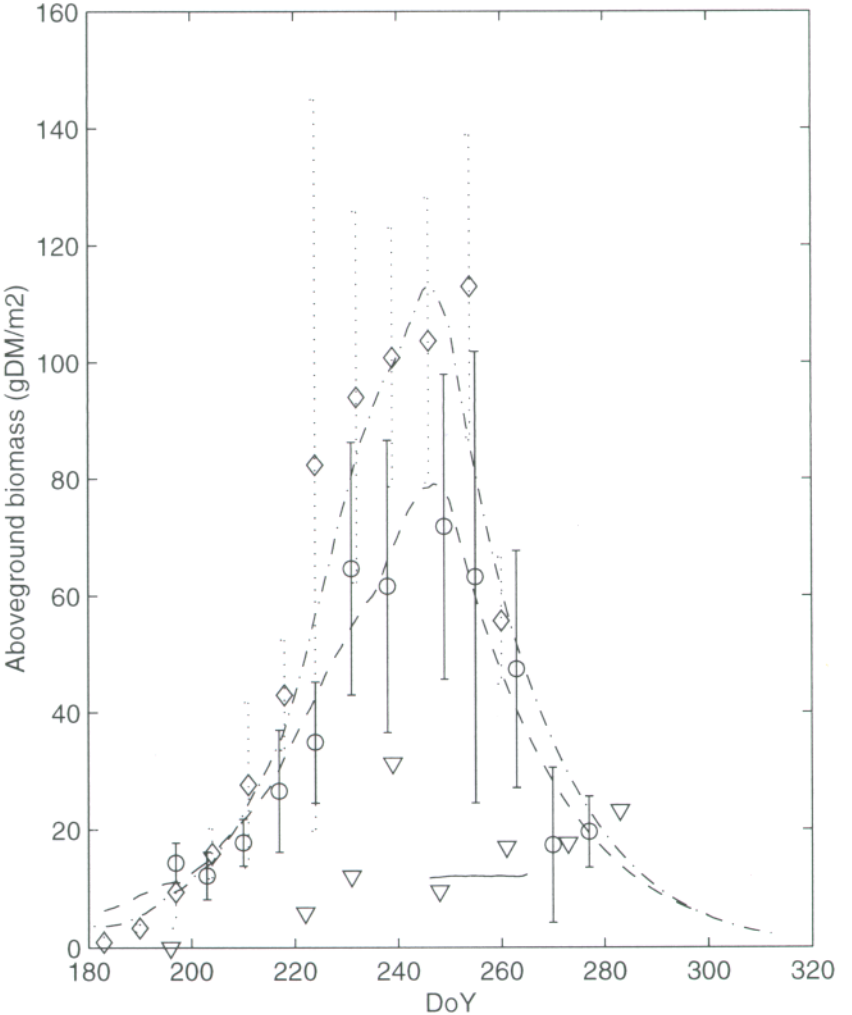

Aboveground biomass (gDM/m2)
DoY
0
20
40
60
80
100
120
140
160
180
200
220
240
260
280
300
320

Figure 1

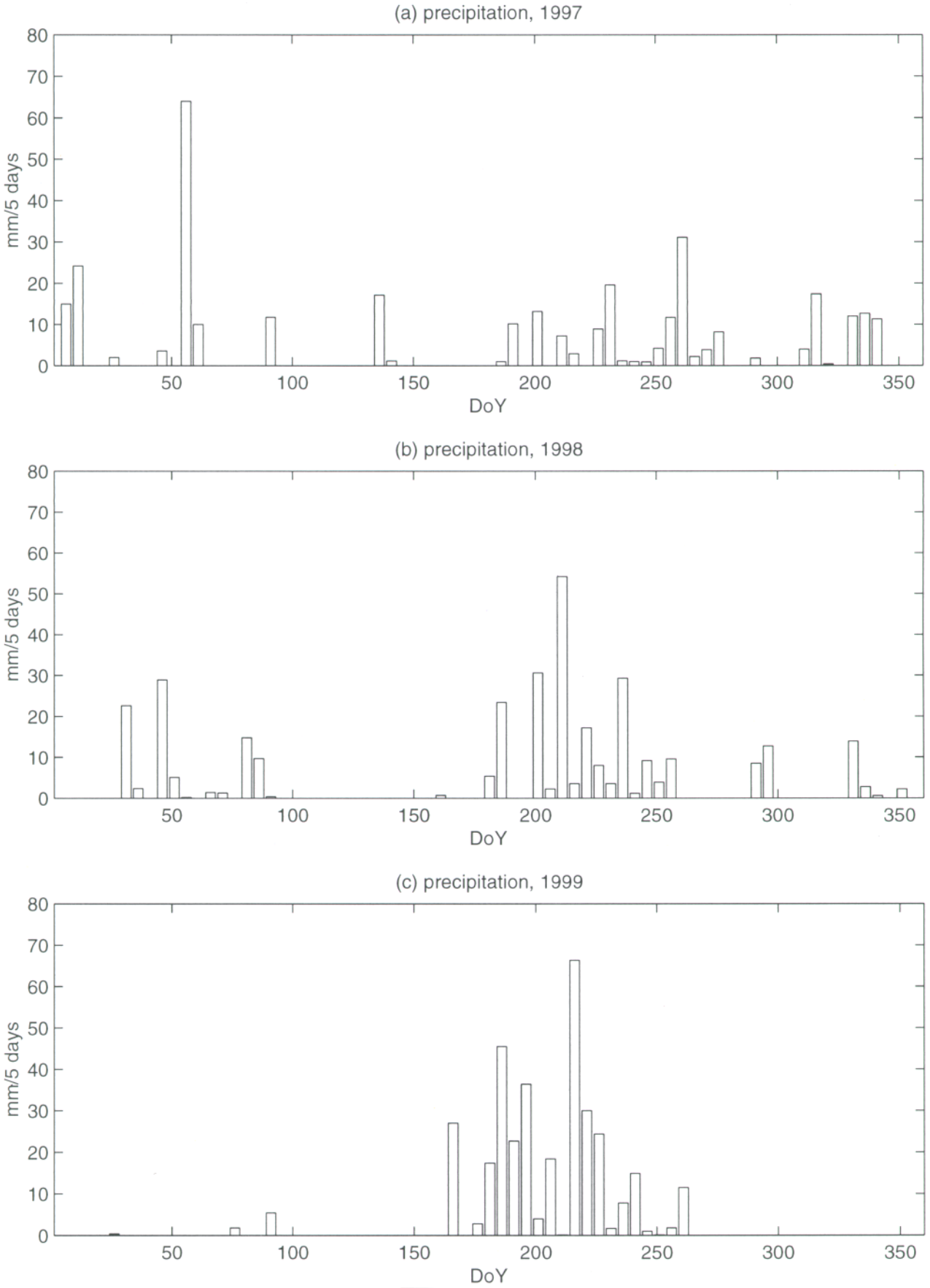

(a) precipitation, 1997
mm/5 days
DoY
(b) precipitation, 1998
mm/5 days
DoY
(c) precipitation, 1999
mm/5 days
DoY

