


**OPERATIONAL MEDIUM RANGE AND
LONG RANGE FORECAST AT
CENTER FOR WEATHER FORECAST
 AND CLIMATE STUDIES**

CPTEC/INPE **BRAZIL**

Iracema F. A. Cavalcanti



ECMWF WORKSHOP 10-14 NOVEMBER 2003







CPTEC

```
graph TD; CPTEC[CPTEC] --- MD[MODELLING AND DEVELOPMENT DIVISION]; CPTEC --- OP[OPERATIONAL DIVISION]; CPTEC --- SAT[SATELLITE DIVISION]; CPTEC --- CE[CLIMATE AND ENVIRONMENTAL DIVISION];
```

**MODELLING
AND
DEVELOPMENT
DIVISION**

**OPERATIONAL
DIVISION**

**SATELLITE
DIVISION**

**CLIMATE AND
ENVIRONMENTAL
DIVISION**

<http://www.cptec.inpe.br>

DMD MODELLING AND DEVELOPMENT DIVISION

IMPROVEMENT OF MODELS

SOFTWARE

To reduce
Computer Time

PHYSICAL PROCESSES

Convection
Radiation
Surface

RESEARCH IN WEATHER AND CLIMATE

Case studies
Climate variability

MODEL RESULTS

SEASONAL PREDICTION

DATA ASSIMILATION

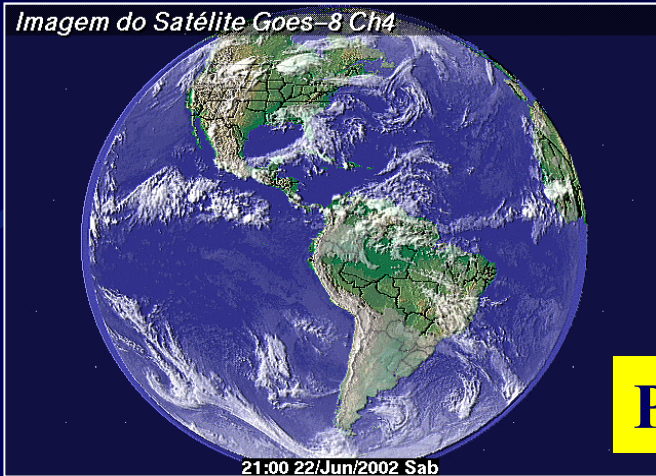
PSAS
(GMAO/NASA)

Physical-Space
Assimilation
System

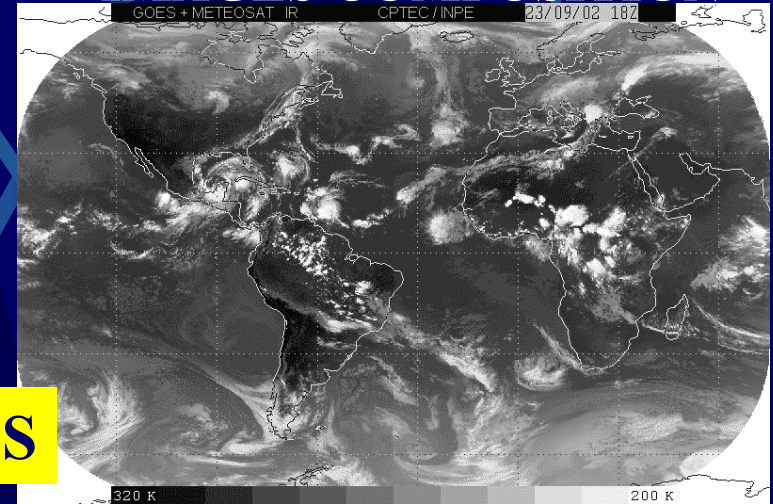
Climate change

SATELLITE DIVISION

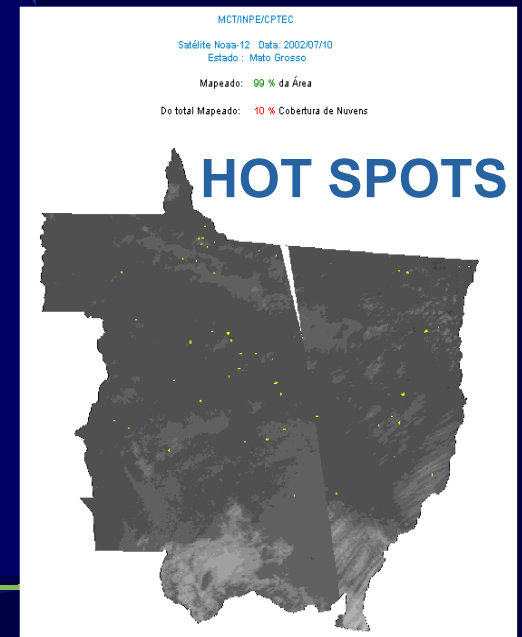
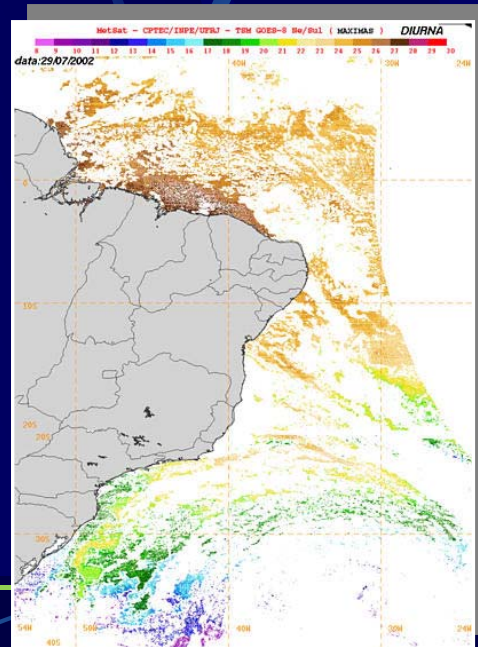
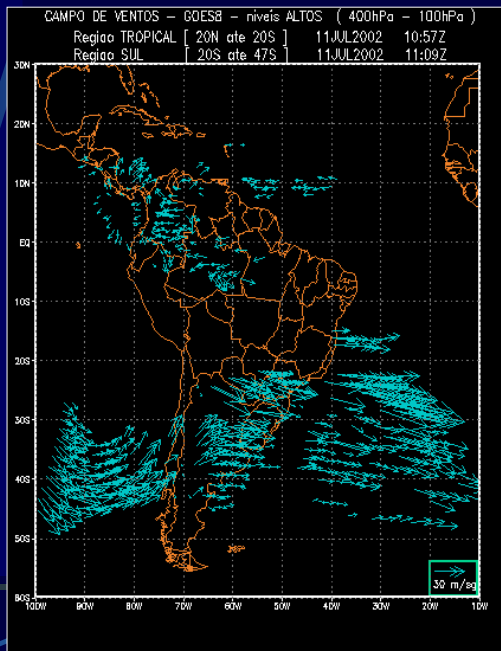
IMAGES RECEPTION



IMAGES COMPOSITION

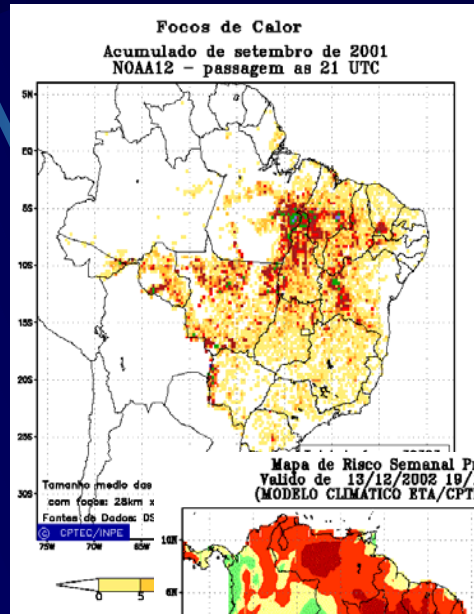


PRODUCTS

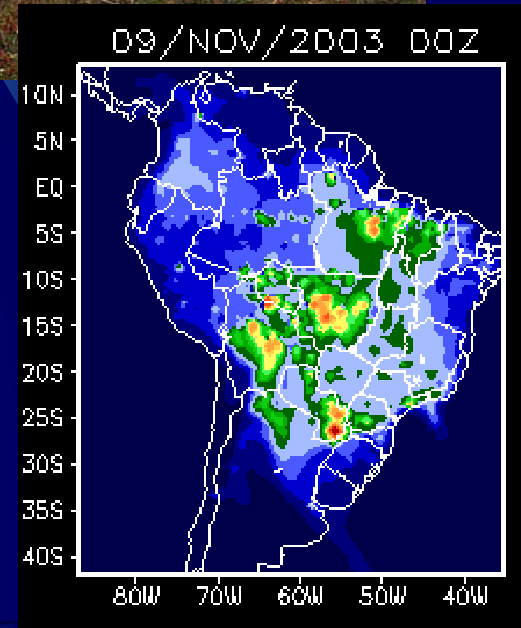
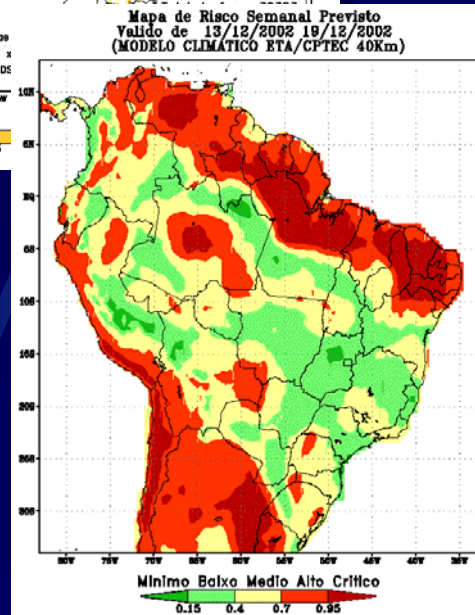


CLIMATE AND ENVIRONMENTAL DIVISION

Biomass Burning Monitoring System



LBA
Interaction
land-atmosphere



OPERATIONAL DIVISION

FORECASTS

**WEATHER
CLIMATE**

PRODUCTS FROM

**AGCM CPTEC/COLA
REGIONAL ETA
ENSEMBLE**

OTHER PRODUCTS

SEA WAVE, SOIL HUMIDITY

COMPUTER OPERATION

SUPERCOMPUTERS

NEC SX-6



32 processors
256 GFLOPS

96 processors
768 GFLOPS

NEC SX-4

8 processors
16GFLOPS



MODELS AT CPTEC

ATMOSPHERIC GLOBAL
CIRCULATION MODEL CPTEC/COLA

REGIONAL MODEL ETA

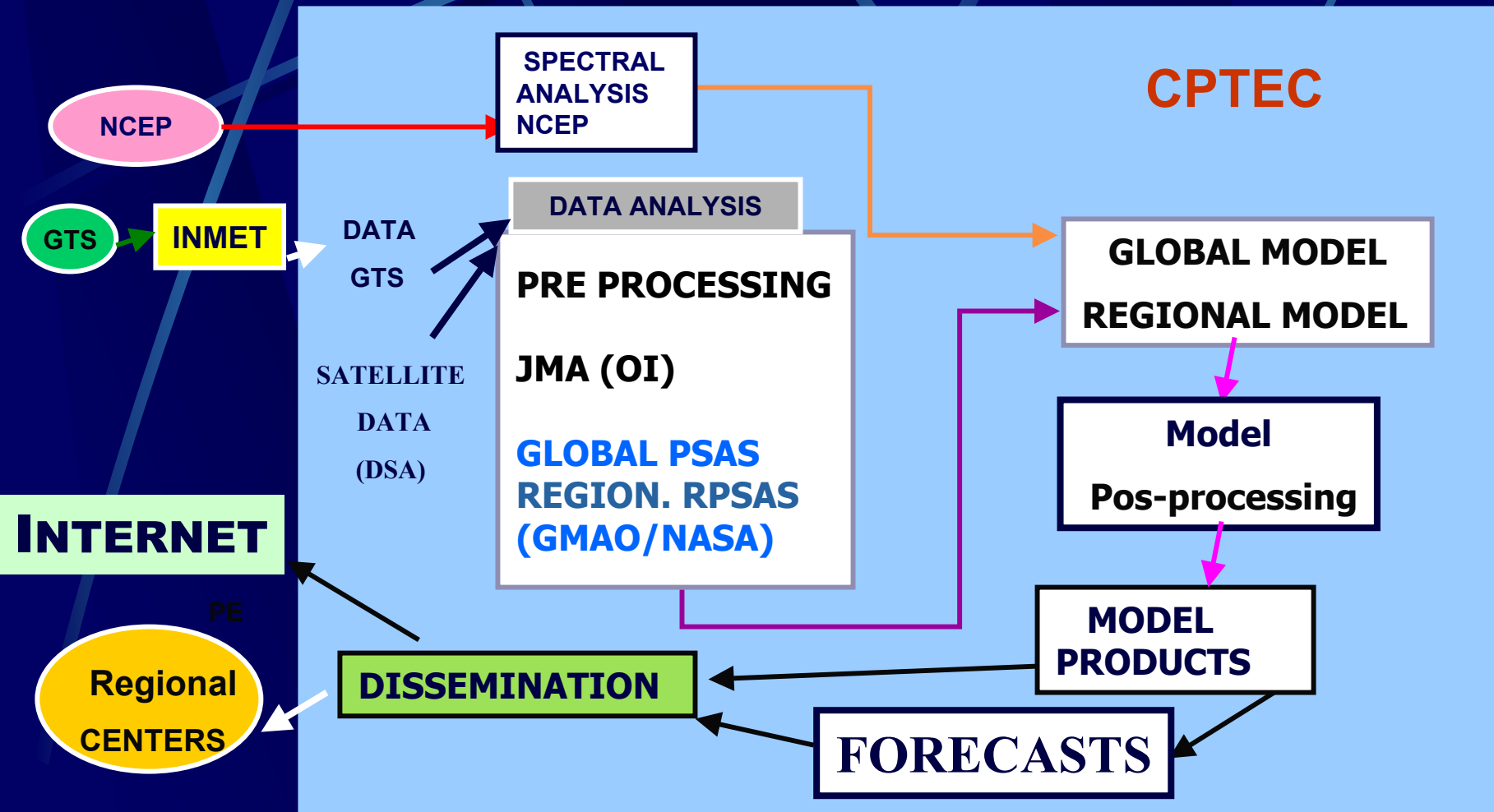
WAVE MODEL WAM

HYDROLOGICAL MODEL

TRANSPORT MODEL (pollutants)

COUPLED GLOBAL OCEAN-ATMOSPHERIC MODEL
(MOM2 AND MOM3)

OPERATIONAL SYSTEM




WEATHER FORECAST

GLOBAL CIRCULATION MODEL

T126 L28 2X DAY 12 DAYS

NCEP I.C.

T126 L28 ENSEMBLE 15 INTEGRATIONS
1xDAY 7 DAYS

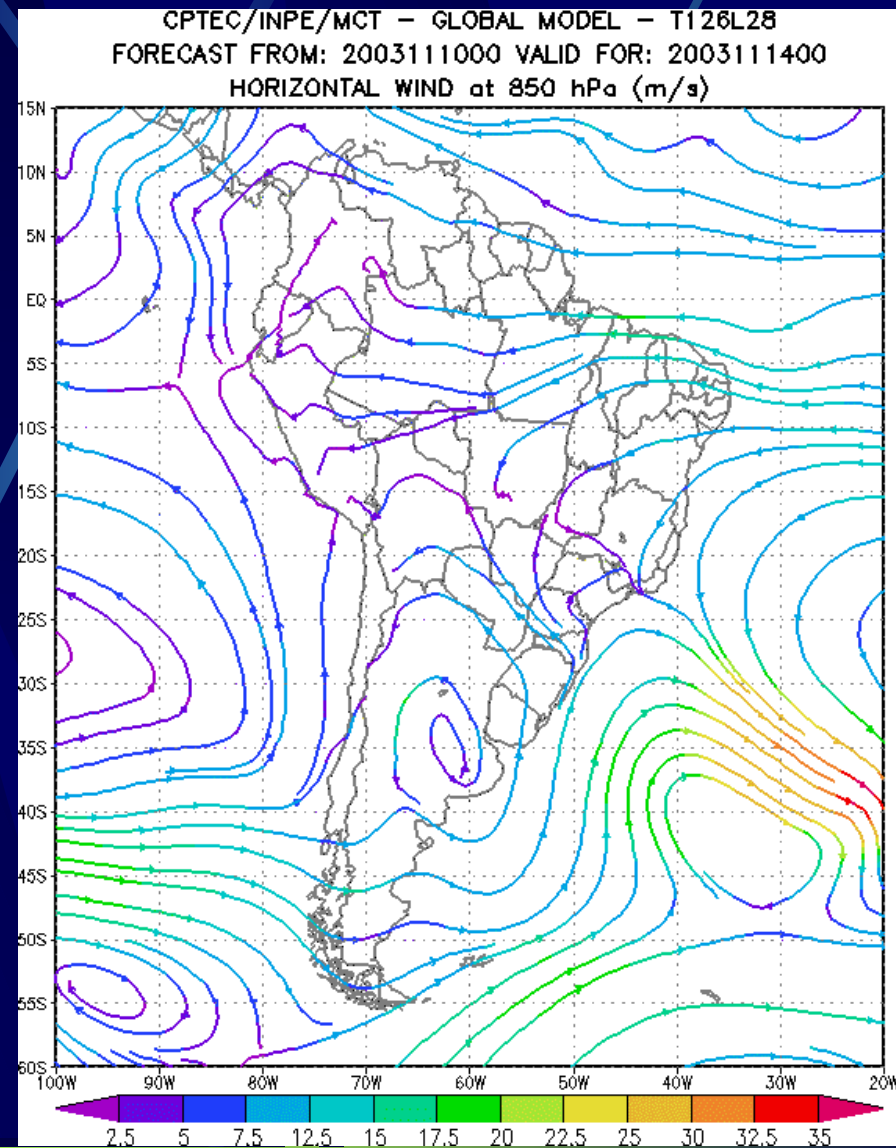
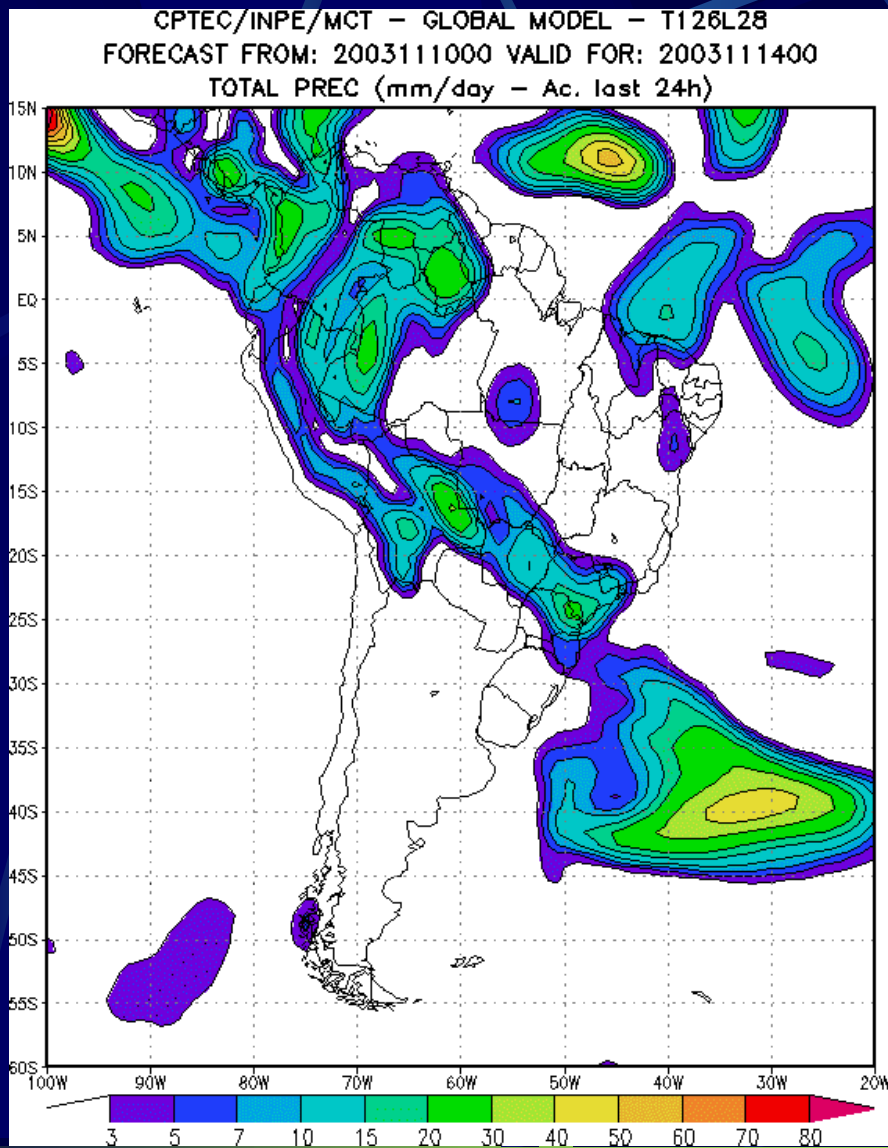


T170 L42 1X DAY 7 DAYS
(PARALELL RUN)

T126 L28 2X DAY 7 DAYS

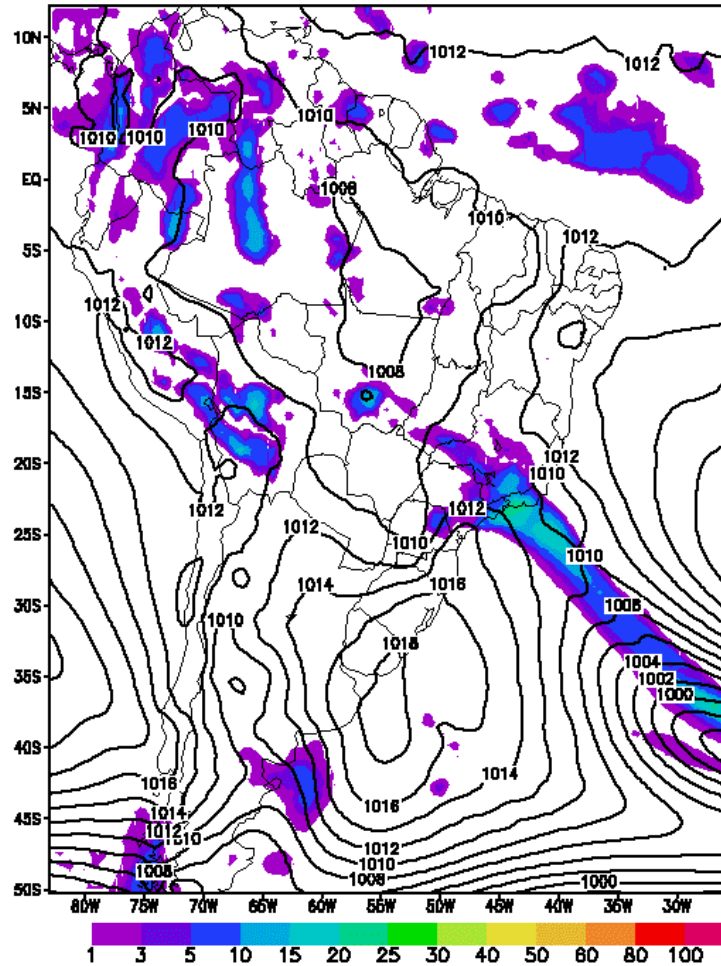
JMA ASSIM. I.C.

