Índices de Monção para a América do Sul

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Introdução

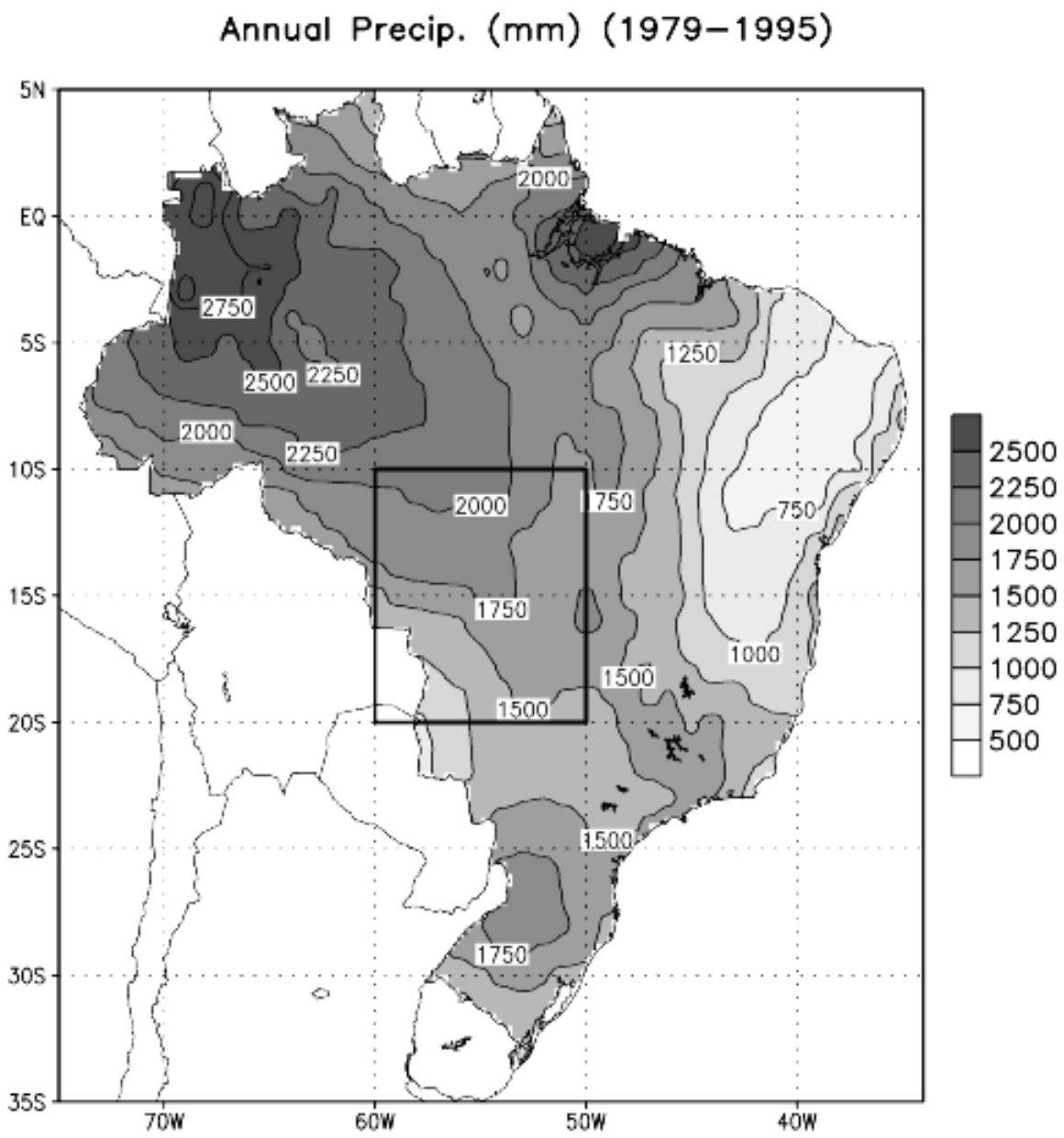
Utilidade - Variabilidade interanual + Previsão

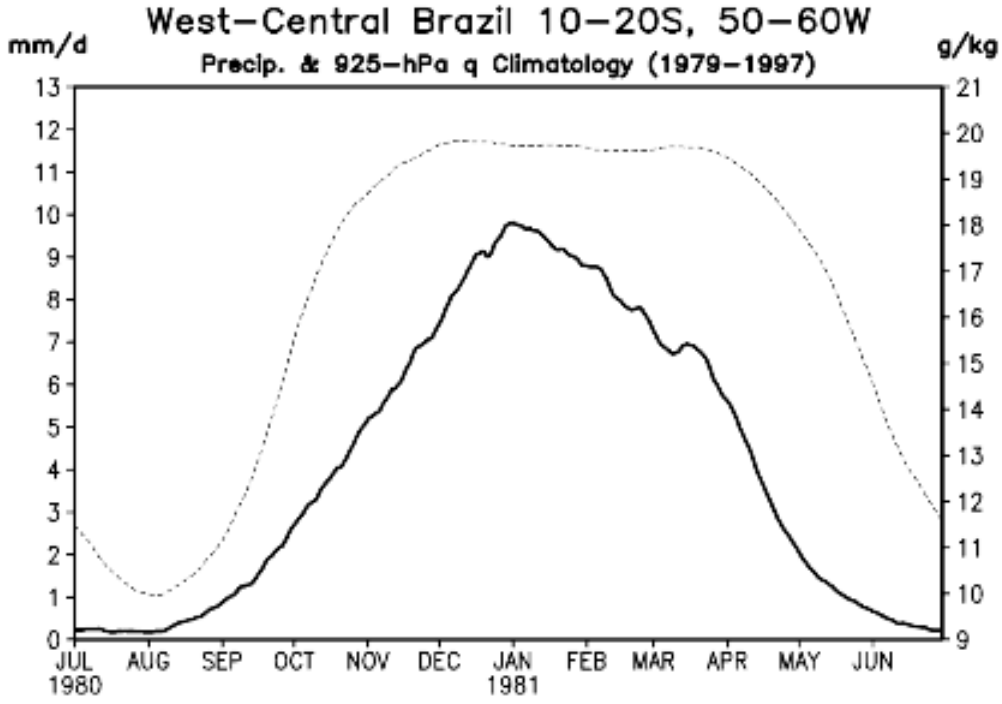
Critérios - Início
Término
Intensidade

Porque a Região Centro-Oeste?

- Ciclo anual da circulação é correlacionada com o sistema de monção (Gan et al. 2004)
- Cabeceiras: Rio Araguaia – Bacia Amazônica

  Rio Paraguai – Bacia da Prata
- Máximo de precipitação


Annual Precip. (mm) (1979–1995)
5N
EQ
5S
10S
15S
20S
25S
30S
35S
70W
60W
50W
40W
2000
2750
2500
2250
1250
2000
2250
2000
1750
750
1750
1000
1500
1500
1500
1750
2500
2250
2000
1750
1500
1250
1000
750
500


West–Central Brazil 10–20S, 50–60W
Precip. & 925–hPa q Climatology (1979–1997)
mm/d
g/kg
13
12
11
10
9
8
7
6
5
4
3
2
1
0
21
20
19
18
17
16
15
14
13
12
11
10
9
JUL
1980
AUG
SEP
OCT
NOV
DEC
JAN
1981
FEB
MAR
APR
MAY
JUN

Objetivos

- Determinar a aplicabilidade de alguns índices de monção para obter o início e o término da estação chuvosa na região Centro-Oeste do Brasil.

Dados

1- Pentads Componentes zonal e meridional do vento em 850 hPa e 200 hPa

- Reanálise do NCAR/NCEP
- Previsão Climática do CPTEC

2- Pentadas Análise da Precipitação – NCEP

Metodologia

Foram utilizados 5 índices

1. U850: u(850hPa; 60W; 20S-10S) > 0 m/s

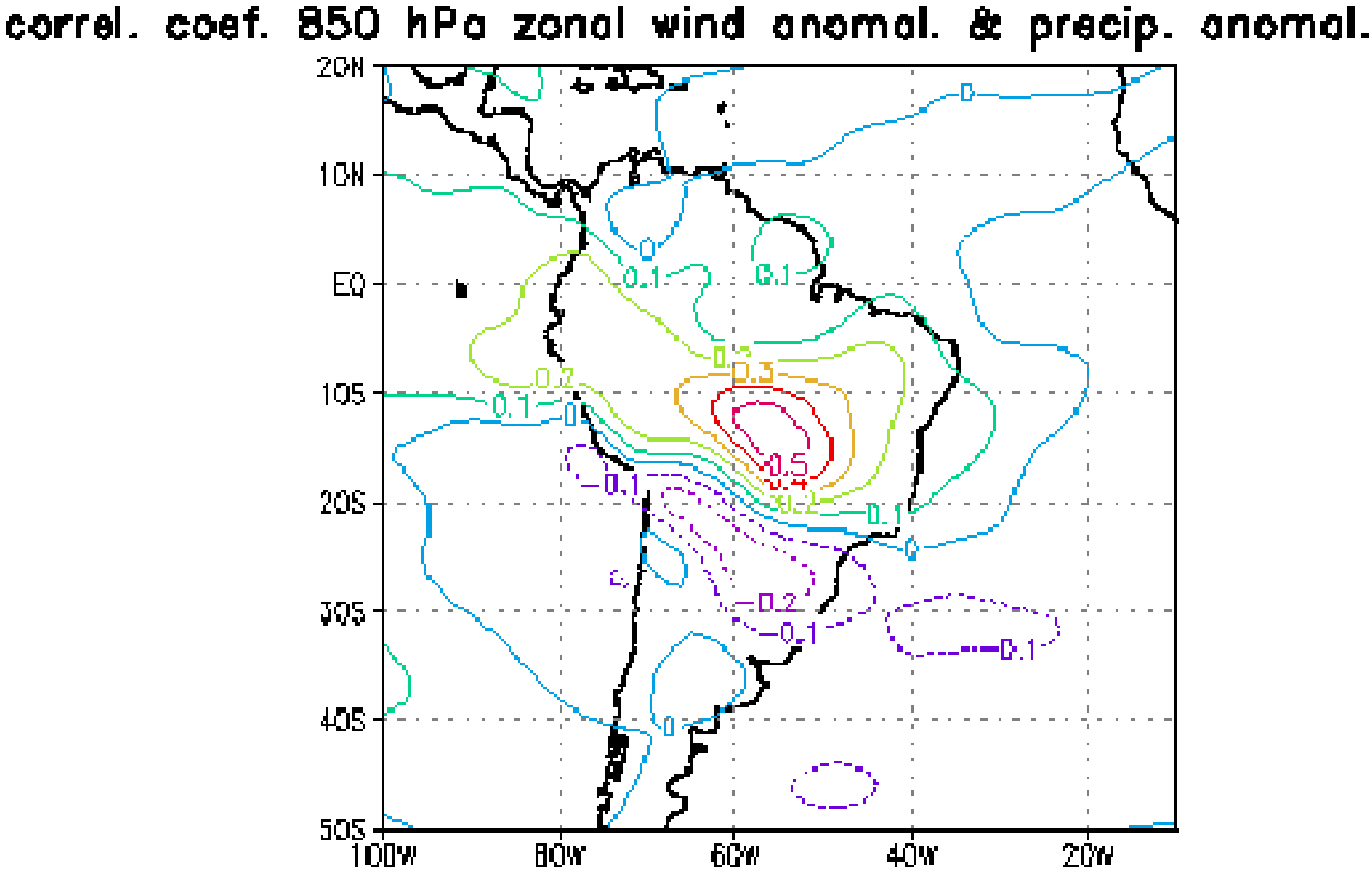
2. V200-850: v(200hPa) – v(850hPa) na área 40W-30W;10S-5S (Figura) >0 m/s