Figure 2

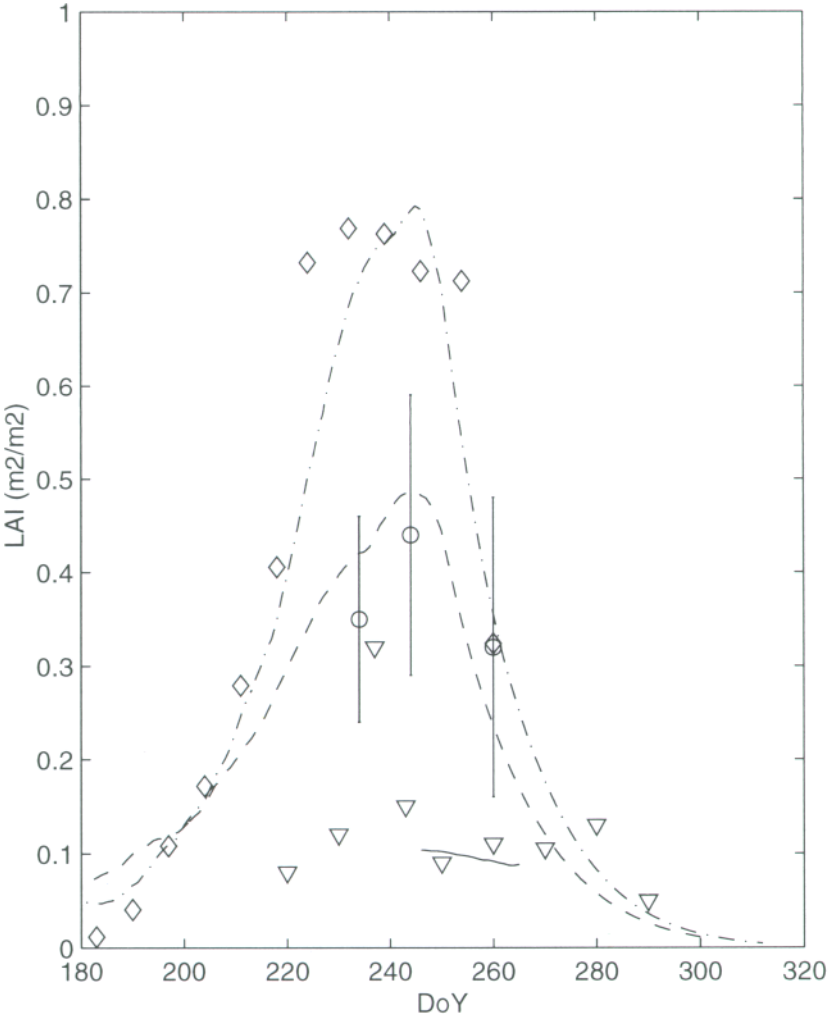

1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
LAI (m2/m2)
180
200
220
240
260
280
300
320
DoY

Figure 3

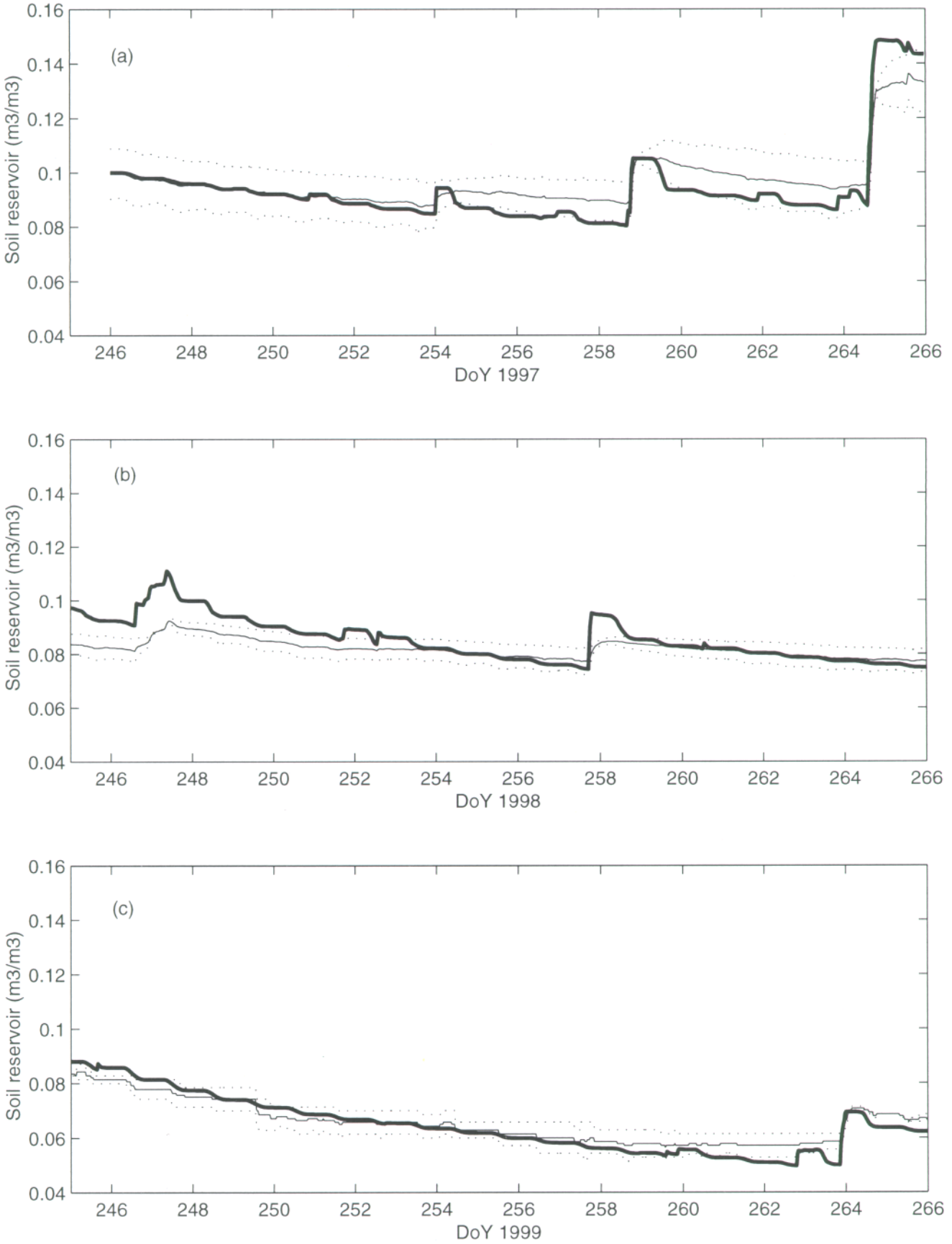

(a)
Soil reservoir (m3/m3)
0.16
0.14
0.12
0.1
0.08
0.06
0.04
246
248
250
252
254
256
258
260
262
264
266
DoY 1997
(b)
Soil reservoir (m3/m3)
DoY 1998
(c)
Soil reservoir (m3/m3)
DoY 1999