AGCM

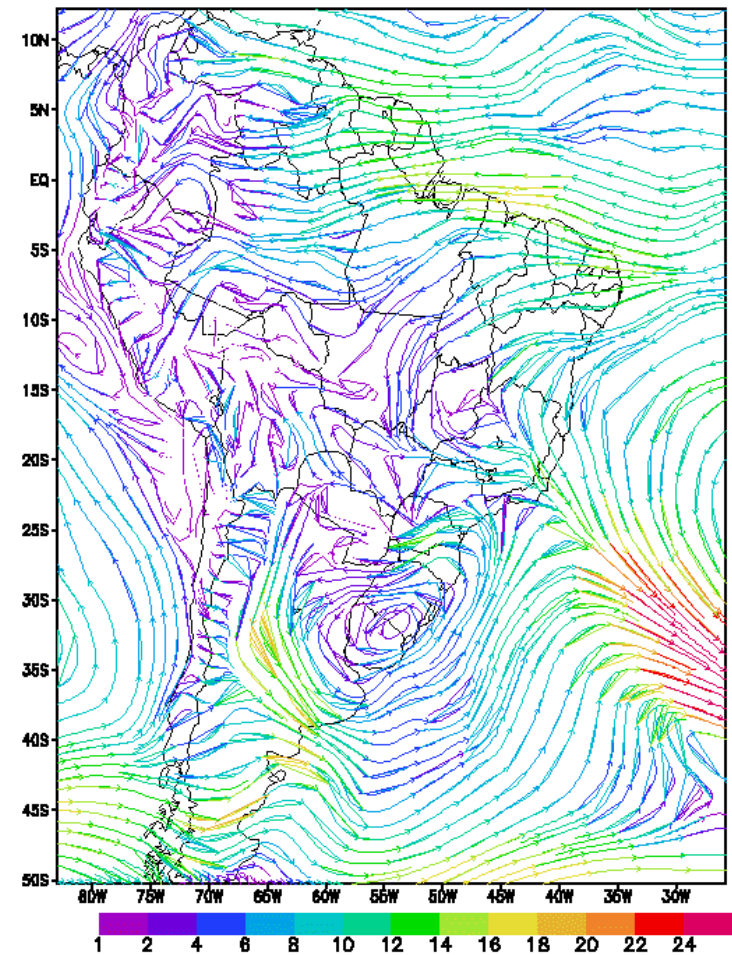


ETA MODEL

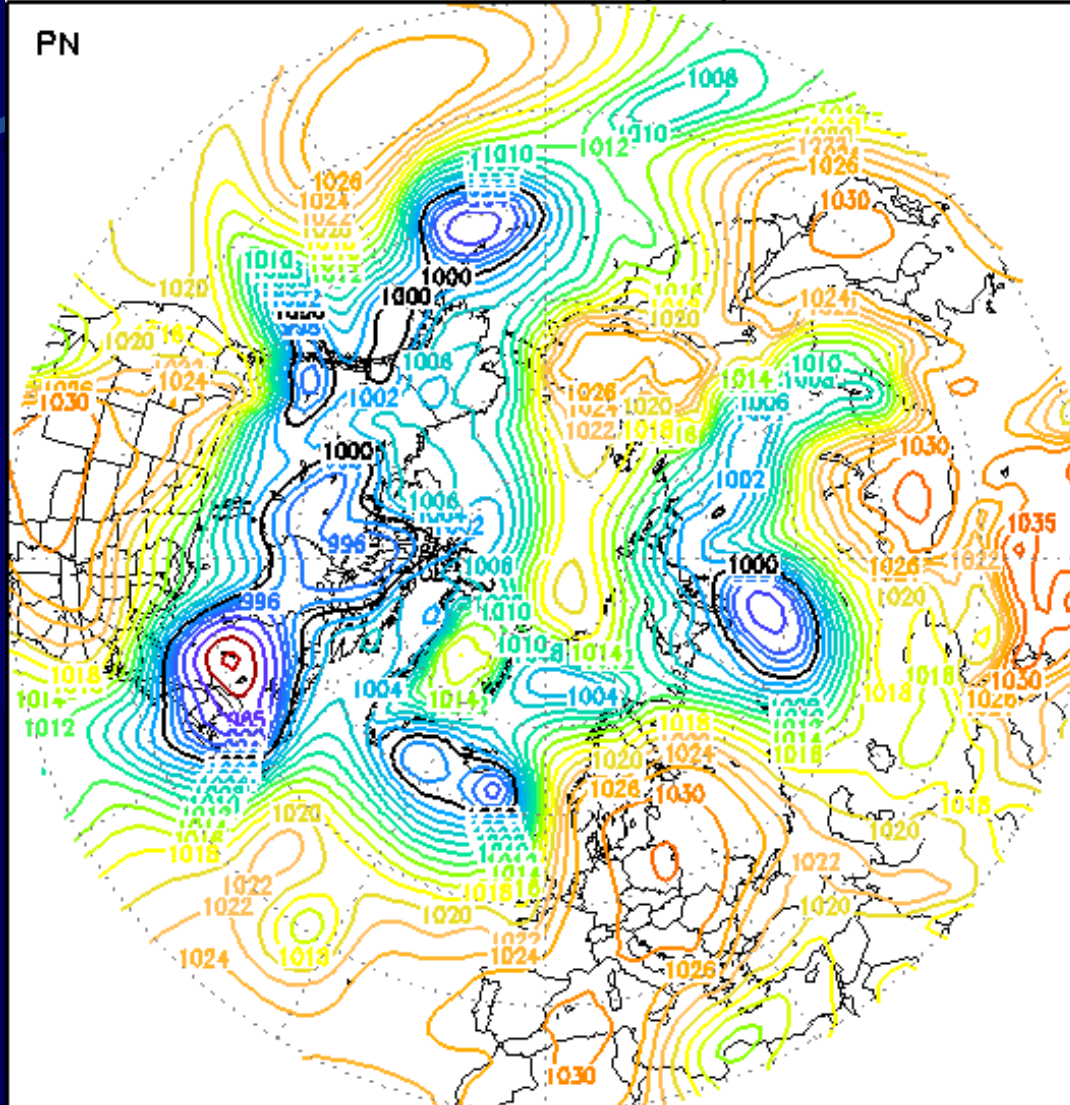
CPTEC/INPE/MCT – MODELO REGIONAL
Previsão de 0102 horas iniciada em 10/11/2003, 00UTC
válida para 14/11/2003, 06UTC (Sexta)
Sombreado: Precipitação Total Acumulada em 06h (mm)
Contorno: Pressão ao Nível Médio do Mar (hPa)



CPTEC/INPE/MCT – MODELO REGIONAL
Previsão de 0102 horas iniciada em 10/11/2003, 00UTC
válida para 14/11/2003, 06UTC (Sexta)
Linhas de Corrente e Magnitude do Vento (m/s) em 850 hPa

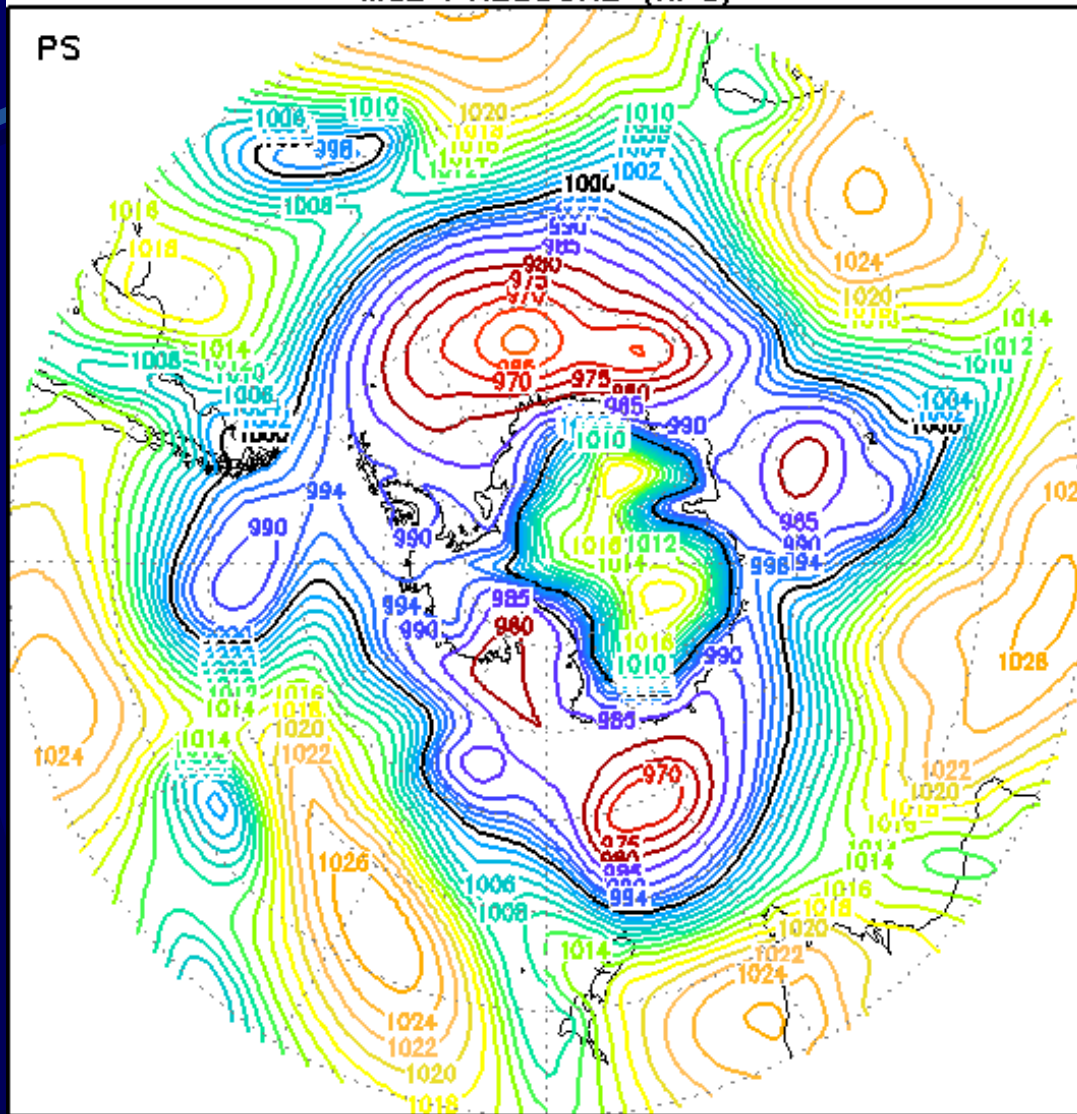


CPTEC/INPE/MCT - GLOBAL MODEL - T126L28
FORECAST FROM: 2003111000 VALID FOR: 2003111400
MSL PRESSURE (hPa)

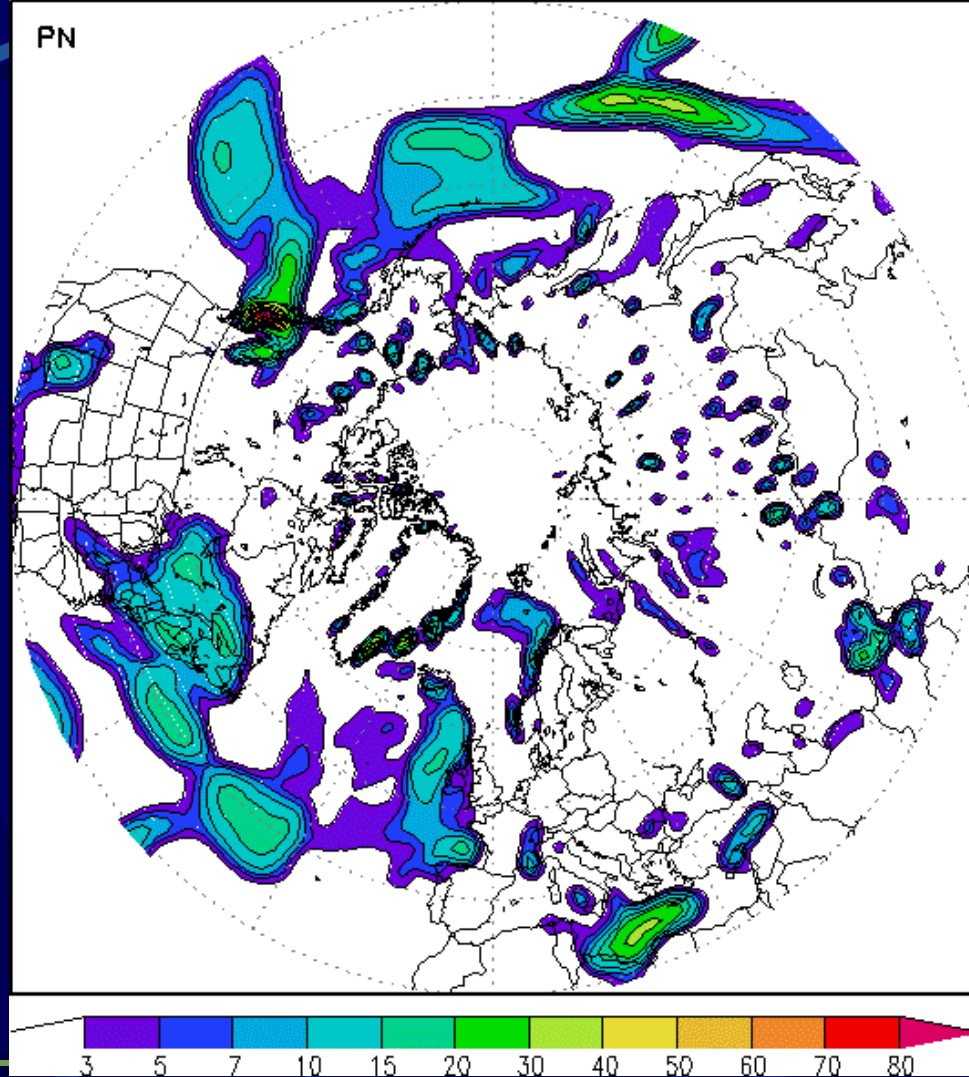


CPTEC/INPE/MCT - GLOBAL MODEL - T126L28
FORECAST FROM: 2003111200 VALID FOR: 2003111400
MSL PRESSURE (hPa)

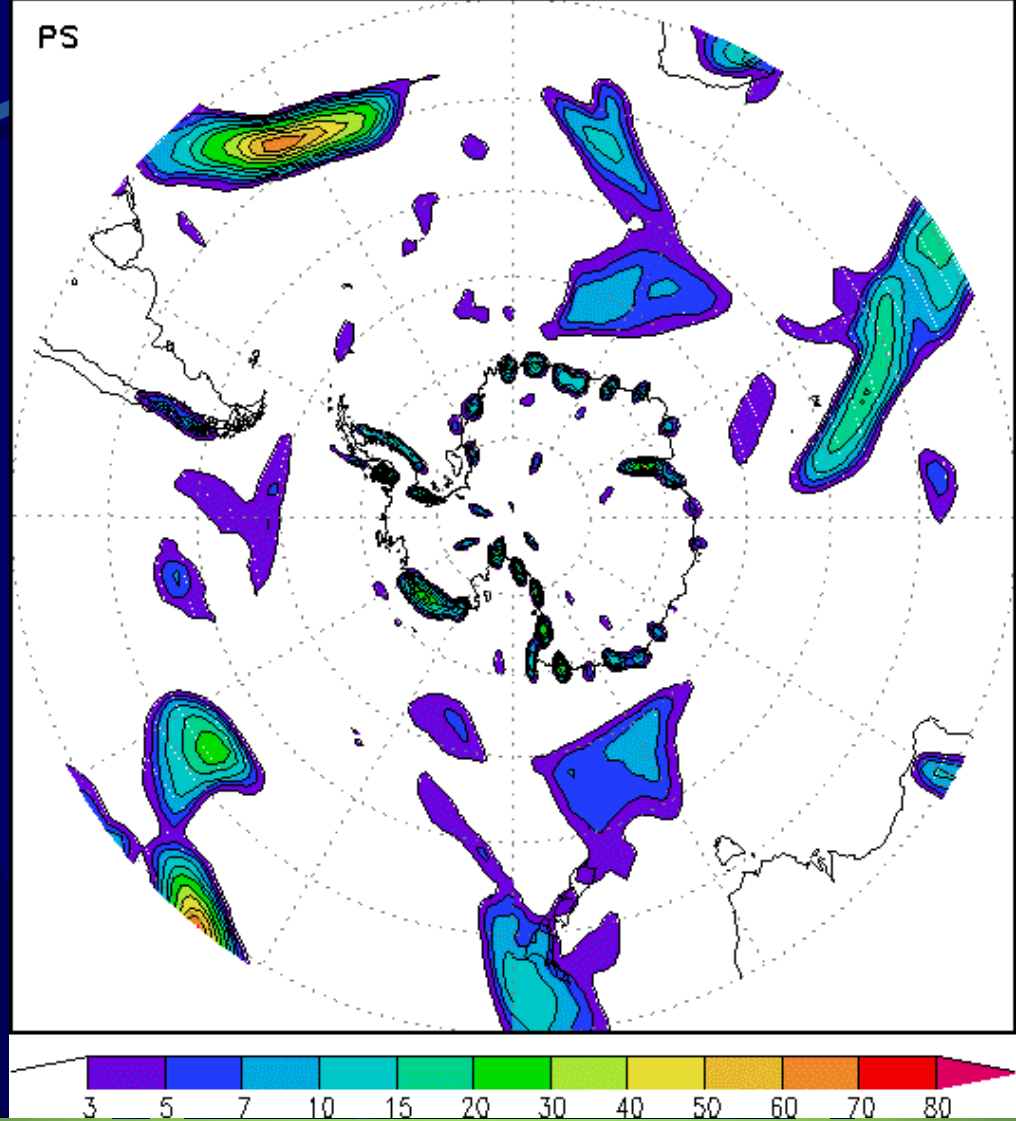
PS



CPTEC/INPE/MCT - GLOBAL MODEL - T126L28
FORECAST FROM: 2003111000 VALID FOR: 2003111400
TOTAL PREC (mm/day - Ac. last 24h)



CPTEC/INPE/MCT - GLOBAL MODEL - T126L28
FORECAST FROM: 2003111200 VALID FOR: 2003111400
TOTAL PREC (mm/day - Ac. last 24h)



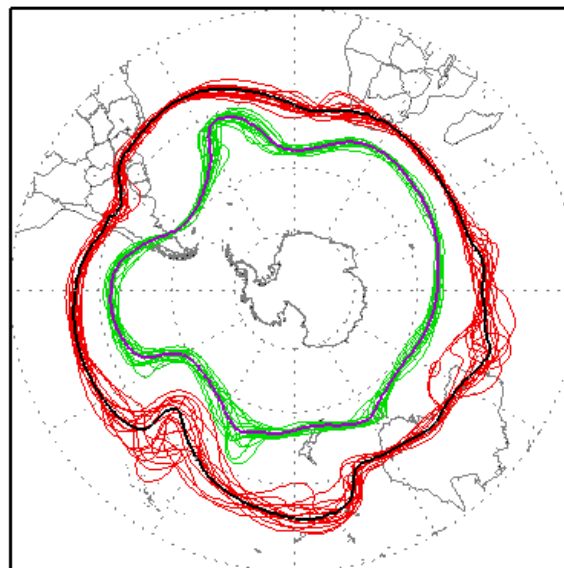
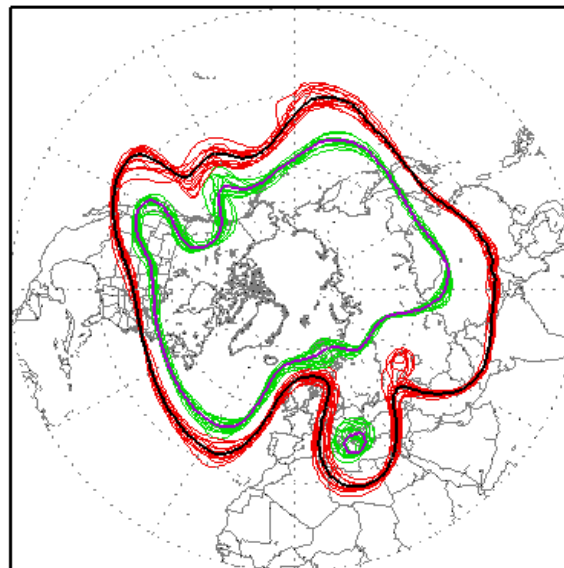
SPAGUETTI DIAGRAM

31/10/2003 TO 6/11/2003

CPTEC/INPE/MCT - PREVISAO DE TEMPO GLOBAL POR ENSEMBLE - T126L28

Diagrama "Spaguetti" - Altura Geopotencial (m) (500 hPa)

Previsao a partir de: 2003103112Z Valido para: 2003110612Z



— Membros do Ensemble (5500.0 m) — Ensemble Medio (5500.0 m)

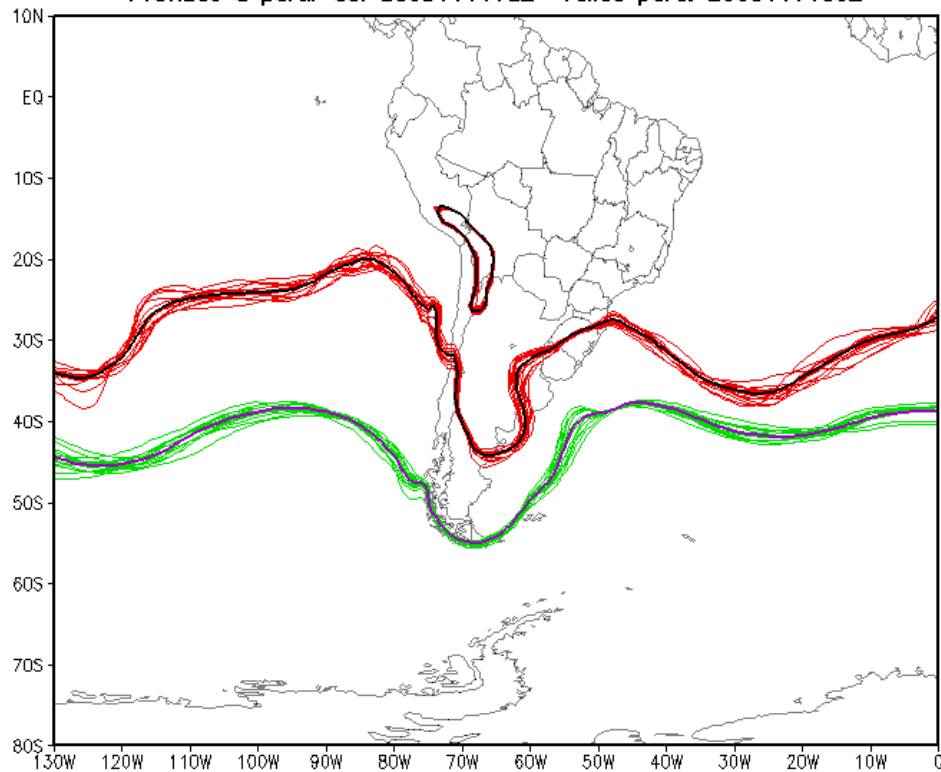
— Membros do Ensemble (5300.0 m) — Ensemble Medio (5300.0 m)

TEMPERATURE

CPTEC/INPE/MCT - PREVISAO DE TEMPO GLOBAL POR ENSEMBLE - T126L28

Diagrama "Spaguetki" - Temperatura (C) (925 hPa)

Previsao a partir de: 2003111112Z Valido para: 2003111400Z



— Membros do Ensemble (15 graus) — Ensemble Medio (15 graus)
— Membros do Ensemble (5.0 graus) — Ensemble Medio (5.0 graus)

CLUSTER ANALYSIS

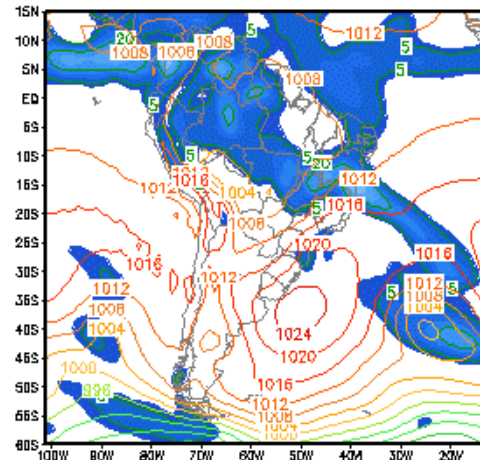
Wards minimum variance method (Wilks, 1995)

OPTEC/INPE/MCT – PREVISAO DE TEMPO GLOBAL POR ENSEMBLE – T126L28

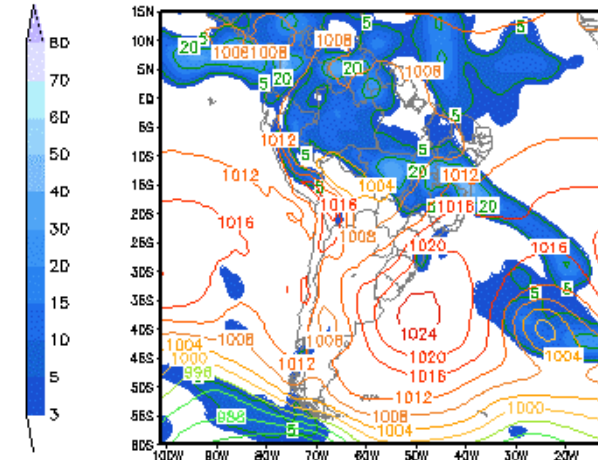
Cluster Medio para Pressao ao Nivel Medio do Mar (hPa) (Contornos) e Precipitacao Acumulada em 24 horas (mm) (Cores)

Previsao de: 2003103112Z Valido para: 2003110600Z

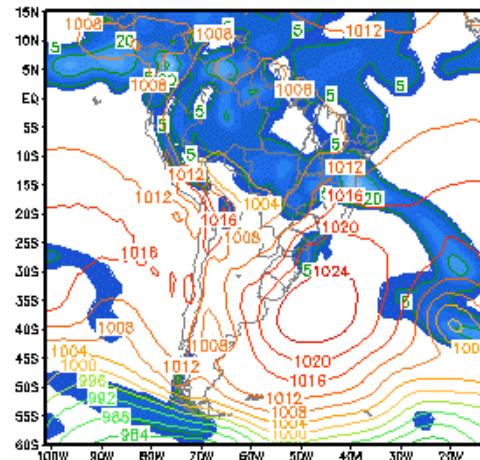
cluster: 1 n.o de membros: 6



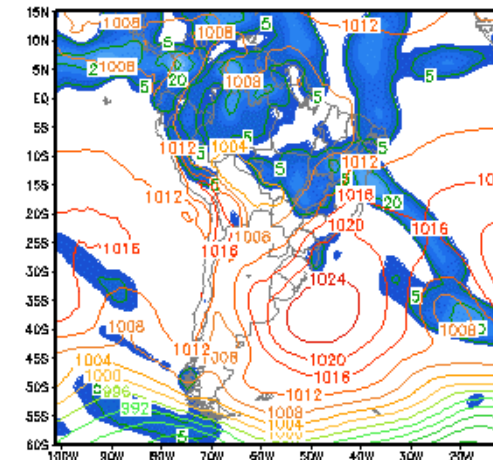
cluster: 2 n.o de membros: 3



cluster: 3 n.o de membros: 4



cluster: 4 n.o de membros: 2

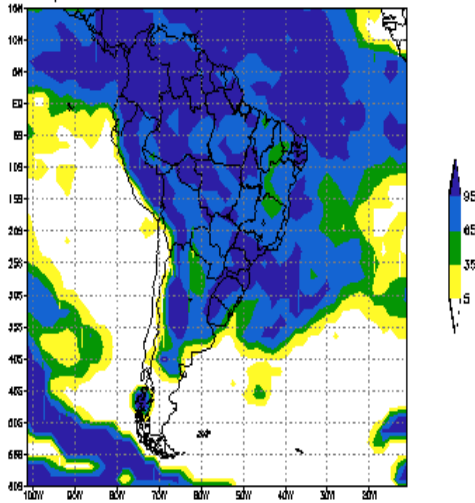


PROBABILISTIC FORECAST GLOBAL MODEL

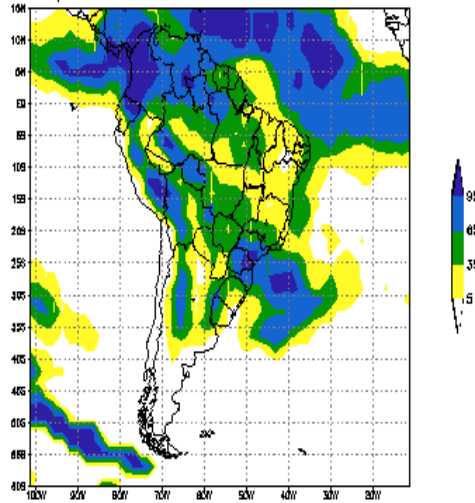
15
INTEGRATIONS

CPTEC/INPE/MCT – PREVISAO DE TEMPO GLOBAL POR ENSEMBLE – T062L28
Previsao de Probabilidades (%) – A partir de: 2001121312Z Valido para: 2001121412Z