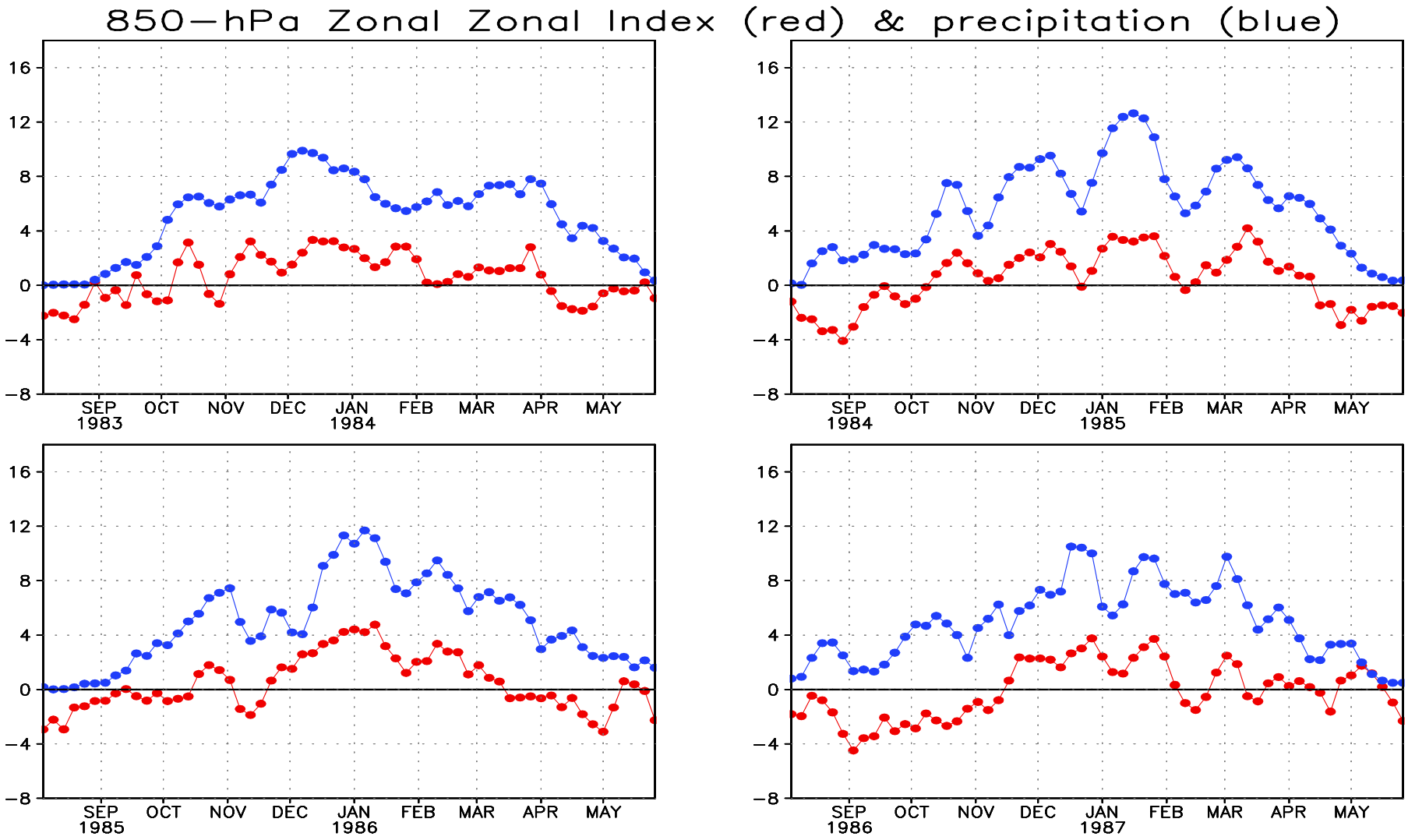
3. U200-850: u(200hPa) – u(850hPa) na área 60W-50W; 15S-10S (Figura) – U200-850/2 < 4m/s

4. UV850: u(60W-50W;15S-10S)+v(65W-60W;25S-20S) +8 > 4m/s

5. U200: u(200hPa; 60W-40W;22.5S-17.5S) + u(200hPa; 60W-50W; 5S-2.5N) – U200/4 < 8m/s

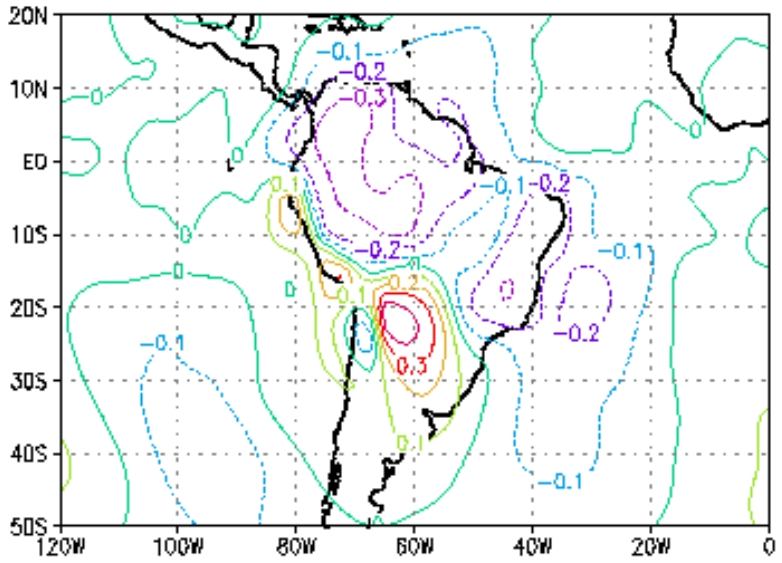
U850


correl. coef. 850 hPa zonal wind anomal. & precip. anomal.
20N
10N
EQ
10S
20S
30S
40S
50S
100W
80W
60W
40W
20W
0
0.1
0.2
0.3
0.5
0.4
-0.1
-0.2

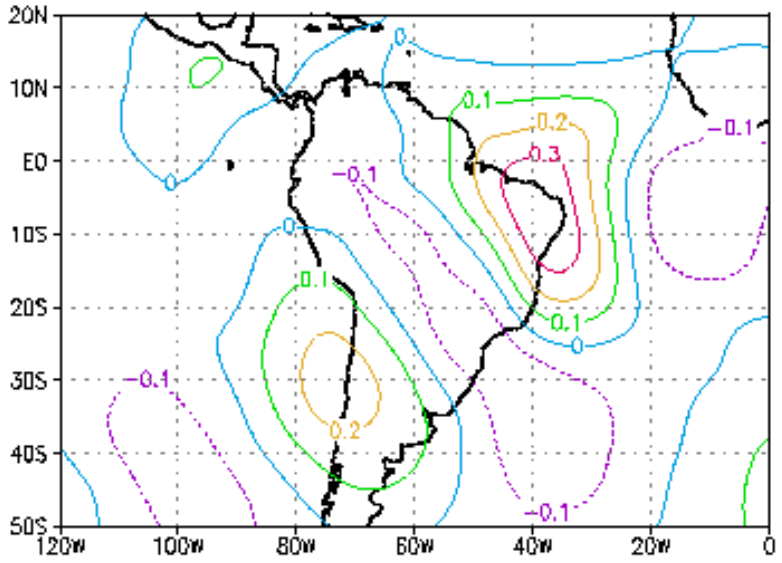

850—hPa Zonal Zonal Index (red) & precipitation (blue)
16
12
8
4
0
−4
−8
SEP
1983
OCT
NOV
DEC
JAN
1984
FEB
MAR
APR
MAY
SEP
1984
OCT
NOV
DEC
JAN
1985
FEB
MAR
APR
MAY
SEP
1985
OCT
NOV
DEC
JAN
1986
FEB
MAR
APR
MAY
SEP
1986
OCT
NOV
DEC
JAN
1987
FEB
MAR
APR
MAY