Figure 4

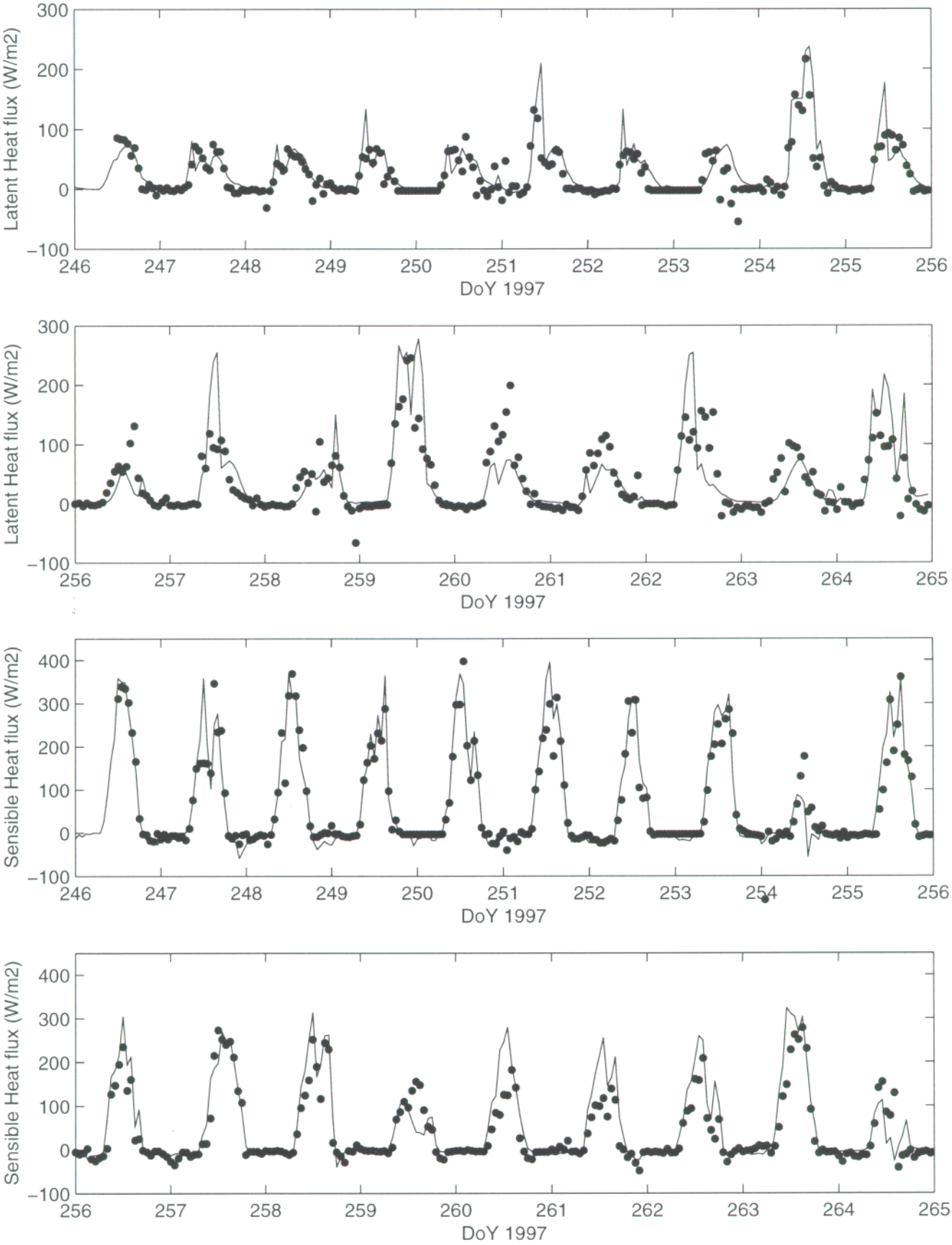

Latent Heat flux (W/m2)
DoY 1997
Latent Heat flux (W/m2)
DoY 1997
Sensible Heat flux (W/m2)
DoY 1997
Sensible Heat flux (W/m2)
DoY 1997

Figure 5a

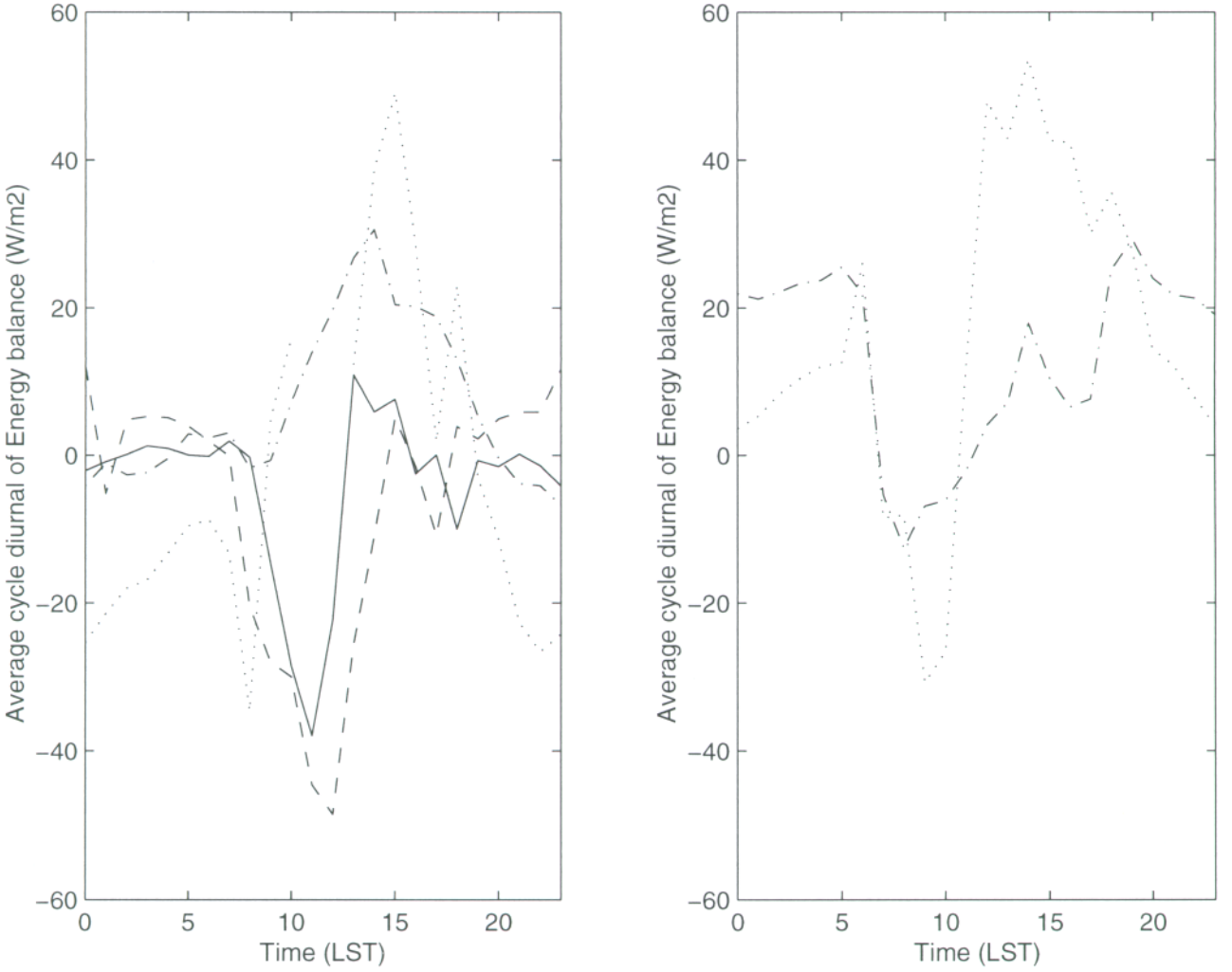

60
40
20
0
−20
−40
−60
Average cycle diurnal of Energy balance (W/m2)
0
5
10
15
20
Time (LST)
60
40
20
0
−20
−40
−60
Average cycle diurnal of Energy balance (W/m2)
0
5
10
15
20
Time (LST)

