



SOUTH AMERICA CLIMATE FEATURES SIMULATED AND PROJECTED BY CMIP5 GLOBAL MODELS.

**Iracema Fonseca de Albuquerque
Cavalcanti
CPTEC/INPE**

**WCRP VAMOS/CORDEX Workshop on Latin-America and Caribbean CORDEX LAC:
Phase I - South America**

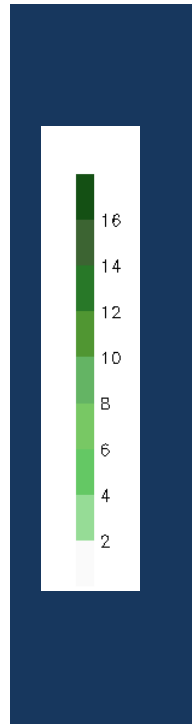
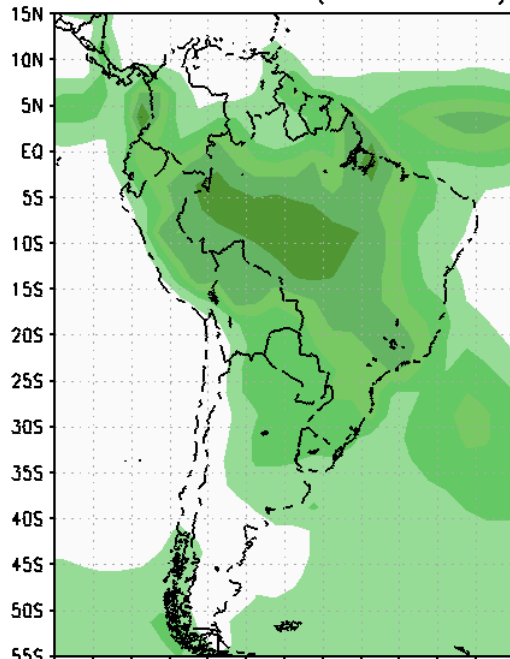
September 11-13. 2013 Lima. Perú

CMIP5 Models

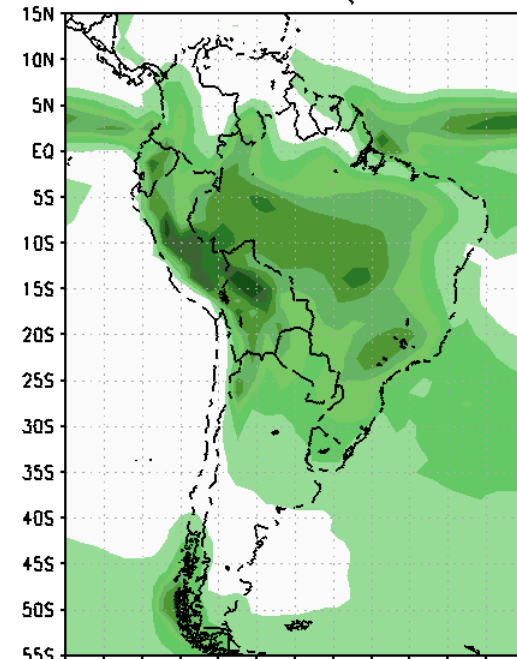
- “ HadGEM2-ES (192 x 145 x L40) UK
- “ CSIRO (192 x 145 x L40) Australia
- “ IPSL (144 x 143 x L39) France
- “ MRI (320 x 160 x L48) Japan
- “ MIROC-ESM (128 x 64 x L80) Japan
- “ MIROC5 (256 x 128 x L40) Japan
- “ NCC (144 x 96 x L26) Norwegian
- “ NCAR (288 x 192 x L26) USA
- “ MPI (192 x 96 x L47) Germany
- “ CNRM (128 x 64 x L45) France
- “ CanESM2 (128 x 64 x L35) Canada

PRECIPITATION CLIMATOLOGY

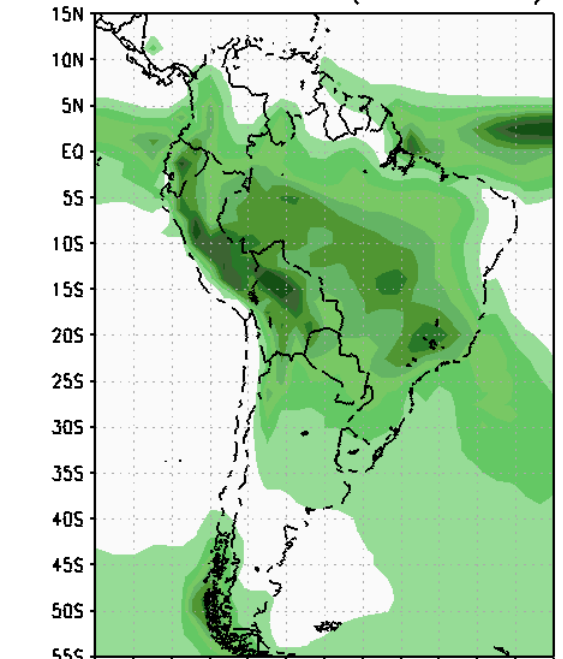
PREC DJF GPCP (1981-2006)



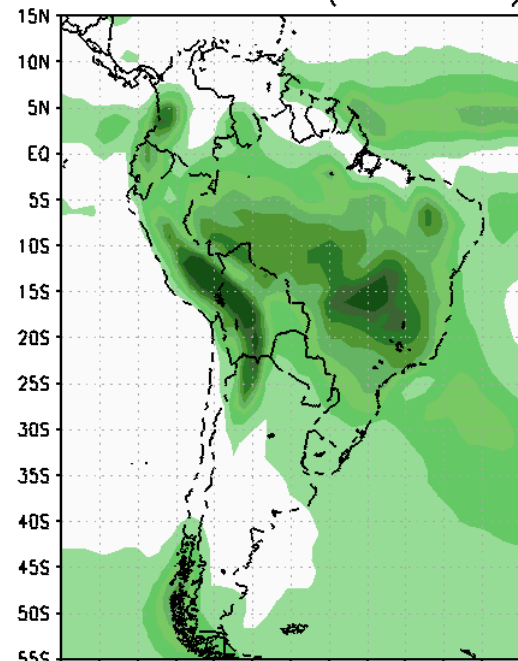
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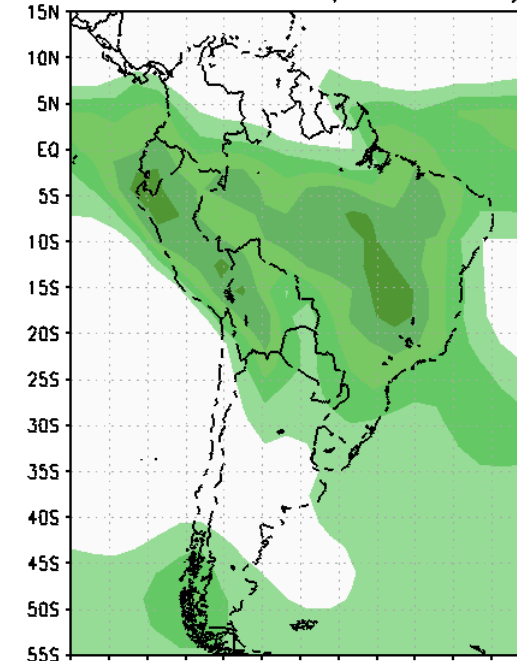
PREC DJF CSIRO(1980-2005)



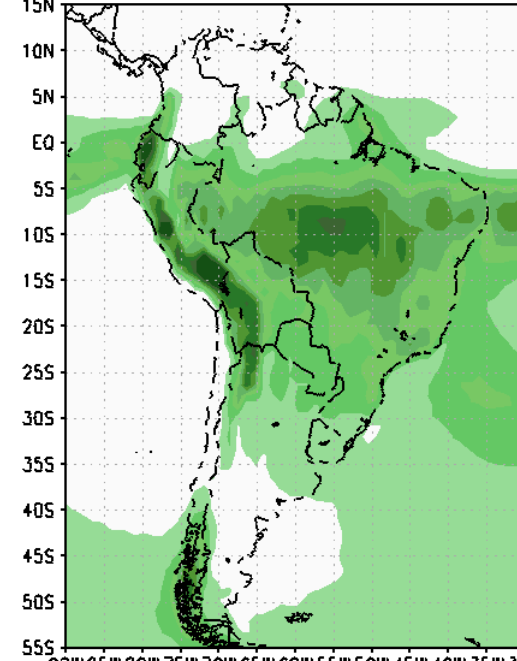
PREC DJF MIROC5(1980-2005)



PREC DJF MIROC(1980-2005)

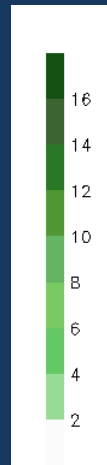


PREC DJF MRI(1980-2005)

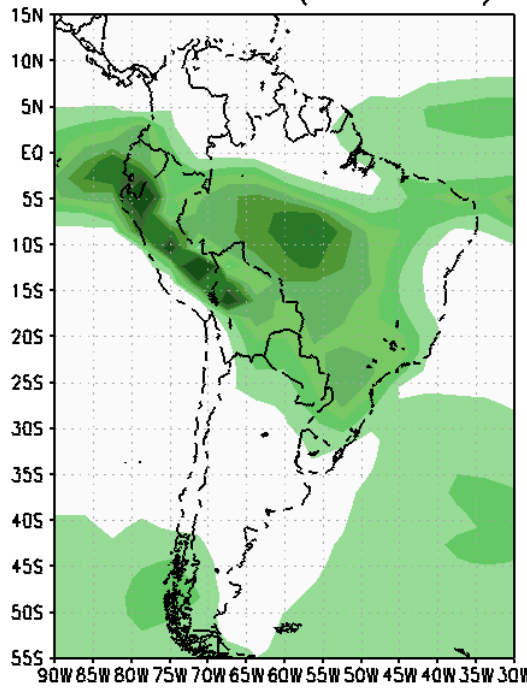


**PREC
DJF**

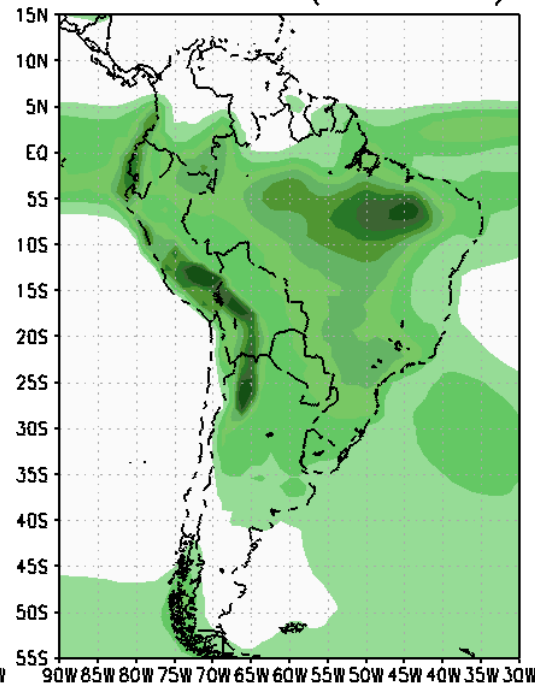
PREC DJF



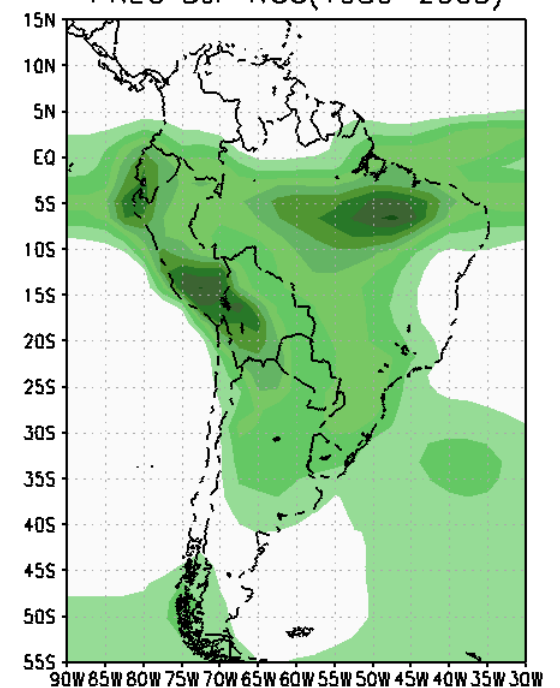
PREC DJF IPSL(1980-2005)