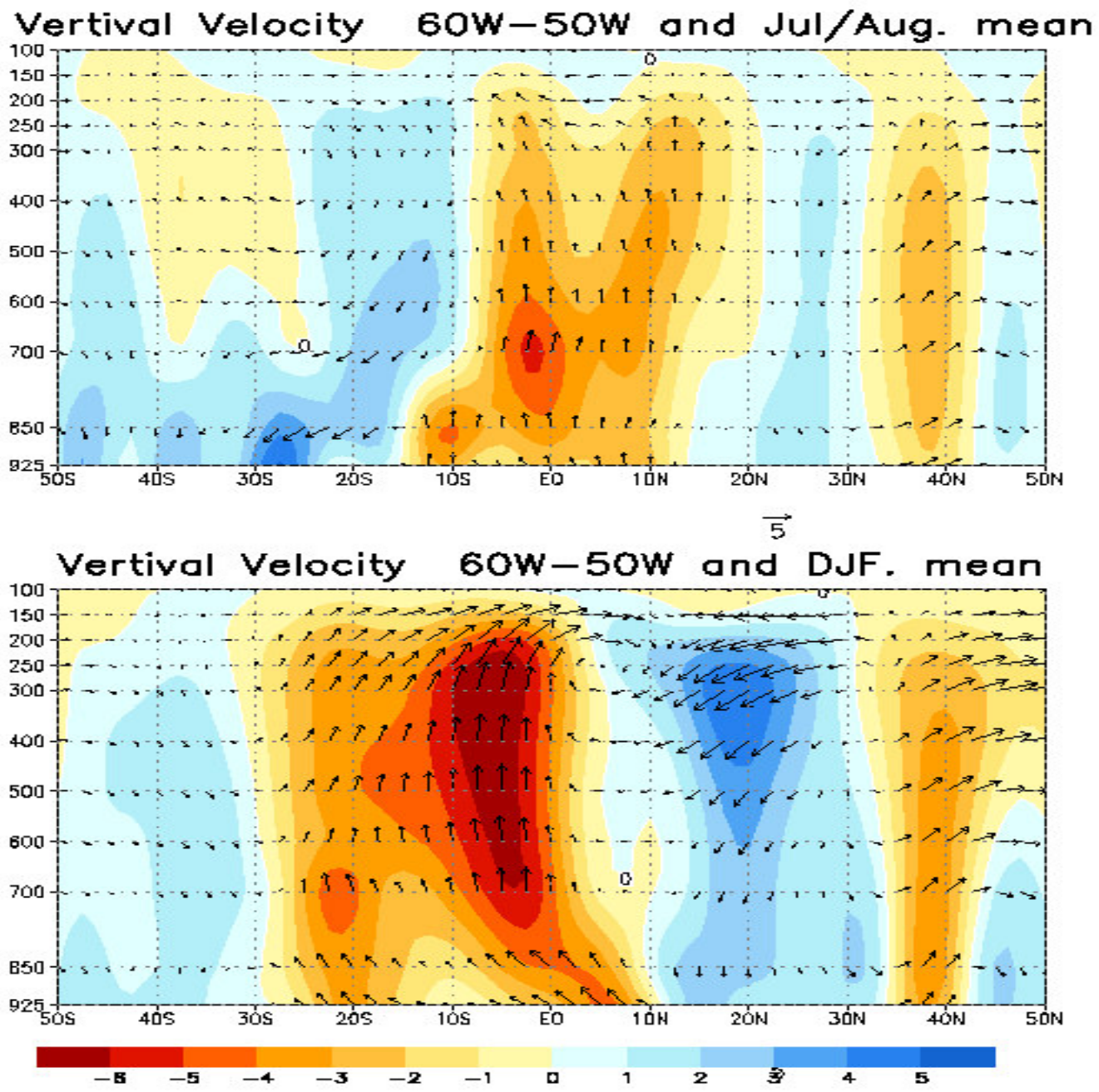
V200-850

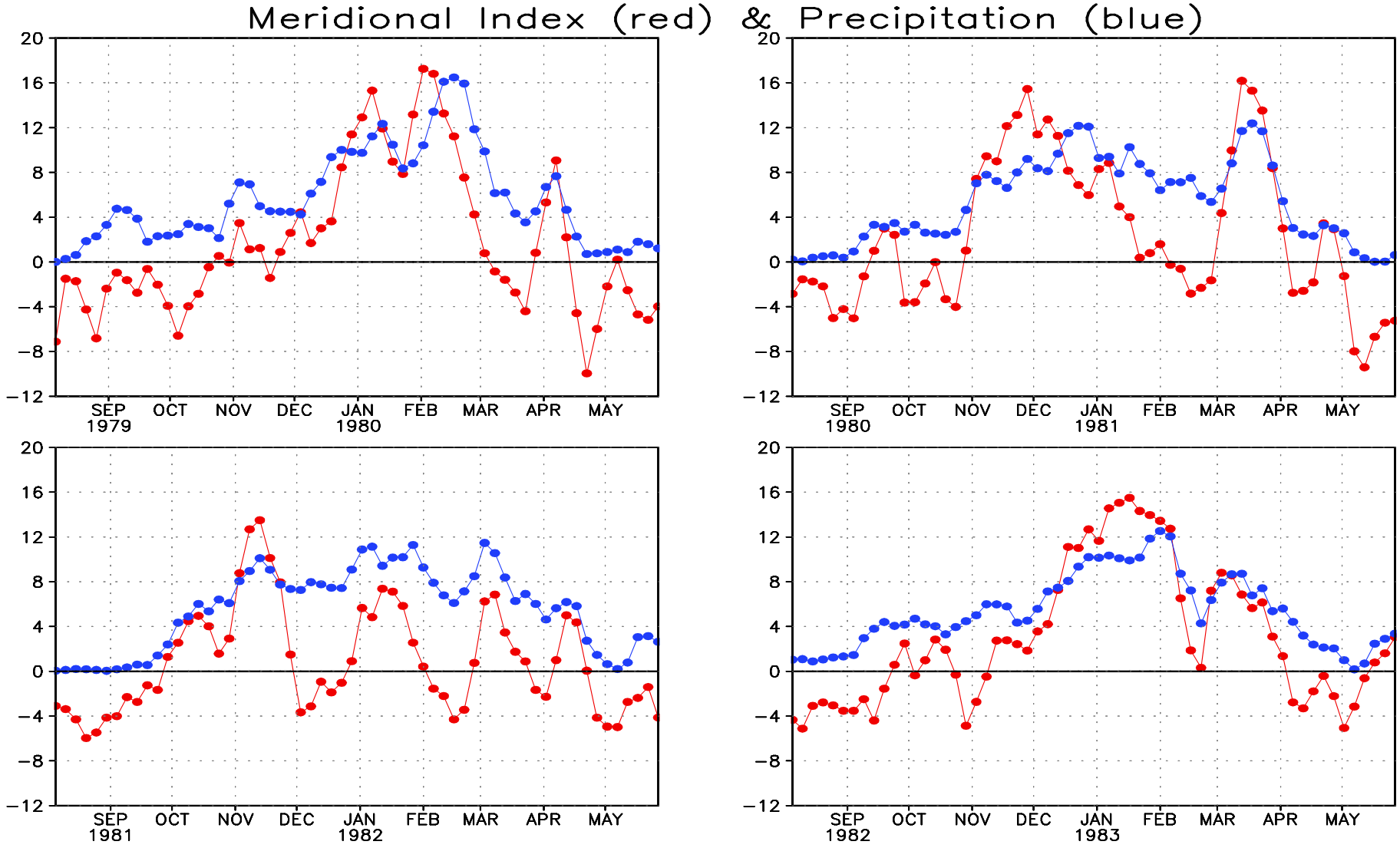
correl. coef. 850 hPa meridional wind anomal. & precip. anomal.



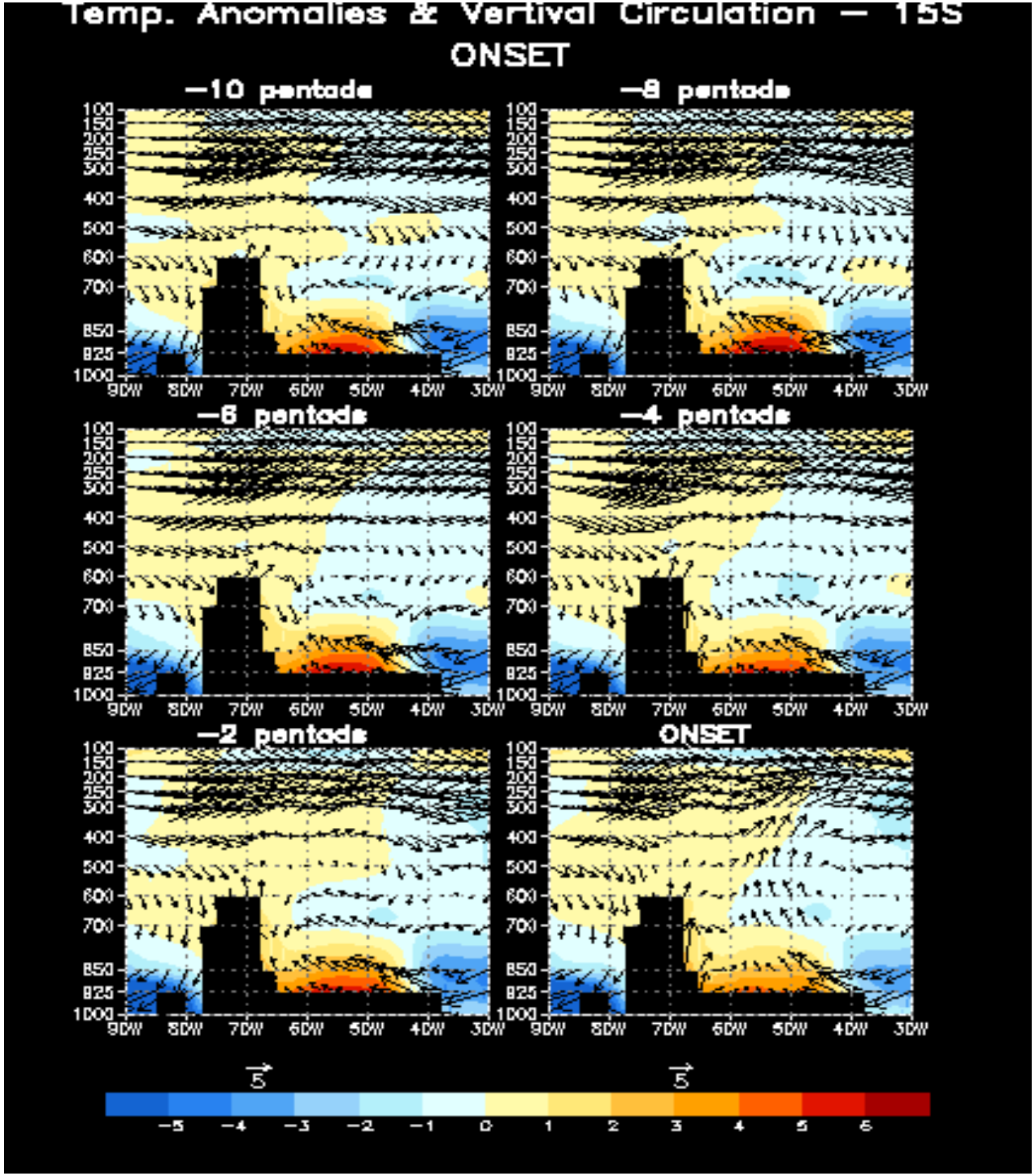
correl. coef. 200 hPa meridional wind anomal. & precip. anomal.