Figure 5b

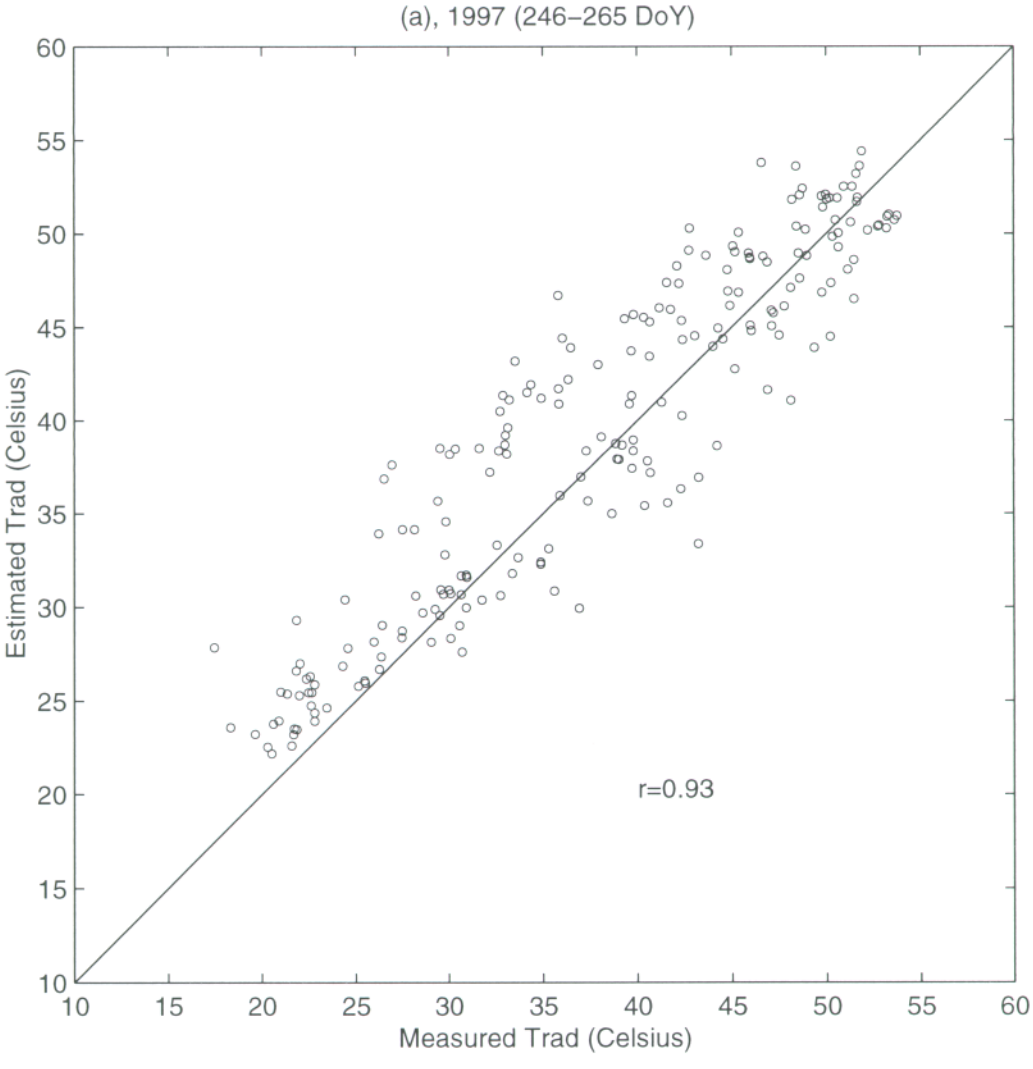

(a), 1997 (246–265 DoY)
Estimated Trad (Celsius)
Measured Trad (Celsius)
r=0.93
10
15
20
25
30
35
40
45
50
55
60

Figure 6a

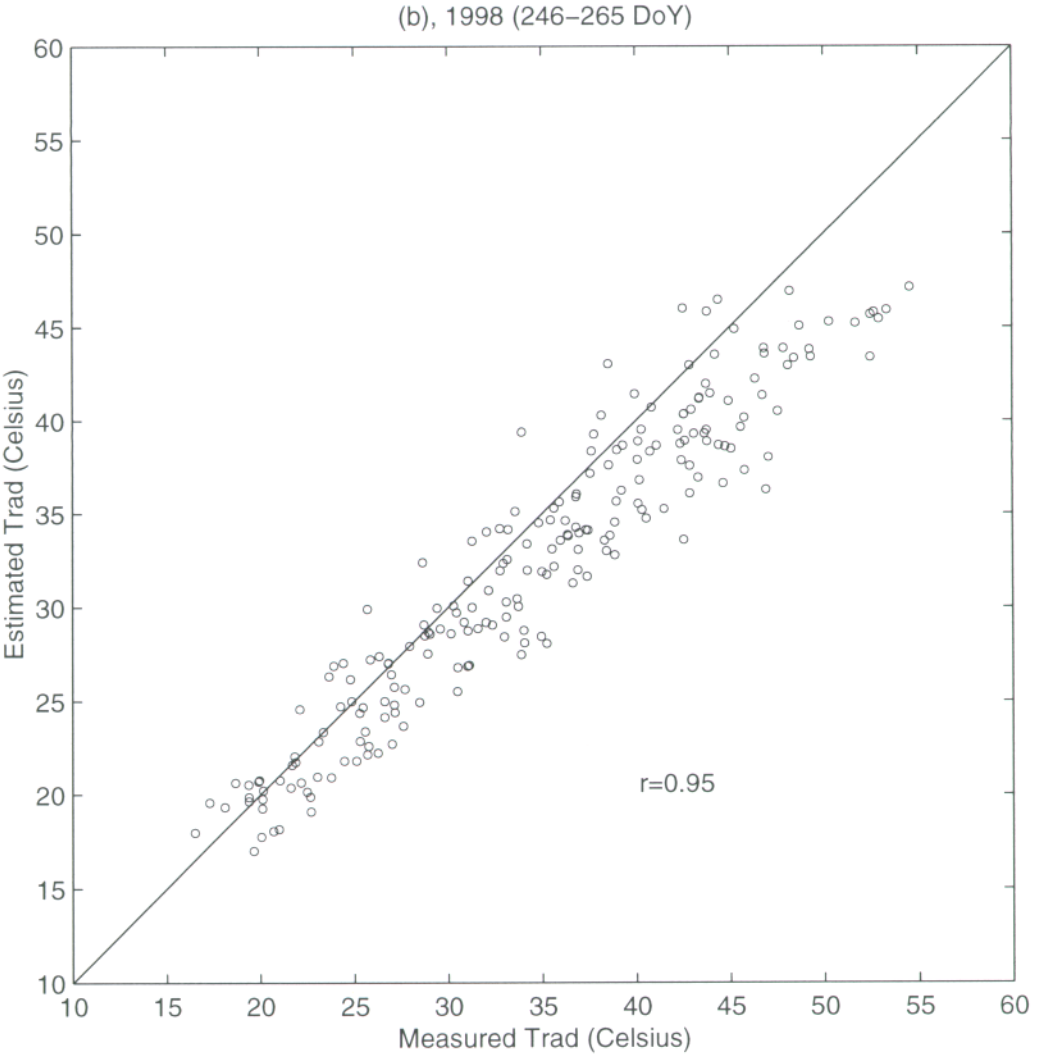

(b), 1998 (246–265 DoY)
Estimated Trad (Celsius)
Measured Trad (Celsius)
r=0.95
10
15
20
25
30
35
40
45
50
55
60

Figure 6b

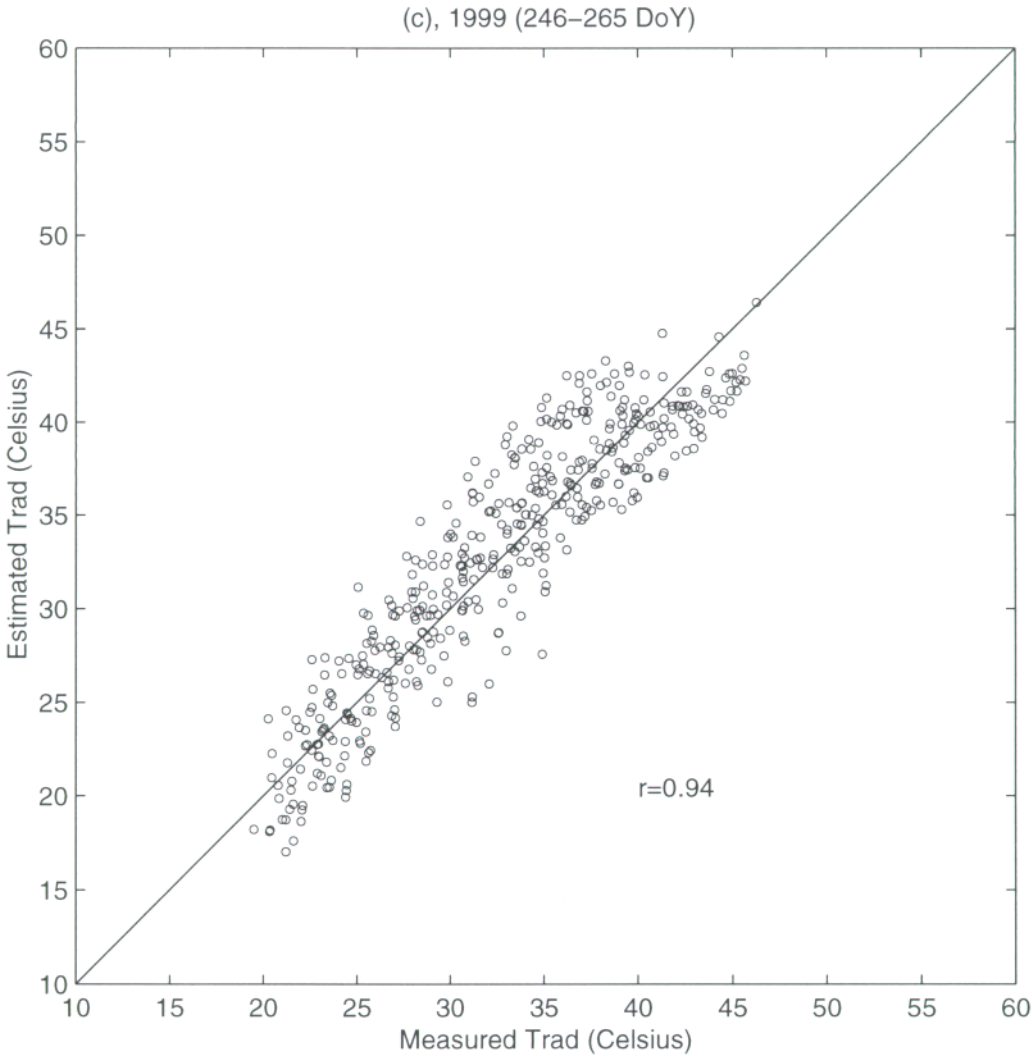

(c), 1999 (246–265 DoY)
Estimated Trad (Celsius)
Measured Trad (Celsius)
r=0.94
10
15
20
25
30
35
40
45
50
55
60