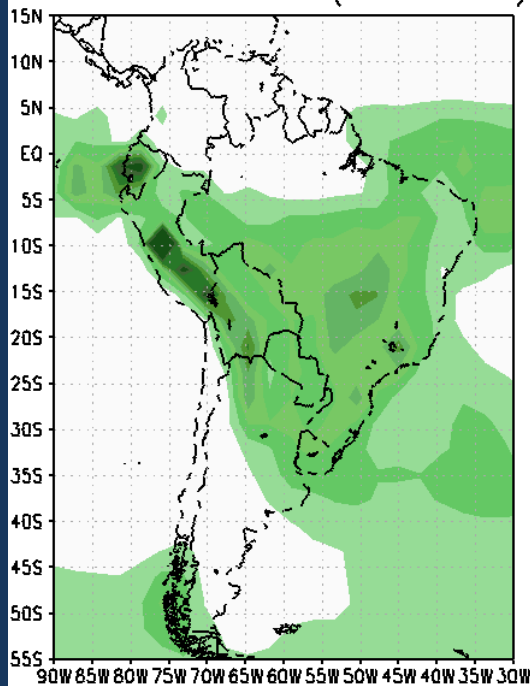
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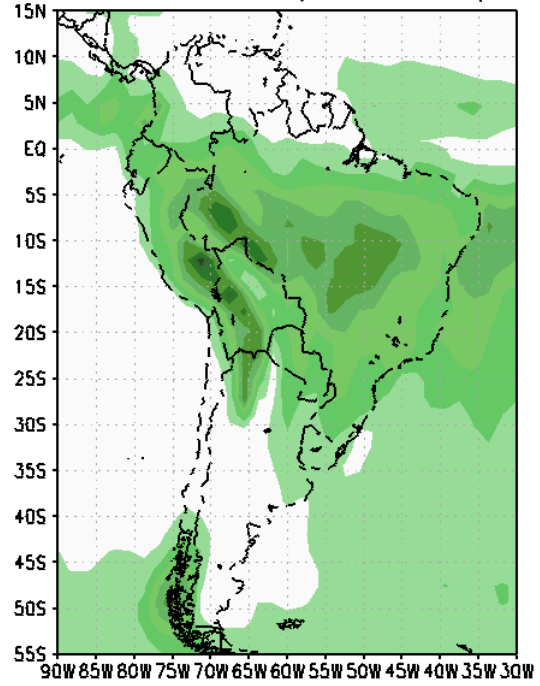
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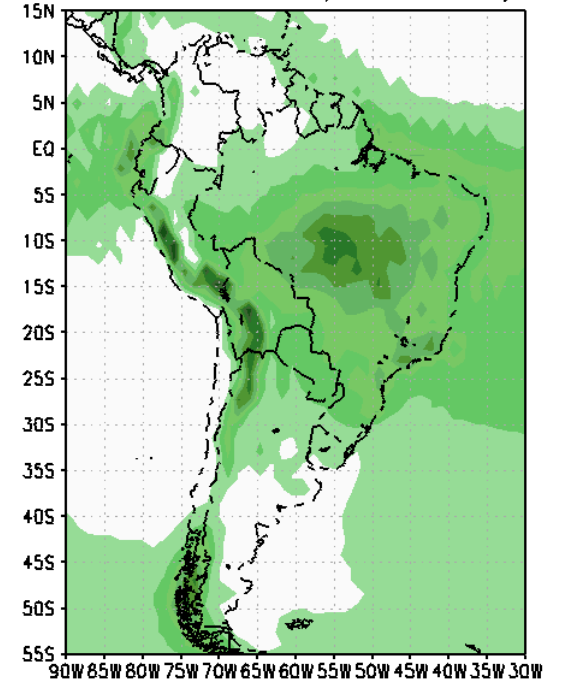
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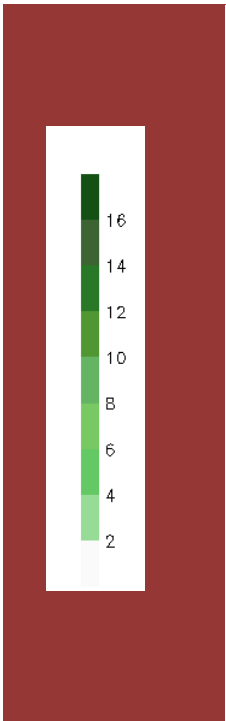
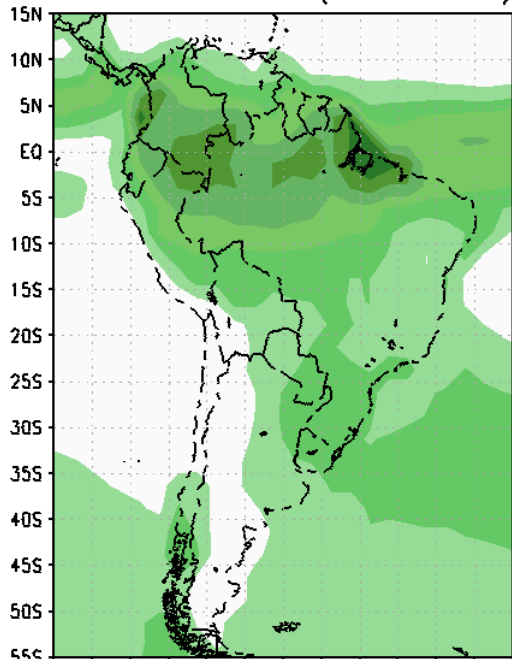
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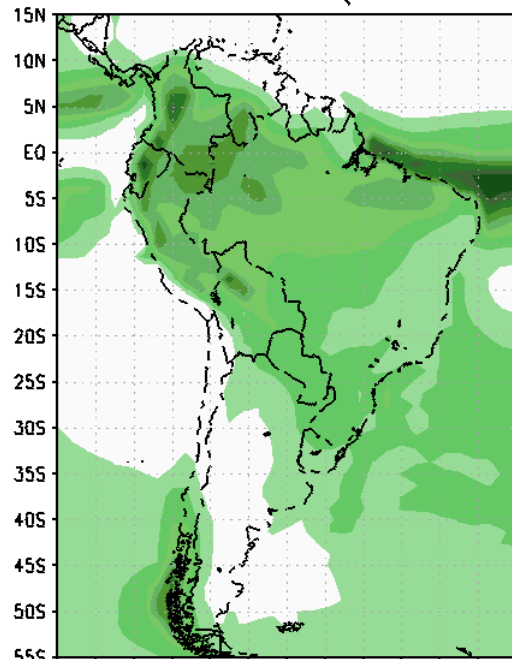
PREC DJF CNRM(1980-2005)



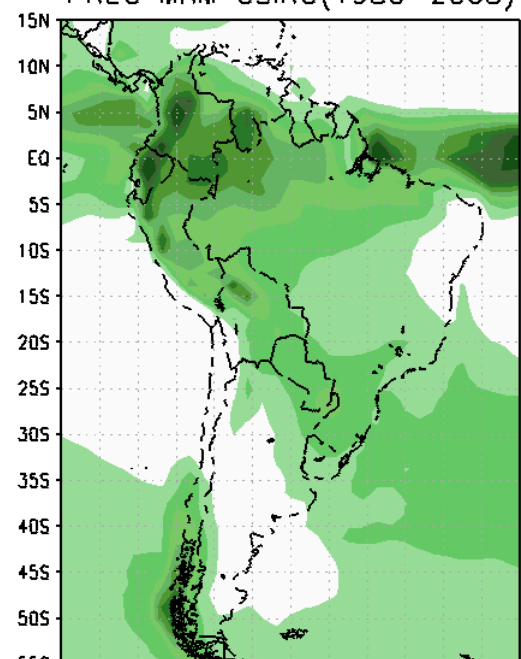
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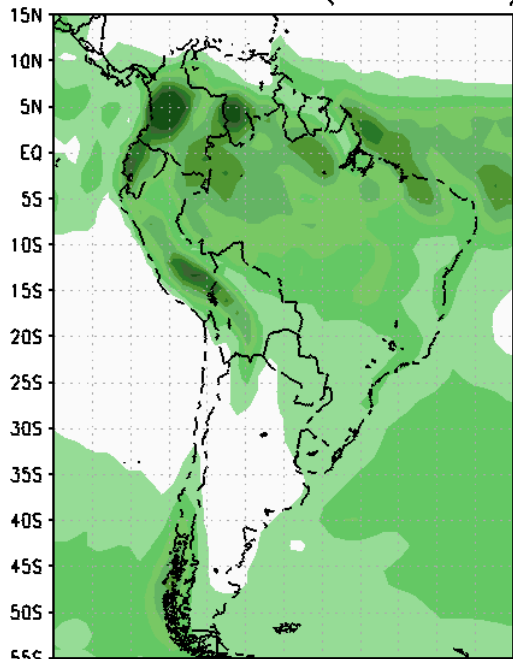
PREC MAM HADGEM2(1980-2005)



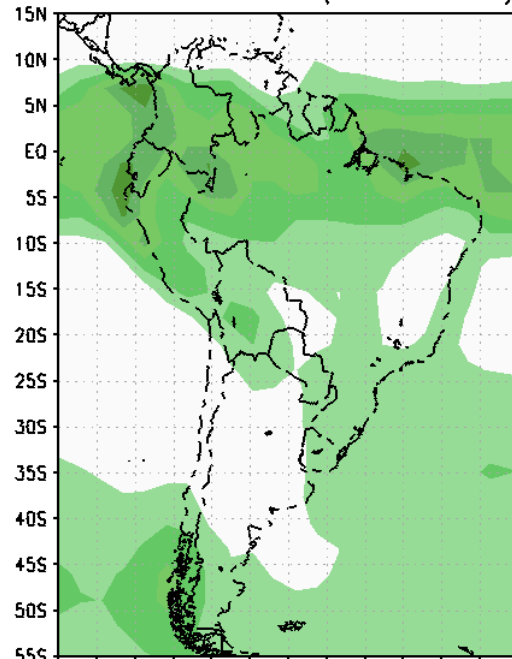
PREC MAM CSIRO(1980-2005)



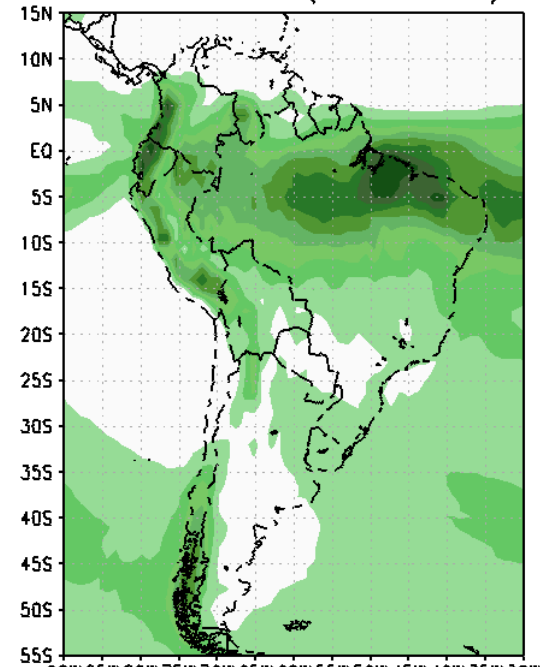
PREC MAM MIROC5(1980-2005)



PREC MAM MIROC(1980-2005)



PREC MAM MRI(1980-2005)



**PREC
MAM**

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90W 85W 80W 75W 70W 65W 60W 55W 50W 45W 40W 35W 30W

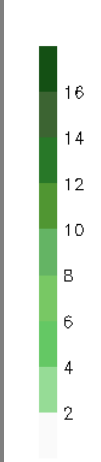
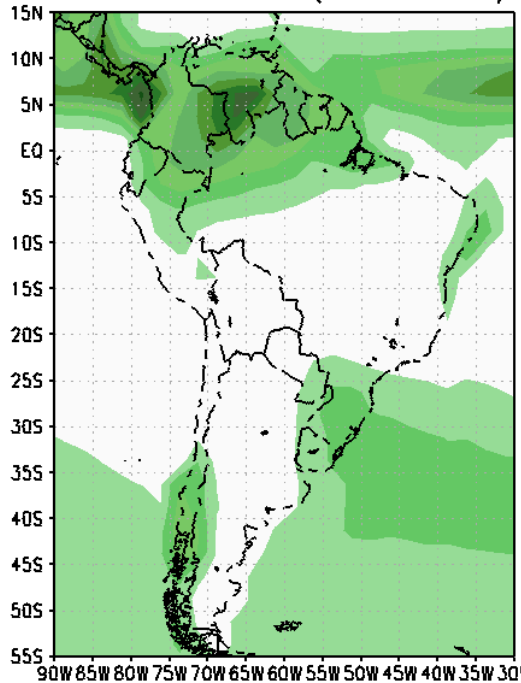
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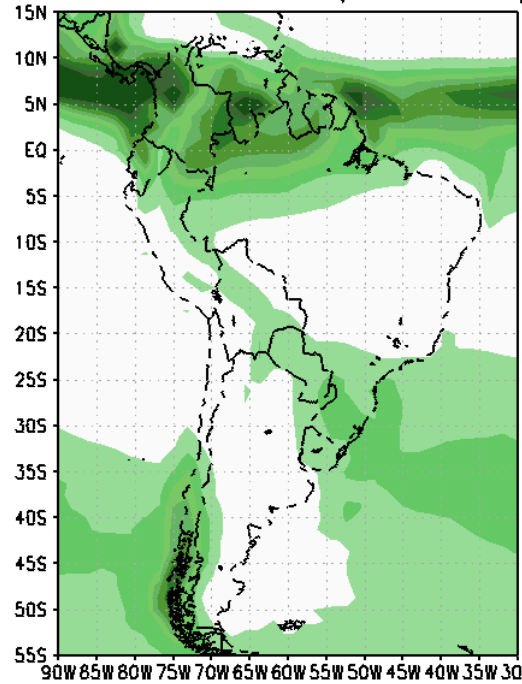
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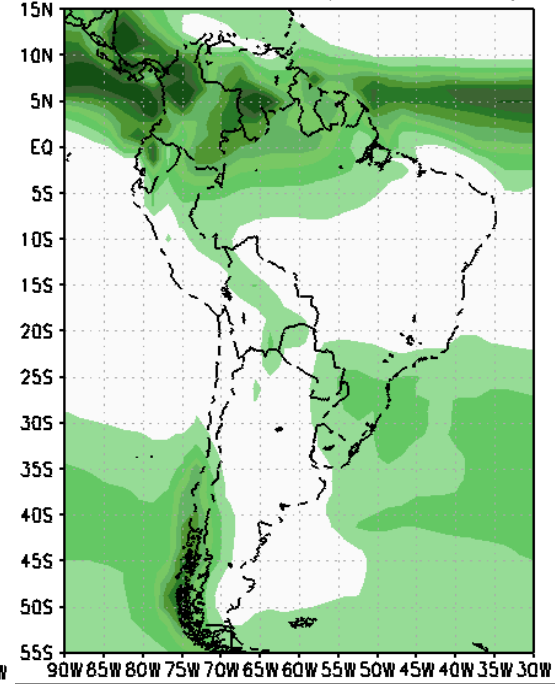
PREC JJA GPCP (1981-2006)