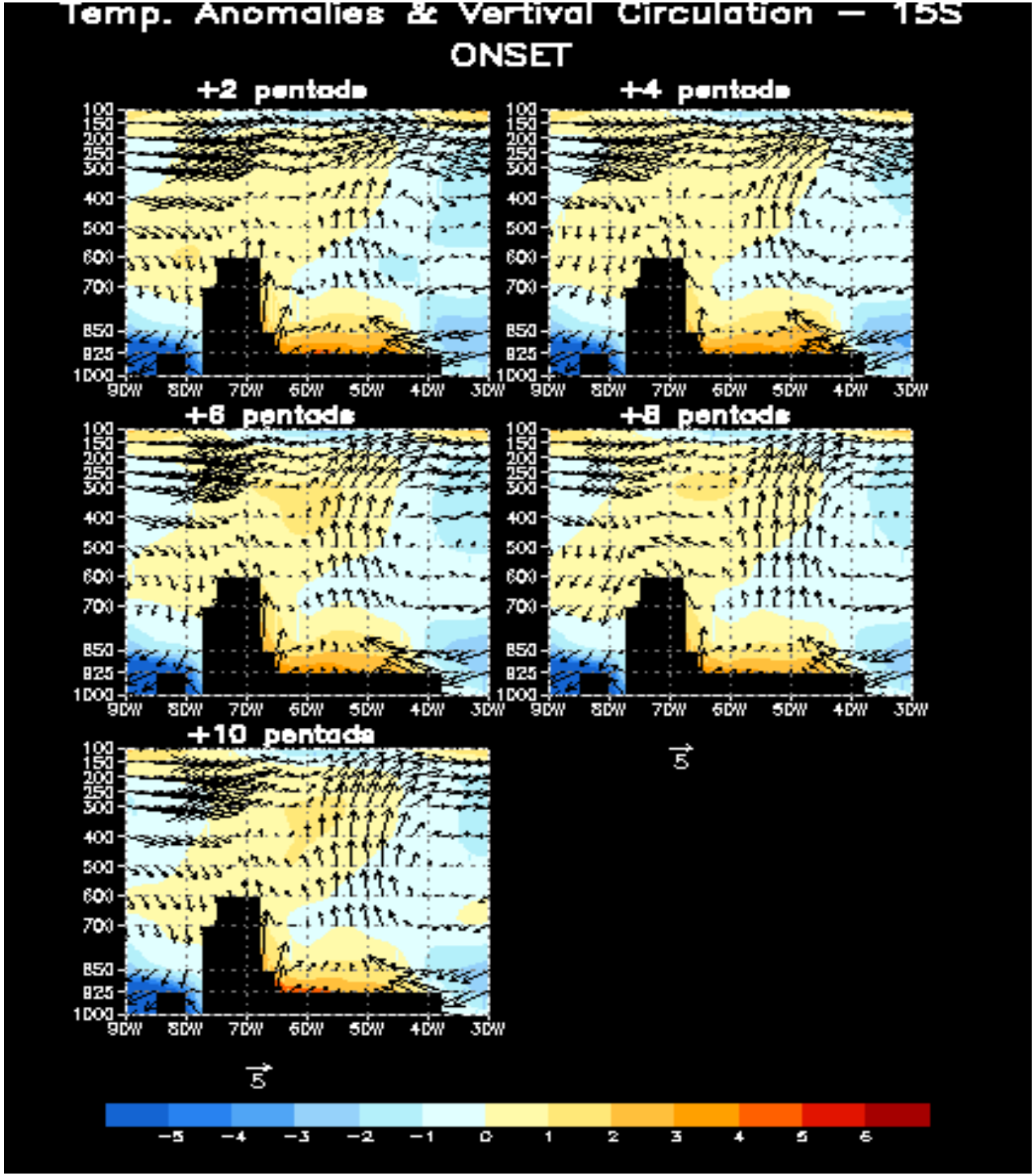

Vertival Velocity 60W–50W and Jul/Aug. mean
100
150
200
250
300
400
500
600
700
850
925
50S
40S
30S
20S
10S
EQ
10N
20N
30N
40N
50N
5
Vertival Velocity 60W–50W and DJF. mean
100
150
200
250
300
400
500
600
700
850
925
50S
40S
30S
20S
10S
EQ
10N
20N
30N
40N
50N
–6
–5
–4
–3
–2
–1
0
1
2
3
4
5


Meridional Index (red) & Precipitation (blue)
20
16
12
8
4
0
−4
−8
−12
SEP
1979
OCT
NOV
DEC
JAN
1980
FEB
MAR
APR
MAY
SEP
1980
OCT
NOV
DEC
JAN
1981
FEB
MAR
APR
MAY
SEP
1981
OCT
NOV
DEC
JAN
1982
FEB
MAR
APR
MAY
SEP
1982
OCT
NOV
DEC
JAN
1983
FEB
MAR
APR
MAY

U200-850

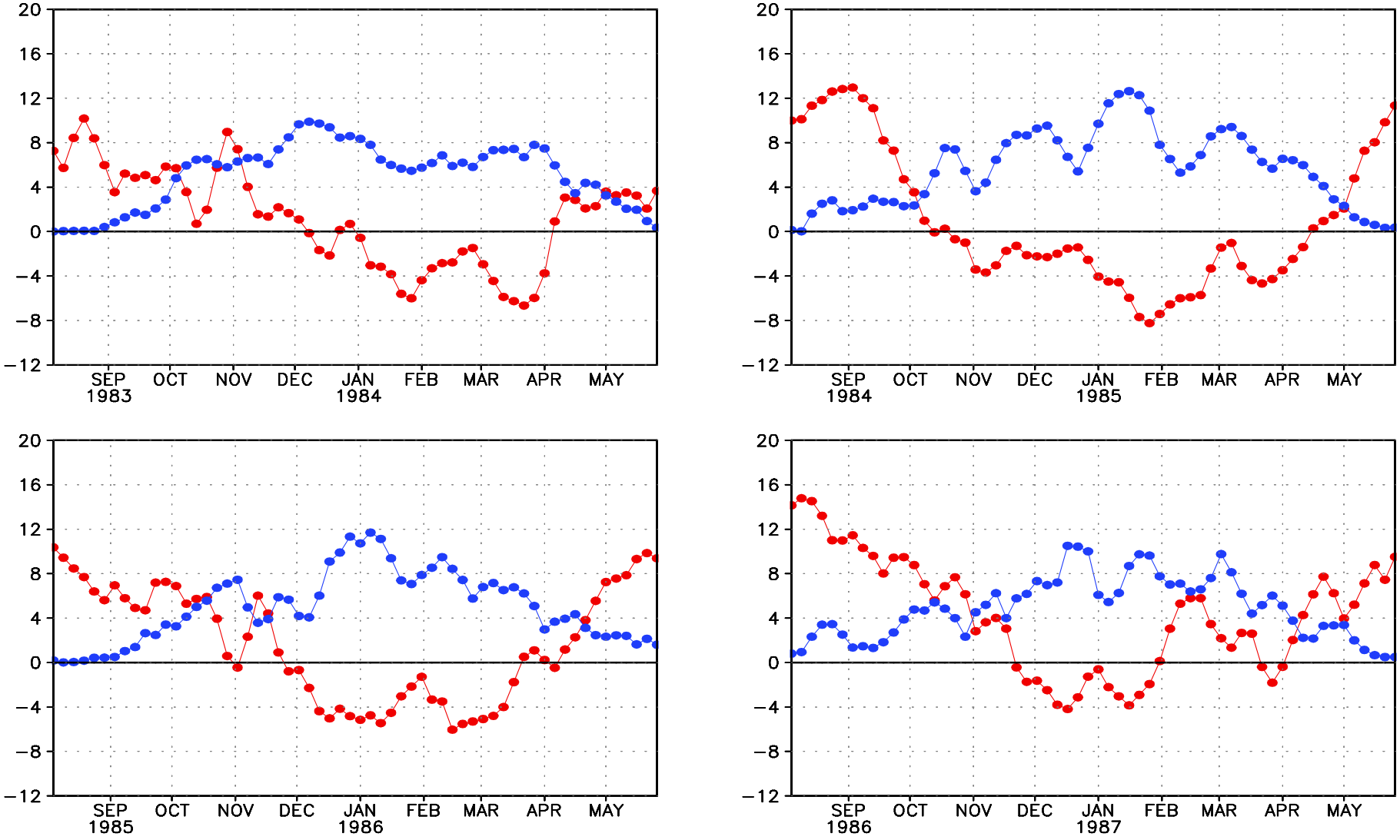

Temp. Anomalies & Vertival Circulation — 15S
ONSET
−10 pentads
−8 pentads
−6 pentads
−4 pentads
−2 pentads
ONSET
100
150
200
250
300
400
500
600
700
850
925
1000
90W
80W
70W
60W
50W
40W
30W
5
−5 −4 −3 −2 −1 0 1 2 3 4 5 6

U200-850

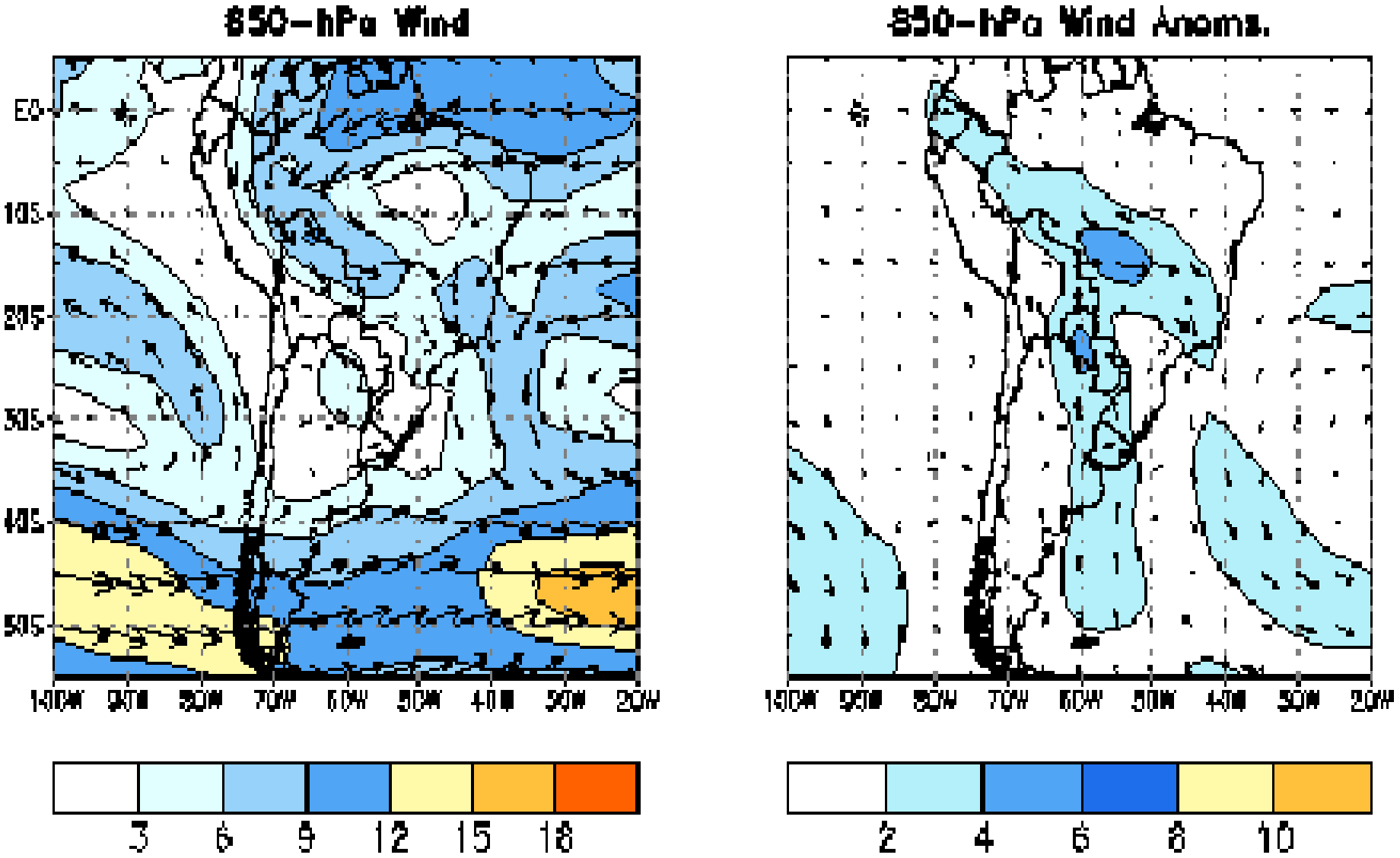

Temp. Anomalies & Vertival Circulation — 15S
ONSET
+2 pentads
+4 pentads
+6 pentads
+8 pentads
+10 pentads
100
150
200
250
300
400
500
600
700
850
925
1000
90W
80W
70W
60W
50W
40W
30W
5
−5
−4
−3
−2
−1
0
1
2
3
4
5
6