Figure 6c

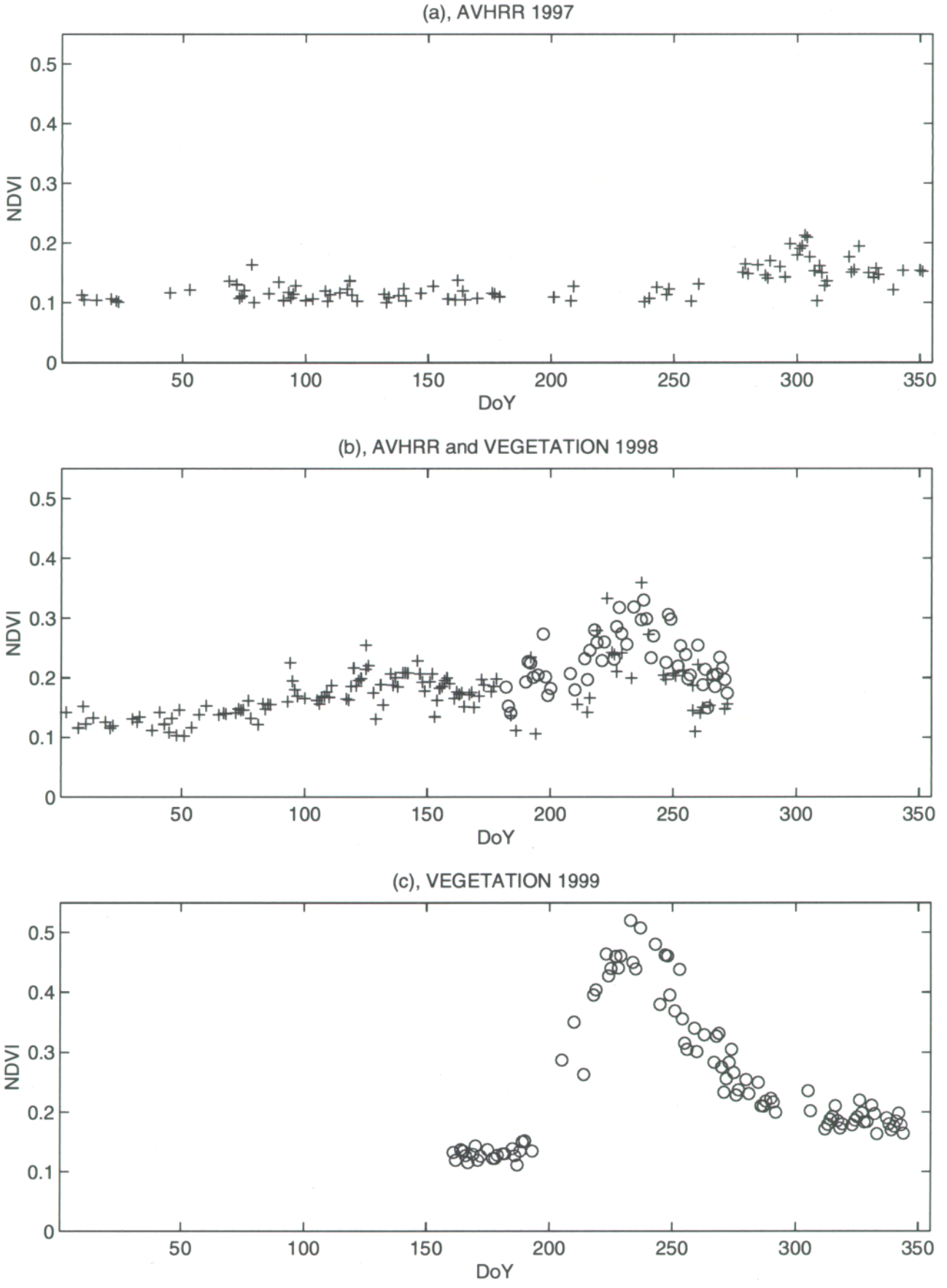

(a), AVHRR 1997
NDVI
DoY
(b), AVHRR and VEGETATION 1998
NDVI
DoY
(c), VEGETATION 1999
NDVI
DoY

Figure 7

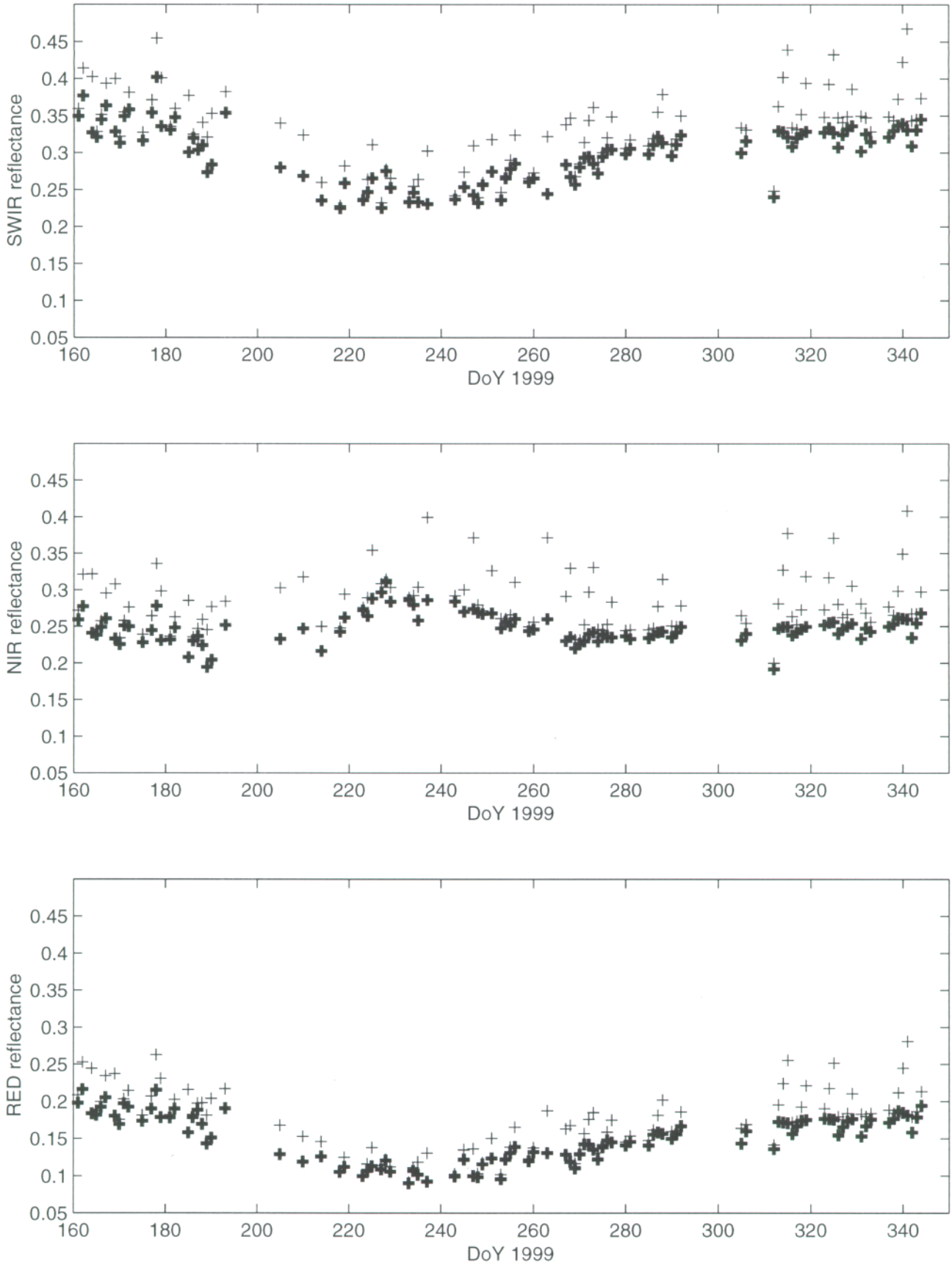
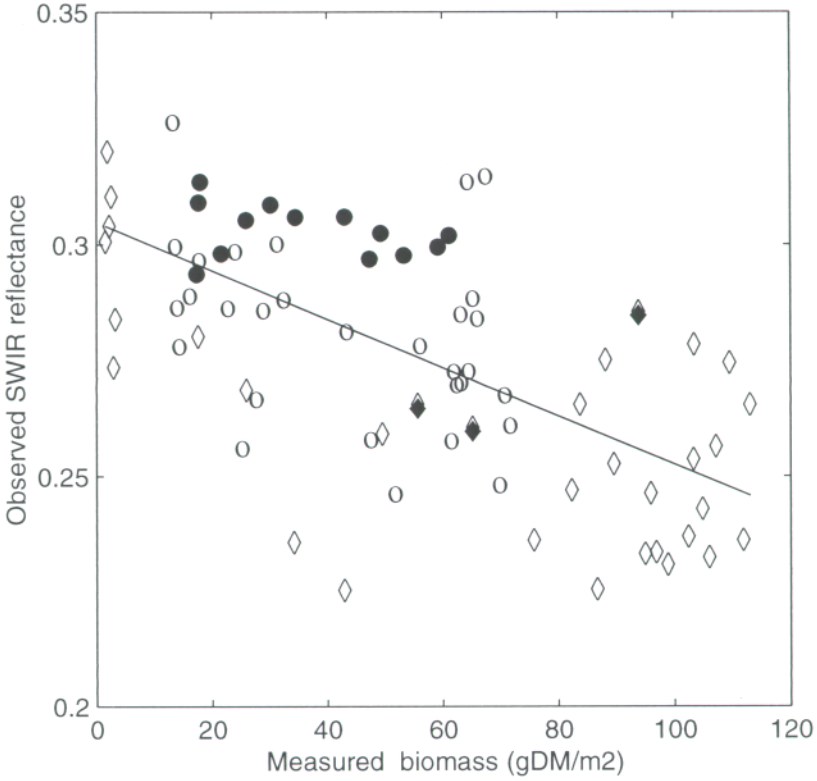