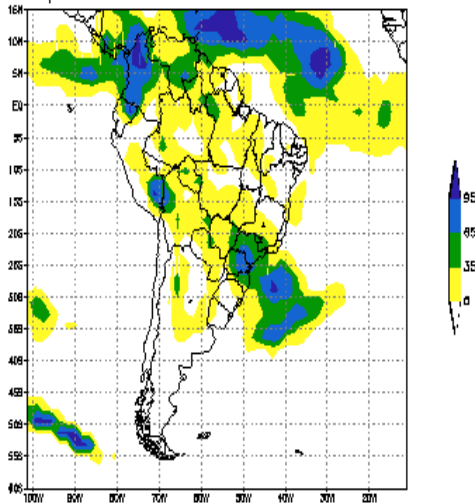
Precipitacao acumulada em 24 hrs > 1.0 mm



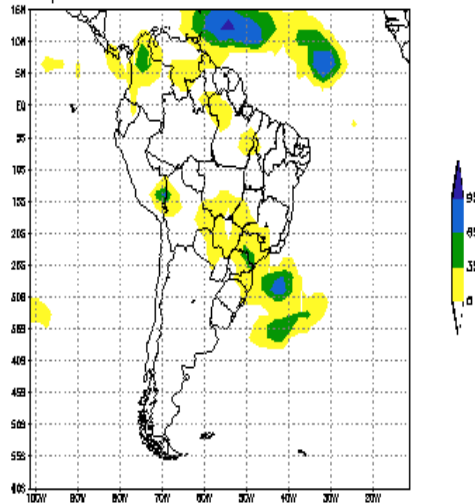
Precipitacao acumulada em 24 hrs > 5.0 mm



Precipitacao acumulada em 24 hrs > 10.0 mm



Precipitacao acumulada em 24 hrs > 20.0 mm



Percentage

95

65

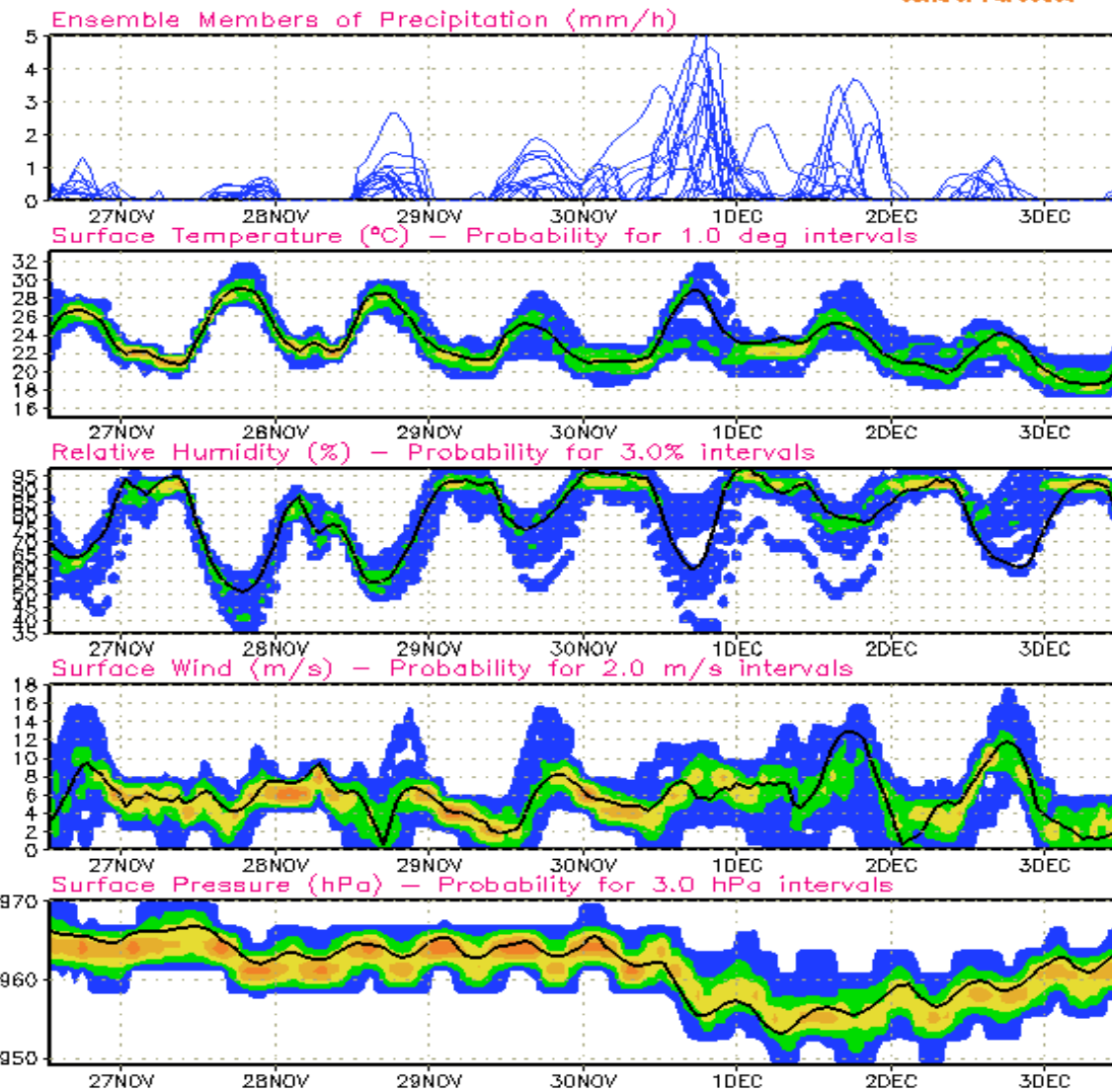
35

5

Probability plumes

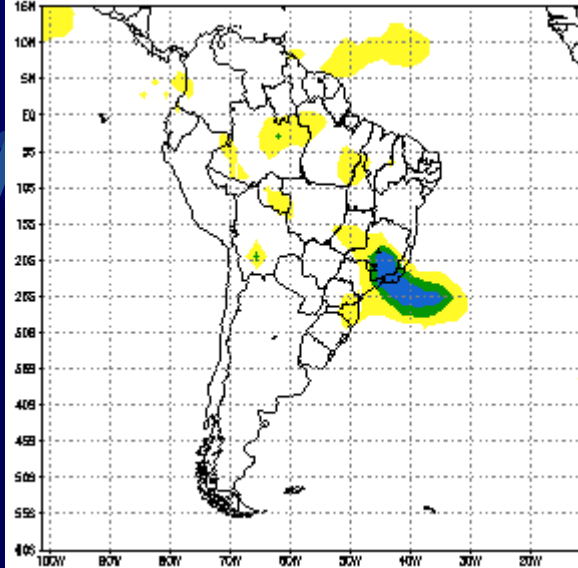
PROBABILITY PLUMES - GLOBAL ENSEMBLE FORECAST - T062L28
CPTEC: 045:00W-23:19S S J CAMPOS (SP) - CACH PAULISTA (SP)
26NOV2001 12Z: Greenwich Meridian Time: Vertical Dotted Line: Midnight

■ 1 - 20 % ■ 20 - 40 % ■ 40 - 60 % ■ 60 - 80 % ■ 80 - 100 %
— Control Forecast

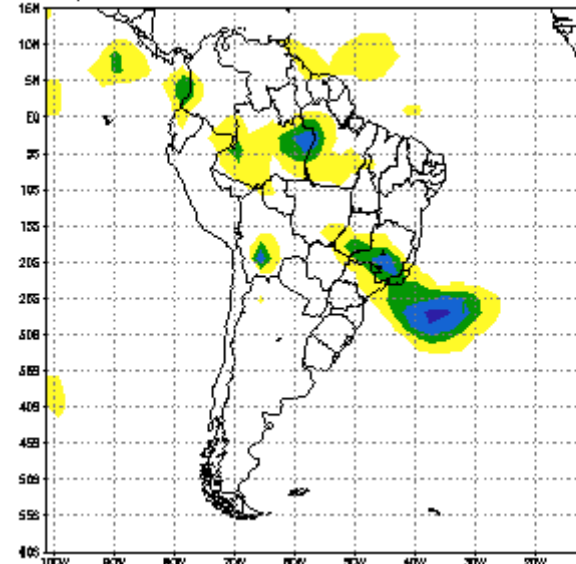


Probabilistic forecast rainfall above 20 mm in 24 hours 11 to 15 december 2002 intense rainfall in MG

Precipitacao acumulada em 24 hrs > 20.0 mm

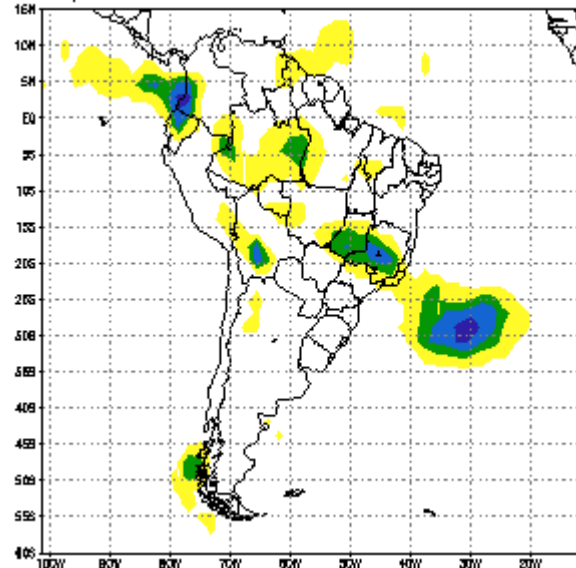


Precipitacao acumulada em 24 hrs > 20.0 mm

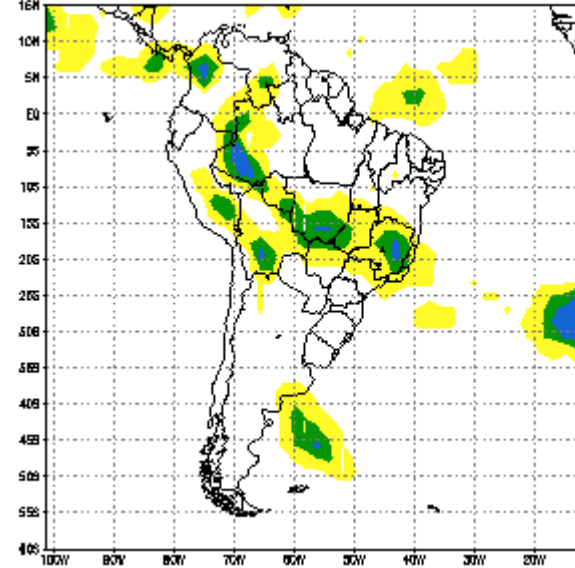


12/12/02 - 21h
forec. 96 h

Precipitacao acumulada em 24 hrs > 20.0 mm



Precipitacao acumulada em 24 hrs > 20.0 mm



15/12/02 - 21h
forec. 168 h

11/12/02 - 21h
forec. 72 h

14/12/02 - 00Z
forec. 144 h

WEATHER FORECAST

REGIONAL MODEL

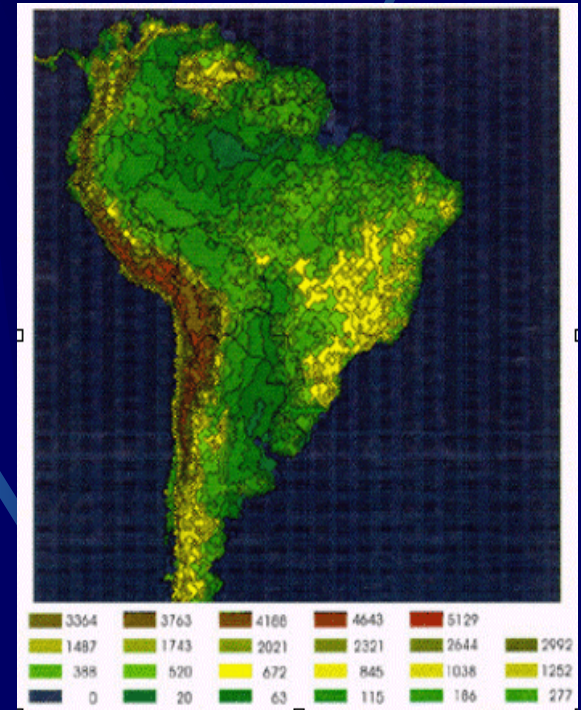
40 km L 38 2 X DAY 7 days

LATERAL CONDITIONS

CPTEC/COLA AGCM

20 km L 38 specific cases 5 days

OUTPUTS: AT EACH 6 HOURS

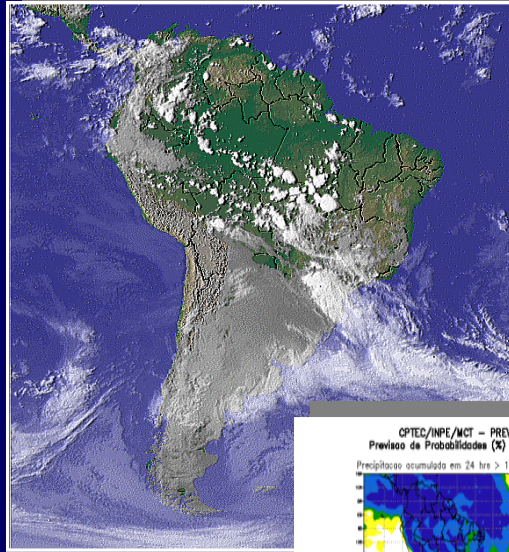


WEATHER FORECASTING

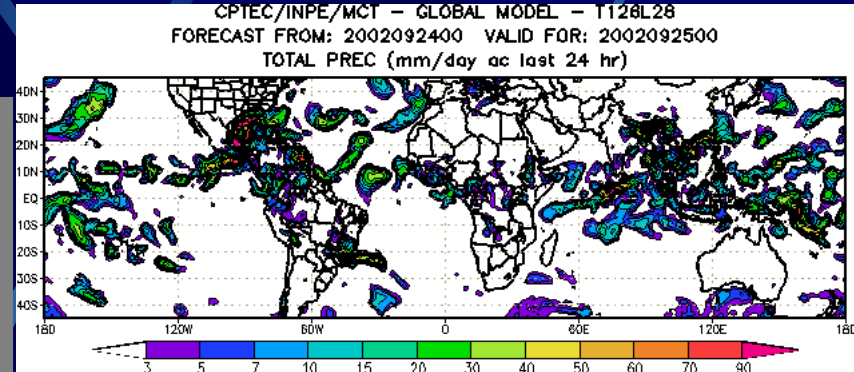
DATA



SATELLITE IMAGES



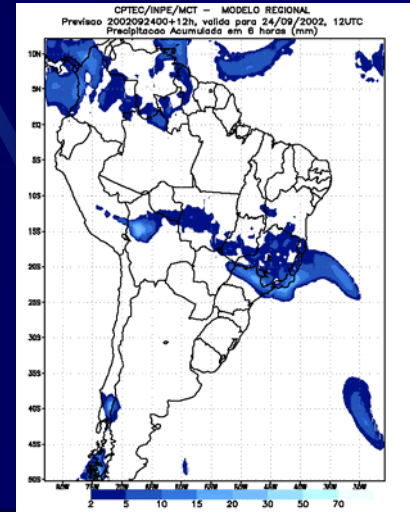
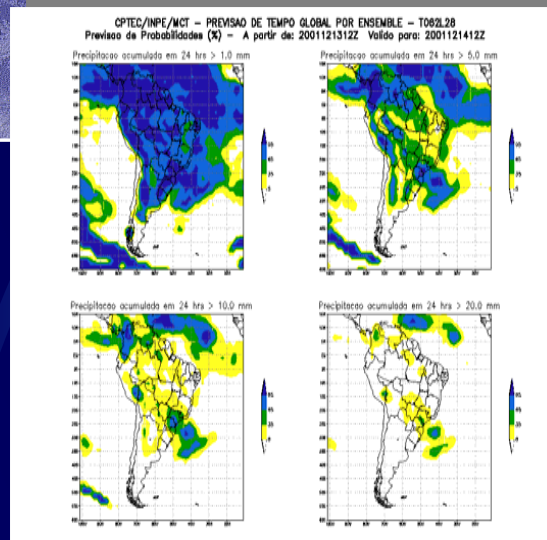
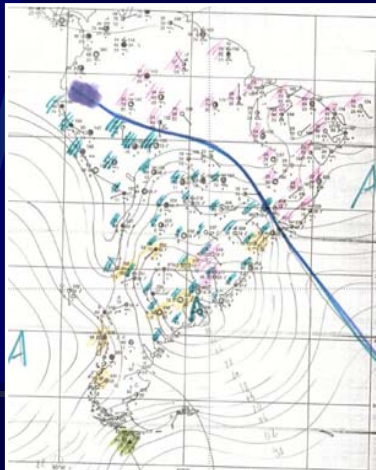
GLOBAL MODEL



ensemble

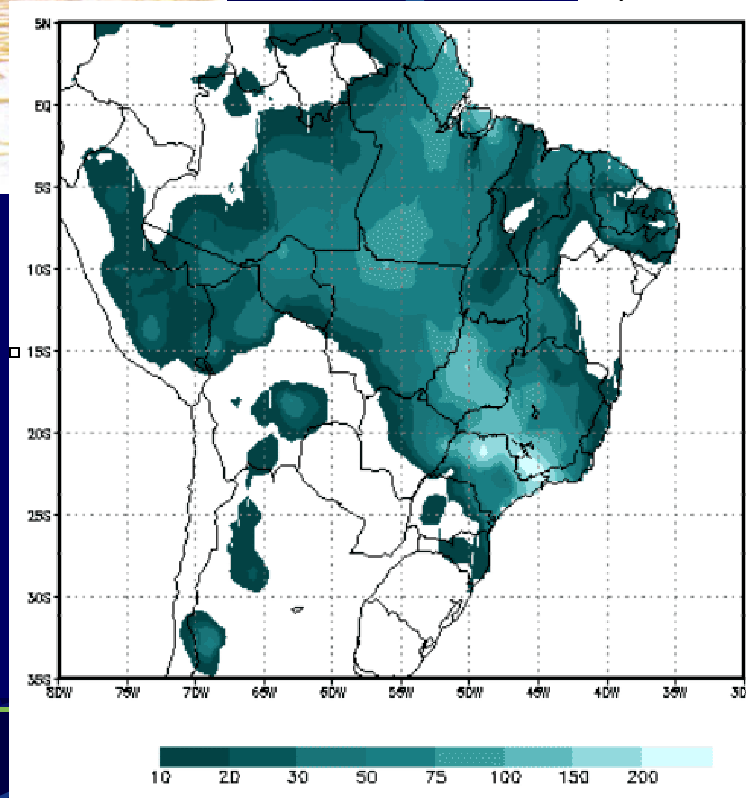
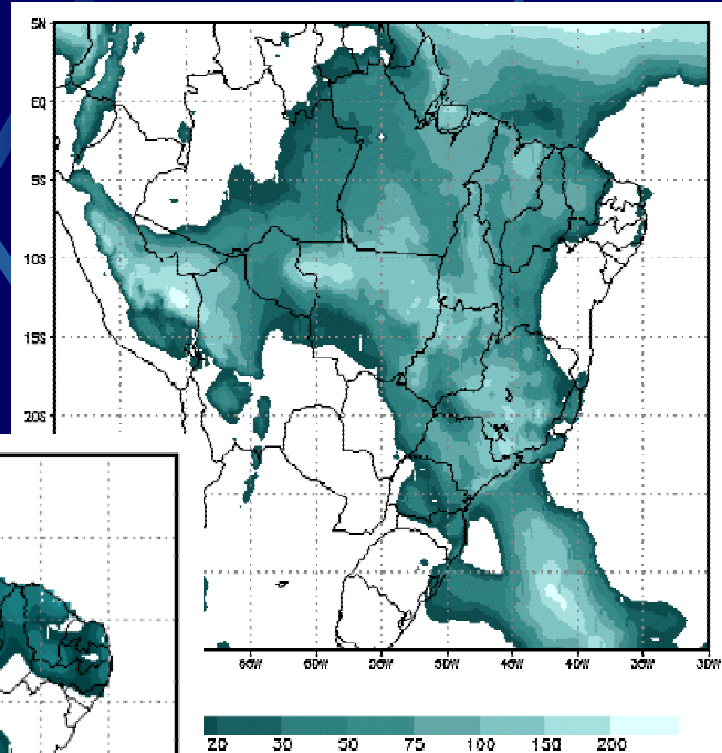
REGIONAL MODEL

SYNOPTIC CHART



Floods Early 2000

Forecasted Accumulated Precipitation
Eta/CPTEC Regional Model
January 02-06, 2000



Observed Precipitation
January 02-06, 2000

Regional CPTeC Model Forecasts Heavy Precipitation for the South of Brazil, 48 hours in advance – Sep 29, 2001 to 30 Sept 2001

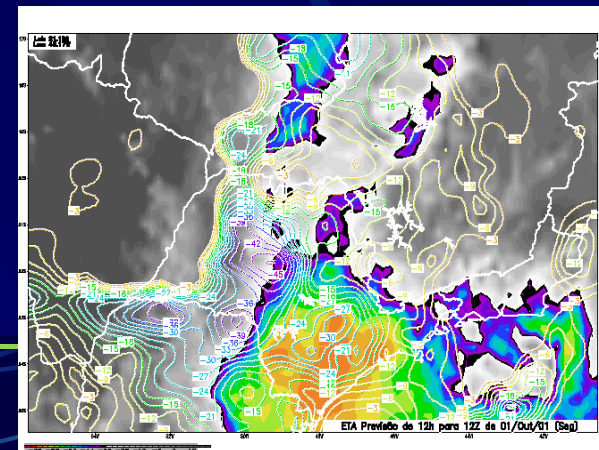
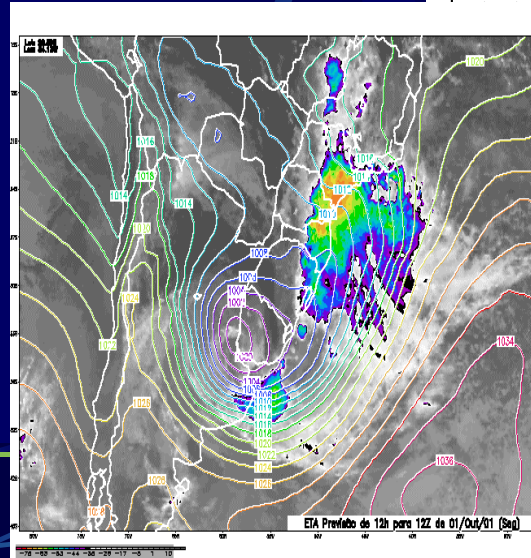
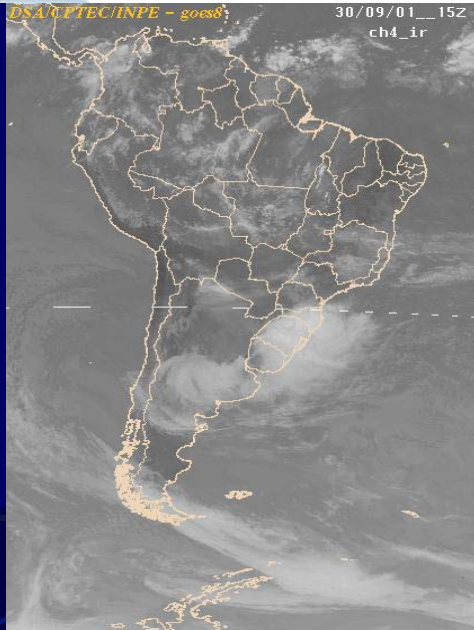
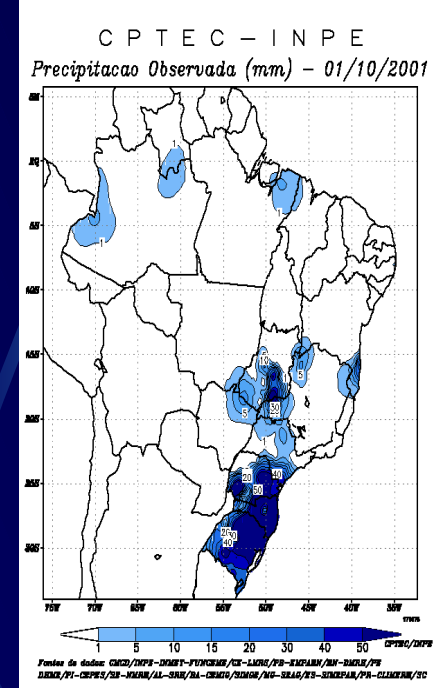
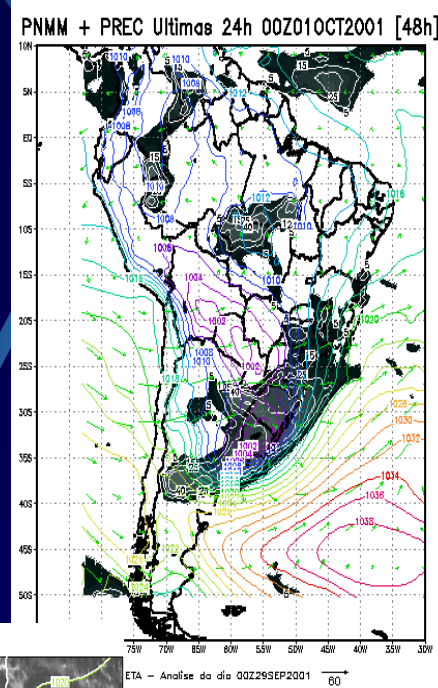
CPTeC - Centro Previsão Tempo e Estudos Climáticos

Sul

28/09/2001

Chuvas Intensas/Forte

No dia 29/09 (sábado) uma área de instabilidade associada a uma baixa pressão sobre a Argentina provocará chuvas fortes sobre os RS. Estas chuvas deverão ocorrer principalmente no período da tarde, estendendo-se pelo noite e madrugada. Não descartados chuvas de granizo em algumas localidades. Deverão ocorrer ventos de rajada, com velocidades de até 50 nós (25m/s) no leste e sul deste Estado. No dia 30/09 (Domingo) o dia será chuvoso em toda a região, podendo ocorrer chuvas fortes em várias localidades.