Zonal Wind Shear (red) & Precipitation (blue)

u(200hPa) – u(850hPa) at 55W–15S

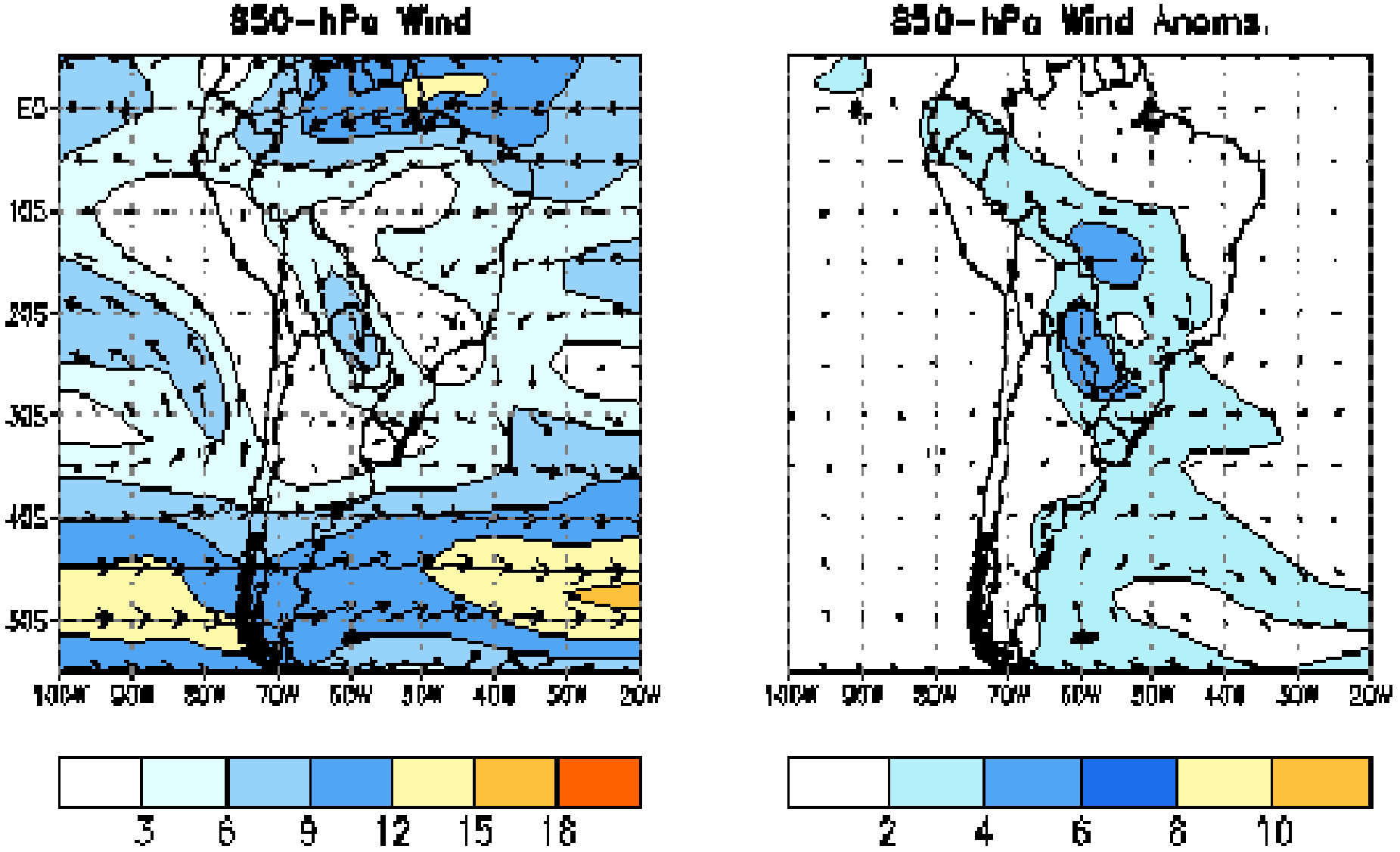


UV850

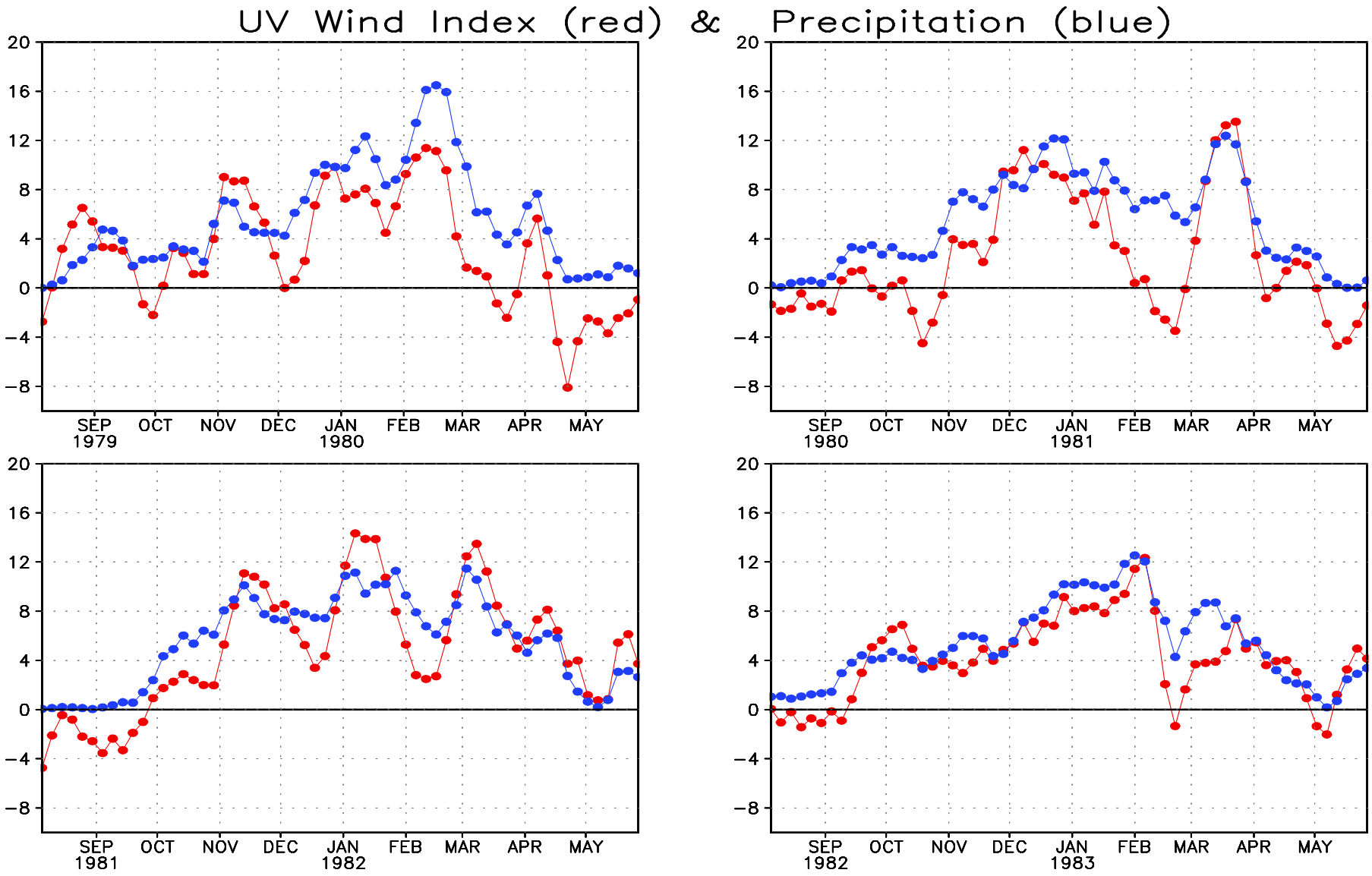


CHUVOSO

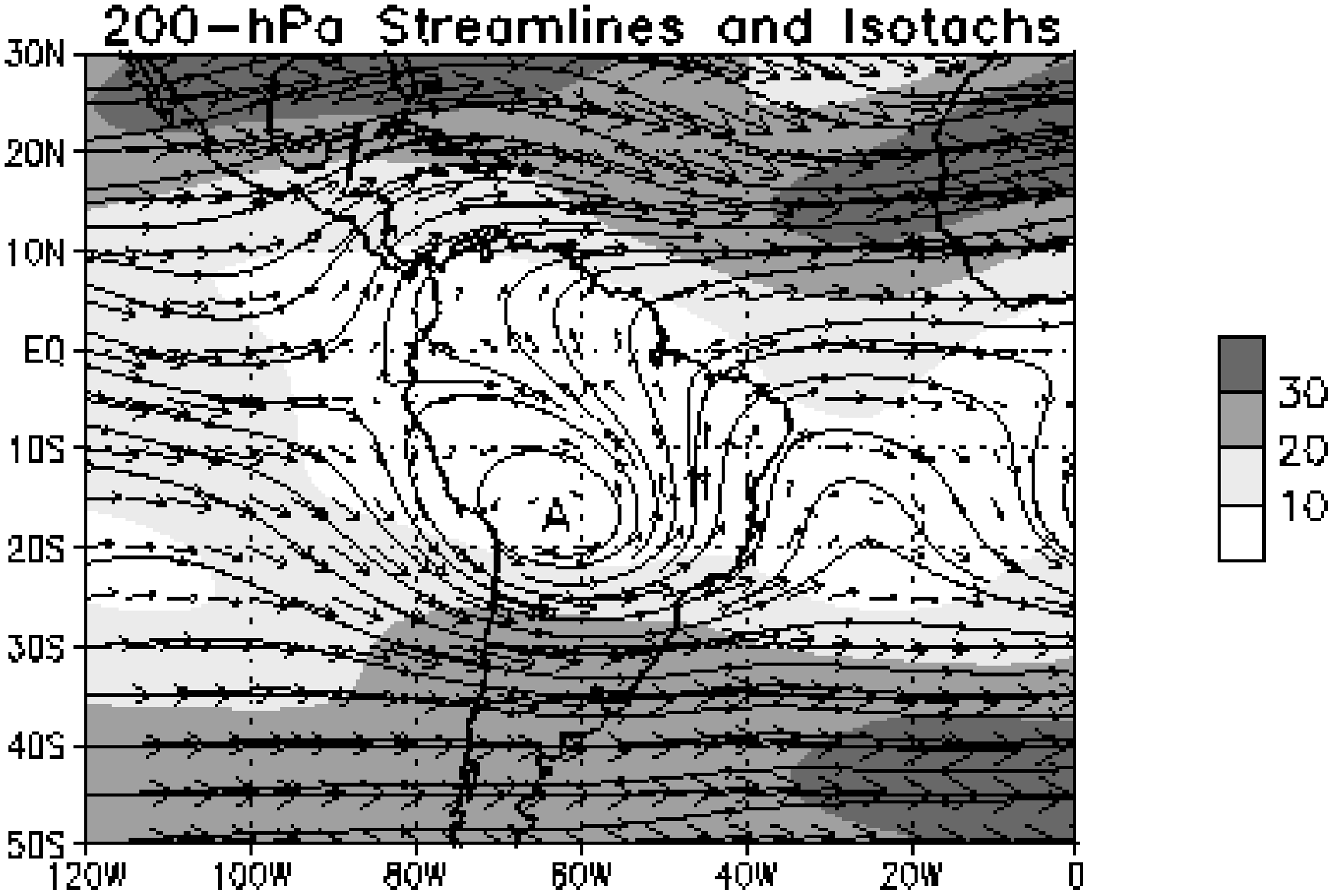
UV850

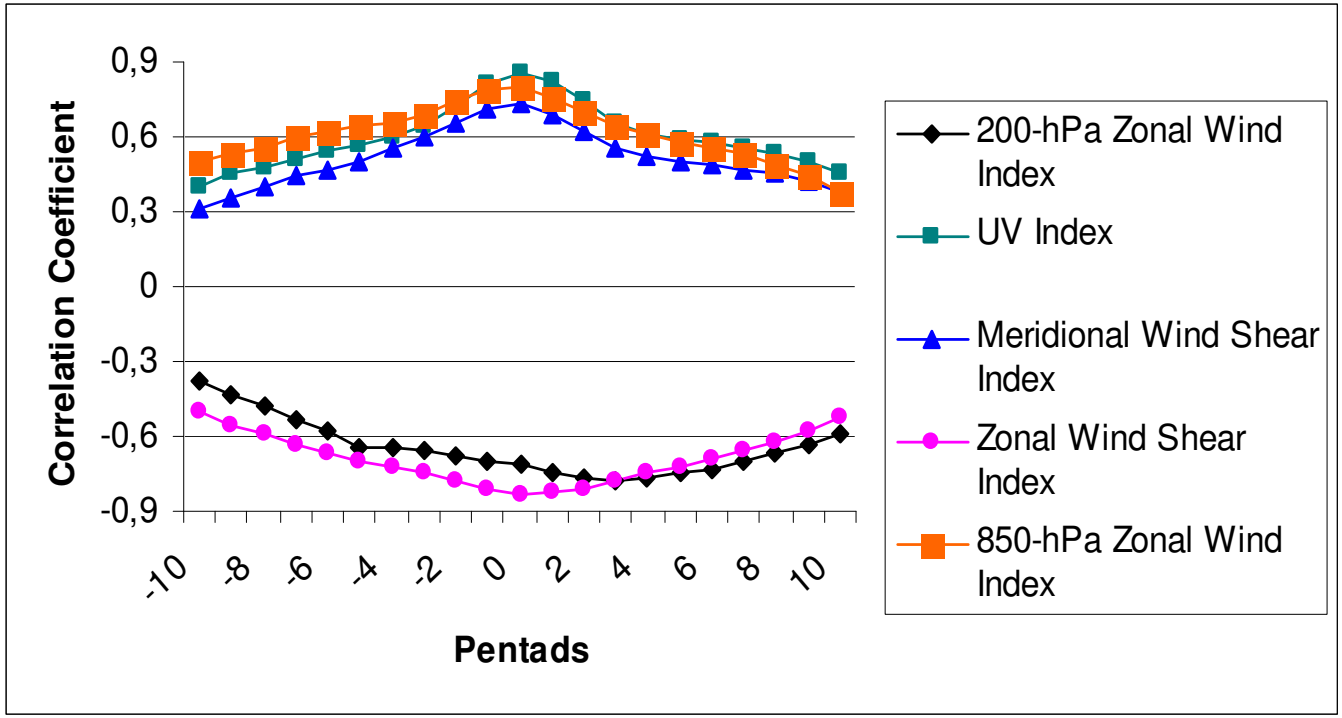

850-hPa Wind
850-hPa Wind Anoms.
EQ
10S
20S
30S
40S
50S
140W
120W
100W
90W
80W
70W
60W
50W
40W
30W
20W
3
6
9
12
15
18
2
4
6
8
10

SECO


UV Wind Index (red) & Precipitation (blue)
20
16
12
8
4
0
−4
−8
SEP
1979
OCT
NOV
DEC
JAN
1980
FEB
MAR
APR
MAY
SEP
1980
OCT
NOV
DEC
JAN
1981
FEB
MAR
APR
MAY
SEP
1981
OCT
NOV
DEC
JAN
1982
FEB
MAR
APR
MAY
SEP
1982
OCT
NOV
DEC
JAN
1983
FEB
MAR
APR
MAY

U200


200-hPa Streamlines and Isotachs
30N
20N
10N
EQ
10S
20S
30S
40S
50S
120W
100W
80W
60W
40W
20W
0
A
30
20
10


Correlation Coefficient
0,9
0,6
0,3
0
-0,3
-0,6
-0,9
-10
-8
-6
-4
-2
0
2
4
6
8
10
Pentads
200-hPa Zonal Wind Index
UV Index
Meridional Wind Shear Index
Zonal Wind Shear Index
850-hPa Zonal Wind Index

	850-hPa zonal wind	ZWSI	UVI	MWSI	200-hPa zonal wind
79/90	04 Nov	04 Nov	30 Oct	30 Oct	30 Oct
80/81	30 Oct	30 Oct	29 Nov	04 Nov	05 Oct
81/82	05 Oct	15 Sep	09 Nov	05 Oct	30 Oct
82/83	15 Sep	25 Sep	30 Sep	30 Sep	15 Oct
83/84	10 Oct	15 Oct	15 Oct	20 Oct	29 Nov
84/85	15 Oct	10 Oct	20 Oct	19 Nov	10 Oct