Figure 8 Cayrol


0.35
0.3
0.25
0.2
Observed SWIR reflectance
0
20
40
60
80
100
120
Measured biomass (gDM/m2)

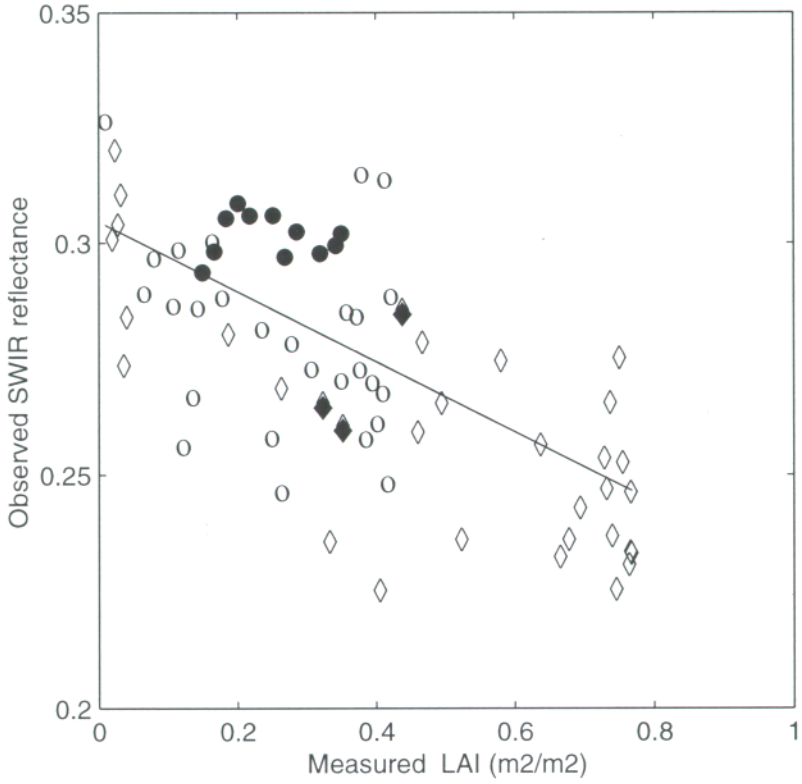
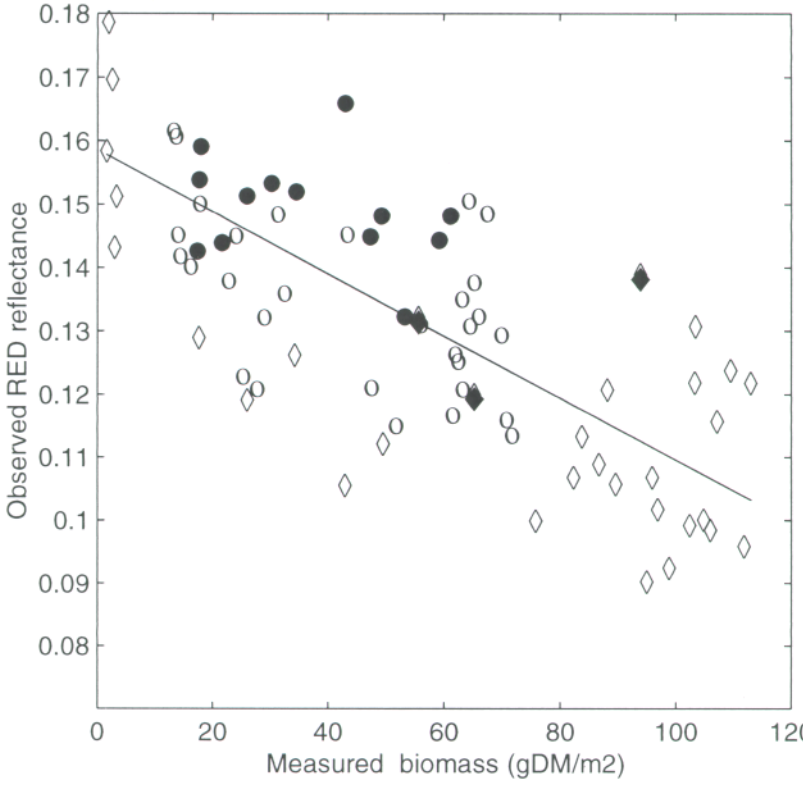

0.35
0.3
0.25
0.2
Observed SWIR reflectance
0
0.2
0.4
0.6
0.8
1
Measured LAI (m2/m2)

Figure 9a


0.18
0.17
0.16
0.15
0.14
0.13
0.12
0.11
0.1
0.09
0.08
Observed RED reflectance
0
20
40
60
80
100
120
Measured biomass (gDM/m2)