Regional CPTEC Model Forecasts Heavy Precipitation for the South of Brazil, 48 hours in advance – Nov 10, 2001

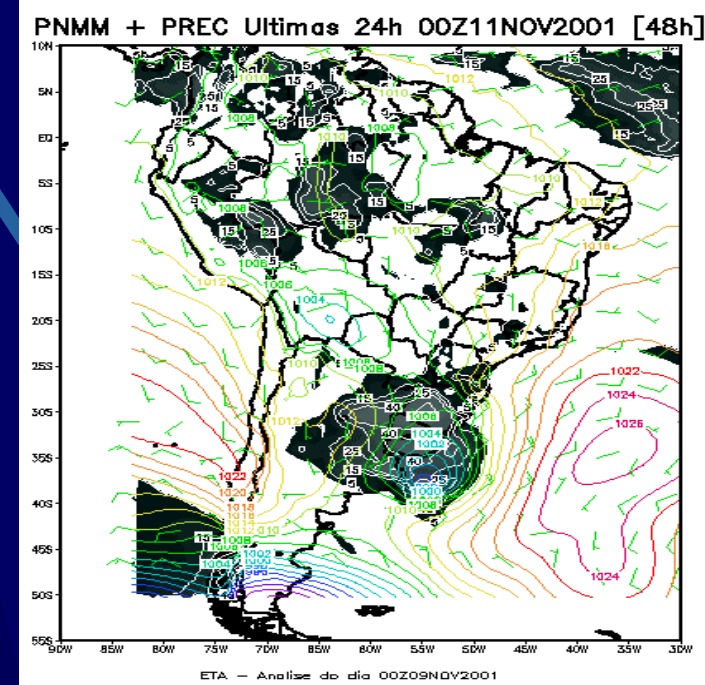
CPTEC - Centro Previsão Tempo e Estudos Climáticos



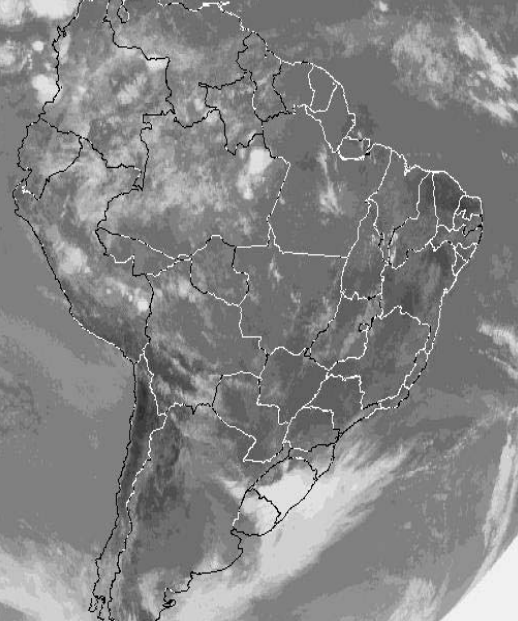
09/11/2001

Chuvas Intensas/Fortes

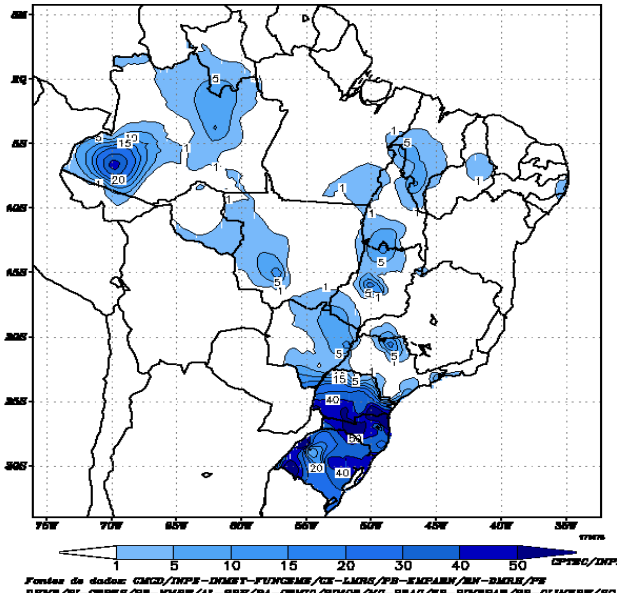
No dia 10/11 (sábado): Uma frente fria provocará chuvas fortes do RS. De acordo com o modelo de previsão são esperadas CHUVAS FORTES, principalmente no final da manhã e período da tarde, em toda a região de fronteira com o Uruguai e na região de Uruguaiana. No dia 11/11 (Domingo): Na madrugada e período da manhã deverá chover forte no setor norte, serrana e litoral do RS. No final da manhã e período da tarde também deverá chover forte em várias localidades de SC e do RS.



INPE/CPTEC G-8 IR 10/11/01 1409Z



CPTEC - INPE
Precipitacao Observada (mm) - 11/11/2001

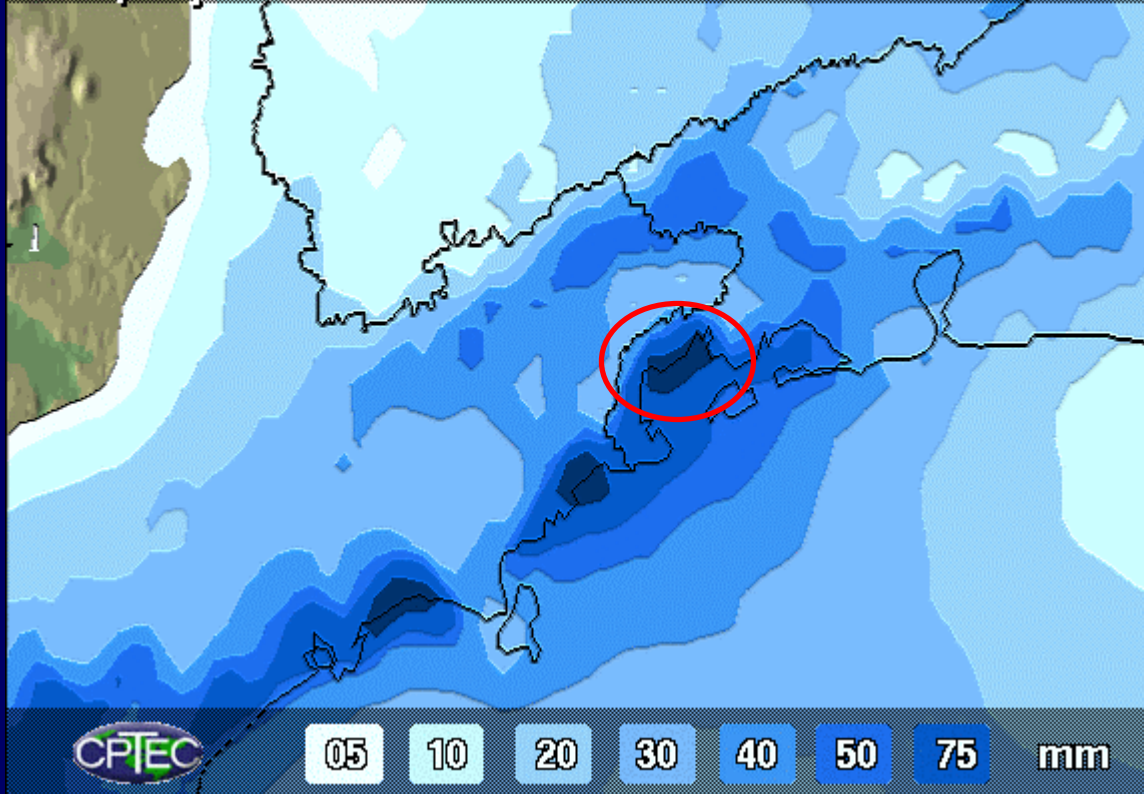


High Resolution Regional Forecast

Angra dos Reis - Dec 2002

Previsão para domingo

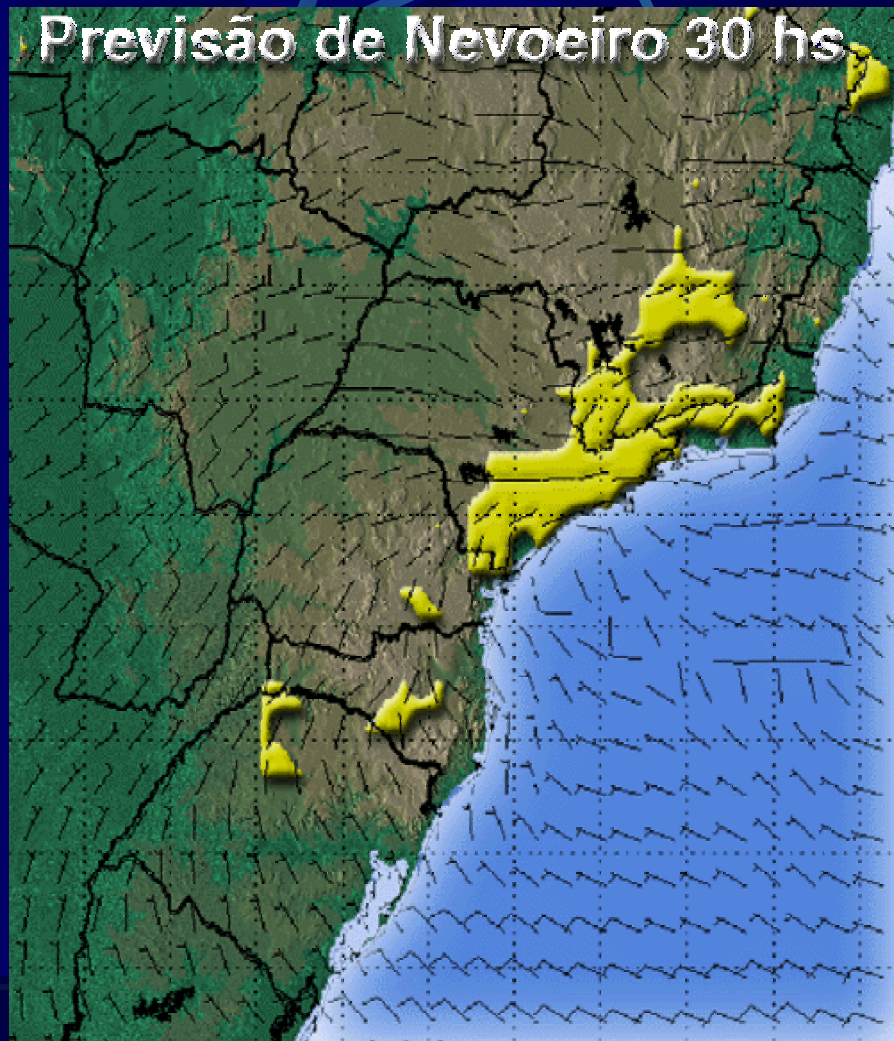
Precipitação acumulada entre 08/12/2002 10h e 09/12/2002 10h



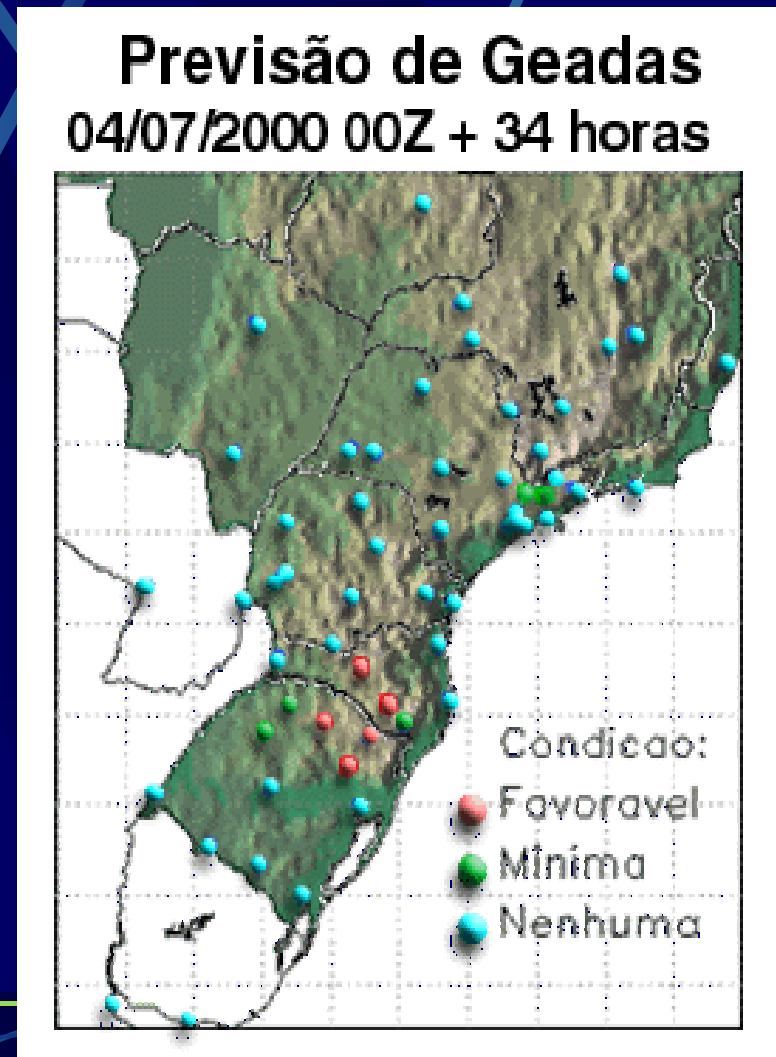
Eta – 10 km – 24h Forecast

APPLICATION OF ETA MODEL OUTPUTS

FOG



FROST



APPLICATION OF AGCM OUTPUTS

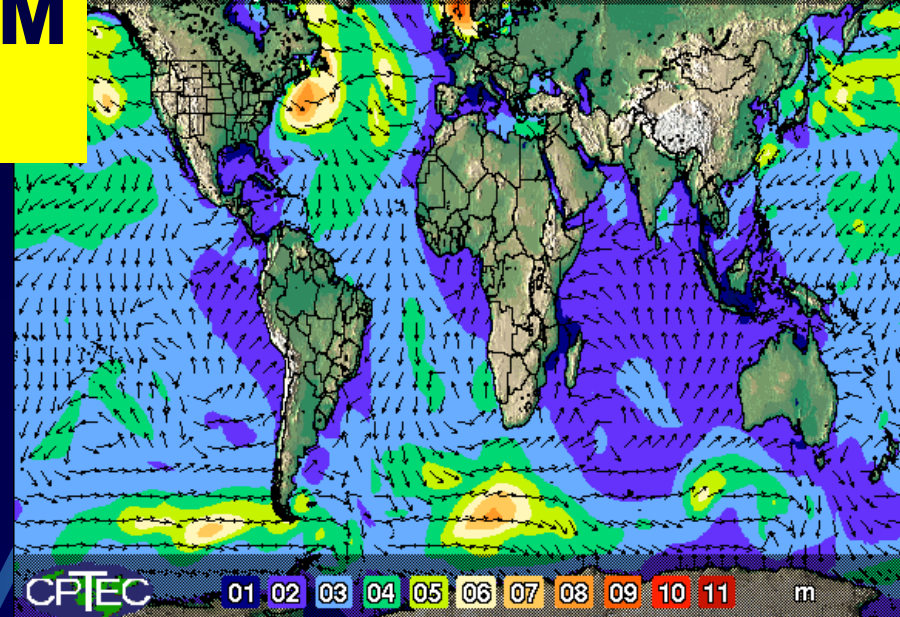
PRODUCTS OF OCEAN WAVE MODEL

➤ GLOBAL PREDICTION OF WAVES: WAM MODEL

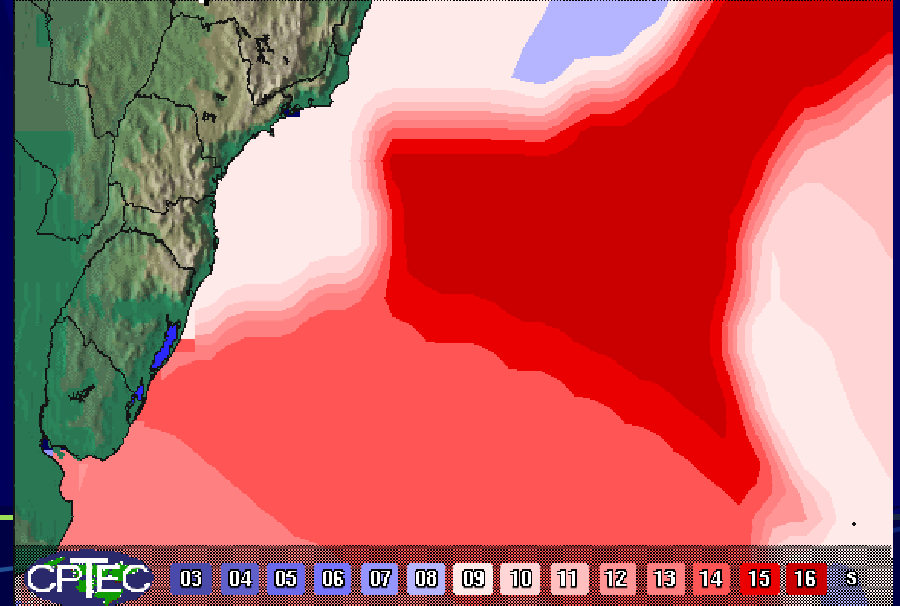
ATMOSPHERIC FORCING
(SURFACE WINDS
PRODUCED BY
CPTEC/COLA T126L28).

1 x day

Altura Significativa e Direção Média das Ondas
Previsão para as 12Z do dia 19/12/2001 - Quarta