85/86	05 Oct	30 Oct	30 Oct	30 Oct	04 Nov
86/87	14 Nov	09 Nov	04 Dec	14 Dec	04 Nov
87/88	25 Oct	15 Oct	30 Oct	09 Nov	20 Oct
88/89	25 Oct	25 Oct	15 Oct	05 Oct	19 Nov
89/90	10 Oct	15 Oct	20 Oct	30 Oct	24 Nov
90/91	30 Sep	15 Oct	04 Dec	03 Jan	10 Oct
91/92	04 Nov	05 Oct	09 Nov	09 Nov	10 Oct
92/93	25 Sep	15 Oct	04 Nov	30 Sep	15 Oct
93/94	15 Oct	25 Sep	29 Nov	29 Nov	15 Oct
94/95	20 Oct	10 Oct	19 Nov	14 Nov	30 Sep
95/96	10 Oct	15 Oct	10 Oct	19 Nov	25 Oct
96/97	10 Oct	10 Oct	19 Nov	05 Oct	10 Oct

	850-hPa zonal wind	ZWSI	UVI	MWSI	200-hPa zonal wind
79/90	18 Apr	18 Apr	27 Fev	18 Apr	08 May
80/81	08 Apr	08 Apr	19 Mar	08 Apr	13 Apr
81/82	23 Apr	23 Apr	28 Apr	28 Apr	13 Apr
82/83	18 Apr	23 Apr	23 Apr	08 Apr	13 May
83/84	13 Apr	_____	13 Apr	28 Apr	_____
84/85	03 May	15 May	29 Apr	18 Apr	08 May
85/86	03 Apr	28 Apr	29 Mar	_____	03 May
86/87	08 Apr	13 Apr	18 May	02 Jun	28 Apr
87/88	28 Apr	03 May	28 Apr	28 Apr	03 May
88/89	23 Apr	13 May	24 Mar	13 May	18 May
89/90	23 Apr	08 May	18 Apr	18 Apr	03 May
90/91	08 Apr	23 Apr	08 Apr	13 Apr	08 Apr
91/92	28 Apr	13 Apr	03 May	13 May	13 Apr
92/93	13 Apr	18 Apr	13 Apr	08 Apr	28 Apr
93/94	23 Apr	28 Apr	18 Apr	18 Apr	13 May
94/95	23 Apr	23 Apr	18 May	23 May	18 Apr
95/96	23 Apr	28 Apr	23 Apr	23 Apr	03 May
96/97	28 Apr	08 Apr	03 May	03 May	28 Apr

V.B.Rao et al.