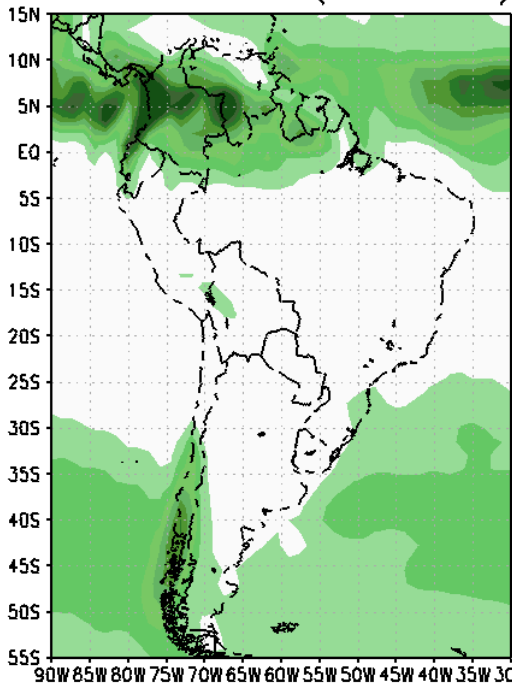
PREC JJA HADGEM2(1980-2005)



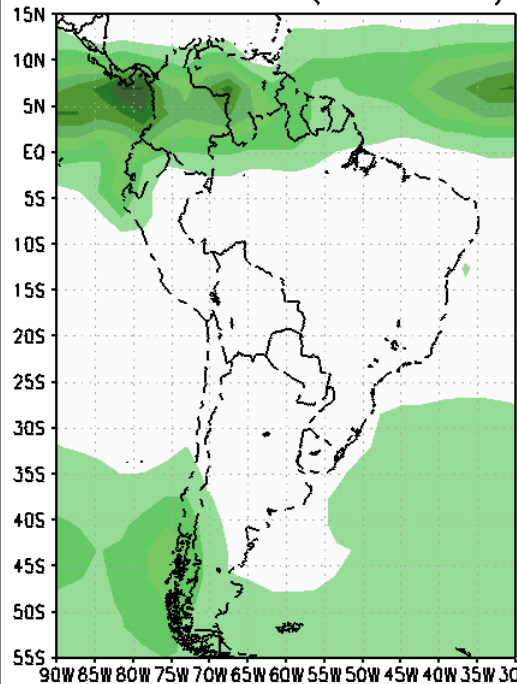
PREC JJA CSIRO(1980-2005)



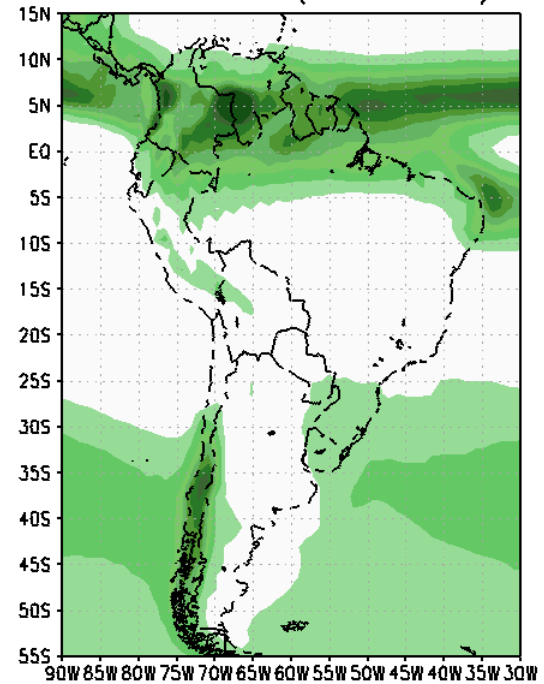
PREC JJA MIROC5(1980-2005)



PREC JJA MIROC(1980-2005)

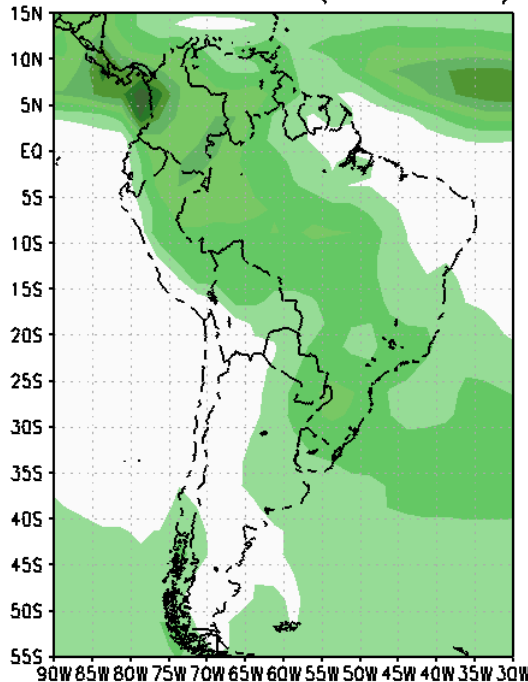


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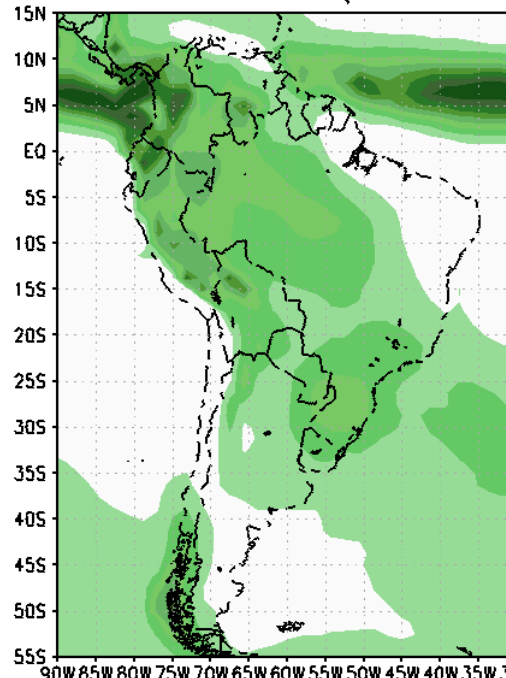


PREC
JJA

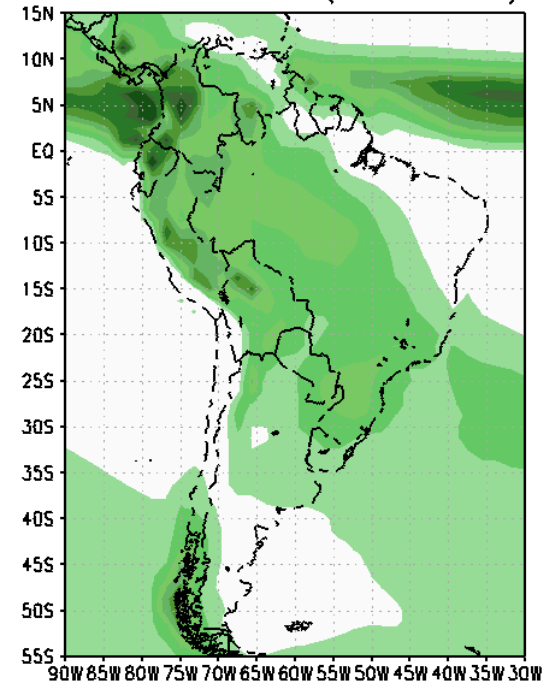
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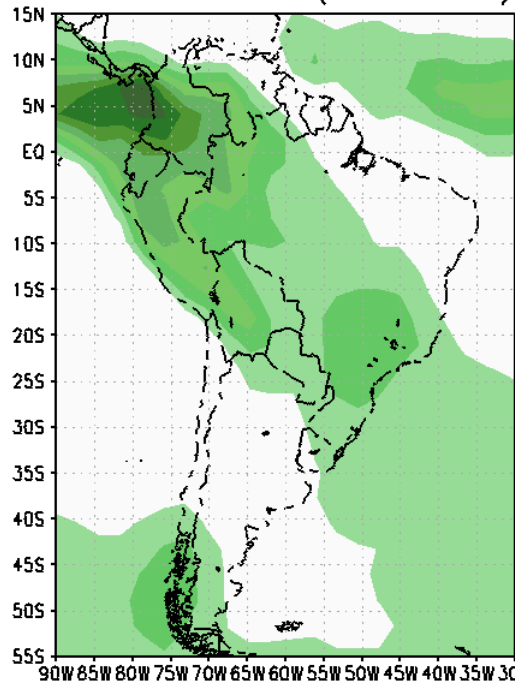
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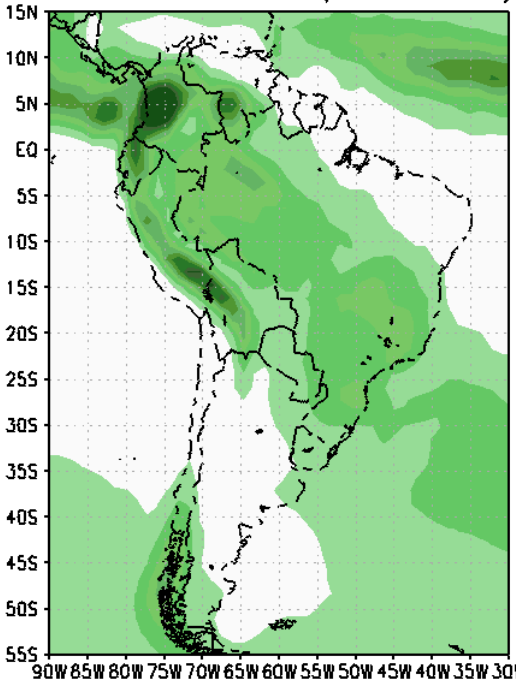
PREC SON CSIRO(1980-2005)



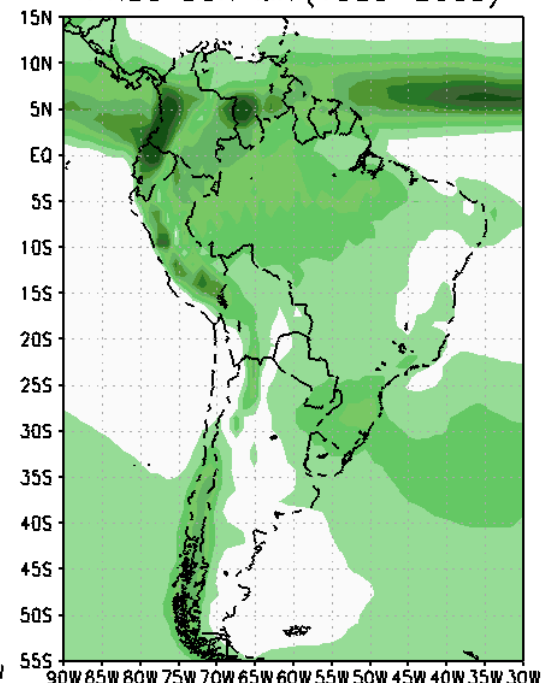
PREC SON MIROC(1980-2005)



PREC SON MIROC5(1980-2005)



PREC SON MRI(1980-2005)



**PREC
SON**

ENSEMBLE

" HADGEM2-ES

" CSIRO

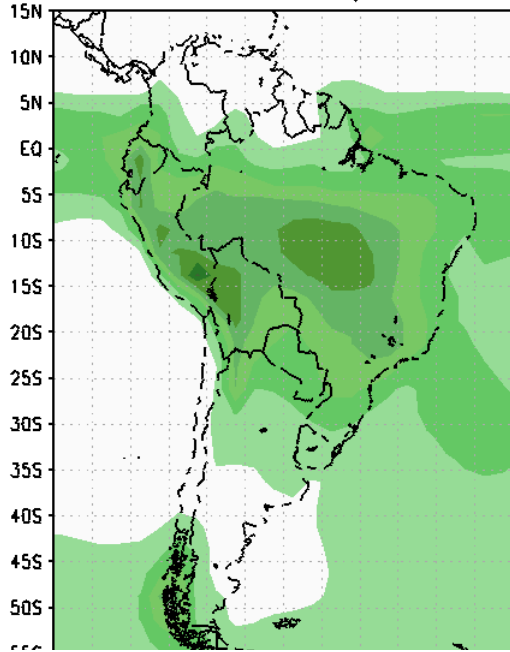
" MIROC-ES

" MRI

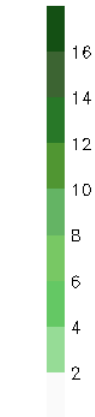
" IPSL

DJF

PREC DJF ENSEMBLE (1980-2005)