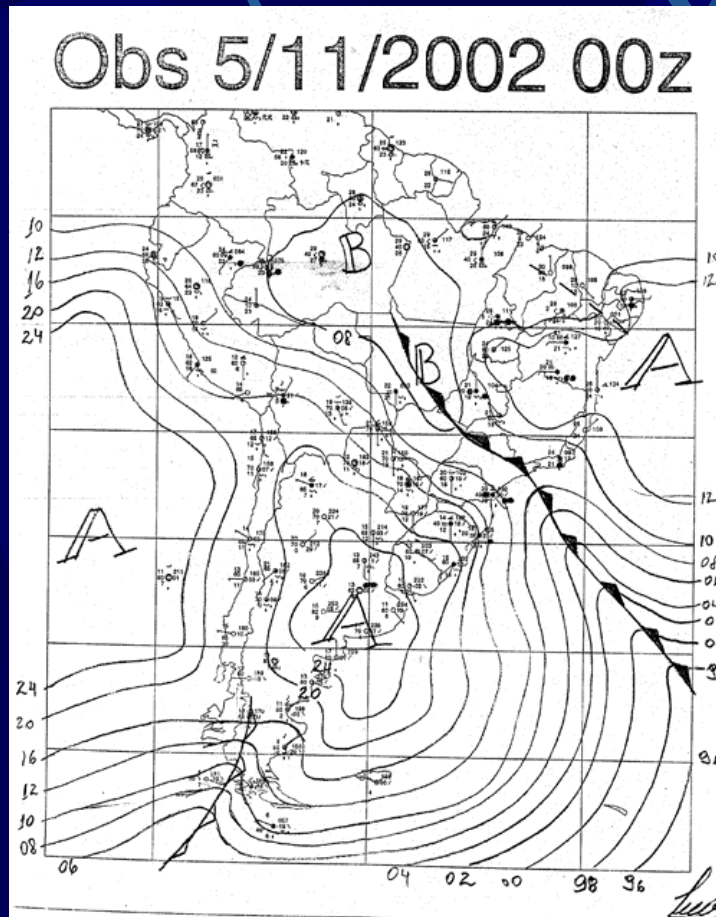


Período de Pico das Ondas
Previsão para as 12Z do dia 06/09/2001 - Quinta-feira



VERIFICATION

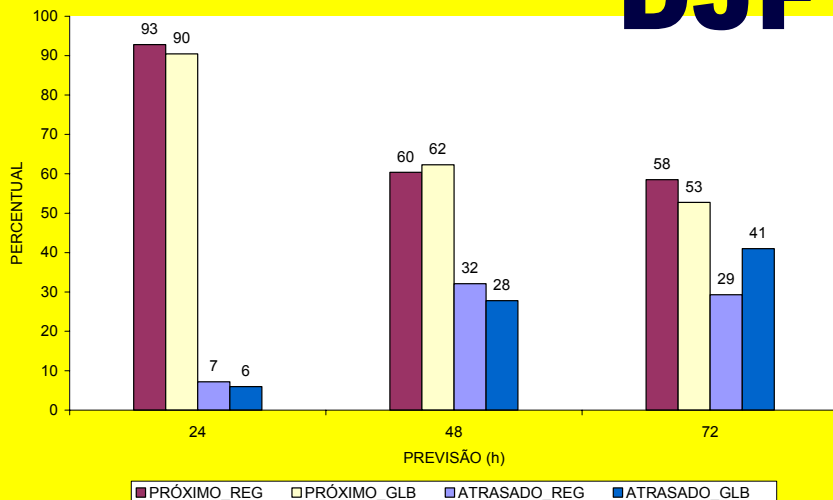
EVALUATION OF FRONTAL SYSTEMS POSITION



PERCENTAGE OF RIGHT FORECAST

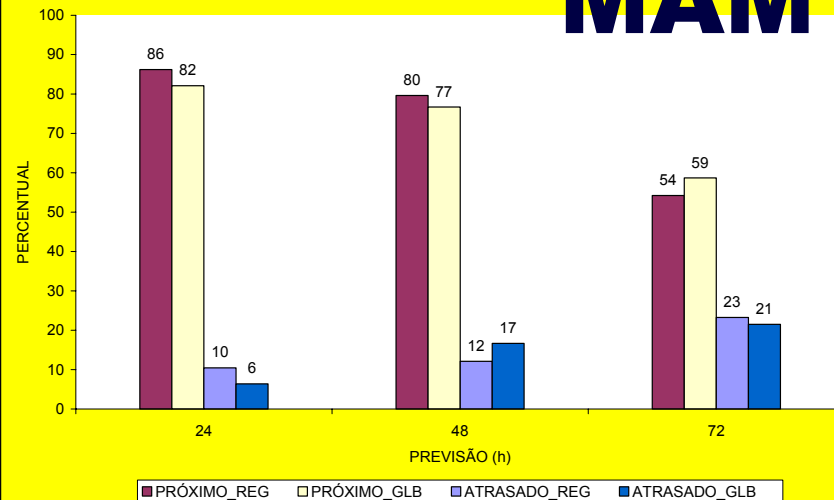
PRIMEIRO TRIMESTRE (ANÁLISE 12Z)
DJA

DJF



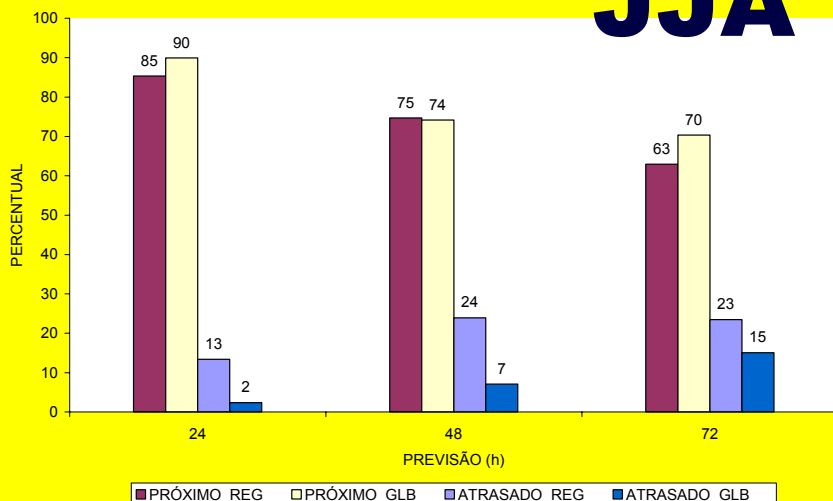
SEGUNDO TRIMESTRE (ANÁLISE DAS 12Z)
MAM

MAM



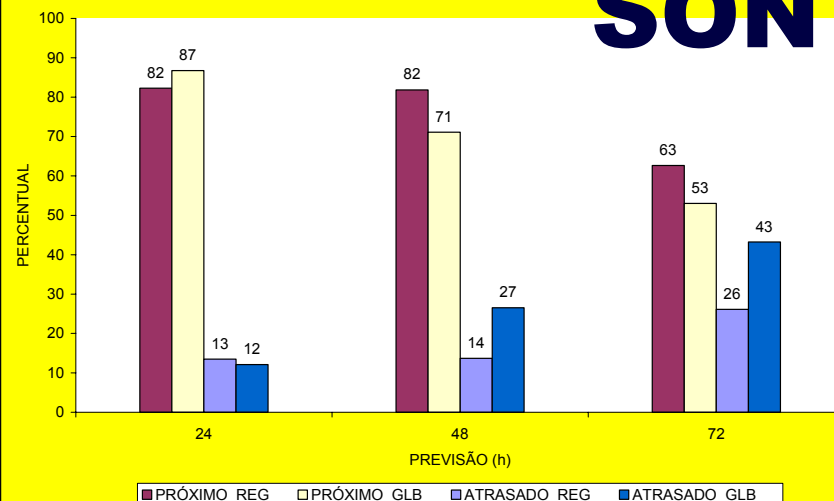
TERCEIRO TRIMESTRE (ANÁLISE DAS 12Z)
JJA

JJA



QUARTO TRIMESTRE (ANÁLISE DAS 12Z)
SON

SON

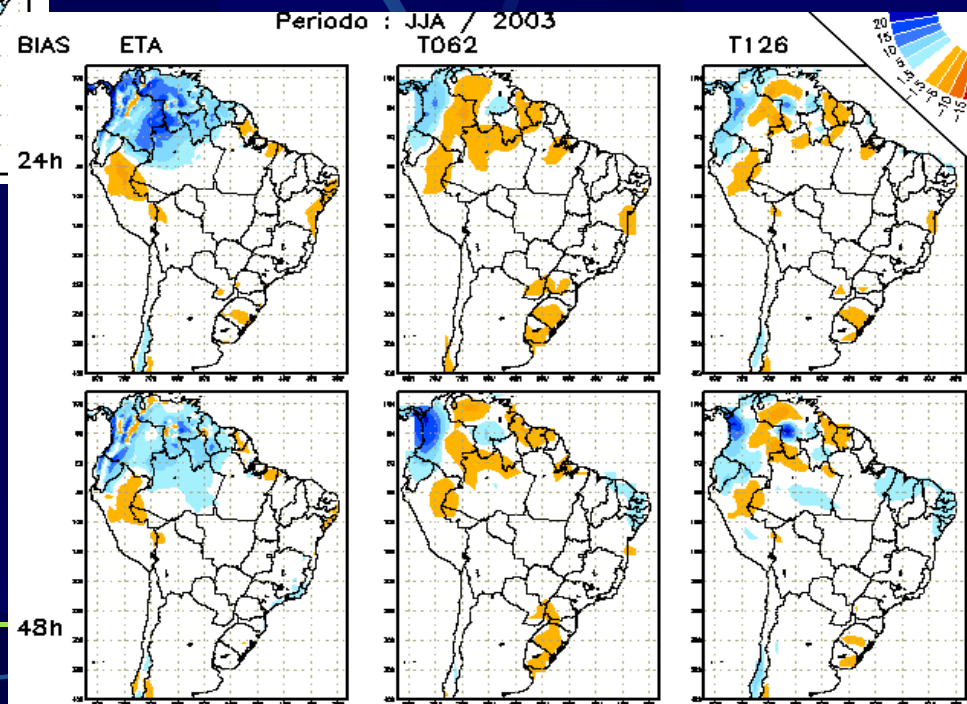
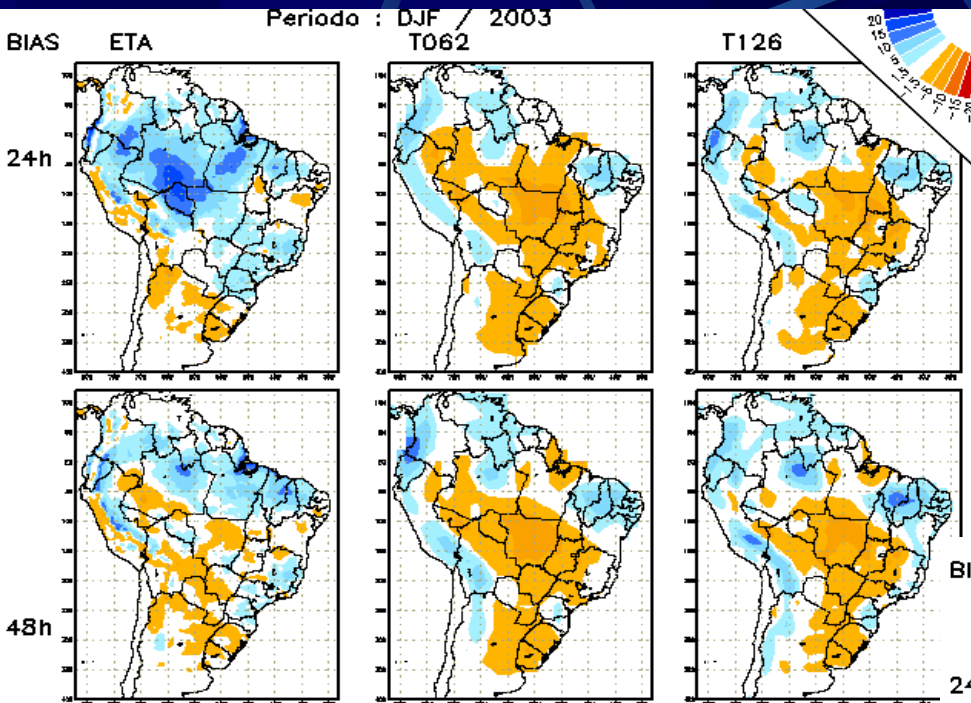


DJF

WEATHER FORECAST PRECIPITATION VERIFICATION

2003

JJA



$$\text{BIAS} = \frac{\sum(P_i - O_i)}{n}$$

P_i : forecast

O_i : observed

VERIFICATION ANALYSES

$$BIAS = \frac{F}{O}$$

$$ETS = \frac{H - CH}{F + O - H - CH}$$

$$CH = \frac{F \times O}{N}$$

F - number of points with forecast precipitation above a threshold
O - number of points with observed precipitation above a threshold

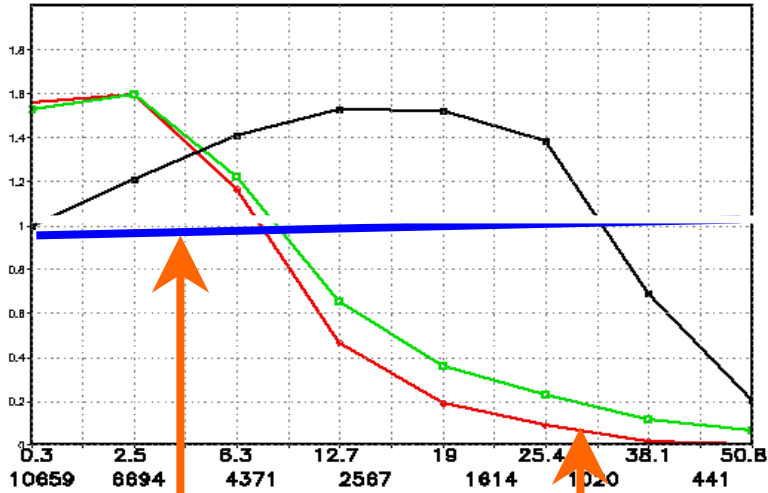
H - number of hits

CH - number of points of random hits

N - number of points in the area

GLOBAL T062
GLOBAL T126
REGIONAL

BIAS 24 horas
America do Sul DJF 2002 - 2003



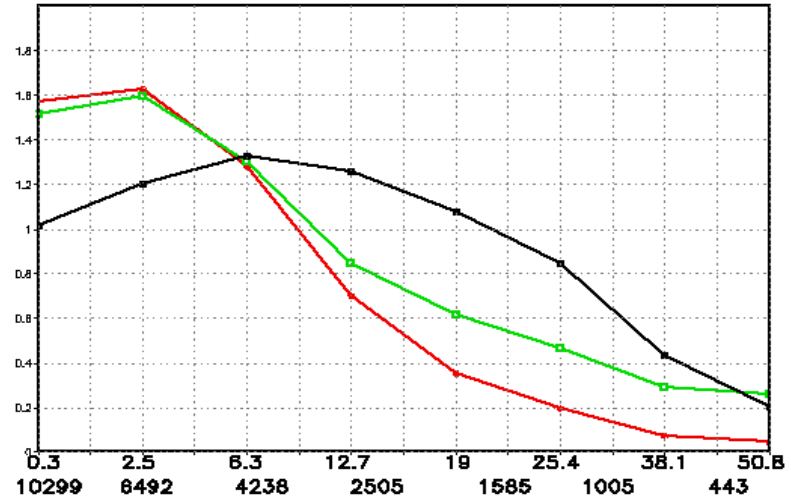
Small values

Large values

BIAS

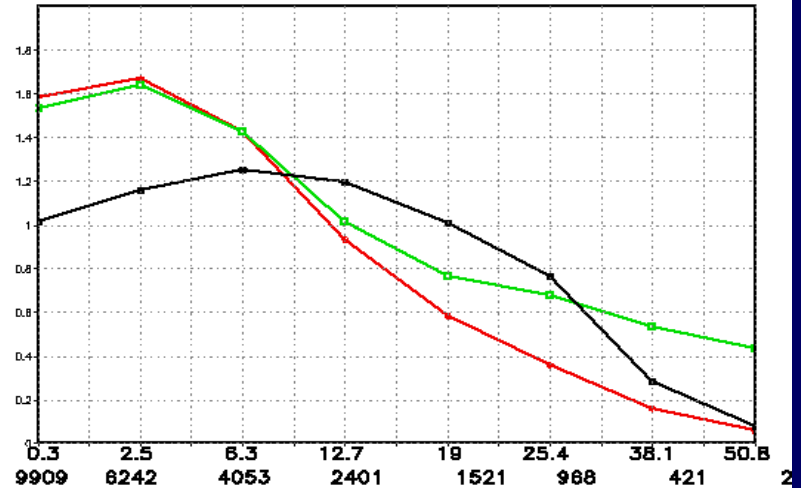
BIAS 48 horas
America do Sul DJF 2002 - 2003

GLOBAL T062
GLOBAL T126
REGIONAL



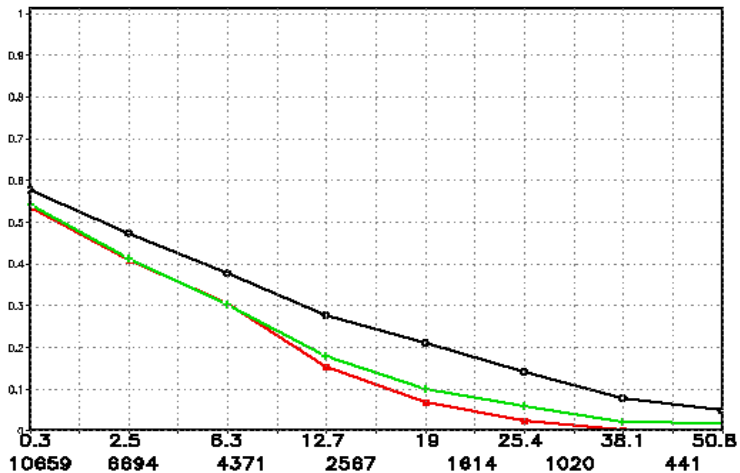
BIAS 72 horas
America do Sul DJF 2002 - 2003

GLOBAL T062
GLOBAL T126
REGIONAL



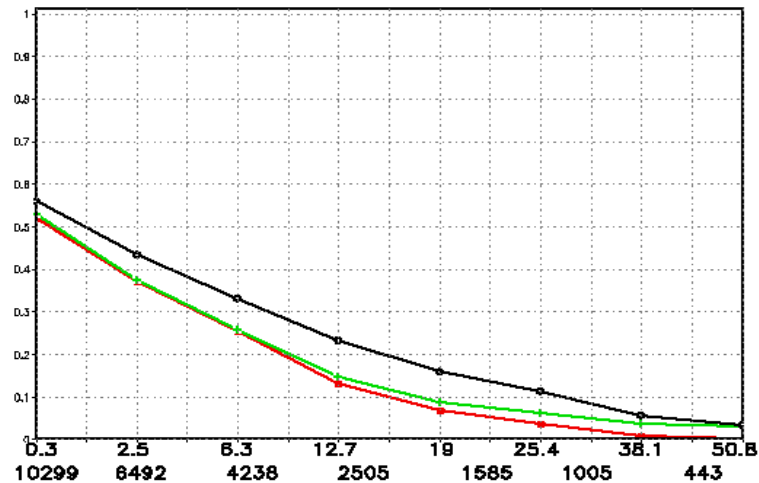
Equitable Threat Score 24 horas
America do Sul DJF 2002 - 2003

GLOBAL T062
GLOBAL T126
REGIONAL



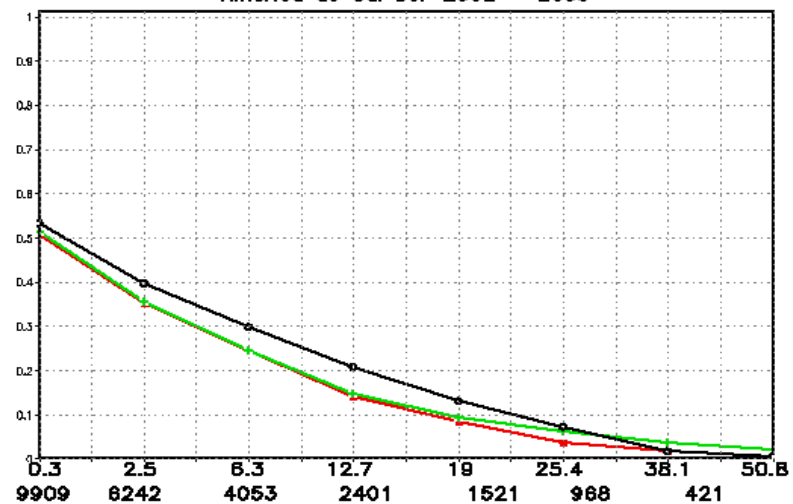
Equitable Threat Score 48 horas
America do Sul DJF 2002 - 2003

GLOBAL T062
GLOBAL T126
REGIONAL



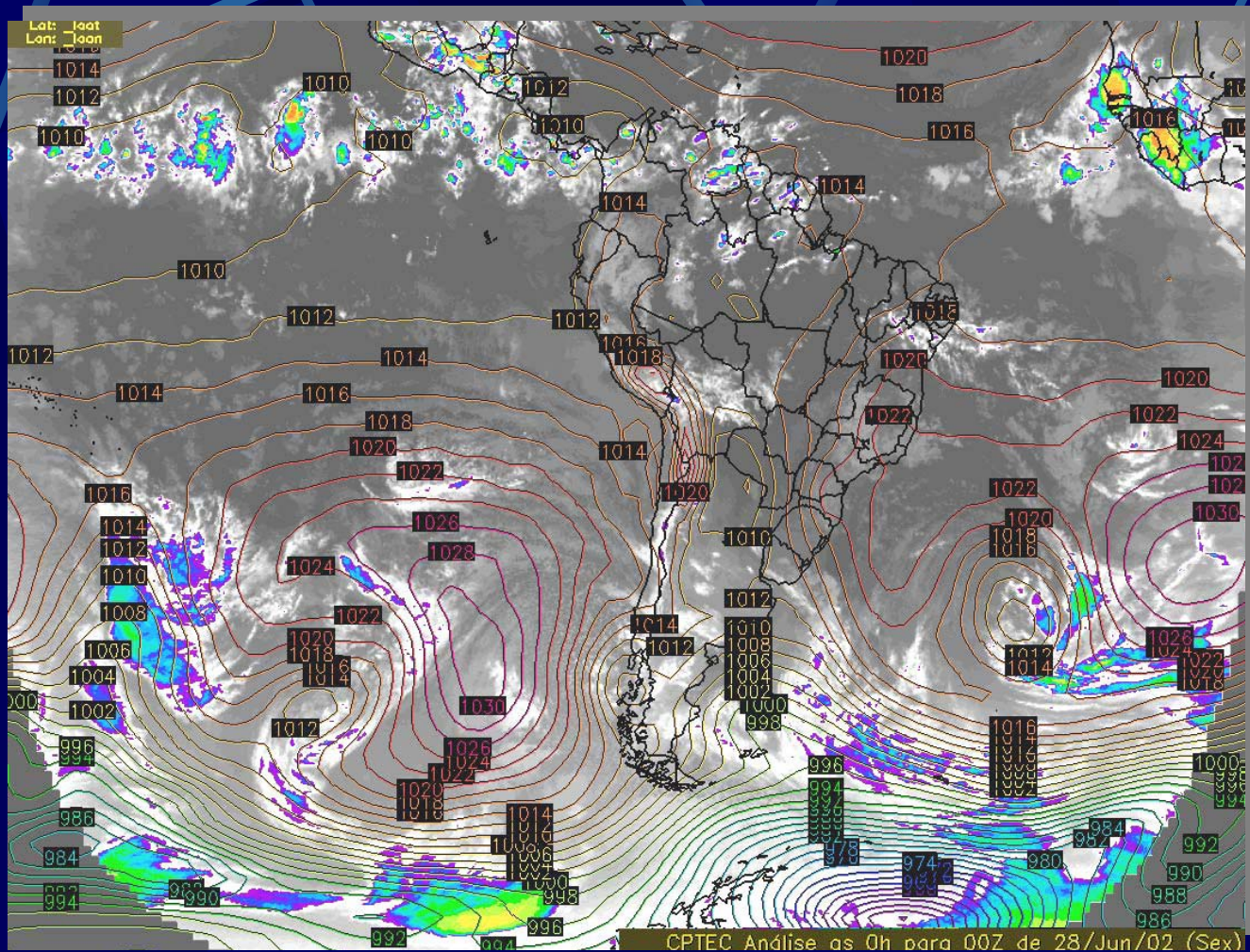
Equitable Threat Score 72 horas
America do Sul DJF 2002 - 2003

GLOBAL T062
GLOBAL T126
REGIONAL



ETS

CLOUDINESS AND PRESSURE FIELD



PRODUCTS DISSEMINATION



O TEMPO HOJE NAS CAPITAIS

CPTEC
www.cptec.inpe.br

Previsão de tempo para o Brasil

Hoje (29/03), no Sul, em SP, em MT e no MS haverá sol com pancadas de chuva no fim do dia. Nas demais áreas de São Paulo, em GO, no BA, AL, SE, PE, no Piauí e no Centro-Oeste do TO, as condições serão predominantemente nublado. Nas demais áreas do Norte e Nordeste, o céu estará nublado com chuva esparsa. As temperaturas estarão elevadas no Sudeste e Centro-Oeste.

Amanhã (30/03), no ES o céu estará nublado com chuva esparsa, devido à presença de uma frente fria (Fm. S.C.) no PR, MS, MT e em RO haverá estabilidade variável com pancadas de chuva no fim do dia. No Sudeste, em GO, continuará o anticiclone da BA e no Centro-Oeste do TO o céu estará predominantemente nublado. Nas demais áreas do País as condições serão com chuva esparsa. As temperaturas estarão elevadas no Sudeste.

Tempestades para o dia 31/03, e de chuva no norte do ES, no SC e no PR. Haverá sol e pancadas de chuva no centro-Oeste. No Norte e norte do Nordeste o céu estará nublado com chuva esparsa. Nas demais áreas do País o céu estará predominantemente nublado. As temperaturas estarão elevadas no Sudeste.

Previsão de tempo para o Estado

Hoje (29/03), o sul estará predominantemente em sol e Friação. Mas no fim do dia haverá aumento de nebulosidade com pancadas de chuva. As temperaturas estarão elevadas. Focando em Santos as temperaturas estarão em torno de 30°C no oeste e 33°C no leste do sul.

Amanhã (30/03), será um dia de sol e poucas nuvens em todo o Estado. As temperaturas estarão em elevação.

A tendência para o dia 31/03, será um dia de sol e poucas nuvens em todo o Estado, podendo ocorrer pancadas de chuva, principalmente nas regiões próximas ao sul. As temperaturas estarão elevadas.

Previsão de tempo para a Capital

Hoje (29/03), será um dia de sol e poucas nuvens e possibilidade de pancadas de chuva no fim do dia. As temperaturas estarão em torno de 25°C. As temperaturas estarão em torno de 31°C (máximo) e 21°C (mínimo).

Amanhã (30/03), o sul estará predominantemente nublado com chuva esparsa, devido à presença de uma frente fria (Fm. S.C.) no PR, MS, MT e em RO haverá estabilidade variável com pancadas de chuva no fim do dia. No Sudeste, em GO, continuará o anticiclone da BA e no Centro-Oeste do TO o céu estará predominantemente nublado. Nas demais áreas do País as condições serão com chuva esparsa. As temperaturas estarão elevadas no Sudeste.

Tempestades para o dia 31/03, e de chuva no norte do ES, no SC e no PR. Haverá sol e pancadas de chuva no centro-Oeste. No Norte e norte do Nordeste o céu estará nublado com chuva esparsa. Nas demais áreas do País o céu estará predominantemente nublado. As temperaturas estarão elevadas no Sudeste.

O TEMPO HOJE EM SÃO PAULO

Condições de Tempo em São Paulo

- Temperatura: 25°C
- Umidade: 88%
- Velocidade do vento: 41%
- Visibilidade: 8.6 km
- Pressão: 1014 hPa

Risco de Fogo

Hoje: Risco baixo a médio
Amanhã: Risco alto a crítico

Temperatura em °C

Hoje Amanhã

Temp. elevadas no Norte / Temp. amenas no Sul e Sudeste

Chuva: Chuva em grande parte do país / Chuvas isoladas em todo o país

Faixa: Fria / Moderada / Forte

Vale do Paraíba, Serra e Litoral Norte

Boletim Regional de Previsão de Tempo para o Vale do Paraíba, Litoral Norte e Serra da Mantiqueira

1607 - Amanhã uma frente fria chegará na região

No dia de hoje, haverá predomínio de sol. No dia amanhã, com a chegada da frente fria, a nebulosidade aumentará e poderá chover no litoral.

Monitoramento de Precipitação Atualizado a cada hora

Vale do Paraíba			Litoral Norte				
Hoje	Parcialmente Nublado	Máxima 23° Umidade Relativa 40%	Vento 2 - 6 Km/h Sudeste	Hoje	Nublado	Máxima 21° Umidade Relativa 65%	Vento 2 - 6 Km/h Sudeste
Amanhã (Período da Manhã)	Nublado	Mínima 12° Umidade Relativa 85%	Vento 2 - 6 Km/h Sudeste	Amanhã (Período da Manhã)	Nublado	Mínima 13° Umidade Relativa 90%	Vento 5 - 10 Km/h Sudeste
Amanhã (Período da Tarde e Noite)	Nublado	Máxima 19° Umidade Relativa 65%	Vento 5 - 12 Km/h Sudeste	Amanhã (Período da Tarde e Noite)	Chuvoso em Pontos Isolados	Máxima 19° Umidade Relativa 75%	Vento 5 - 10 Km/h Sudeste

Communicating Early Warnings through Fax, Phone, Web

FAX TO CIVIL DEFENSE

**PREVISÃO DE TEMPO PARA GRANDE SP
DEFESA CIVIL ESTADUAL**

Fuente de dados:
CPTEC - Centro de Previsão de Tempo e Estudos Climáticos

Previsão de Tempo para o dia: 28/03/2001



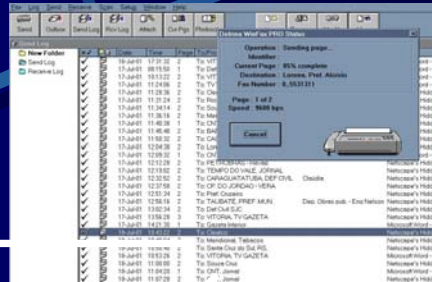
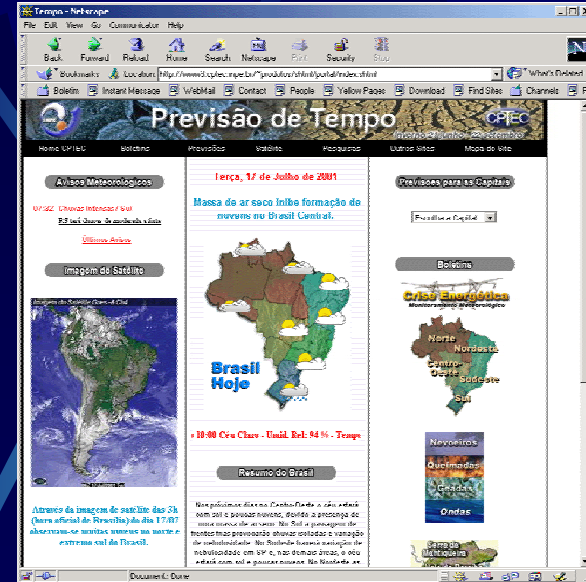
Através da imagem de radar observa-se chuva no norte de São Paulo. A imagem de satélite indica a frente fria no sul de SP e áreas de nuvens convectivas no sul, sudoeste, leste e nordeste paulista.

PREVISÃO PARA A GRANDE SP:

Hoje 28/03: A influência de uma frente fria está favorecendo condições de chuva no sul, sudoeste e oeste de São Paulo de SP no hoje. Nas áreas da Grande SP há chuva fraca na zona norte e sudoeste da Capital e no norte da Região de São Paulo. As áreas de chuva deverão atingir a região central de São Paulo, nas próximas horas, e essas chuvas poderão ser de intensidade moderada. No decorrer da tarde, será possível ocorrer chuvas de intensidade moderada nas áreas da Grande SP.

Qualquer novas informações entrarem em contato.

Qualquer dúvida telefonar Previsão de Tempo CPTEC/INPE
f: 12 560 8400
e-mail: proaect@ptec.inpe.br

Previsão de Tempo

Terça, 17 de Julho de 2001

Massa de ar seco inibe formação de nuvens no Brasil Central.

Brasil Hoje

18:00 Cto. Chuv. - Unid. Exp. 94.6% - Temp.

Resumo do Brasil

Atmosfera de São Paulo - São Paulo

Atmosfera de São Paulo - São Paulo

MetOp OFFICE

FAX TO MAYOR'S OFFICE

FAX TO PRESS

Boletim Regional de Previsão de Tempo para o Vale do Paraíba, Litoral Norte e Serra da Mantiqueira

1907 - Massa de ar seco atenua na região

A massa de ar seco inibe o desenvolvimento da nebulosidade.