Ano	Início	Fim	Duração
49/50	07/nov	26/mai	201
50/51	03/out	01/abr	181
51/52	08/out	25/abr	201
52/53	27/set	15/abr	201
53/54	02/set	10/abr	221
54/55	12/set	06/mar	176
55/56	01/dez	15/mar	106
56/57	09/jan	05/mar	56
57/58	20/nov	14/abr	146
58/59	26/set	14/mai	231
59/60	26/set	14/mar	171

60/61	05/out	29/mar	175
61/62	09/dez	02/abr	115
62/63	04/nov	29/mar	146
63/64	30/out	02/abr	156
64/65	14/out	22/abr	190
65/66	24/set	17/abr	206
66/67	29/set	28/mar	181
67/68	19/out	27/mar	161
68/69	18/out	20/mar	154
69/70	18/out	17/mar	151

70/71	07/nov	27/mar	141
71/72	23/out	10/mai	201
72/73	27/out	05/abr	161
73/74	05/out	05/abr	183
74/75	17/out	11/mar	146
75/76	17/out	25/mar	161
76/77	26/set	08/fev	136
77/78	26/out	15/mar	141
78/79	11/out	09/abr	181
79/80	26/out	18/abr	176

80/81	30/out	03/abr	156
81/82	30/out	08/abr	161
82/83	05/out	18/abr	196
83/84	10/out	07/abr	181
84/85	19/out	22/abr	186
85/86	04/out	28/mar	176
86/87	18/nov	07/abr	141
87/88	19/out	26/abr	191
88/89	18/out	22/mar	156
89/90	18/out	21/abr	186

90/91	03/out	06/abr	186
91/92	02/nov	10/mai	191
92/93	17/set	20/abr	216
93/94	17/out	10/abr	176
94/95	17/out	30/abr	196
95/96	07/out	19/abr	196
96/97	06/out	29/abr	206
97/98	01/out	04/mai	216
98/99	06/out	20/mar	166
99/00	16/out	24/mar	161

00/01	20/out	29/mar	161
01/02	20/set	13/abr	206
02/03	30/set	19/mar	171
03/04	20/out	27/abr	191

Média	**10/Out**	**06/Abr**	**174**
Tarde	**09/Jan**	**26/Mai**	
Cedo	**12/Set**	**08/Fev**	
El Niño	**13/Out**	**10/Abr**	**176**
La Niña	**17/Out**	**02/Abr**	**161**

Índices

Previsão Climática

Condição Inicial – Maio 2005

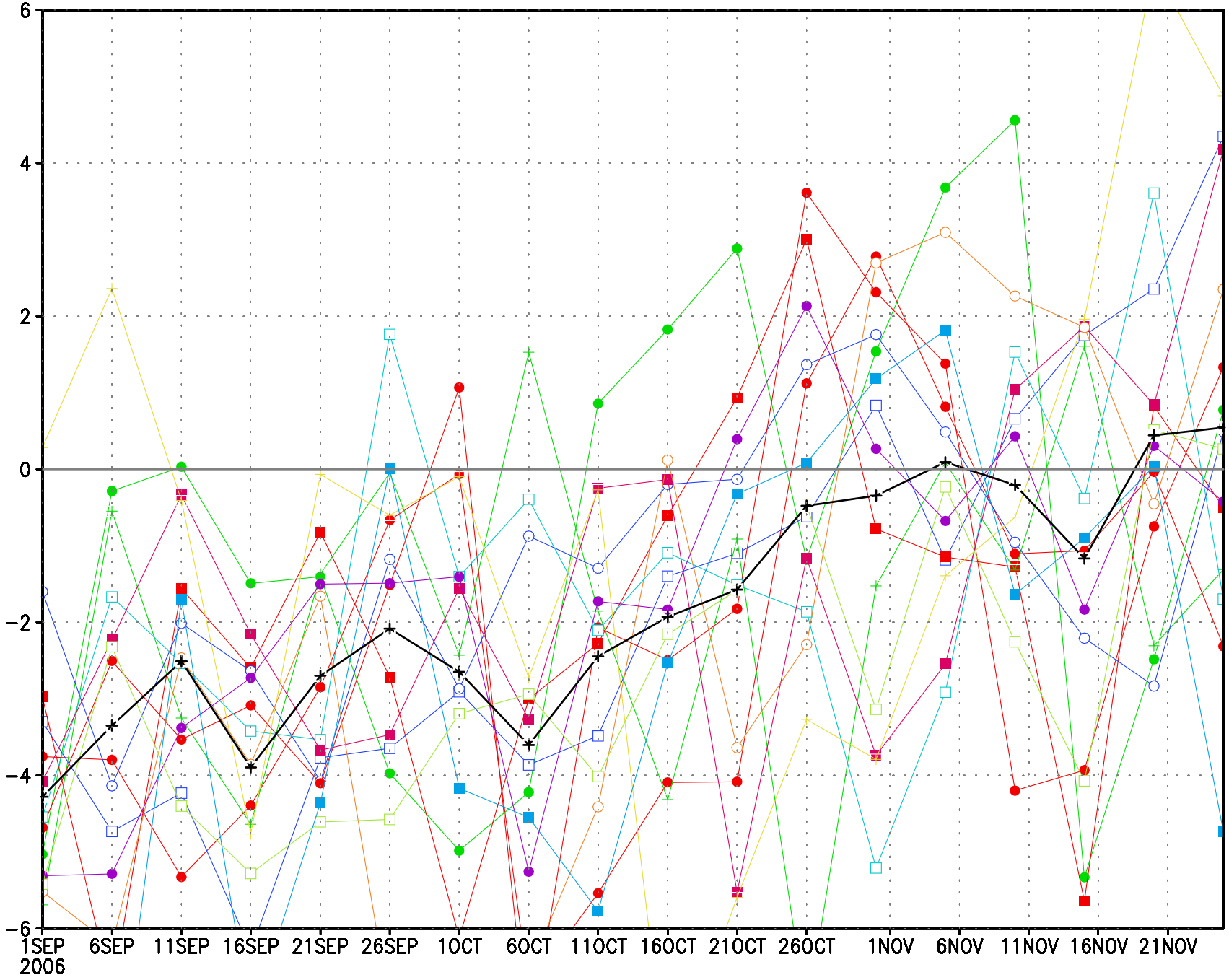
	U850	U200	U 200-850	U+V	V 200-850
14	12 Nov	?	13 Out	28 Out	12 Nov
15	28 Set	?	18 Set	18 Set	02 Nov
16	?	?	18 Out	08 Out	07 Nov
17	12 Nov	?	18 Set	03 Out	22 Nov
18	02 Nov	?	18 Out	03 Out	?
19	?	?	23 Out	23 Out	28 Out
20	07 Nov	?	08 Out	23 Out	23 Out
21	22 Nov	?	28 Out	02 Nov	?
22	?	?	07 Nov	?	07 Nov
23	?	?	28 Out	18 Out	28 Out
Média	22 Nov 02 Nov	?	18 Out 8 Out	28 Out 13 Out	12 Nov 02 Nov