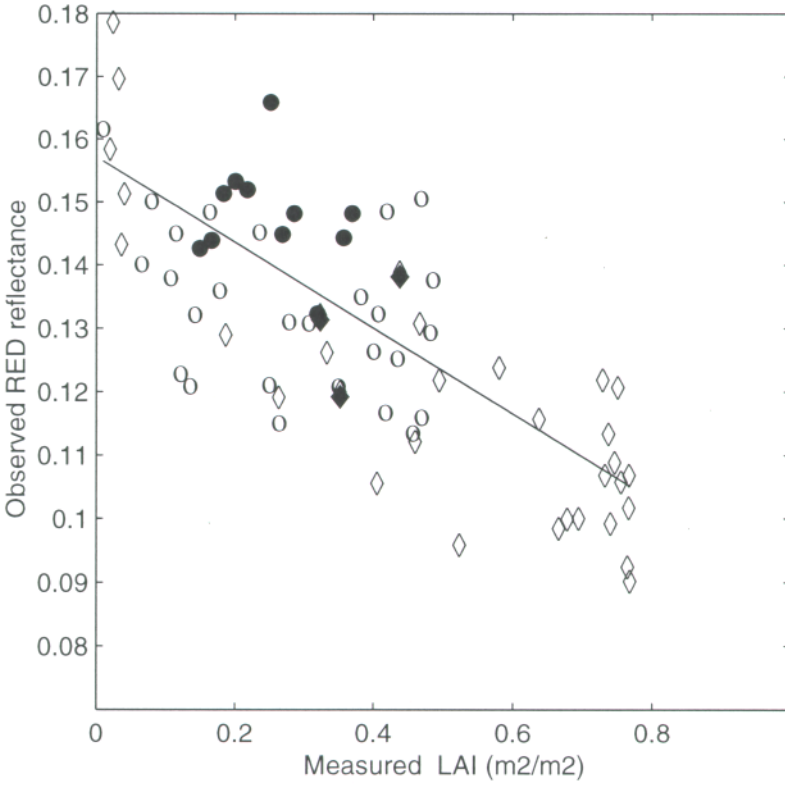
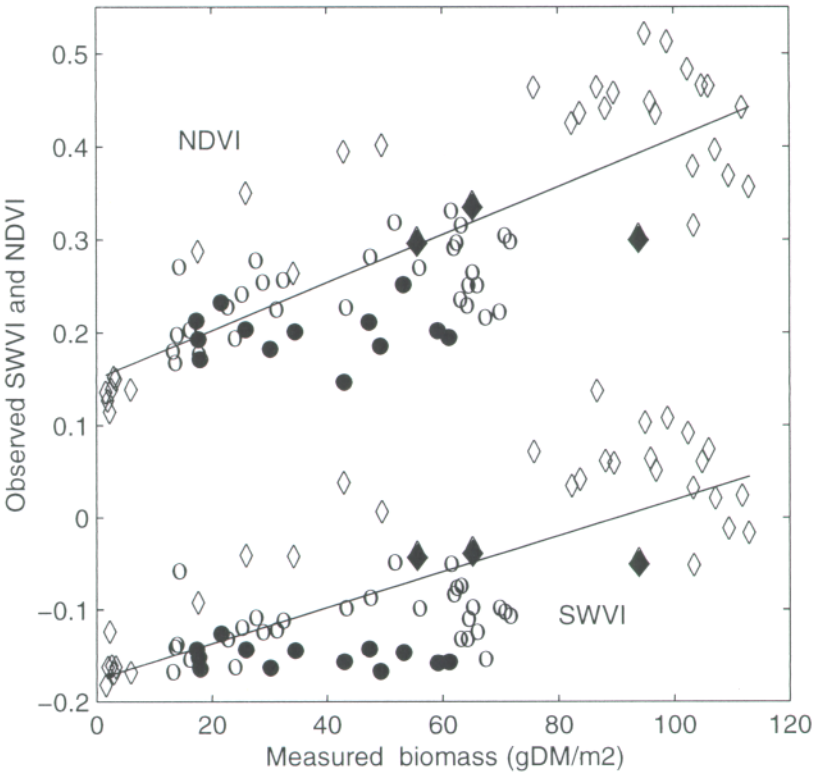

0.18
0.17
0.16
0.15
0.14
0.13
0.12
0.11
0.1
0.09
0.08
Observed RED reflectance
0
0.2
0.4
0.6
0.8
1
Measured LAI (m2/m2)

Figure 9b


NDVI
SWVI
Observed SWVI and NDVI
Measured biomass (gDM/m2)
0.5
0.4
0.3
0.2
0.1
0
−0.1
−0.2
0
20
40
60
80
100
120

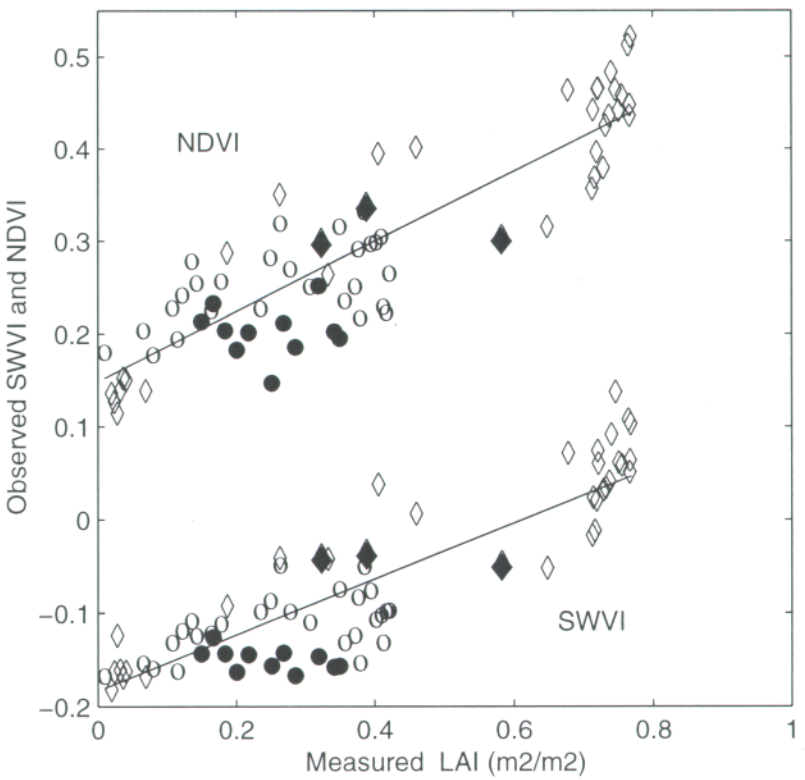

NDVI
SWVI
Observed SWVI and NDVI
Measured LAI (m2/m2)
0.5
0.4
0.3
0.2
0.1
0
−0.1
−0.2
0
0.2
0.4
0.6
0.8
1