Parâmetros	Vale do Paraíba	Serra da Mantiqueira	Litoral Norte
Previsão de Tempo	Parcialmente Nublado	Parcialmente Nublado	Parcialmente Nublado
Vento	Moderado	Moderado	Misto
Vel. Vento (km/h)	2-6	2-6	5-10
Um. Rel. (%)	40%	35%	60%
Temp. Máx.	29°C	29°C	31°C

Cidade	Temp. Máx.	Temp. Mín.	Chuva (mm)
Cachoeira Paulista	28.2°C	14.0°C	0.0mm
Itaó José das Chagas	27.5°C	11.7°C	0.0mm
Campo do Jordão	19.2°C	4.0°C	0.0mm
Thiúba	30.2°C	12.4°C	0.0mm

CPTEC - Centro Previsão Tempo e Estudos Climáticos

19/03/2002

Chuva Intermitente

Hoje (19), manter-se-ão as condições de pancadas de chuva no fim da tarde nas áreas da Grande SP, Vale do Paraíba e nordeste de SP e sul de MG, devido ao forte aquecimento. Amanhã (20), com a aproximação de uma frente fria a possibilidade de pancadas de chuva e trovoadas serão maiores e deverão acontecer já no início da tarde e ao longo do dia em SP, especialmente no leste e nordeste de SP, RJ e sul de MG. No dia 21/03, o dia será chuvoso no leste e nordeste paulista, RJ e sul de MG e chuvas esparsas nas outras áreas de SP e de MG.



CLIMATE PREDICTION

SEASONAL PREDICTION



AGCM T62 L28

6 months

(average of 3 months)



ETA 40 km

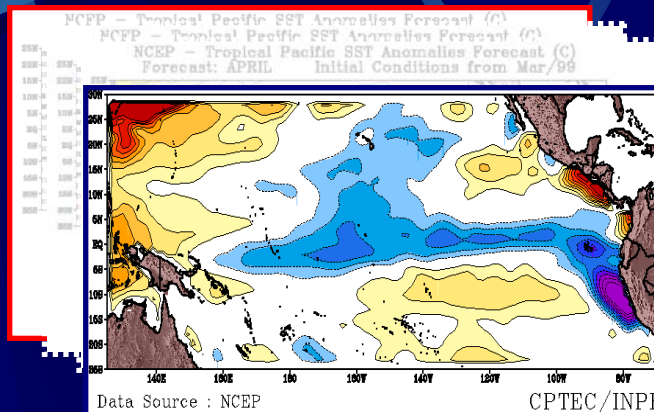
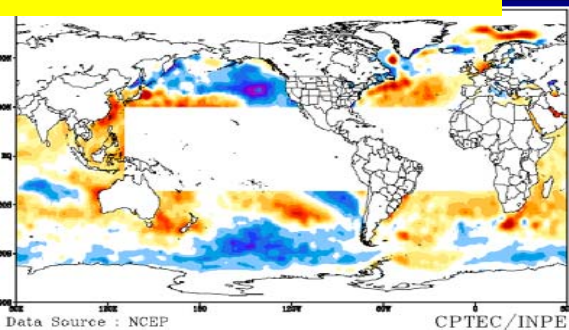
3 months

(look each month)

BOUNDARY CONDITIONS for CPTEC AGCM Runs

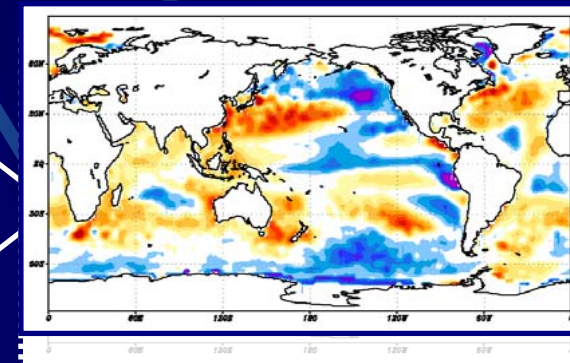
Merge

Global SST Anomalies
NCEP



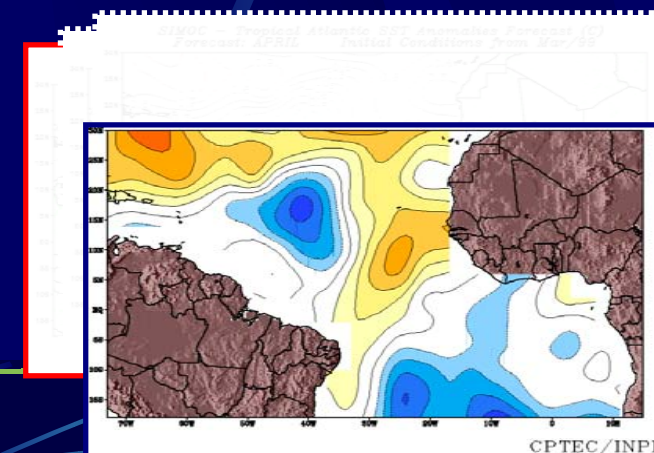
Tropical Pacific SST Anomalies
NCEP SSTA Forecast

Lower BC: SSTA Field



Elsewhere in the Global Oceans,
persisted SSTA

Merge



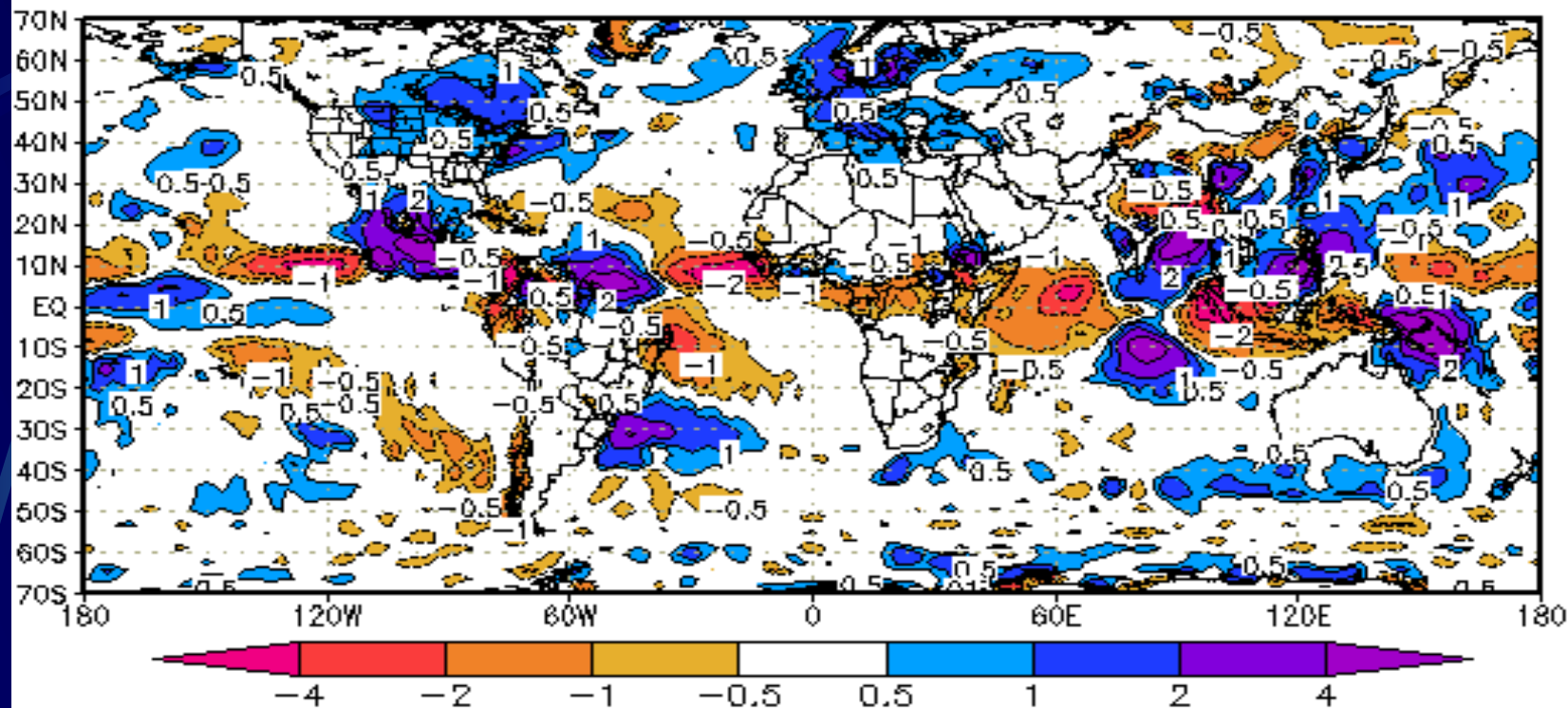
Tropical Atlantic SST Anomalies
CPTEC/SIMOC SSTA Forecast

ENSEMBLES

- 15 Integrations using persisted SST
- 15 Integrations using forecasted SST
- I.C. From different days

SEASONAL PREDICTION ATMOSPHERIC GLOBAL CIRCULATION MODEL

PREVISAO DE ANOMALIA DE PRECIPITACAO (mm/dia)
JUL2002 AGO2002 SET2002

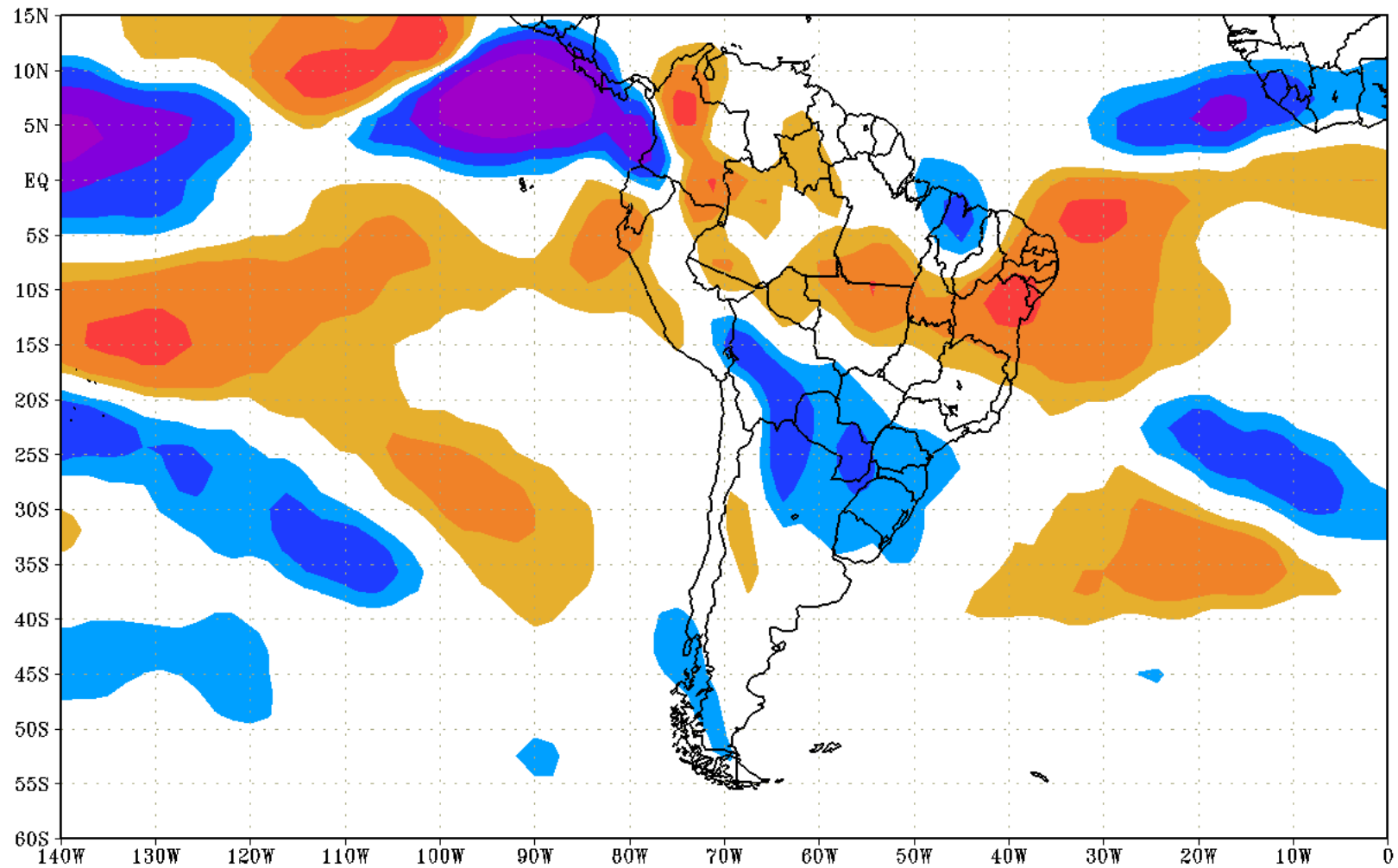


CPTEC/INPE SST PREDICTED - ATLANTIC: SIMOC/CPTEC/INPE Jun02 15 ENSEMBLE MEAN

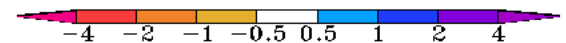
PREDICTED ANOMALY PRECIPITATION

CPTEC – INPE Modelo de Previsão Climática
ANOMALIAS (Marco_a_Maio-2003)

Sombr:Precipitacao Total



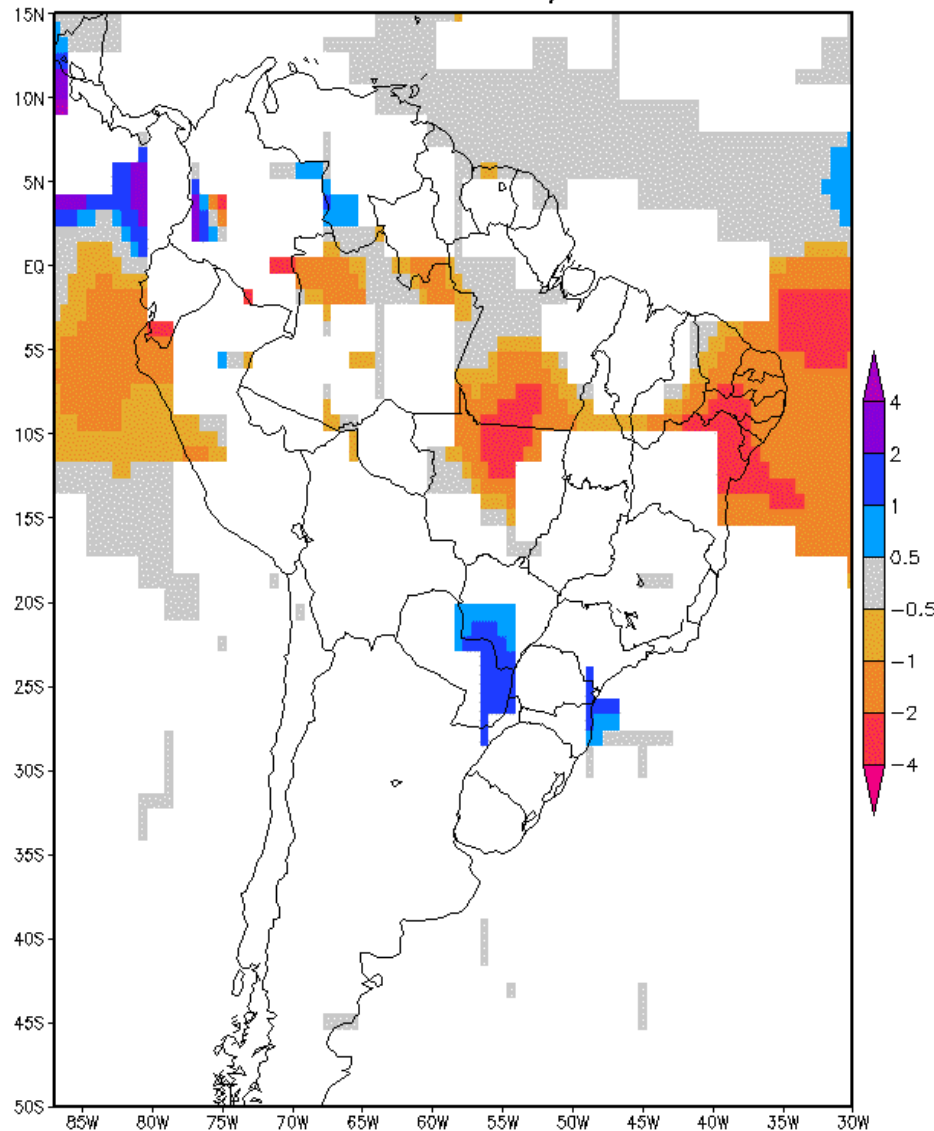
TSM Persistidano Atlantico e Pacifico
Media de 15 membros



ANOMALY PRECIPITATION

MAM2003

Anomalia de precipitacao - ($r_{\min}=0.3$)
Previsao: MAR-MAY/2003

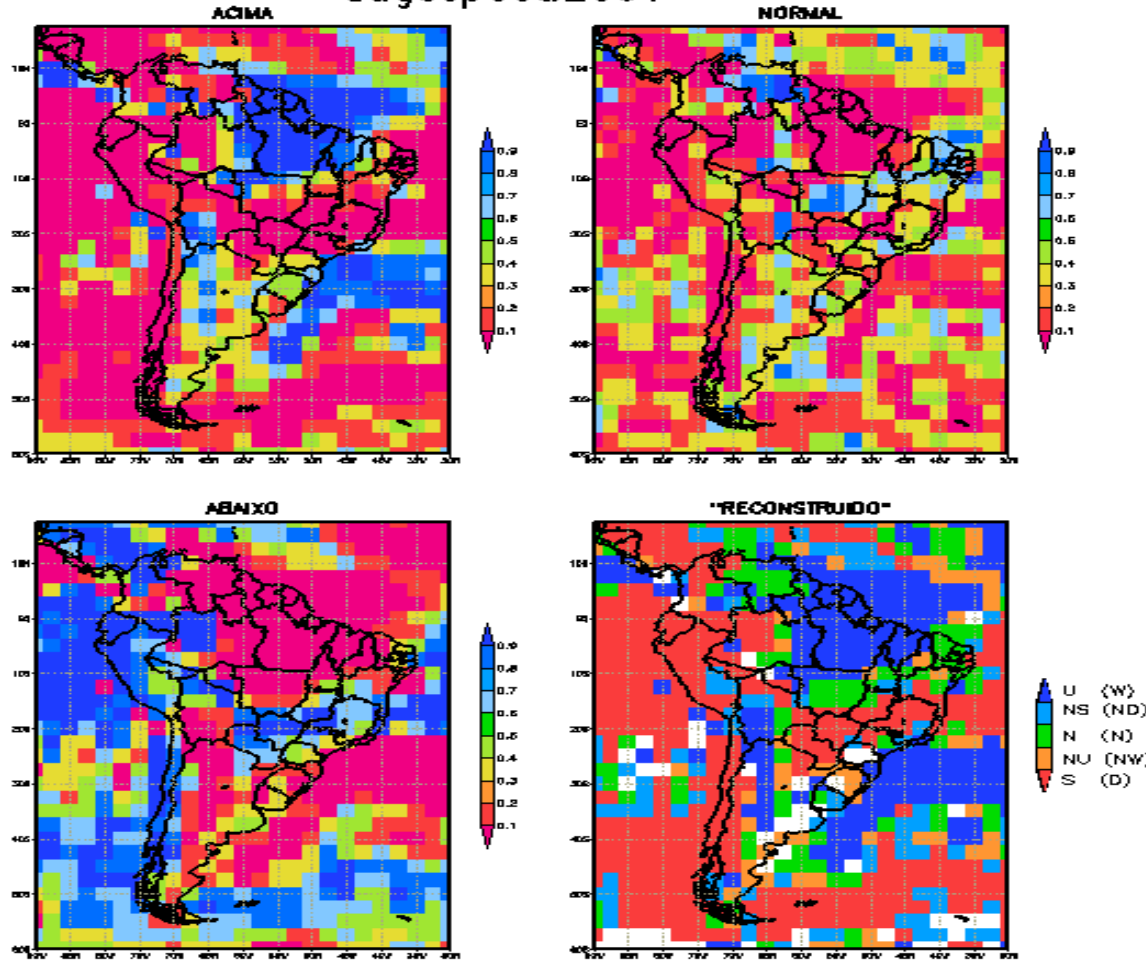


TSM: Persistida-Jan/03

Modelo: CPTEC/COLA

PROBABILISTIC PREDICTION

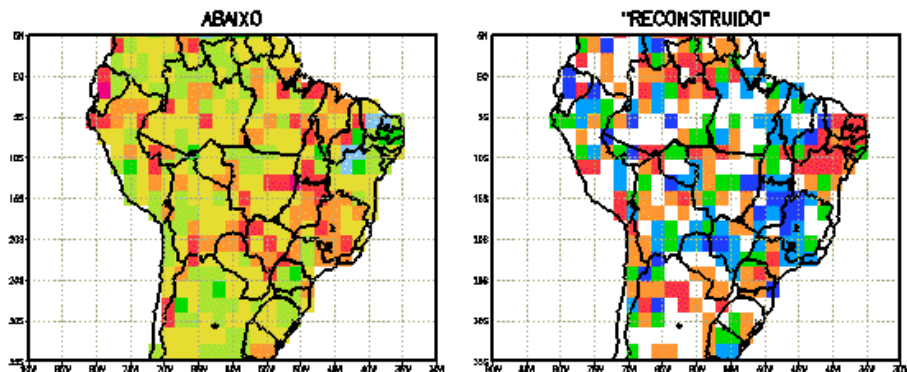
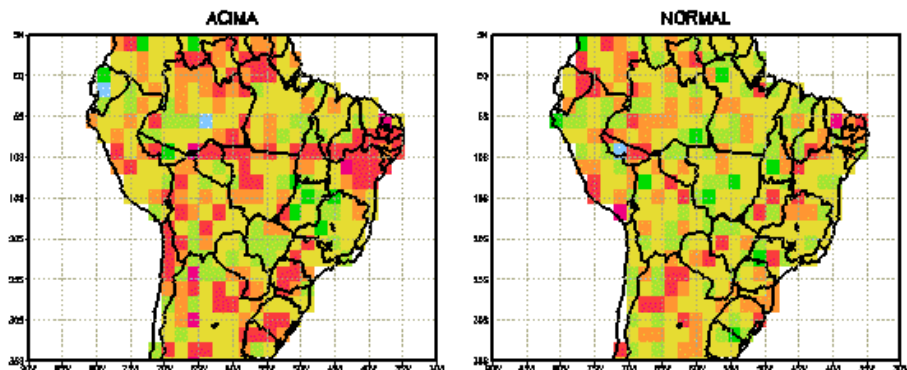
CPTEC/INPE-Previsão por Categorias
augsepoct:2001