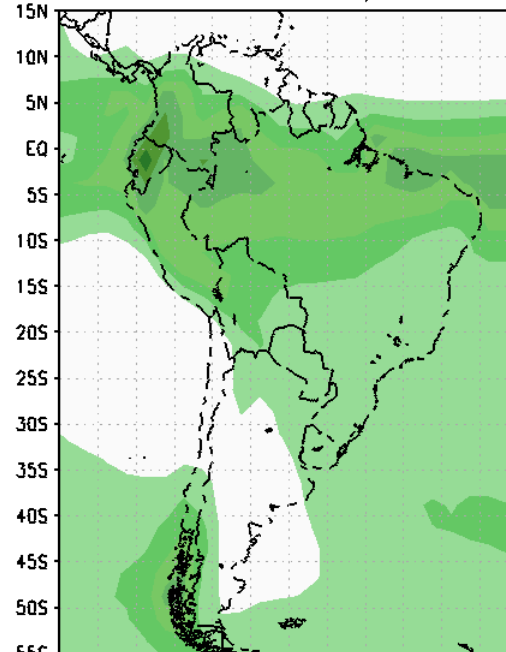


ENSEMBLE



(1980-2005)

PREC MAM ENSEMBLE (1980-2005)

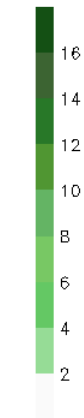
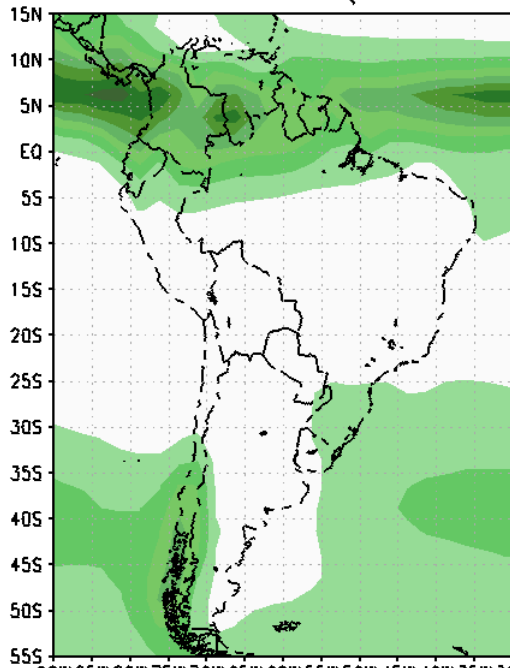


MAM



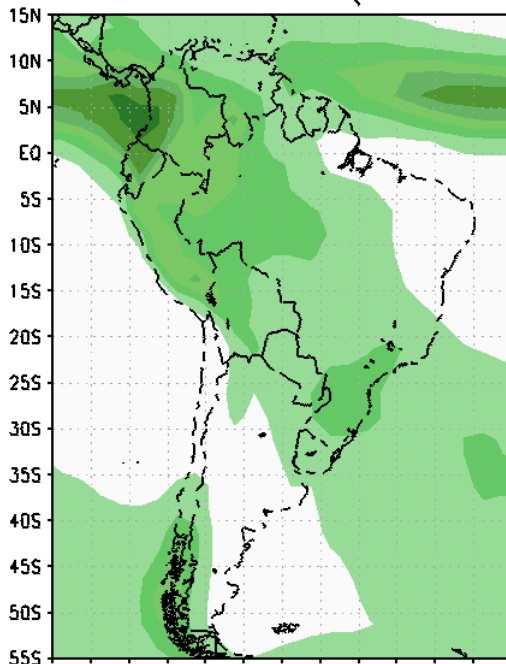
JJA

PREC JJA ENSEMBLE (1980-2005)

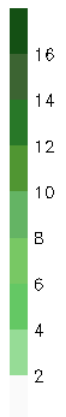


90W 85W 80W 75W 70W 65W 60W 55W 50W 45W 40W 35W 30W

PREC SON ENSEMBLE (1980-2005)

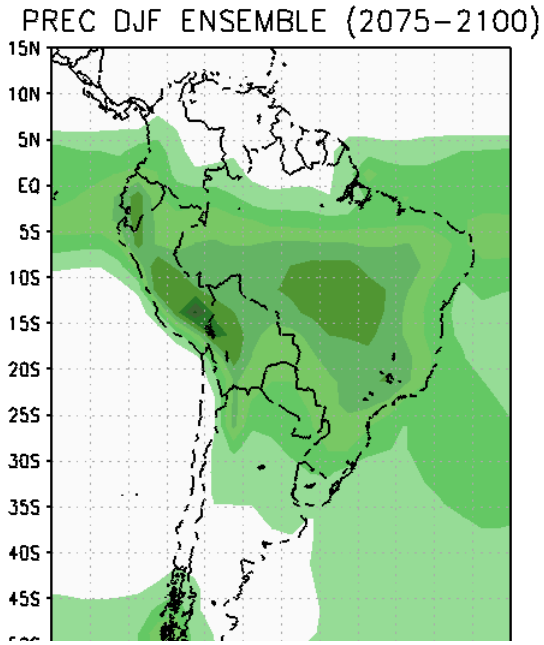


SON

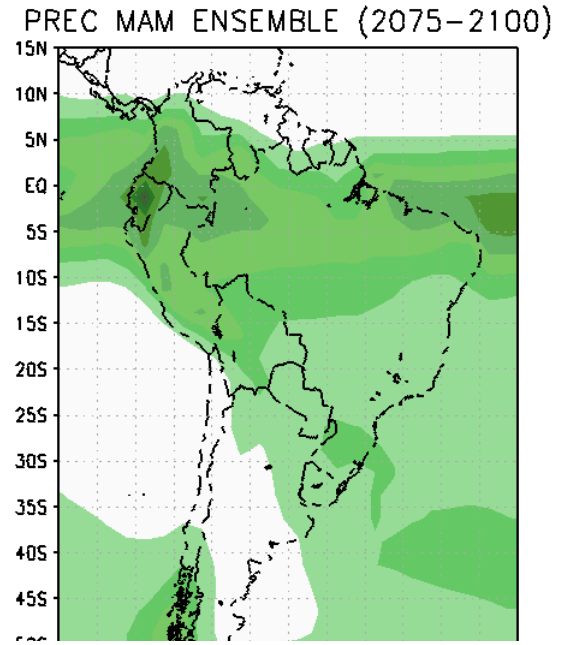
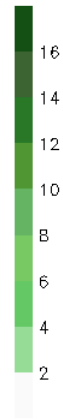


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DJF



ENSEMBLE

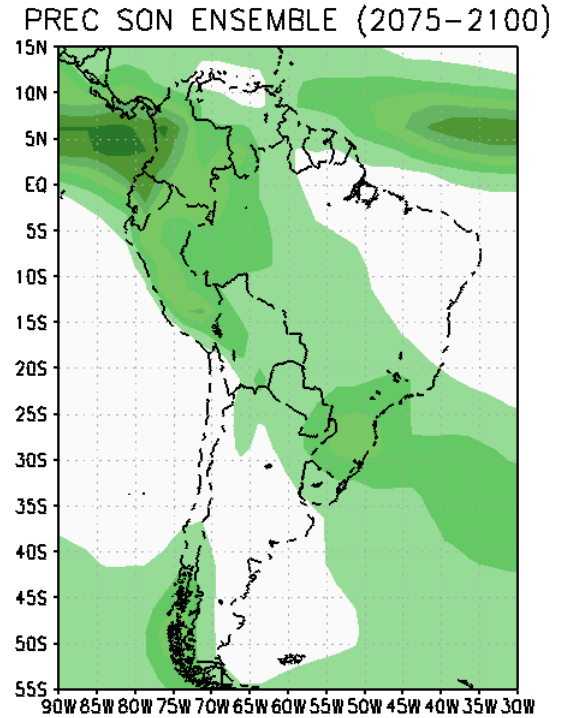
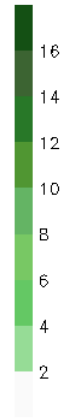
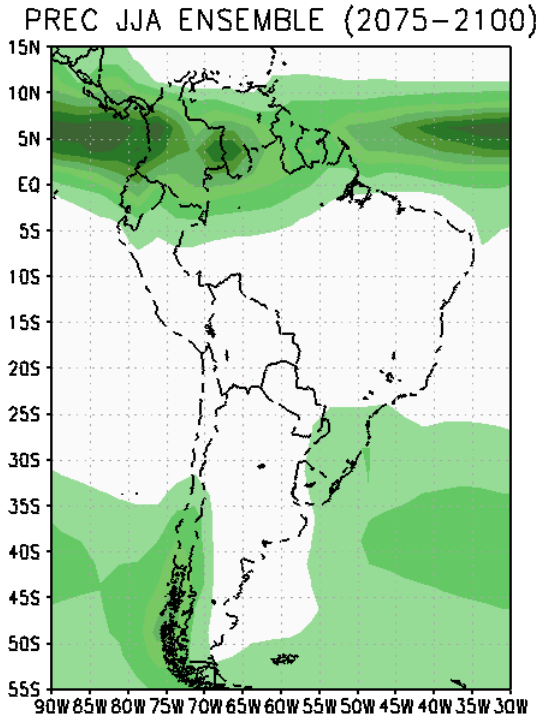


MAM



**(2075-2100)
rcp 8.5**

JJA



SON



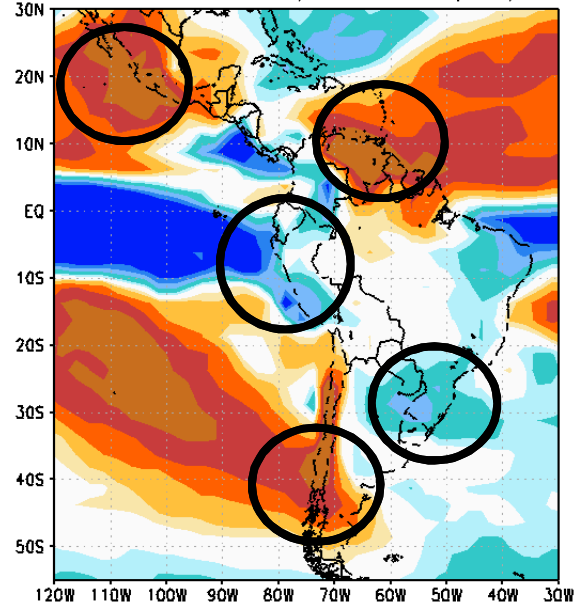
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90W 85W 80W 75W 70W 65W 60W 55W 50W 45W 40W 35W 30W

**PRECIPITATION CHANGE
(2075-2100) – (1980-2005)**

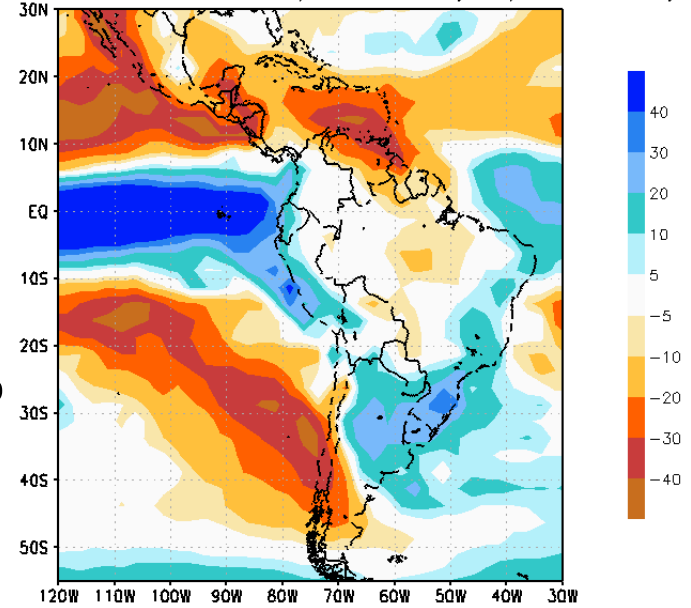
DJF

DIF PREC DJF ENSEMBLE (2075-2100)- (1980-2005)



MAM

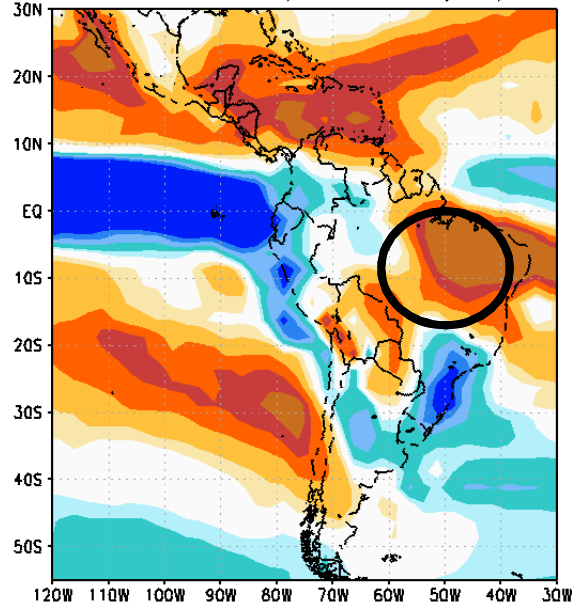
DIF PREC MAM ENSEMBLE (2075-2100)- (1980-2005)