Figure 9c

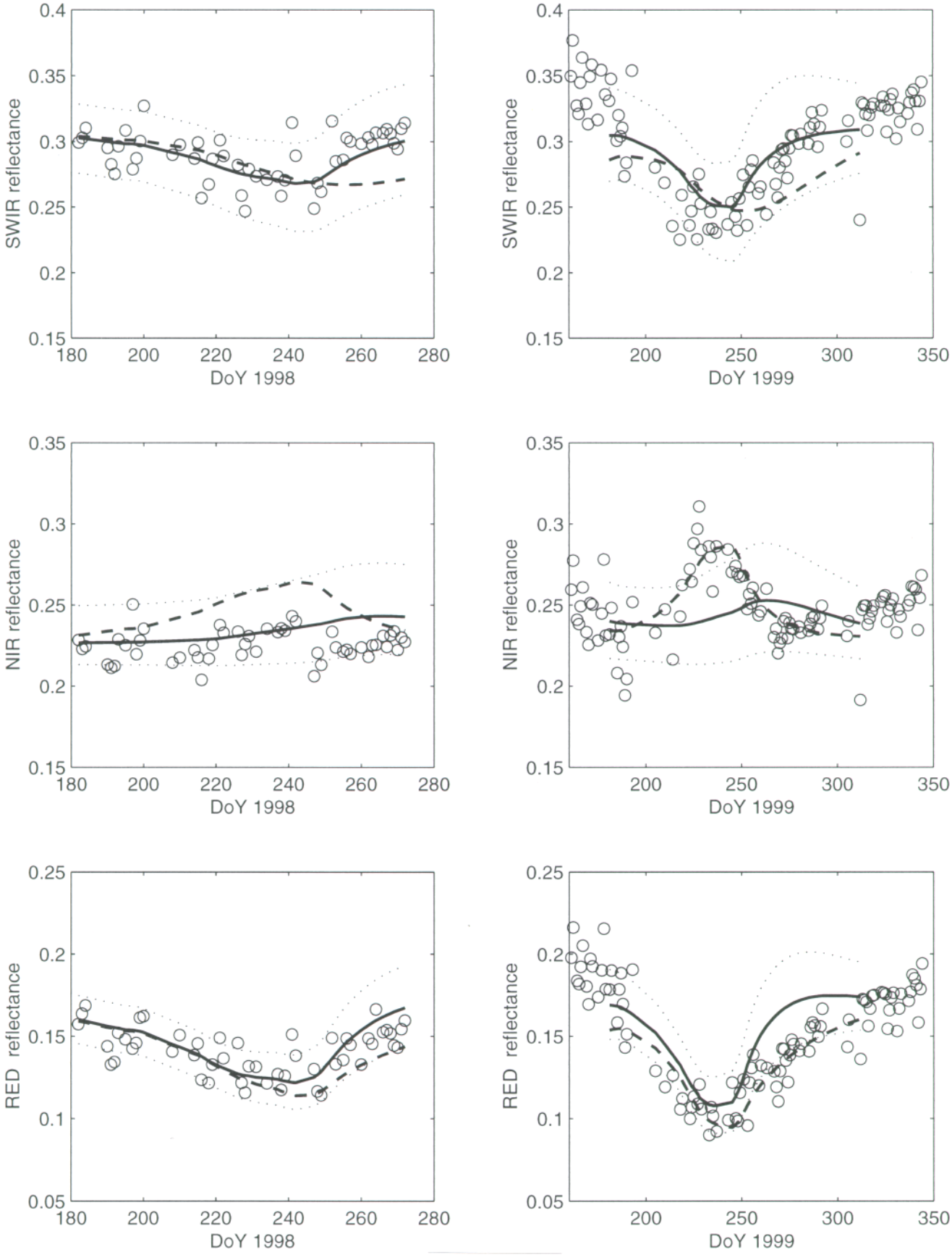

SWIR reflectance
DoY 1998
DoY 1999
NIR reflectance
RED reflectance

Figure 10a

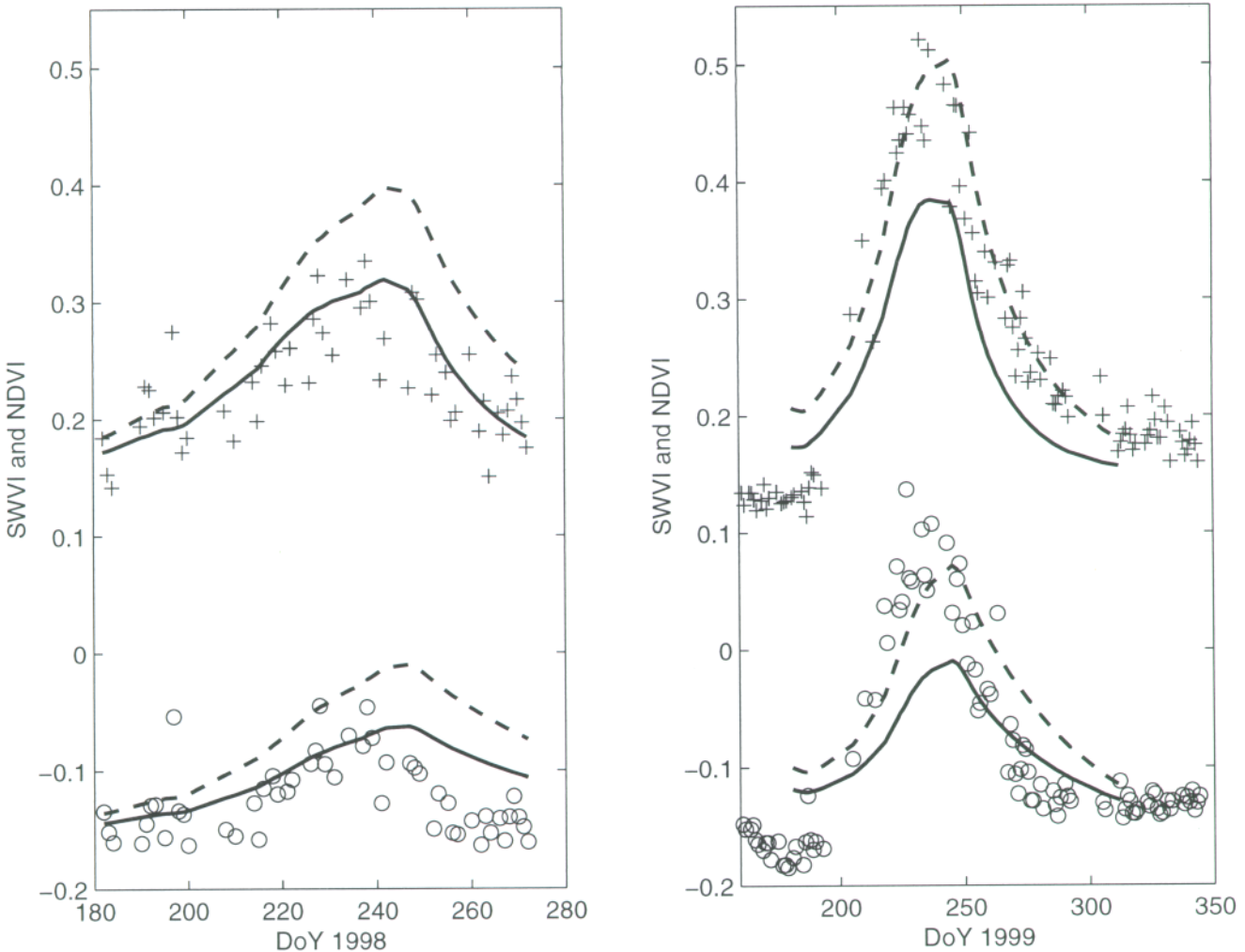

SWVI and NDVI
0.5
0.4
0.3
0.2
0.1
0
−0.1
−0.2
180
200
220
240
260
280
DoY 1998
SWVI and NDVI
0.5
0.4
0.3
0.2
0.1
0
−0.1
−0.2
200
250
300
350
DoY 1999

Figure 10b

	Biomass (gDM m^{-2}) Correlation coefficient (r) Slope and intercept of linear relationships	**LAI** (m^2 m^{-2}) Correlation coefficient (r) Slope and intercept of linear relationships
SWIR	-0.63 -0.0005 0.3048	-0.68 -0.0755 0.3046
RED	-0.74 -0.0005 0.1586	-0.76 -0.0677 0.1572
NDVI	0.81 0.0026 0.1505	0.88 0.3780 0.1485
SWVI	0.76 0.0019 -0.1757	0.86 0.2991 -0.1832

TABLE 1. Correlations, slopes and intercepts of the linear relationships between VEGETATION reflectances (SWIR and RED), vegetation indices (SWVI and NDVI) and measured biomass, LAI collected over two years (1998 and 1999).

GREEN LEAF						**LITTER LEAF**						
Reflectance			Transmittance			Reflectance			Transmittance			
RED	NIR	SWIR	RED	NIR	SWIR	RED	NIR	SWIR	RED	NIR	SWIR	
0.097 (0.02)	0.38 (0.03)	0.29 (0.02)	0.04 (0.08)	0.34 (0.05)	0.31 (0.04)	0.43 (0.08)	0.53 (0.05)	0.5 (0.08)	0.13 (0.07)	0.22 (0.07)	0.25 (0.08)	Asner et al. 1998
0.1	0.45	0.3	0.05	0.5	0.4	0.25	0.43	0.3	-	-	-	Walter-Shea et al. 1992

TABLE 2. Variability of grass green leaf and litter optical properties in the VEGETATION bands (RED, NIR and SWIR). Mean values from Asner et al. 1998 (standard deviations in parentheses) and mean values from Walter-Shea et al. 1992. The symbol - means no data available.

Soil reflectance		
RED	NIR	SWIR
0.17 (0.0144)	0.23 (0.0168)	0.31 (0.0248)

TABLE 3. Soil reflectance in the RED, NIR and SWIR bands. Values (standard deviations in parentheses) from VEGETATION sensor before the growing 1999 season (DoY 160-175).