TSM pers - Jun01

**Percentage
based
on
the number
of members
in each
category**

CPTEC/INPE-Previsao por Categorias FMA - 2003



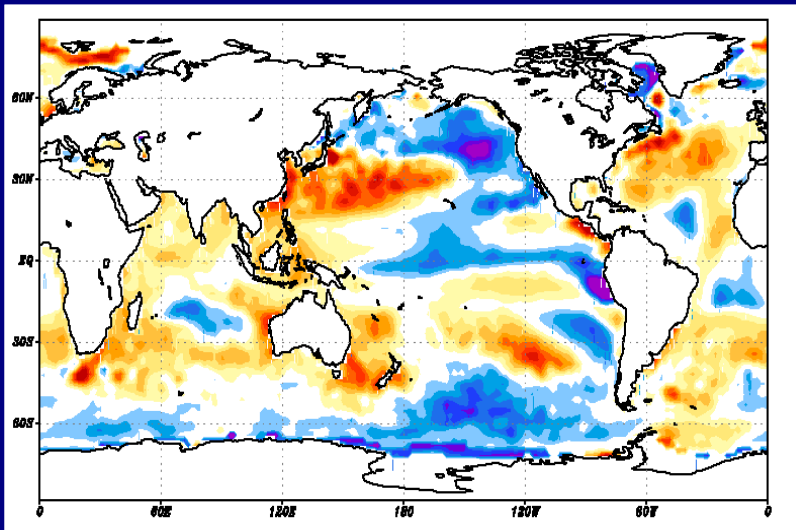
TSM pers - Dec02

**Percentage of
the
correct
forecast in
each
category
50 years**

CLIMATE SIMULATIONS

AGCM CPTEC/COLA T62L28

MONTHLY OBSERVED SST



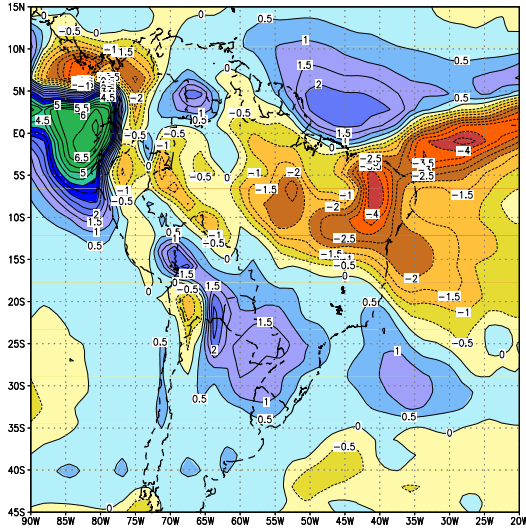
**ENSEMBLE
9 INTEGRATIONS
10 YEARS (1981-1991)
(9 DAYS I.C.)**

**ENSEMBLE
10 INTEGRATIONS
50 YEARS (1950-2000)
(10 DAYS I.C.)**

ENSO AND PRECIPITATION ANOMALIES

MODEL

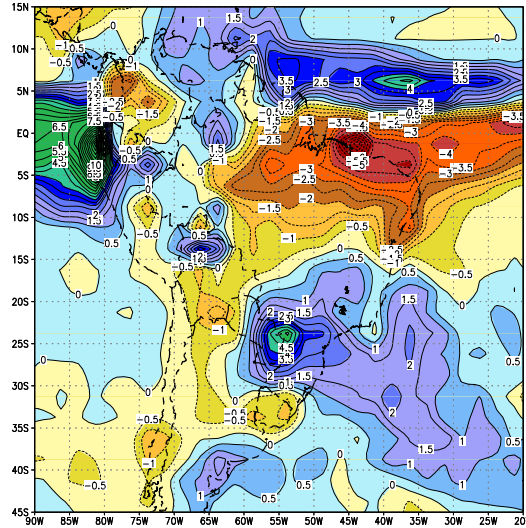
MAM 83 T62L28 ENSEMBLE



EI NINO

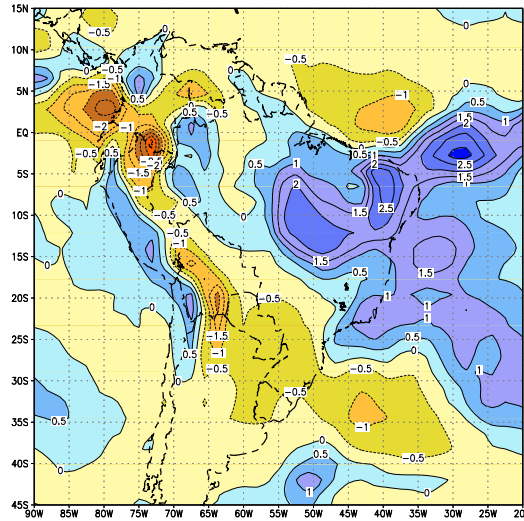
CMAP

MAM 83 CMAP

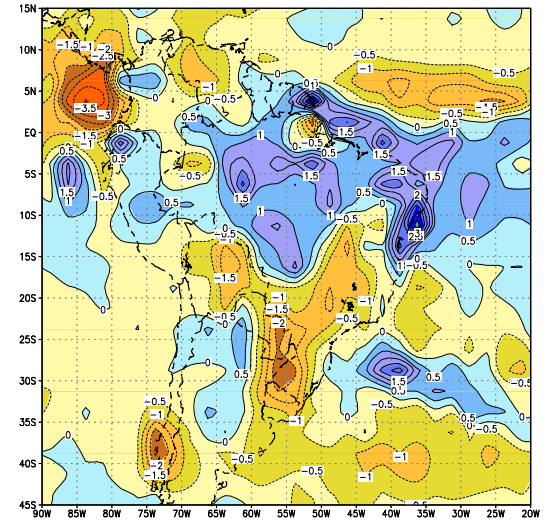


LA NINA

MAM 89 T62L28 ENSEMBLE



MAM 89 CMAP

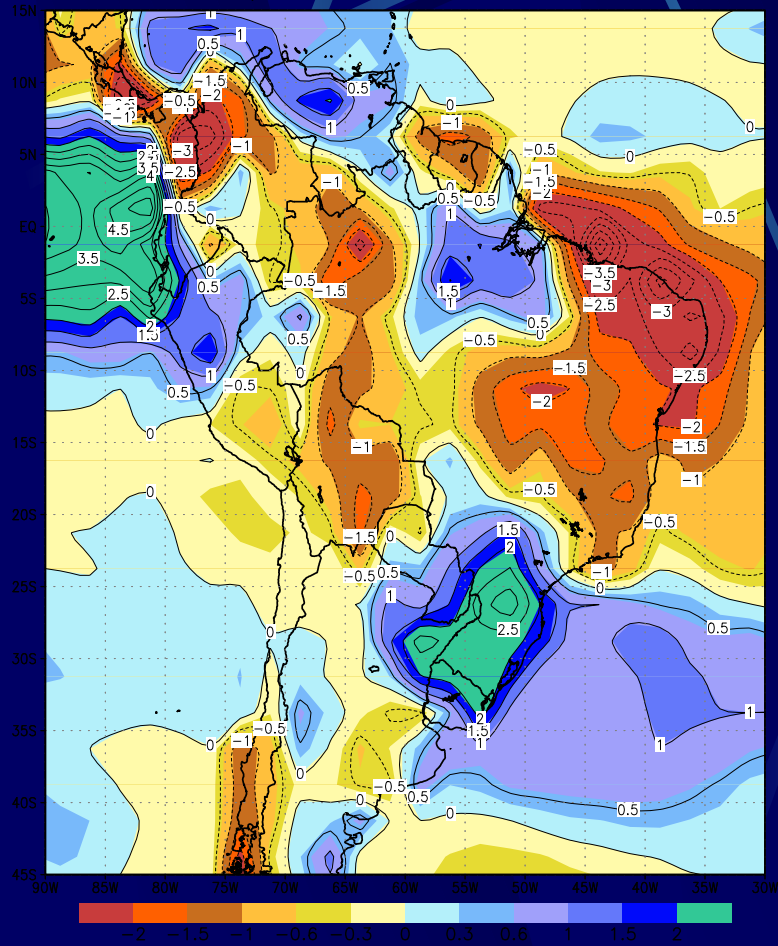


MAM 98

SEASONAL PREDICTION OF EXTREME CASES

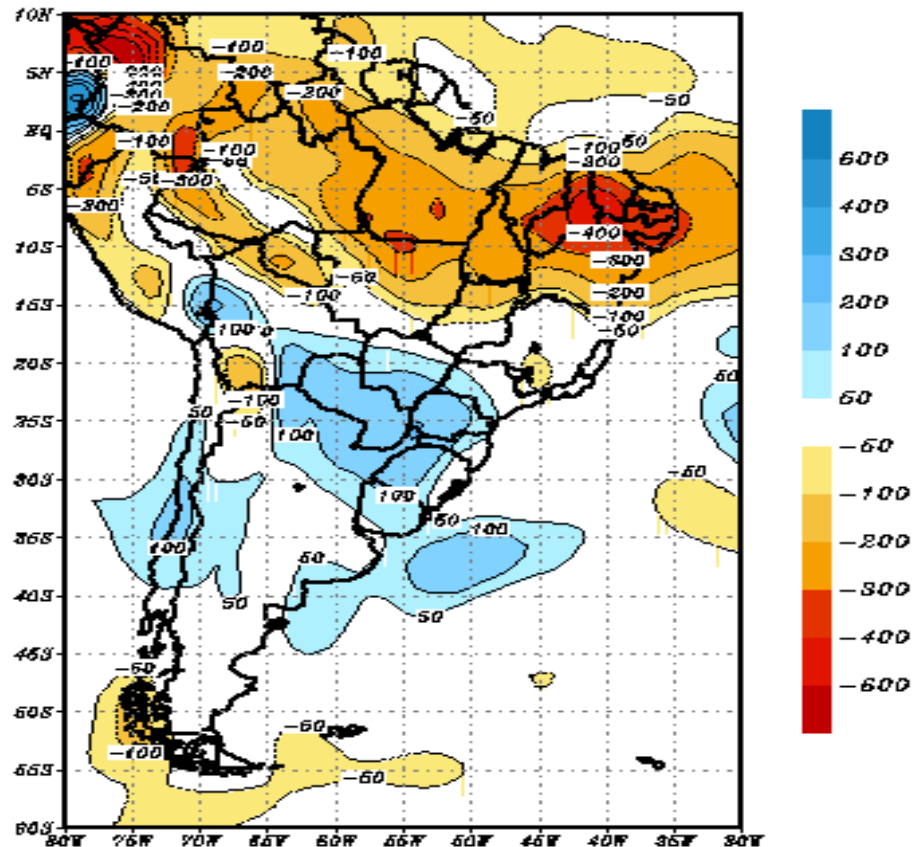
OBSERVED

CMAP/CAMS MAM 1998 CMAP



MODEL

Precipitation Anomalies Prediction (mm)
MAM 98

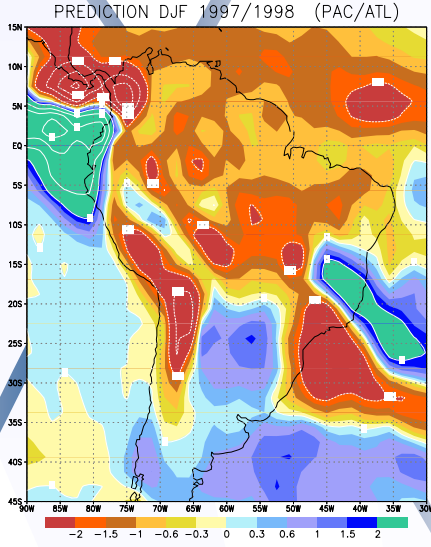
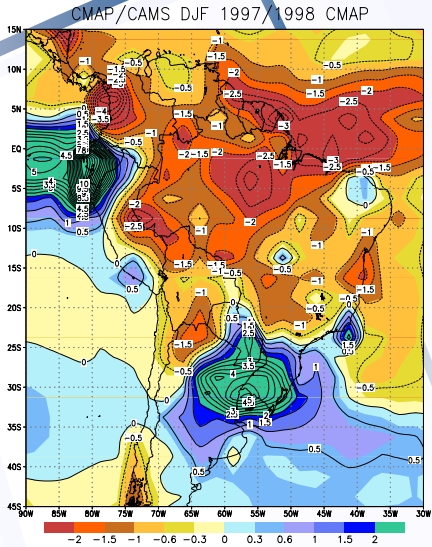


EXTREME CASES OF SEASONAL PRECIPITATION ANOMALIES AND THE PREDICTION BY THE CPTEC/COLA AGCM.

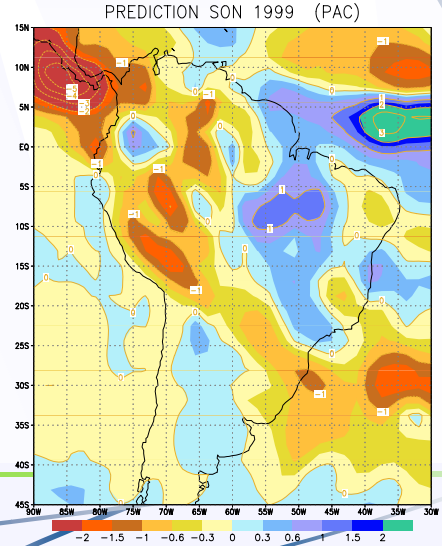
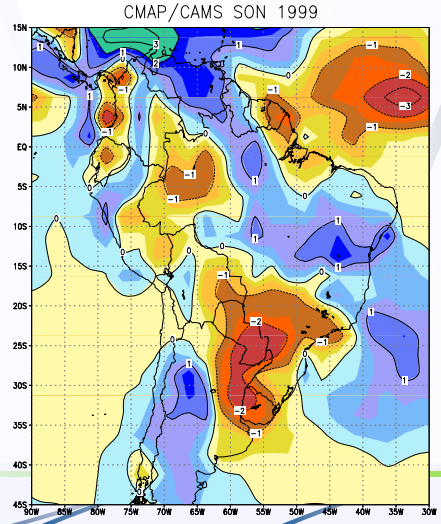
OBSERVED CMAP

MODEL

DJF 1997/1998

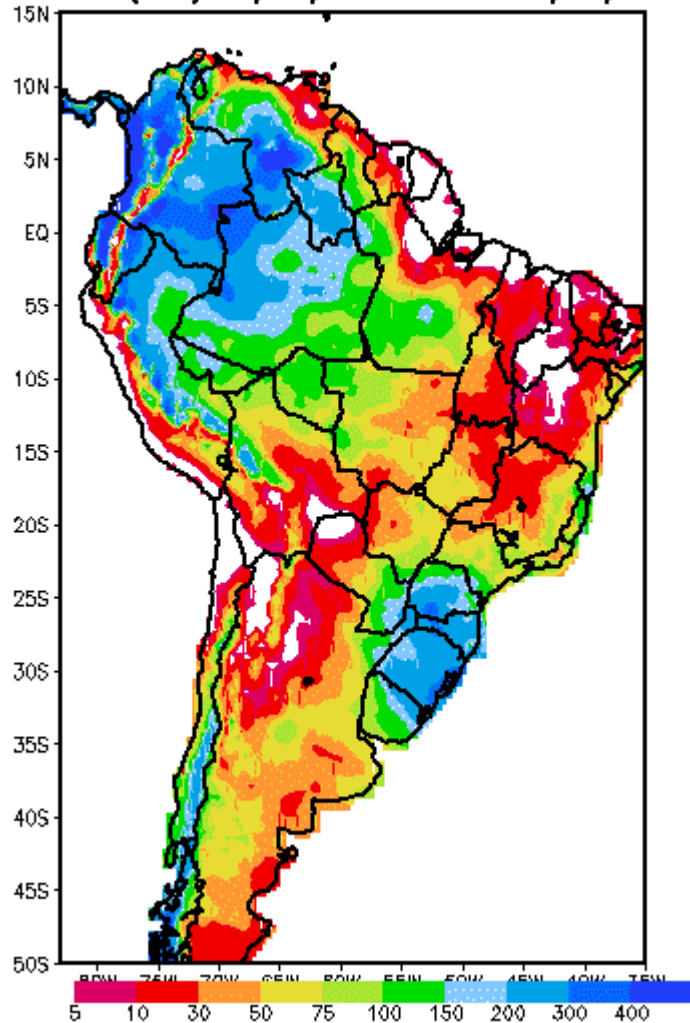


SON 1999

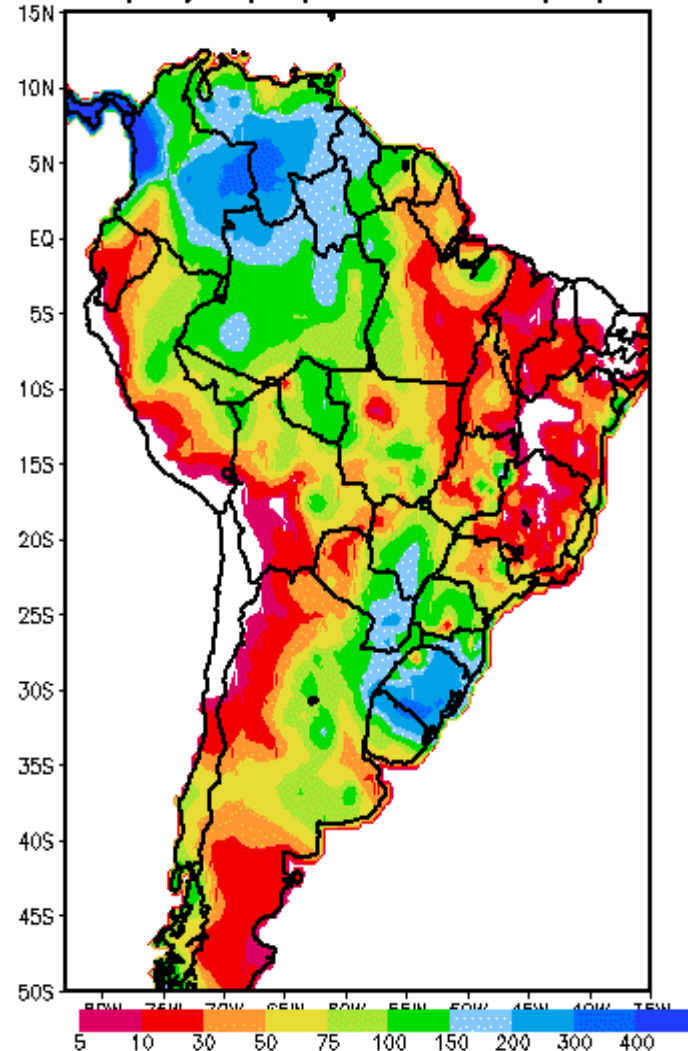


DOWN-SCALING/ REGIONAL MODEL ETA MONTHLY PREDICTION

Eta2d 40 km C.I 2001082812
Prec. Acum. (mm) 01/09/2001 12Z a 30/09/2001 12Z



Prec. Obs. (mm) 01/09/2001 12Z a 30/09/2001 12Z



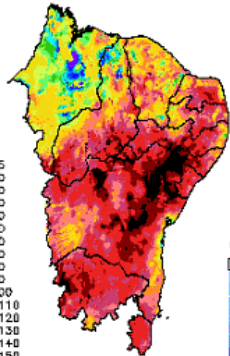
APPLICATION OF ETA MODEL OUTPUTS

Hydrological model

Water balance

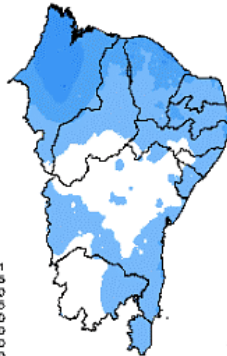
SUDENE - CPTEC - INPE
Balanco de Agua no Solo
Periodo 01042003-30042003

Armazenamento
de agua no solo



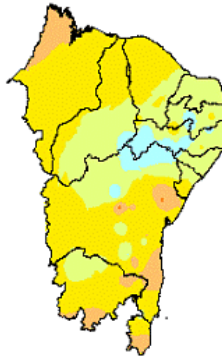
Milímetros
00 - 05
05 - 10
10 - 20
20 - 30
30 - 40
40 - 50
50 - 60
60 - 70
70 - 80
80 - 90
90 - 100
100 - 110
110 - 120
120 - 130
130 - 140
140 - 150
> 150

Precipitacao
media



mm/dia
00 - 01
01 - 05
05 - 10
10 - 15
15 - 20
20 - 30
30 - 40
40 - 50
> 50

Evapotranspiracao
media



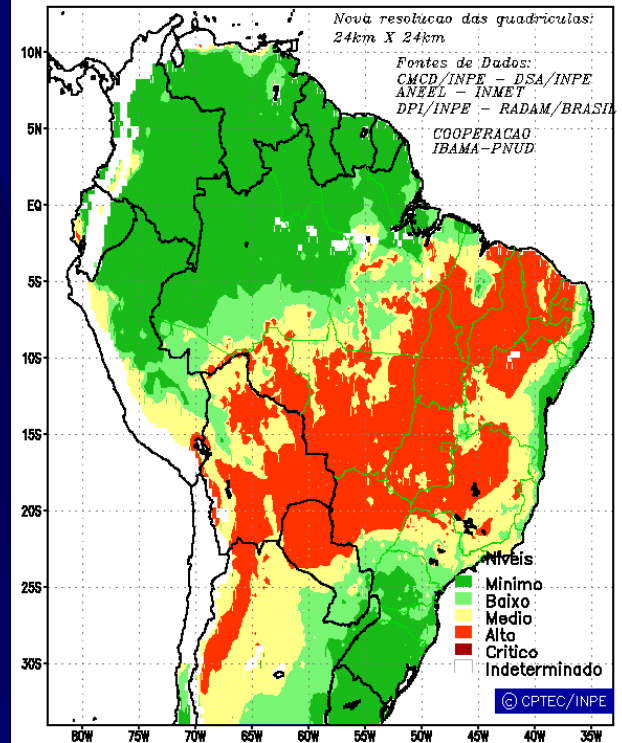
mm/dia
0 - 1
1 - 2
2 - 3
3 - 4
4 - 5
5 - 6
6 - 7
7 - 8
8 - 9
9 - 10
> 10

Fontes de dados: CMCD/INPE-INMET-FUNCEME/CE-LMRS/PB-EMPARN/RN-DMRH/PE
SRH/BA-NMRH/AL-SEAAB/PI-CEPES/SE-CEMIG/SIMGE/MG-SEAG/ES

© CPTEC/INPE

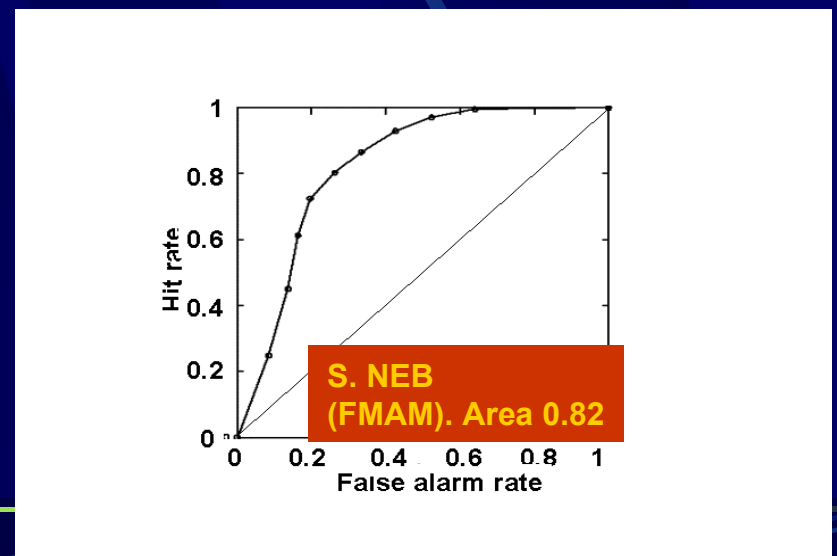
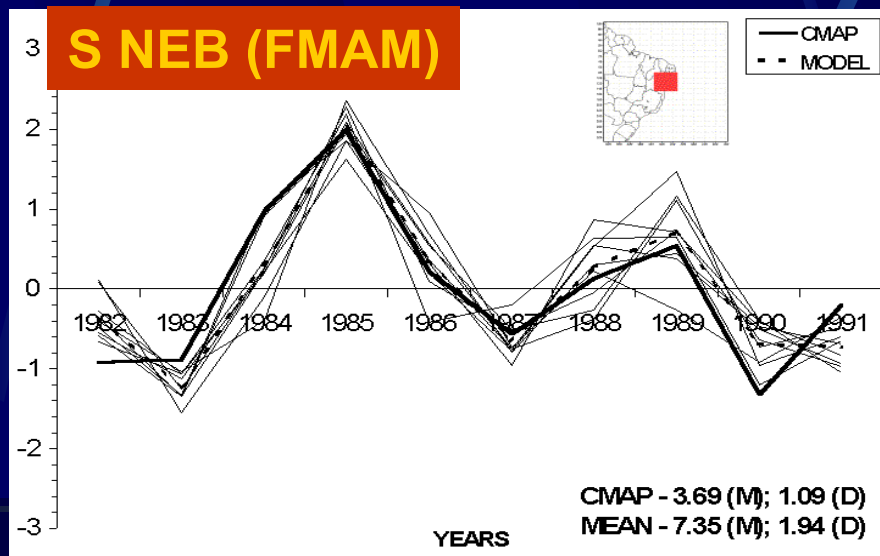
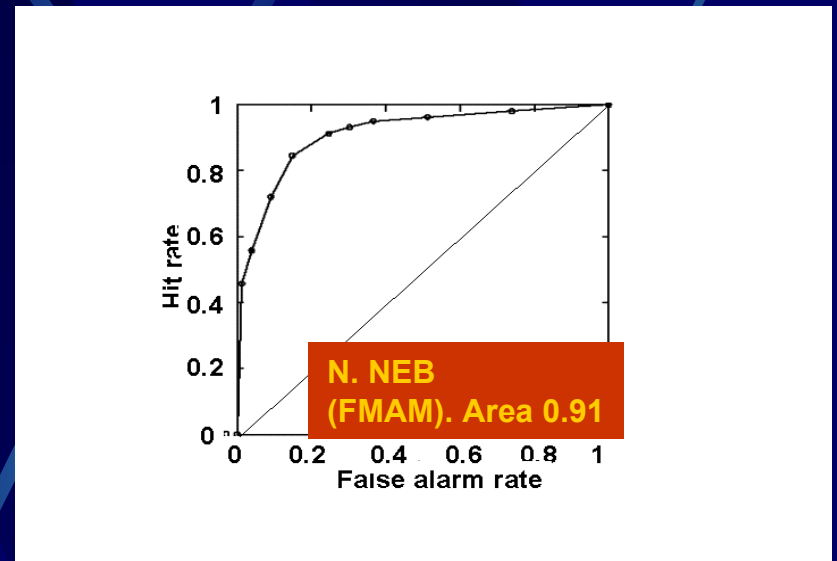
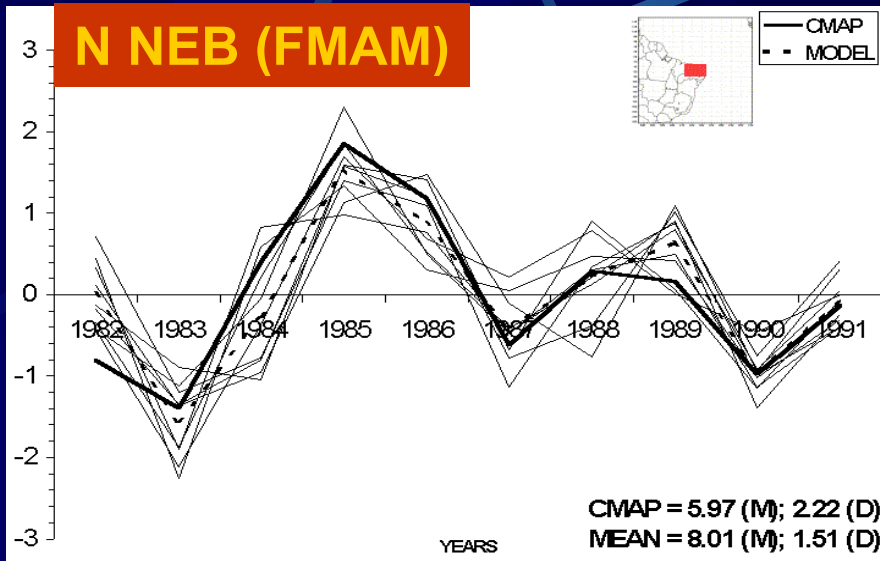
Risk of fires

MODELO REGIONAL CLIMATICO ETA
Mapa de Risco Futuro de Agosto de 2003 (Res: 0,25 graus)
Inic.: 20030715 12UTC CPTEC/DSA/CLIMA