**Difference %
ENSEMBLE
2075-2100)-
(1980-2005)**

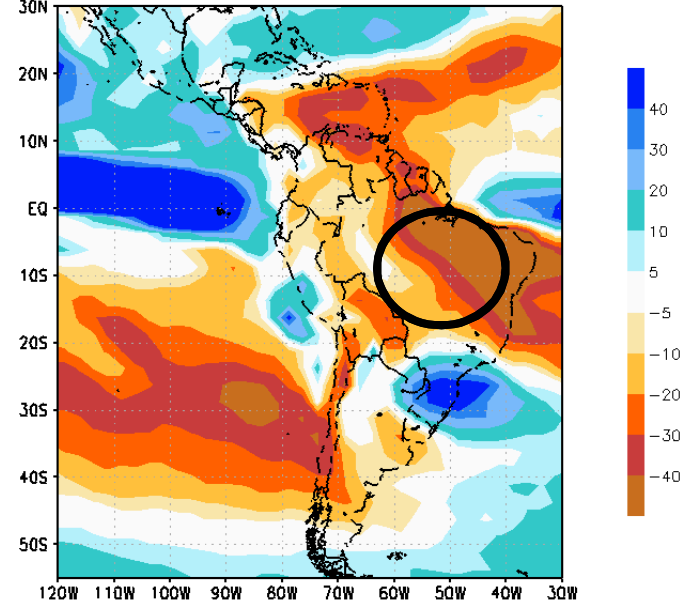
JJA

DIF PREC JJA ENSEMBLE (2075-2100)- (1980-2005)



SON

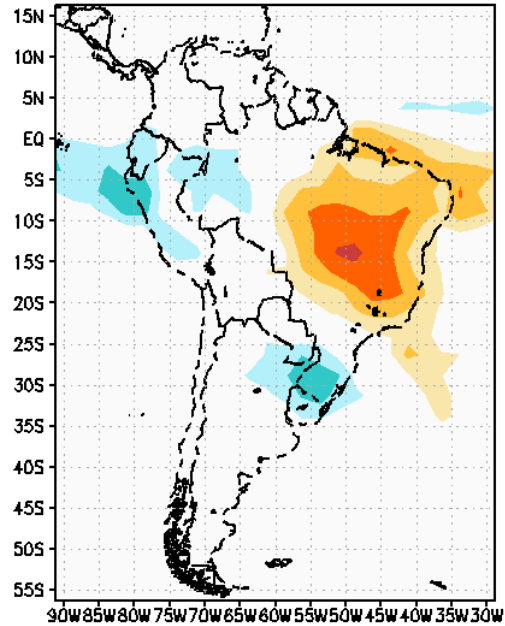
DIF PREC SON ENSEMBLE (2075-2100)- (1980-2005)



**MODES OF PRECIPITATION
VARIABILITY
(EOF ANALYSES)**

(1980-2005)

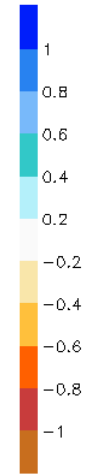
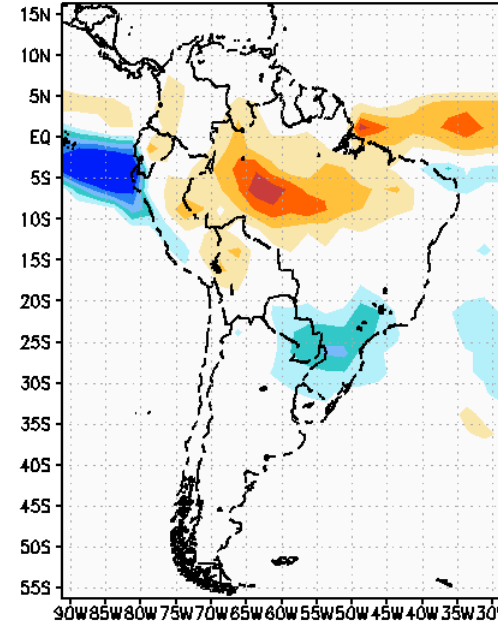
EOF1 APREC DJF (1980-2005) ENSEMBLE



**EOF 1
ENSEMBLE**

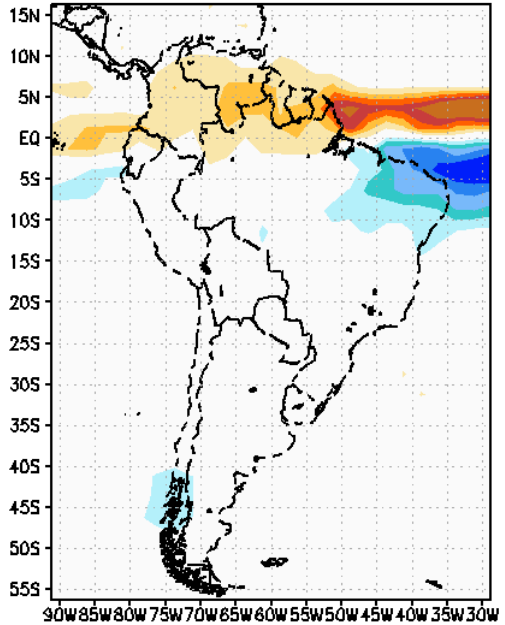
(2075-2100)

EOF1 APREC DJF (2075-2100) ENSEMBLE

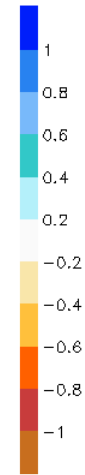
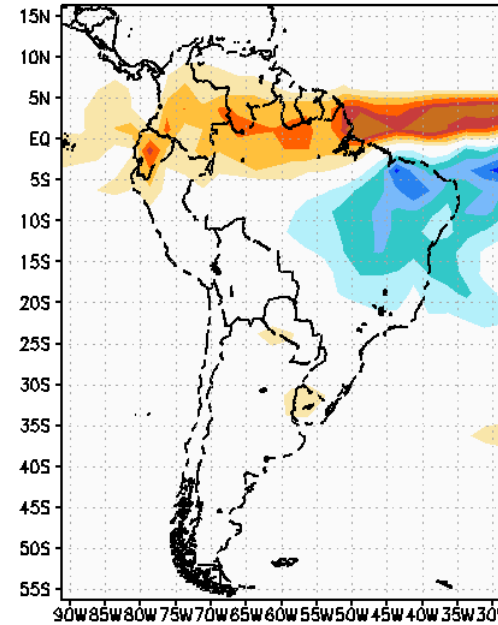


DJF

EOF1 APREC MAM (1980-2005) ENSEMBLE



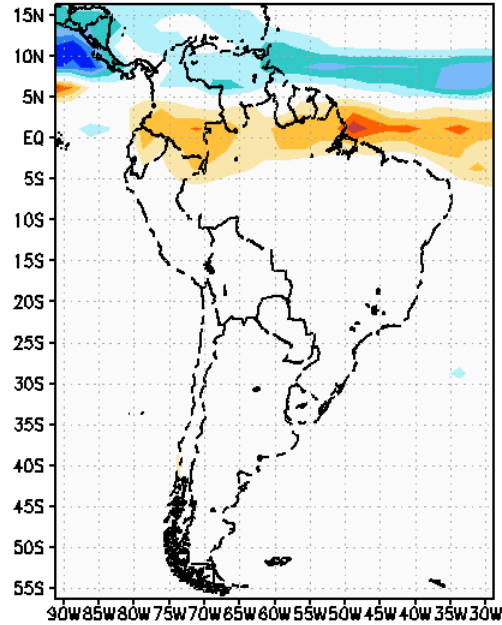
EOF1 APREC MAM (2075-2100) ENSEMBLE



MAM

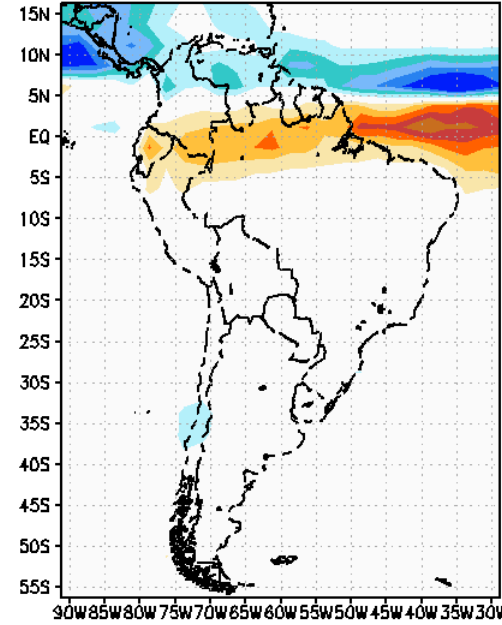
(1980-2005)

EOF1 APREC JJA (1980-2005) ENSEMBL

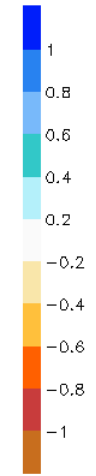


(2075-2100)

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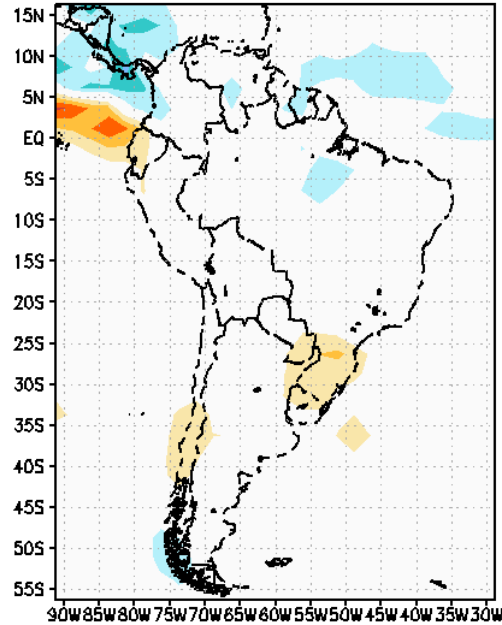


**EOF 1
ENSEMBLE**

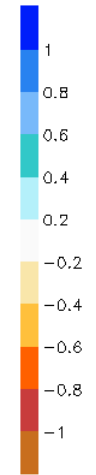
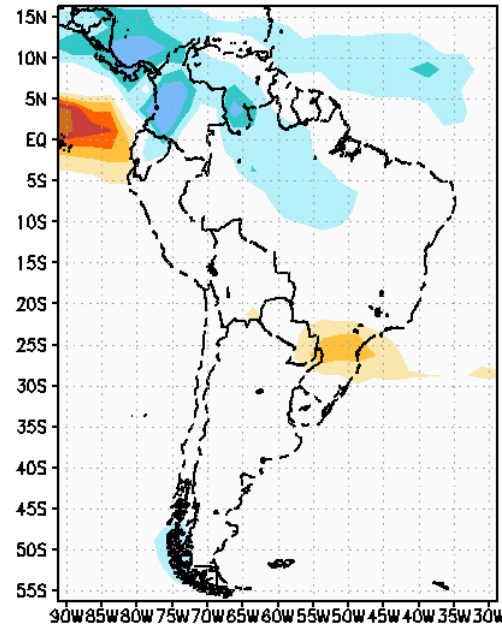