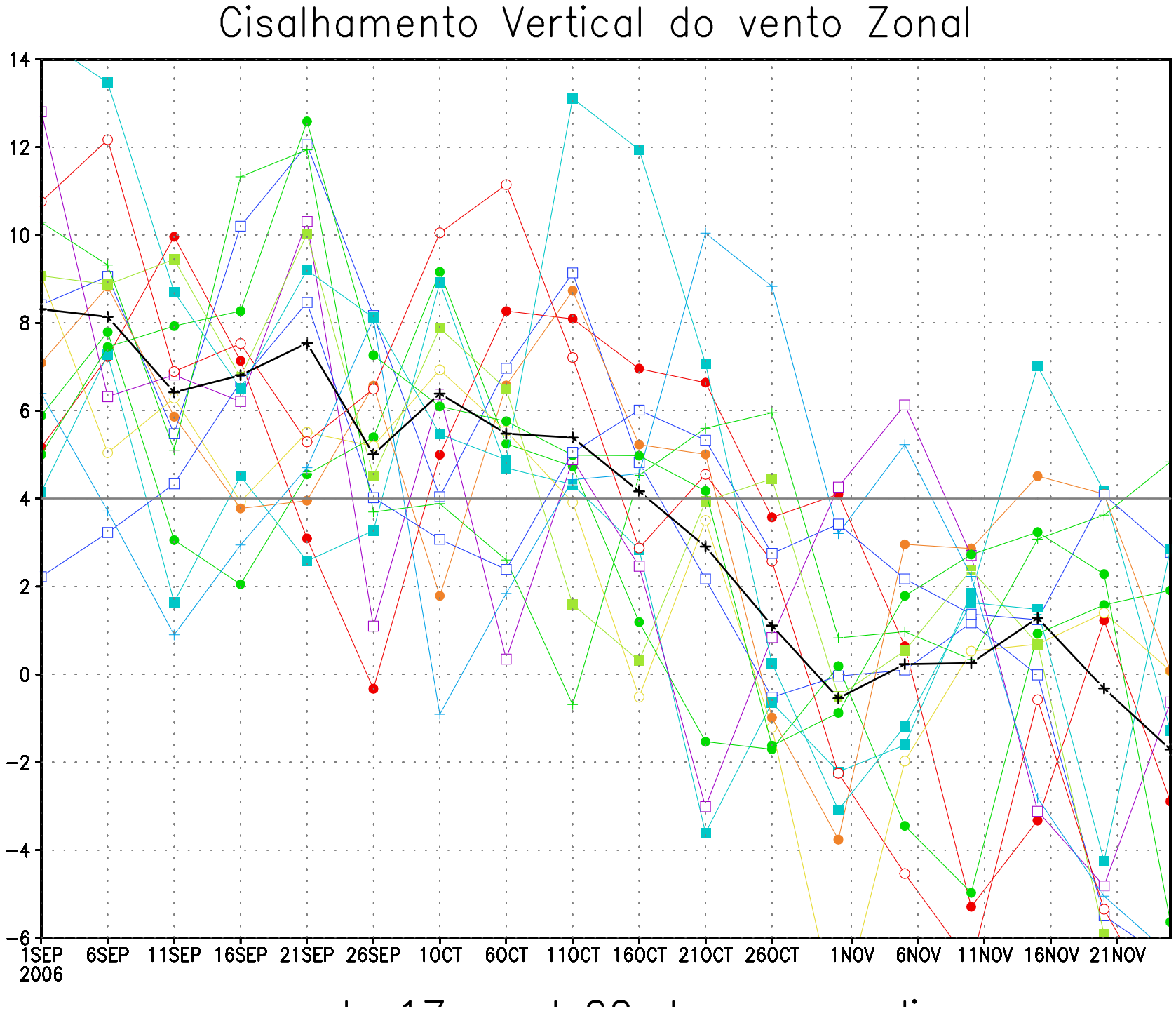
Condição Inicial - Junho 2005

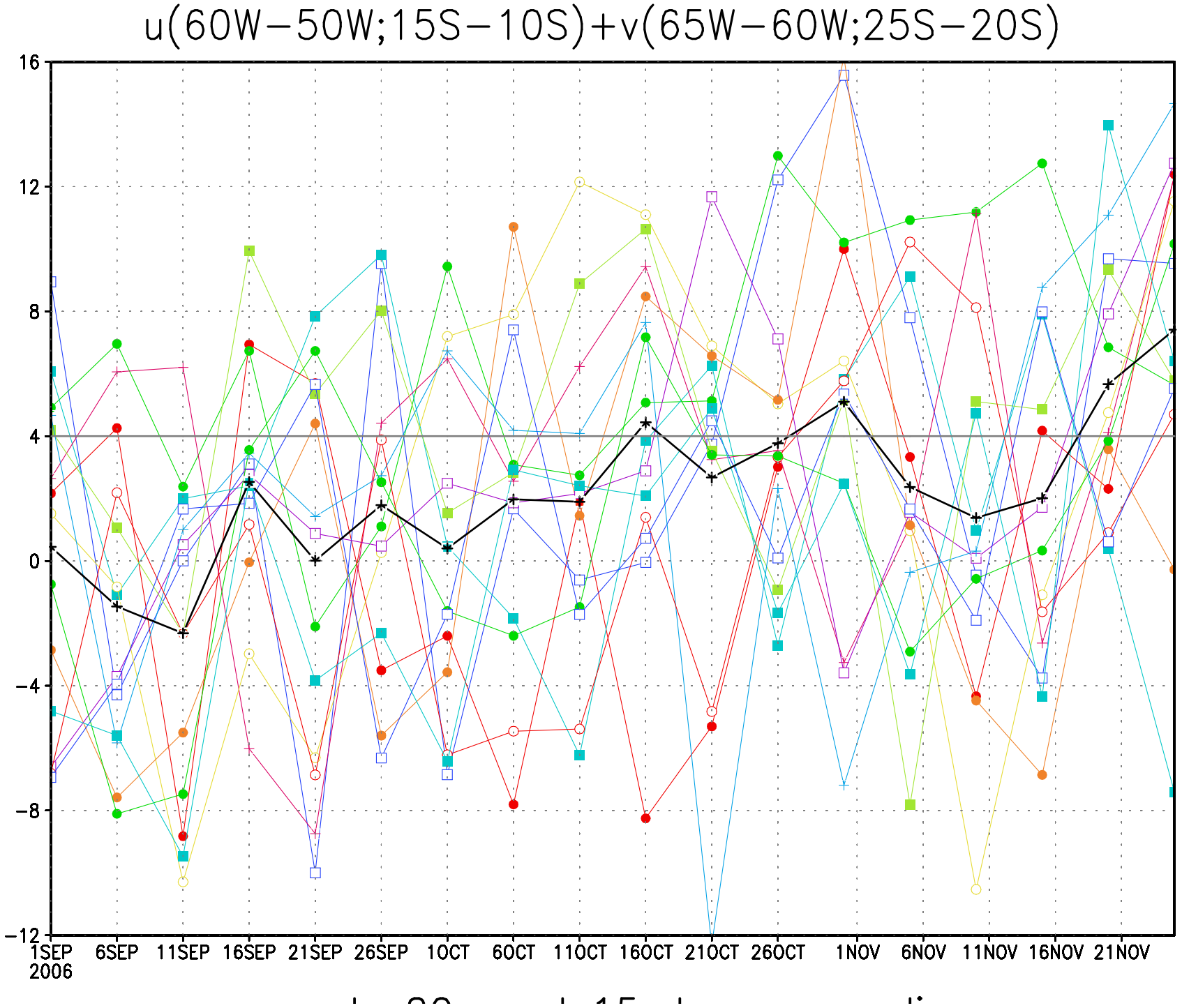
	U850		U 200-850	U+V	V 200-850
14	18 Oct		18 Out	02 dez	07 Dez
15	02 Dez		23 Out	03 Out	28 Out
16	12 Dez		12 Nov	07 Dez	17 Dez
17	27 Nov		22 Nov	27 Nov	27 Dez
18	27 Nov		23 Out	17 Nov	07 Dez
19	17 Dez		13 Out	22 Nov	22 Nov
20	?		18 Out	23 Out	?
21	07 Nov		28 Out	02 Nov	?
22	12 Nov		23 Out	22 Nov	?
23	02 Nov		23 Out	28 Out	?
Média	12 Nov 22 Nov		23 Out 28 Out	02 Nov 12 Nov	22 Dez 02 Dez

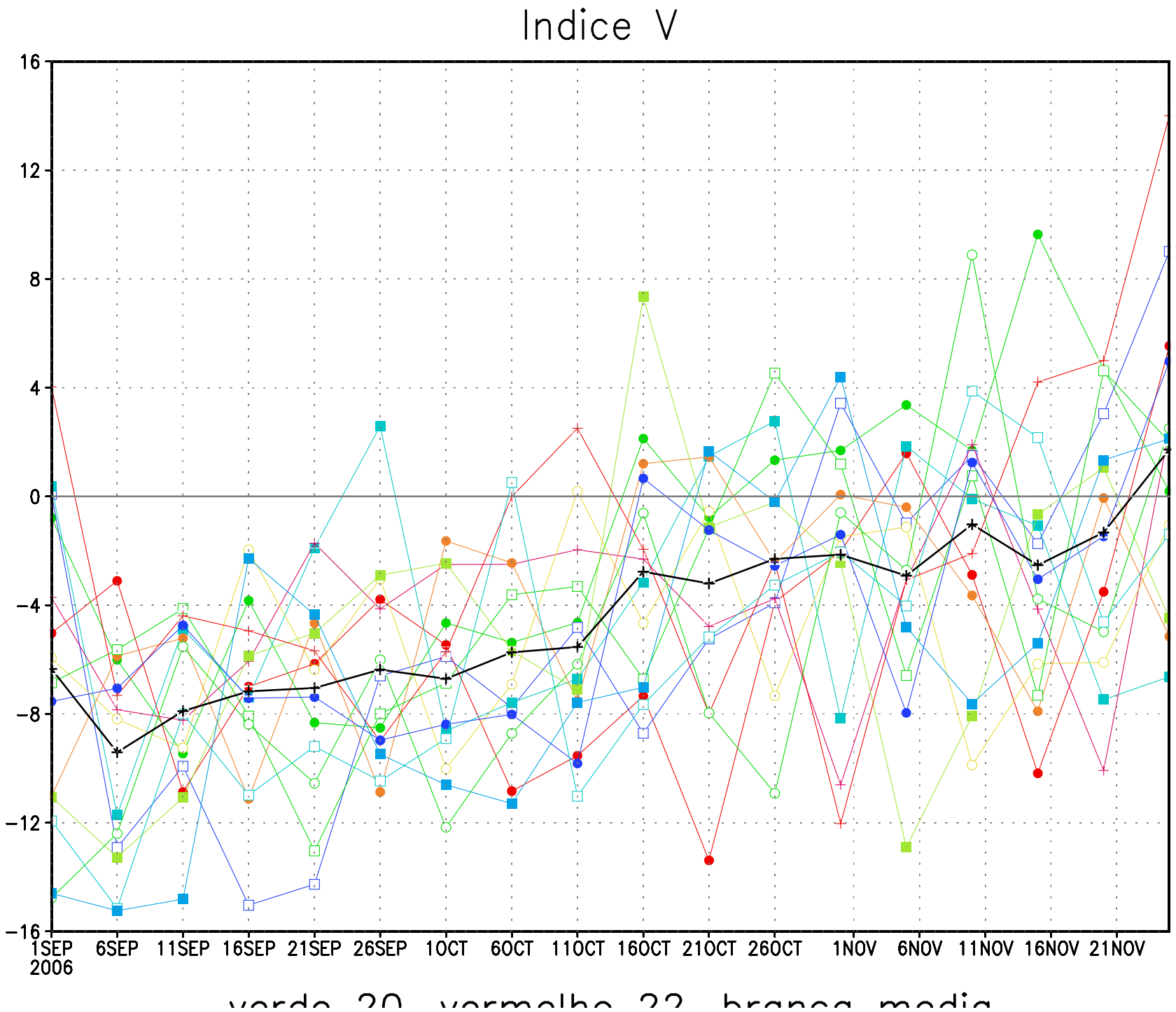
Junho 2006

membro	u850	u200-850	uv	v200-850
09	-	11/out	-	(21/out)
10	15/nov	06/out	11/out	-
11	15/nov	21/set	25/nov	-
12	-	15/nov	15/nov	-
13	-	15/out	06/out	-
14	-	11/out	-	-
15	-	21/out	25/nov	-
16	26/out	26/out	-	-
17	26/out	21/out	16/out	-
18	11/out	21/out	21/out	-
19	05/nov	10/out	21/out	-
20	25/nov	06/out	-	-
22	25/nov	06/out	25/nov	-
23	25/nov	15/nov	-	-


u850(60W;20S−10S)
6
4
2
0
−2
−4
−6
1SEP
2006
6SEP
11SEP
16SEP
21SEP
26SEP
1OCT
6OCT
11OCT
16OCT
21OCT
26OCT
1NOV
6NOV
11NOV
16NOV
21NOV


Cisalhamento Vertical do vento Zonal
14
12
10
8
6
4
2
0
−2
−4
−6
1SEP
2006
6SEP
11SEP
16SEP
21SEP
26SEP
1OCT
6OCT
11OCT
16OCT
21OCT
26OCT
1NOV
6NOV
11NOV
16NOV
21NOV


u(60W−50W;15S−10S)+v(65W−60W;25S−20S)
16
12
8
4
0
−4
−8
−12
1SEP
2006
6SEP
11SEP
16SEP
21SEP
26SEP
1OCT
6OCT
11OCT
16OCT
21OCT
26OCT
1NOV
6NOV
11NOV
16NOV
21NOV


Indice V
16
12
8
4
0
−4
−8
−12
−16
1SEP
2006
6SEP
11SEP
16SEP
21SEP
26SEP
1OCT
6OCT
11OCT
16OCT
21OCT
26OCT
1NOV
6NOV
11NOV
16NOV
21NOV
verde 20 vermelho 22 branca media

Julho 2006

membro	u850	u200-850	uv	v200-850
09	20/nov	26/out	15/nov	10/nov
10	11/out	26/out	15/nov	16/nov
11	26/out	21/out	21/out	31/out
12	31/out	16/out	16/out	16/out
13	-	31/out	-	-
14	-	16/out	10/nov	-
15	-	11/out	01/out	-
16	25/nov	10/nov	-	31/out
17	10/nov	26/out	20/nov	-
18	10/nov	11/out	31/out	-
19	15/nov	31/out	31/out	10/nov
20	31/out	21/out	20/nov	10/nov
22	-	11/out	15/nov	10/nov
23	-	26/out	10/nov	20/nov

	u850	u200-850	uv	v200-850
Junho-2006	25/nov	11/out	25/nov	(21/out)
Julho-2006	04/nov	16/out	20/nov	26/nov

Rao et al.

Média	**10/Out**
Tarde	**09/Jan**
Cedo	**12/Set**

Gan et al. (2004)

Média	**15/Out**
Tarde	**14/Nov**
Cedo	**15/Set**

Conclusões

A estação chuvosa na Região Centro-Oeste
deve atrasar
entre 2 semanas e 1 mês