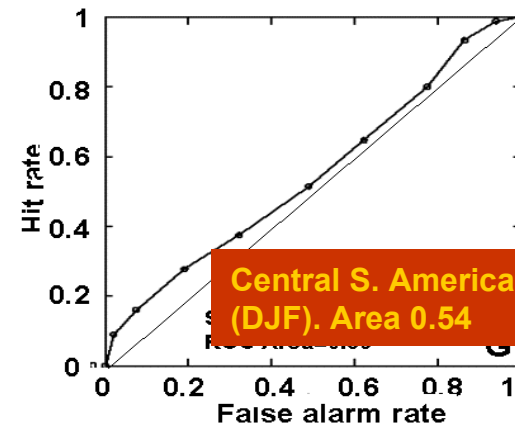
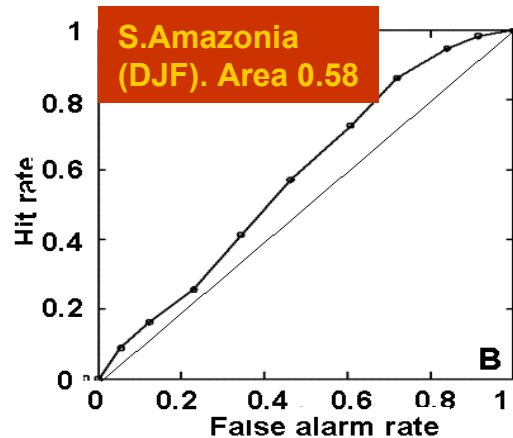
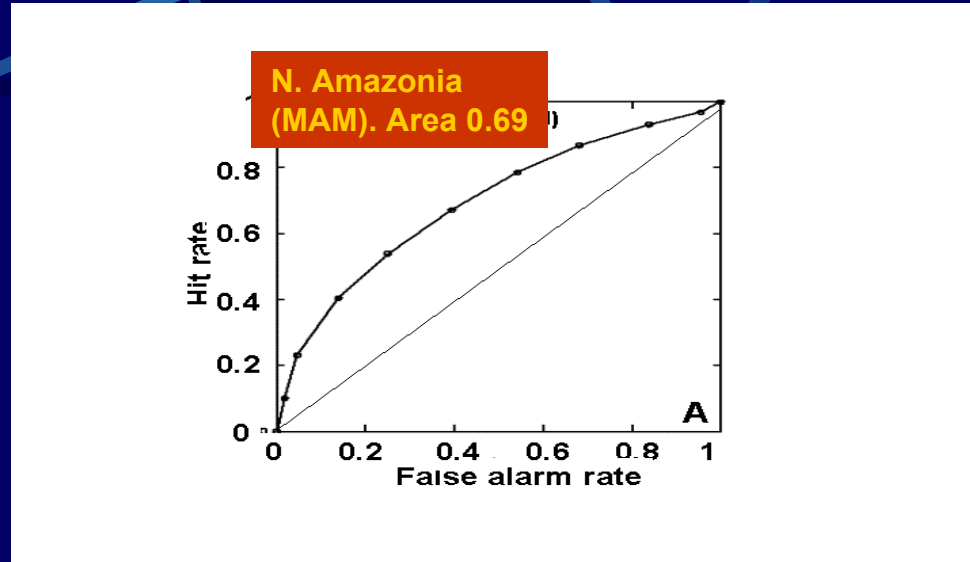


VERIFICATION

Example of regions with High predictability: NE Brazil



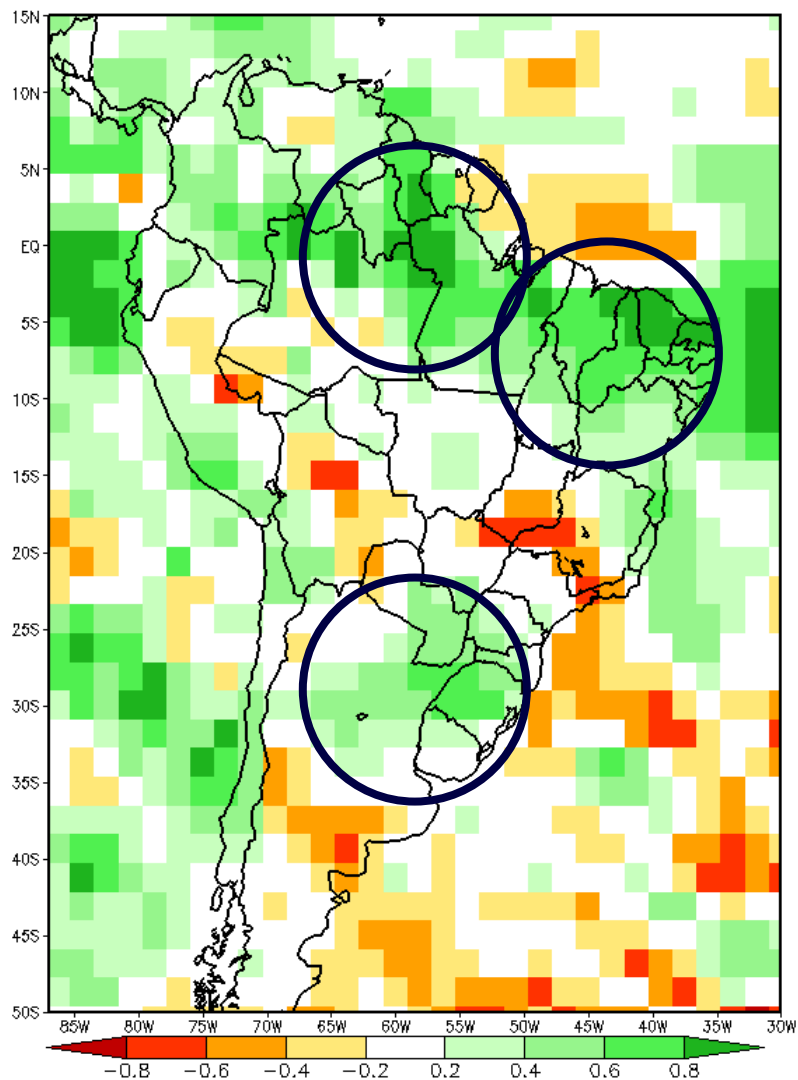
ROC Curves (Relative Operational Characteristic): Measurement of skill of the model, defined on the hit rate and false alarm rate. Larger area below the curve → Better skill and larger predictability.



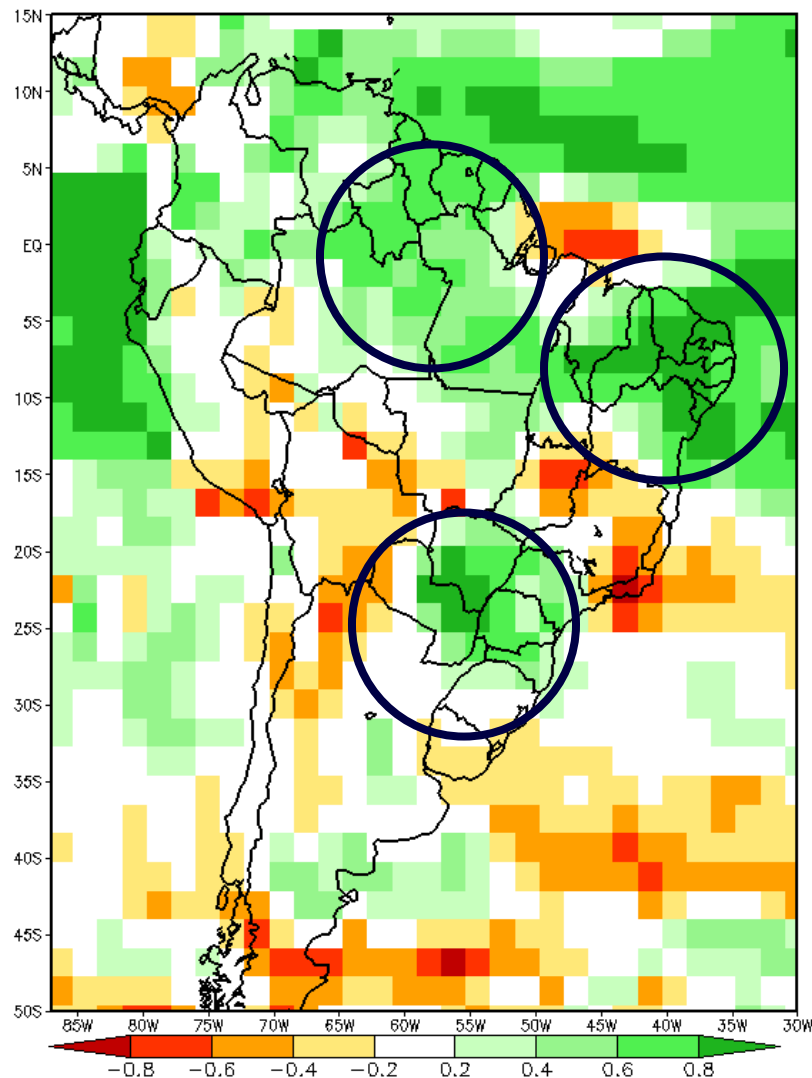
Correlation of anomaly rainfall (observed vs model):

High positive correlation (better predictability), High negative correlation (lower predictability)

Anomaly Correlation
DJF



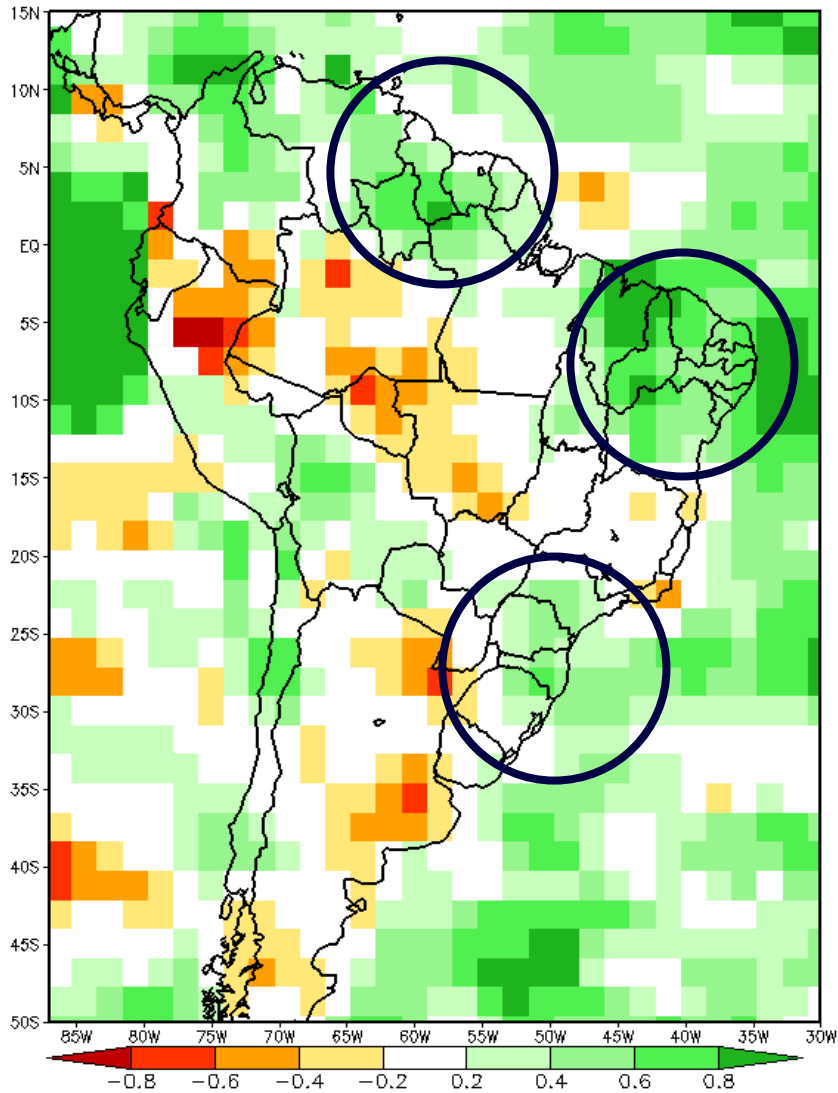
Anomaly Correlation
MAM



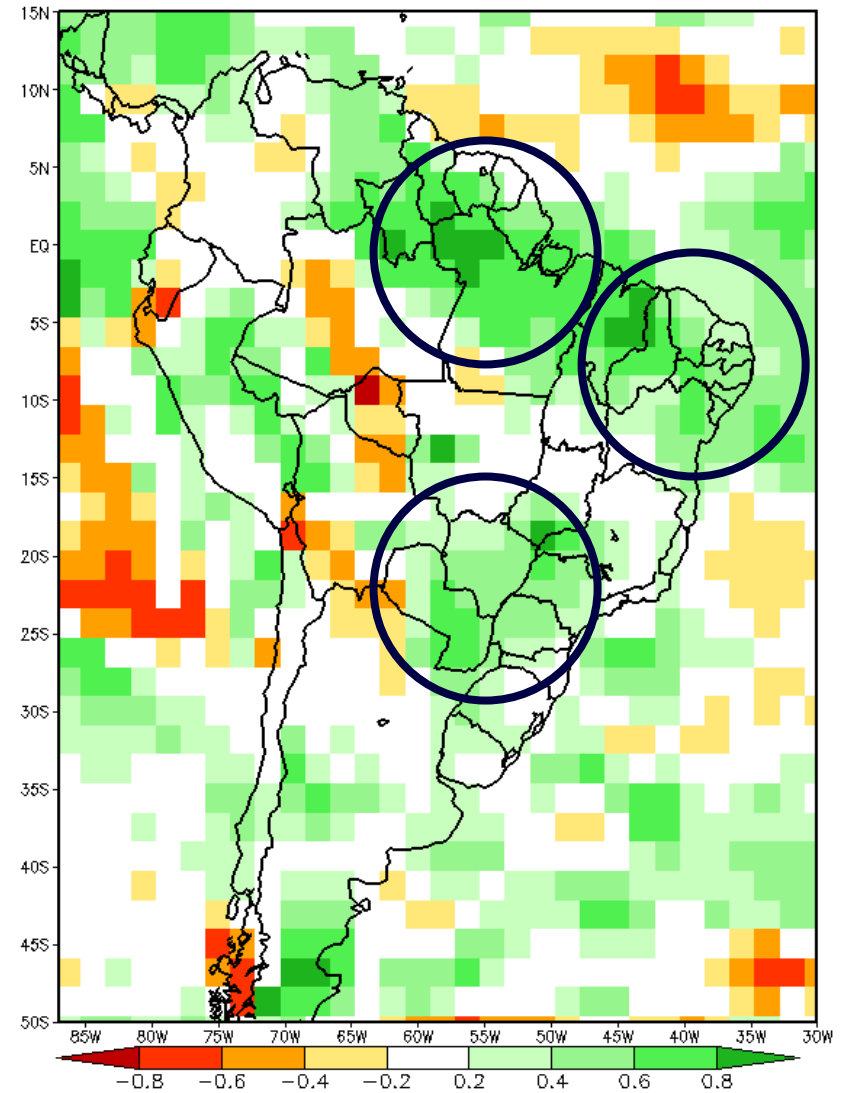
Anomaly correlation for rainfall (observed vs model):

High positive correlation (better predictability), High negative correlation (lower predictability)

Anomaly Correlation
JJA



Anomaly Correlation
SON



MONTHLY MEETINGS

- LARGE SCALE CONDITIONS
- CPTEC AGCM AND ETA RESULTS
- SEASONAL PREDICTION OF OTHER MODELS
- IRI MULTI-MODEL ENSEMBLE
- ECMWF
- MET OFFICE
- NCEP
- NSIP
- ECHAM

EXAMPLE OF THE FINAL PREDICTION



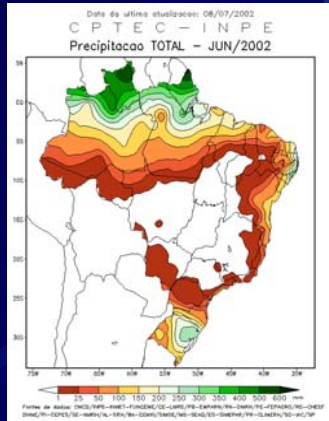
Distribuição de probabilidade (%) de ocorrência de chuvas em relação a média histórica

- Acima da média histórica
- Próximas à média histórica
- Abaixo da média histórica

As regiões hachuradas indicam a confiabilidade da previsão (vide legenda na figura)

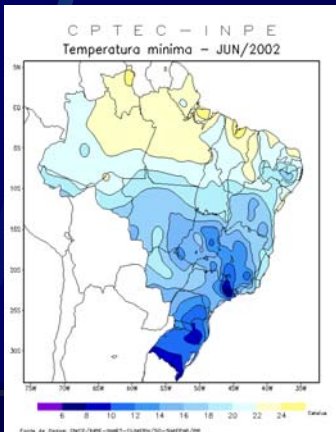
INFOCLIMA

GLOBAL
MONITORING



RAINFALL
MONITORING

TEMPERATURE
MONITORING



Infoclima CPTec

Home CPTec | Tempo | Clima | Satélite | Prev. Numéricas | Dados Observacionais | Energia | Pesca & Ocean. | Pós-Graduação

Ano 9 16 de julho de 2002 Número 07

Editor técnico: Marcelo Henrique Seluchi
Elaboração: Grupo de Previsão Climática

INICIA SE UM NOVO EPISÓDIO EL NIÑO

SUMÁRIO EXECUTIVO

CONDIÇÕES CLIMÁTICAS NO BRASIL EM JUNHO E INÍCIO DE JULHO DE 2002

SITUAÇÃO DO PACÍFICO E ANÁLISE TÉCNICAS E ASPECTOS GLOBAIS

PREVISÃO CLIMÁTICA PARA AGOSTO, SETEMBRO E OUTUBRO DE 2002 (ASO0002)

ATENÇÃO SOBRE O USO DAS PREVISÕES CLIMÁTICAS

Indiclima em PDF. Clique aqui!

Sumário Executivo

No mês de junho, as chuvas mais significativas ocorreram no extremo norte do Brasil, leste da Região Nordeste e no Rio Grande do Sul. Nas demais áreas do país as chuvas ficaram abaixo da média climatológica. No Brasil central, desvios negativos de chuva ocorreram devido à fraqueza atenuação das frentes frias, associada a uma situação de bloqueio atmosférico no Oceano Pacífico Sul. Em decorrência do comportamento anômalo das frentes frias, as temperaturas ficaram mais elevadas em praticamente toda região central do Brasil e em parte do Sudeste Brasileiro. No mês de junho ocorreram seis frentes frias, sendo sete a média para esse mês.

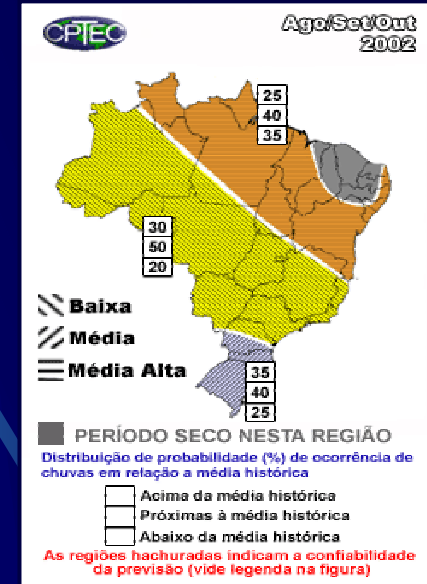
Dois frentes frias, nos dias 12 e 22 de junho, causaram queda significativa de temperatura na Região Sul. Durante a sua trajetória pelo interior, os sistemas frontais causaram ocorrência nebulosidade e chuvas fracas.

Entre os distúrbios informacionais estão as chuvas ocorridas no centro e norte do Chile, que enfrentou uma das piores chuvas nos últimos 100 anos.

Durante o mês de junho a Temperatura da Superfície do Mar (TSM) esteve anormalmente quente em até 1°C entre as longitudes de 170°E e 105°W, no Pacífico Equatorial. Os modelos oceânicos de previsão dos centros europeu e norte-americano (ECMWF e NCEP, respectivamente) previram a evolução do fenômeno El Niño até o final de 2002, ou início de 2003.

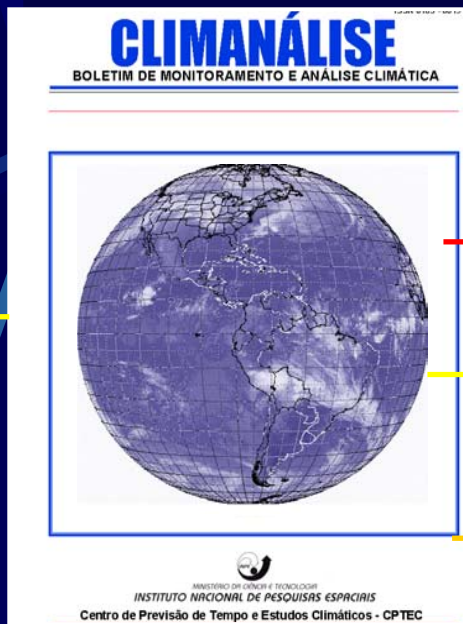
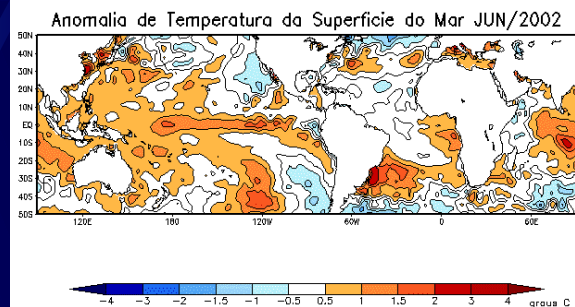
A previsão de chuvas para o trimestre ASO é de precipitações variando do normal a ligeiramente abaixo da média no norte da Região Norte (alta confiabilidade) e sul e leste da Região Nordeste (média confiabilidade). No Rio Grande do Sul e Santa Catarina as chuvas serão de normais a acima da média (média confiabilidade). Nas regiões sudeste e centro-oeste, a previsão é de chuva em torno da normal (baixa confiabilidade). As temperaturas deverão ficar entre a normal climatológica e ligeiramente acima da média na maior parte do país.

CPTec/INPE
SEASONAL CLIMATE PREDICTION

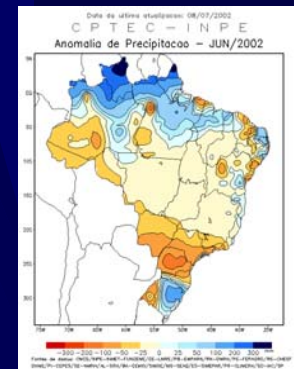


CLIMANÁLISE

LARGE SCALE

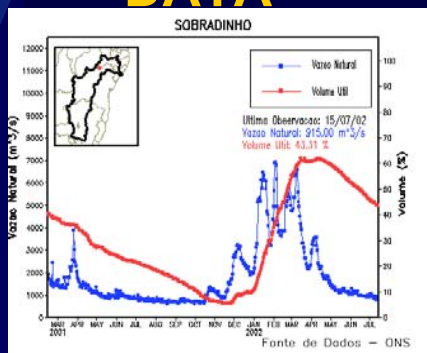


BRAZIL RAINFALL

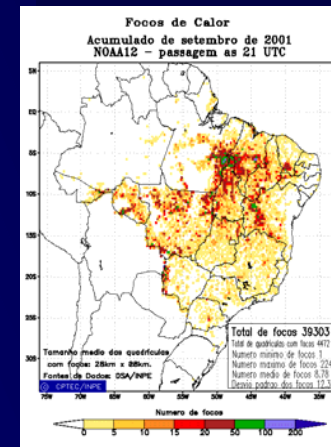


SYNOPTIC SYSTEMS

HYDROLOGICAL DATA



HOT SPOTS



SCIENTIFIC PAPERS

APPLICATIONS FROM CLIMATE PRODUCTS

AGRICULTURE

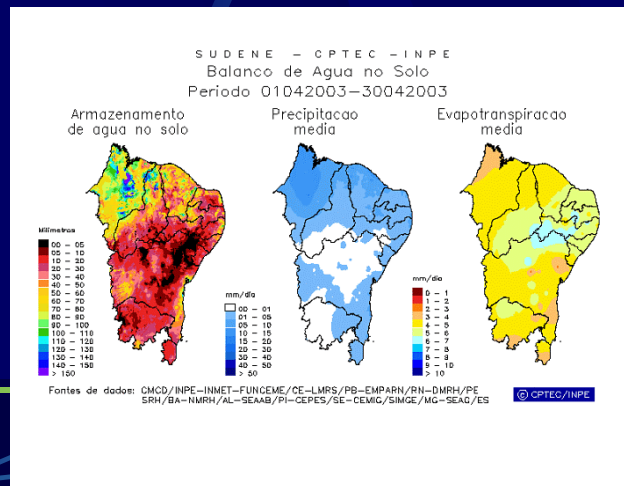
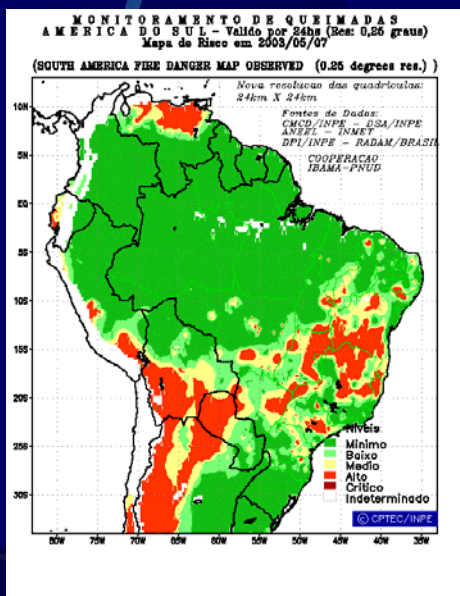
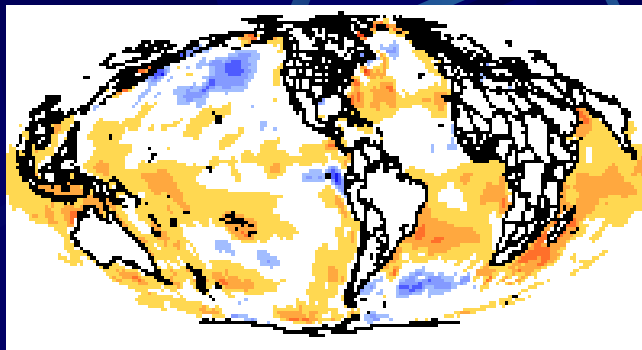
WATER RESOURCES

BUSH FIRE MONITORING

NORDESTE DROUGHTS

FLOODS IN SOUTHERN BRAZIL

EL NINO/LA NINA MONITORING



DEVELOPMENTS TO IMPROVE THE MODELS

- **EXPERIMENTS WITH DIFFERENT**
- **CONVECTION SCHEME**
- **RADIATION SCHEME**
- **MORE REALISTIC SOIL HUMIDITY**
- **NEW VEGETATION MAP**
- **VARIABILITY OF CO₂ AND OZONE**

CONCLUSION

FUTURE IMPLEMENTATIONS

**WEATHER
FORECASTS**



T170L42
T256L42
ETA 20 km
Regional ensemble

**CLIMATE
PREDICTION**



T126L28
Regional Climatology
Regional ensemble
Coupled Ocean-Atmosphere

See products at

www.cptec.inpe.br