JJA

EOF1 APREC SON (1980-2005) ENSEMBL



EOF1 APREC SON (2075-2100) ENSEMBL

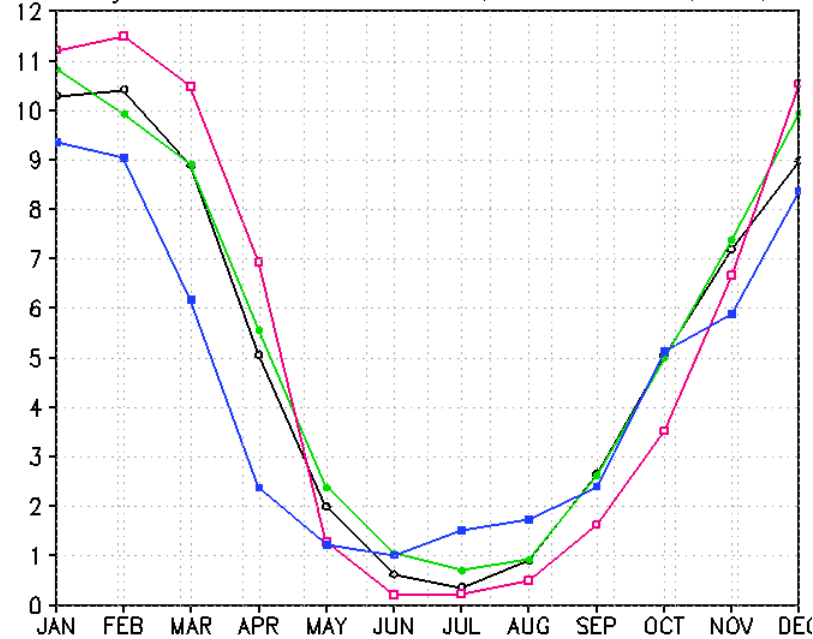


SON

ANNUAL CYCLE

CORE SAMS

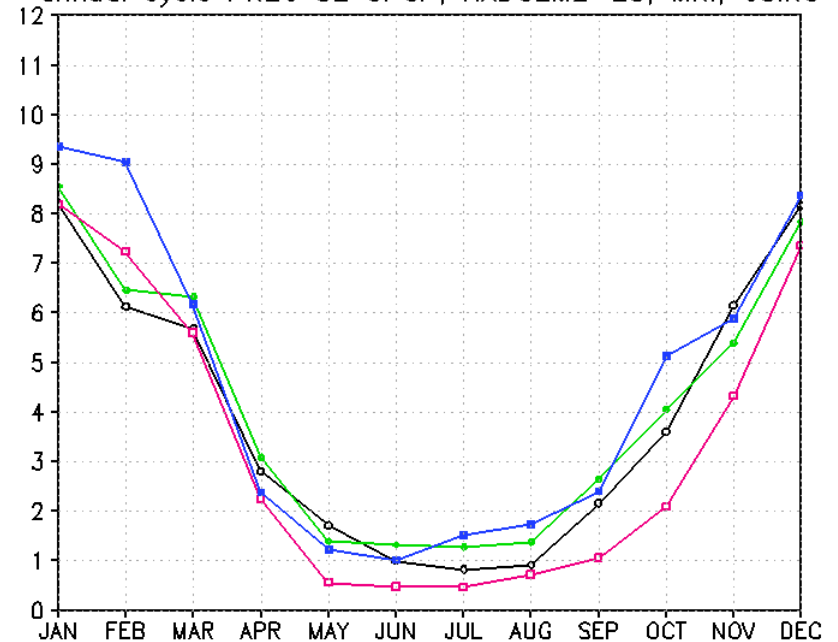
annual cycle PREC monsoon GPCP, HADGEM2-ES, MRI, CSIRO



ANNUAL CYCLE

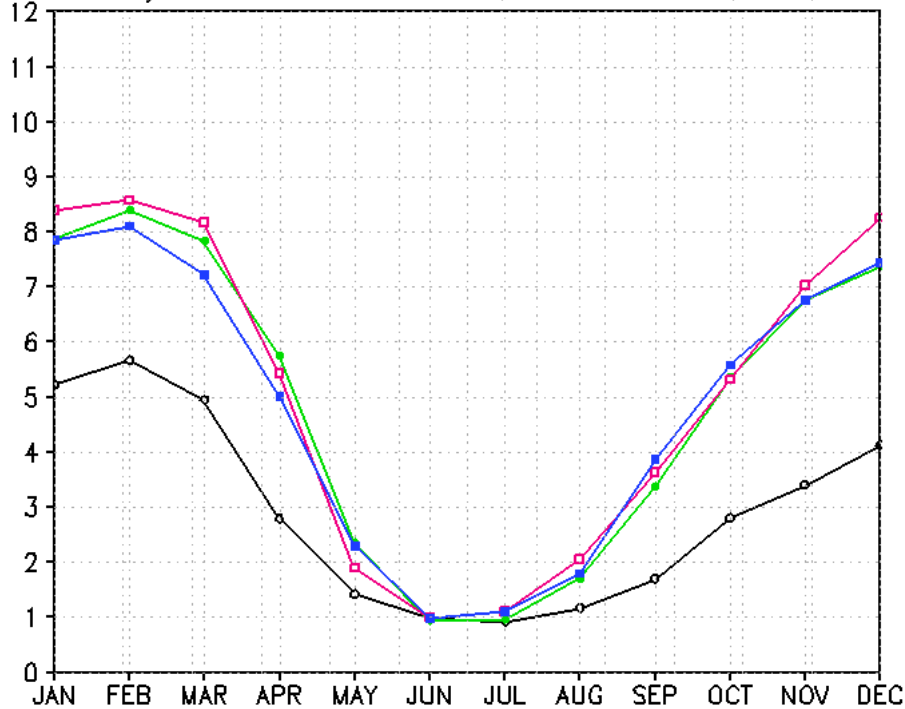
SOUTHEASTERN BRAZIL

annual cycle PREC SE GPCP, HADGEM2-ES, MRI, CSIRO



PERU

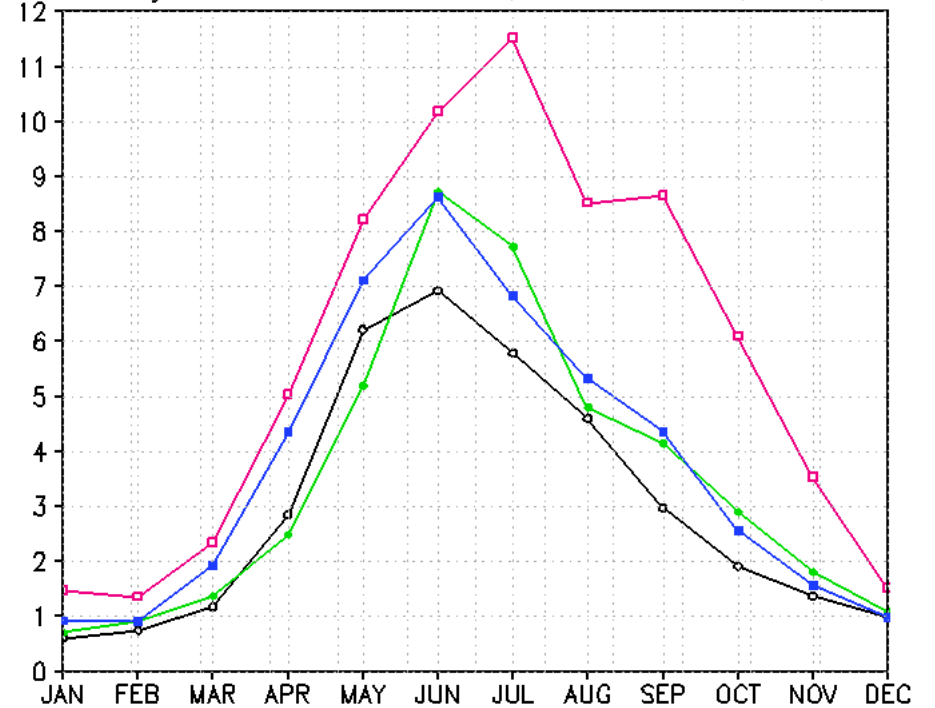
annual cycle PREC PERU GPCP, HADGEM2-ES, MRI, CSIRO



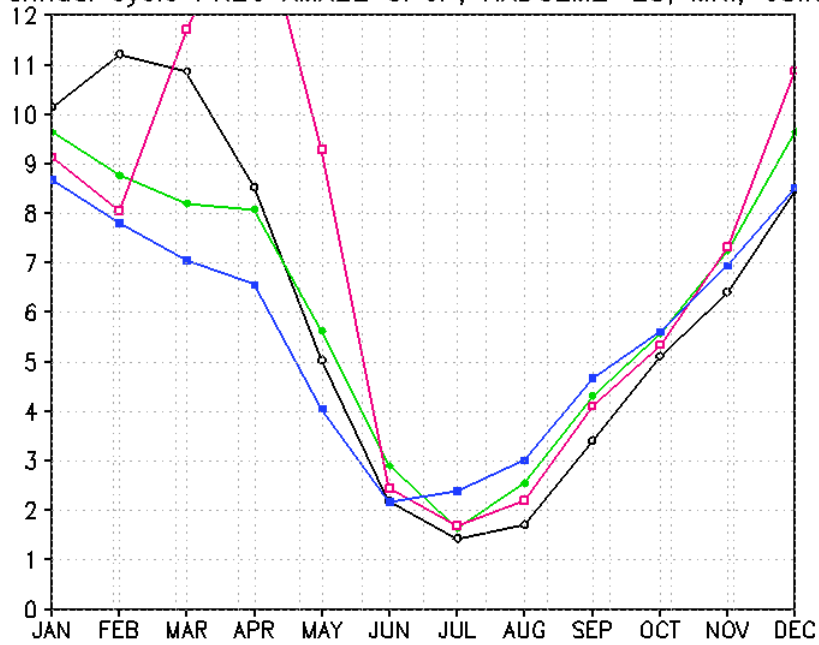
ANNUAL CYCLE

CHILE

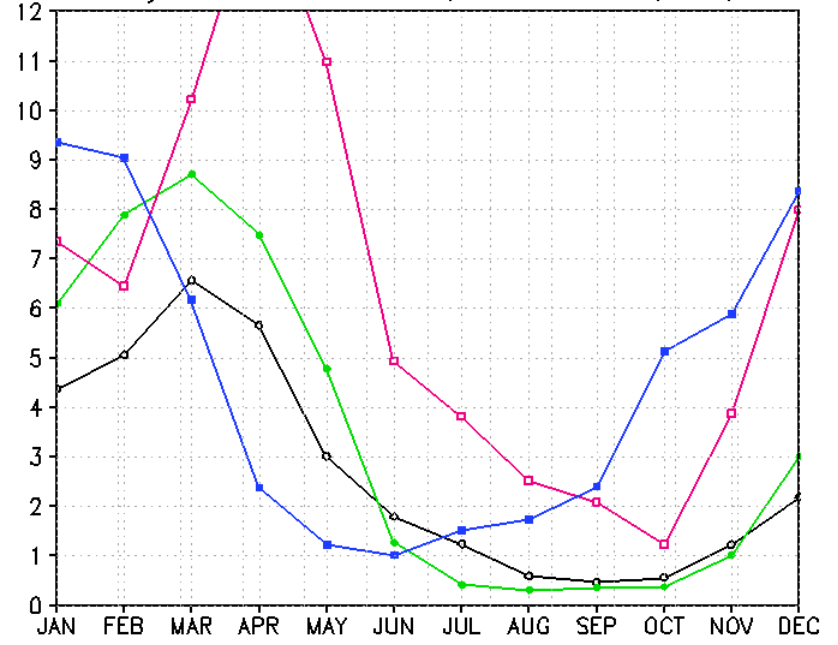
annual cycle PREC CHILE GPCP, HADGEM2-ES, MRI, CSIRO



annual cycle PREC AMAZE GPCP, HADGEM2-ES, MRI, CSIRO

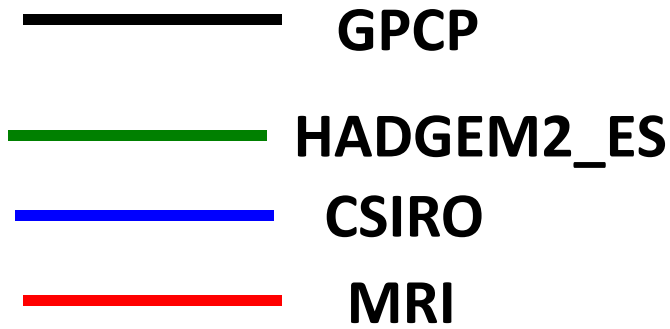


annual cycle PREC NNE GPCP, HADGEM2-ES, MRI, CSIRO

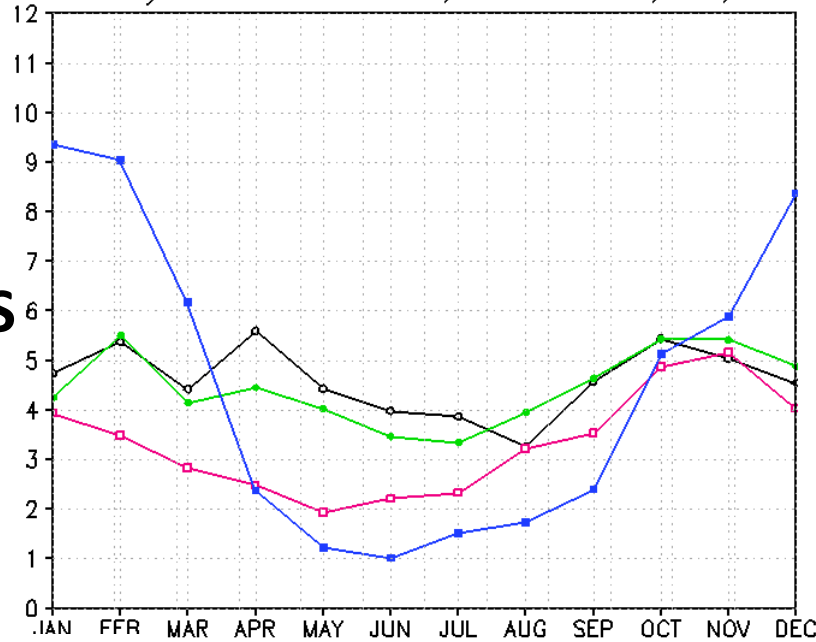


NORTHEASTERN

EASTERN AMAZON



annual cycle PREC SUL GPCP, HADGEM2-ES, MRI, CSIRO



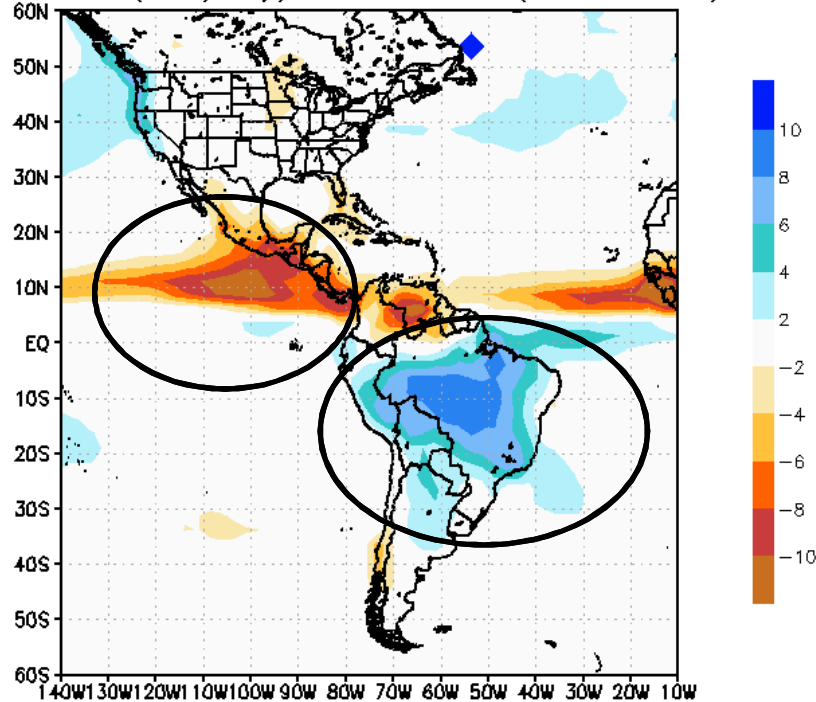
SOUTHERN LPB

Monsoon regions

Precipitation Difference (DJFM-JJAS) or
(JJJA-DJFM) ≥ 2.0 mm/day

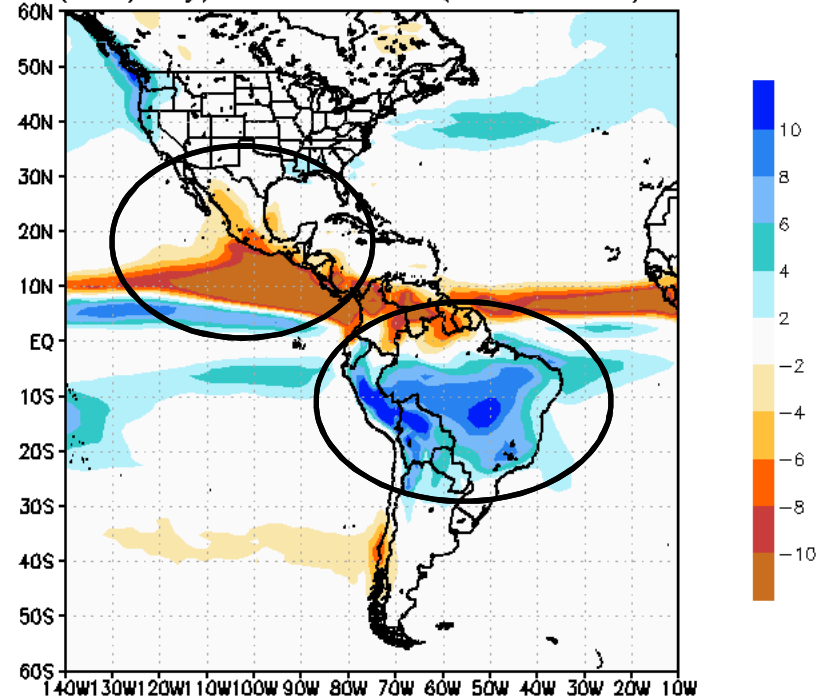
GPCP

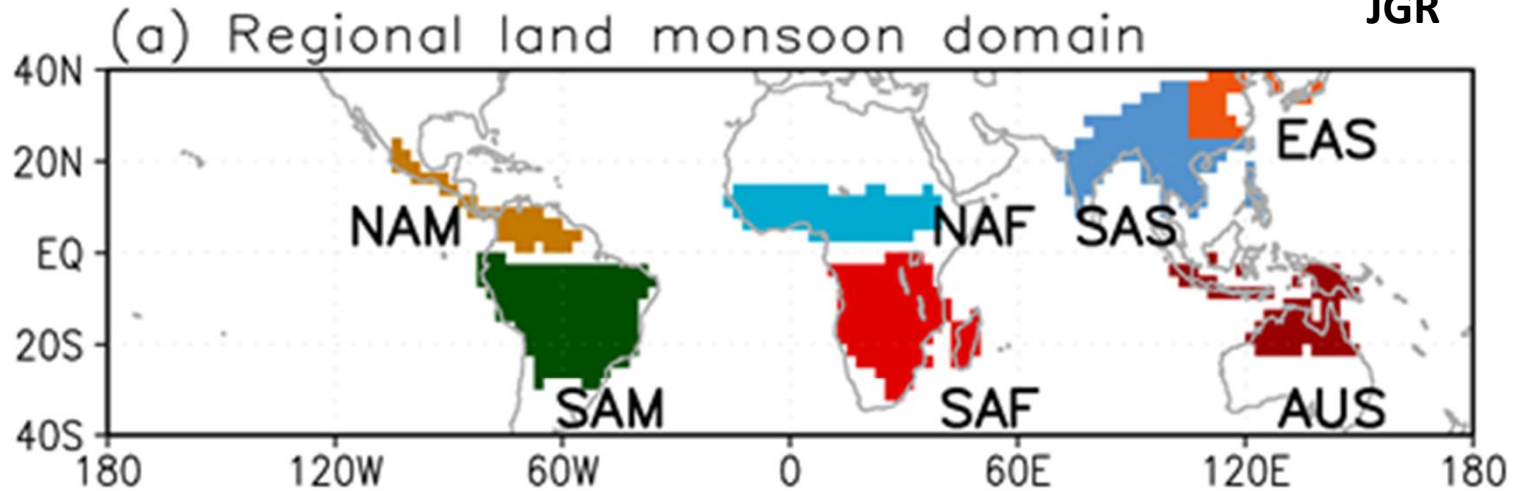
DIF Prec (mm/day) DJFM-JJAS (1979-2005)



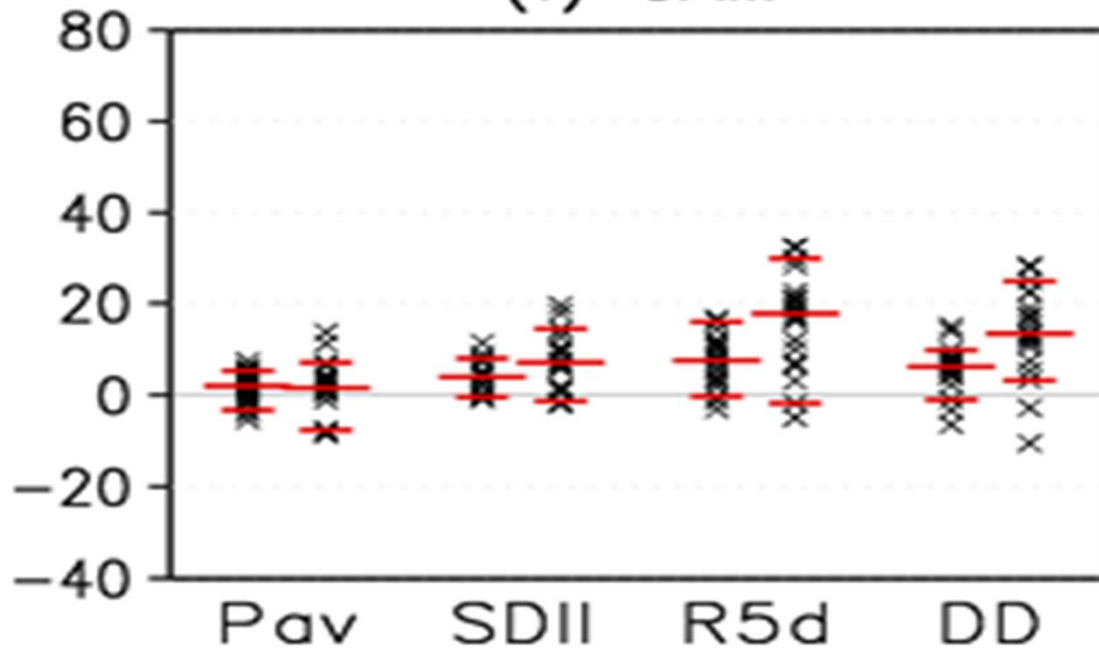
HADGEM2

DIF Prec (mm/day) DJFM-JJAS (1979-2005) HADGEM2





(f) SAM



Pav: average precipitation
SDII: daily precipitation I.
R5d: maximum 5 days prec.
DD: dry days

% of changes

—
29 CMIP5 models
1986-2005 and 2080- 2099

JAN

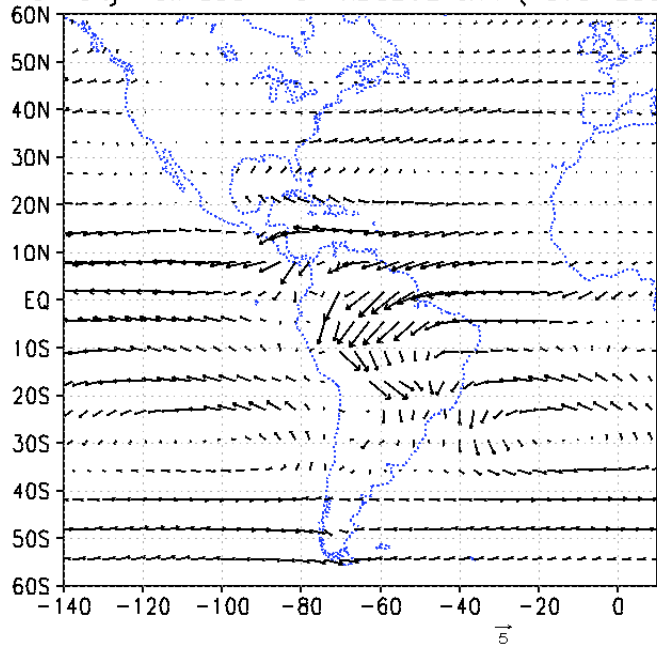
Humidity flux at 850 hPa

JUL

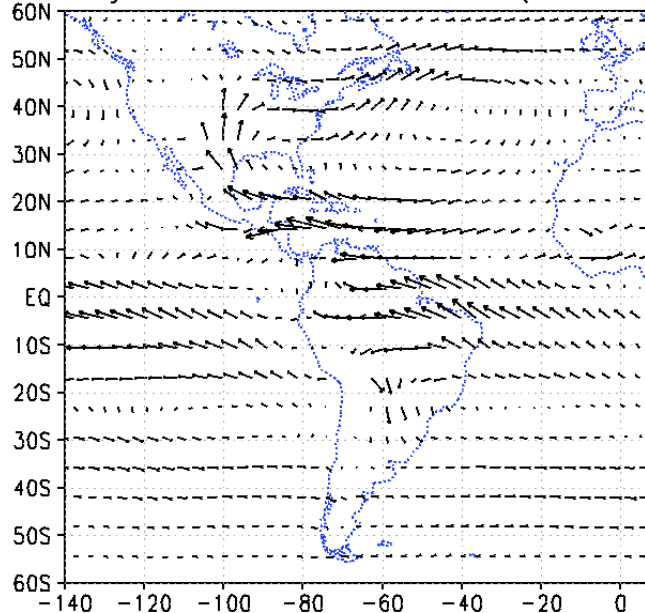
1979-2005

2073-2099

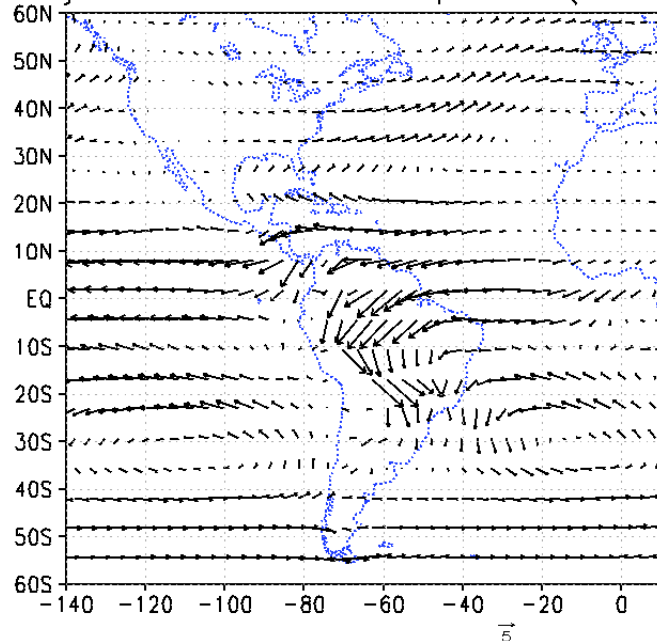
umidity flux 850 hPa HADGEM2 JAN (1979-2005)



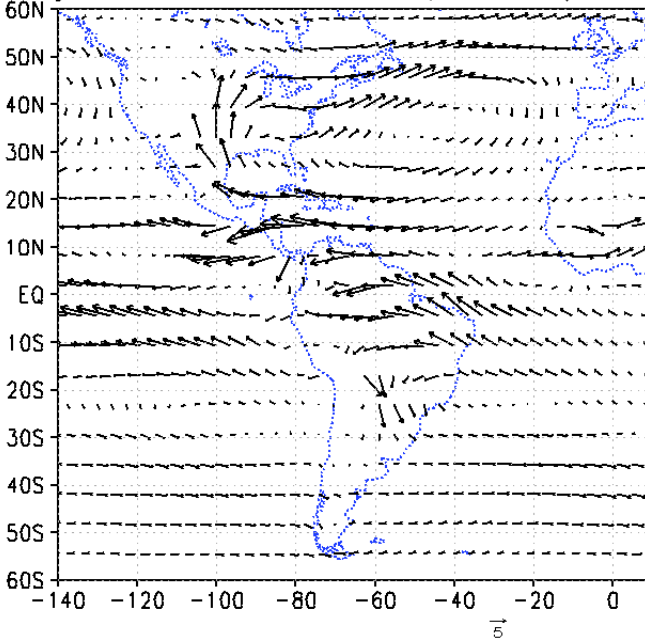
umidity flux 850 hPa HADGEM2 JUL (1979-2005)



umidity flux 850 hPa HADGEM2 rcp8.5 JAN (2073-2099)



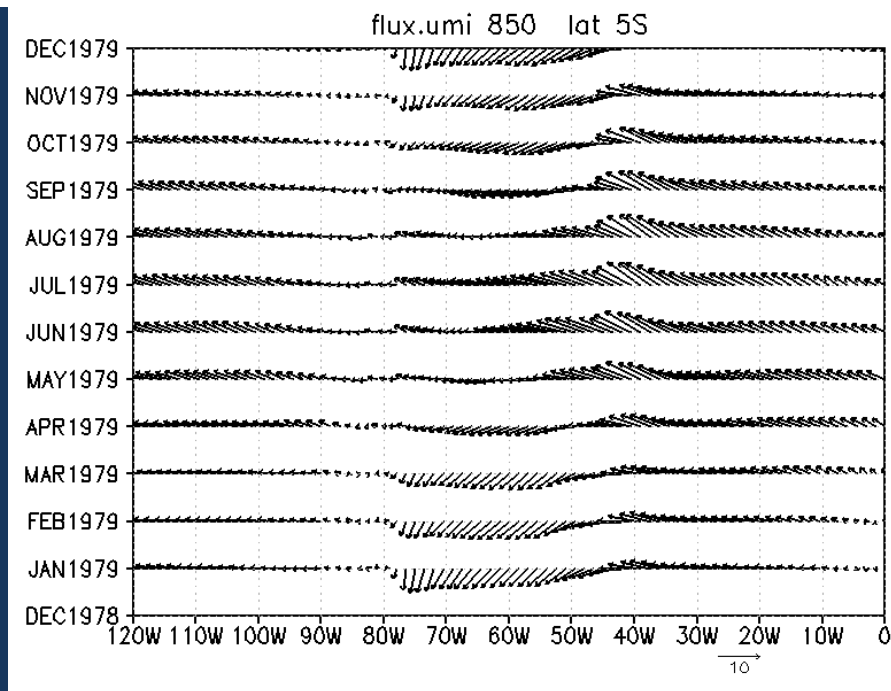
umidity flux 850 hPa HADGEM2 rcp8.5 JUL (2073-2099)



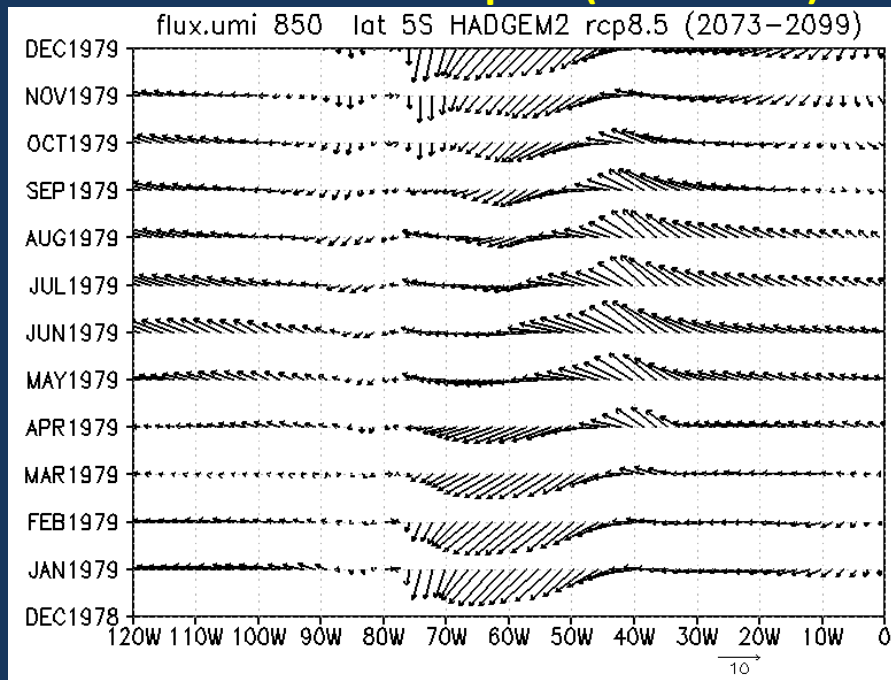
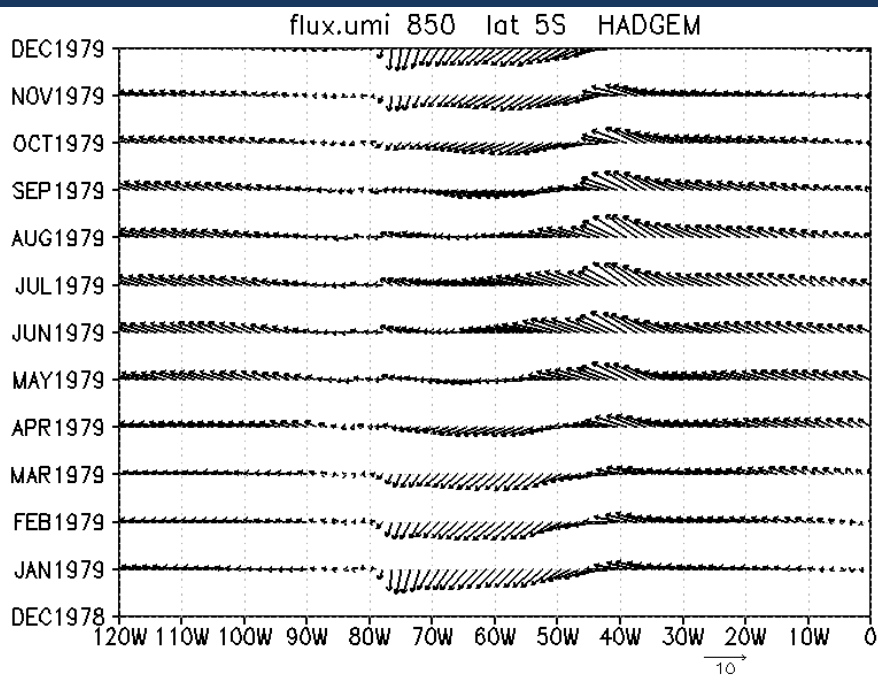
850 hPa Humidity Flux at 5° S

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HADGEM2 (1979-2005)



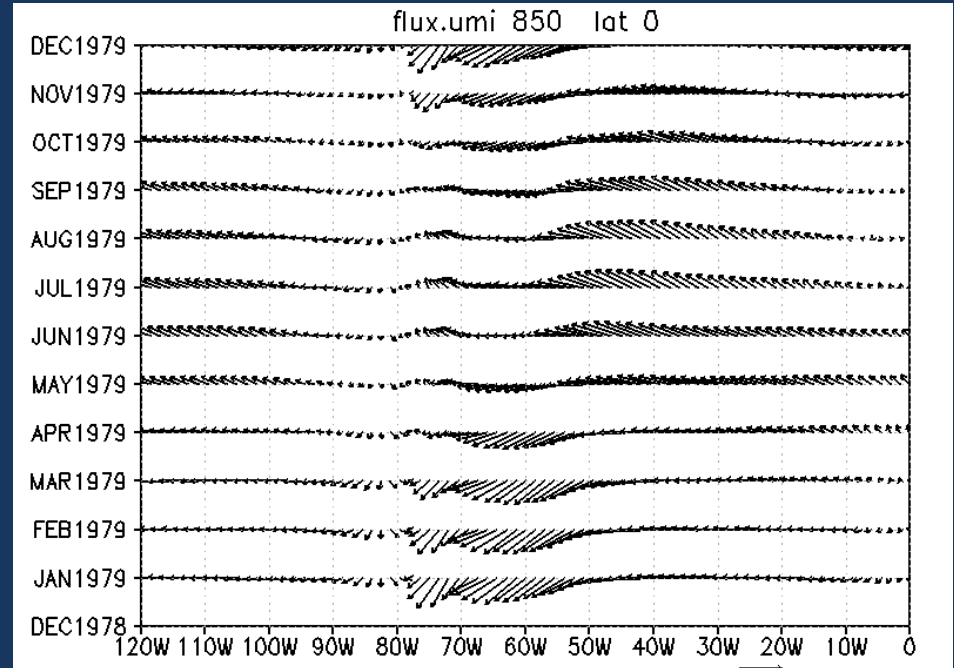
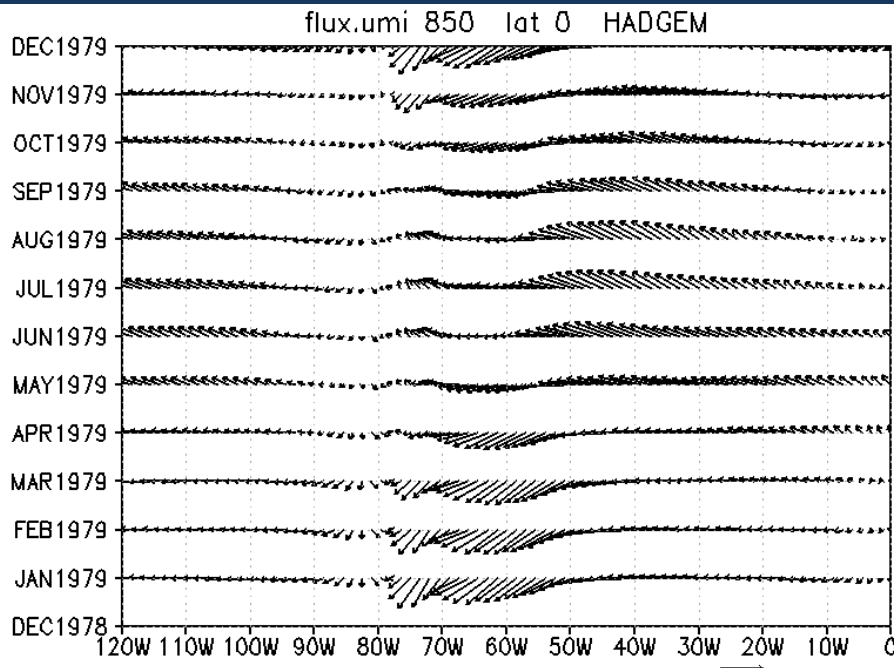
HADGEM2 rcp8.5 (2073-2099)



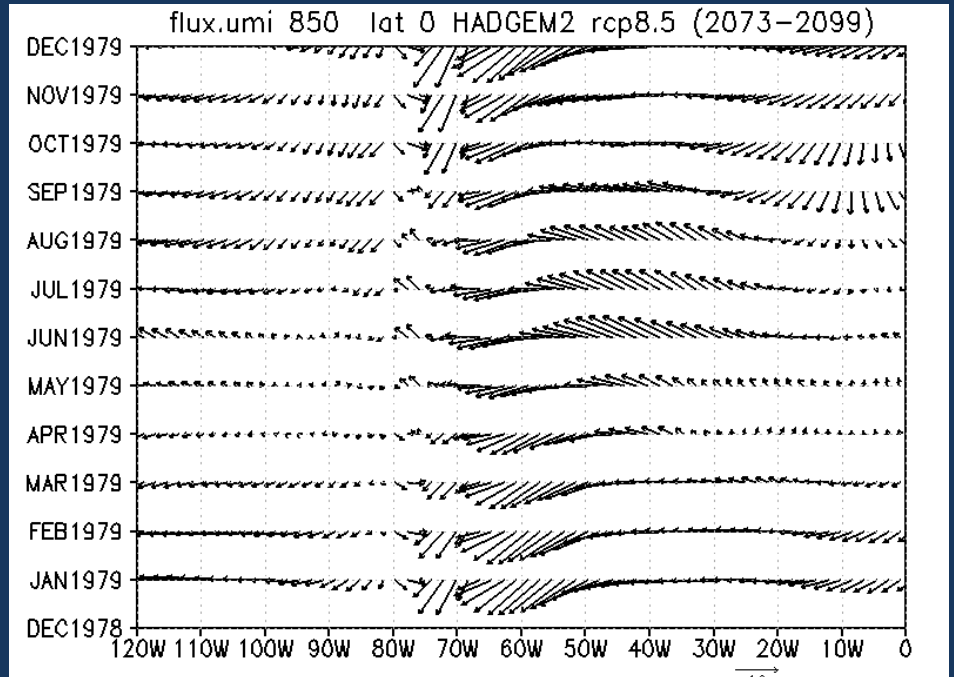
850 hPa Humidity Flux at equator

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HADGEM2 (1979-2005)



HADGEM2 rcp8.5 (2073-2099)



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FAPESP

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