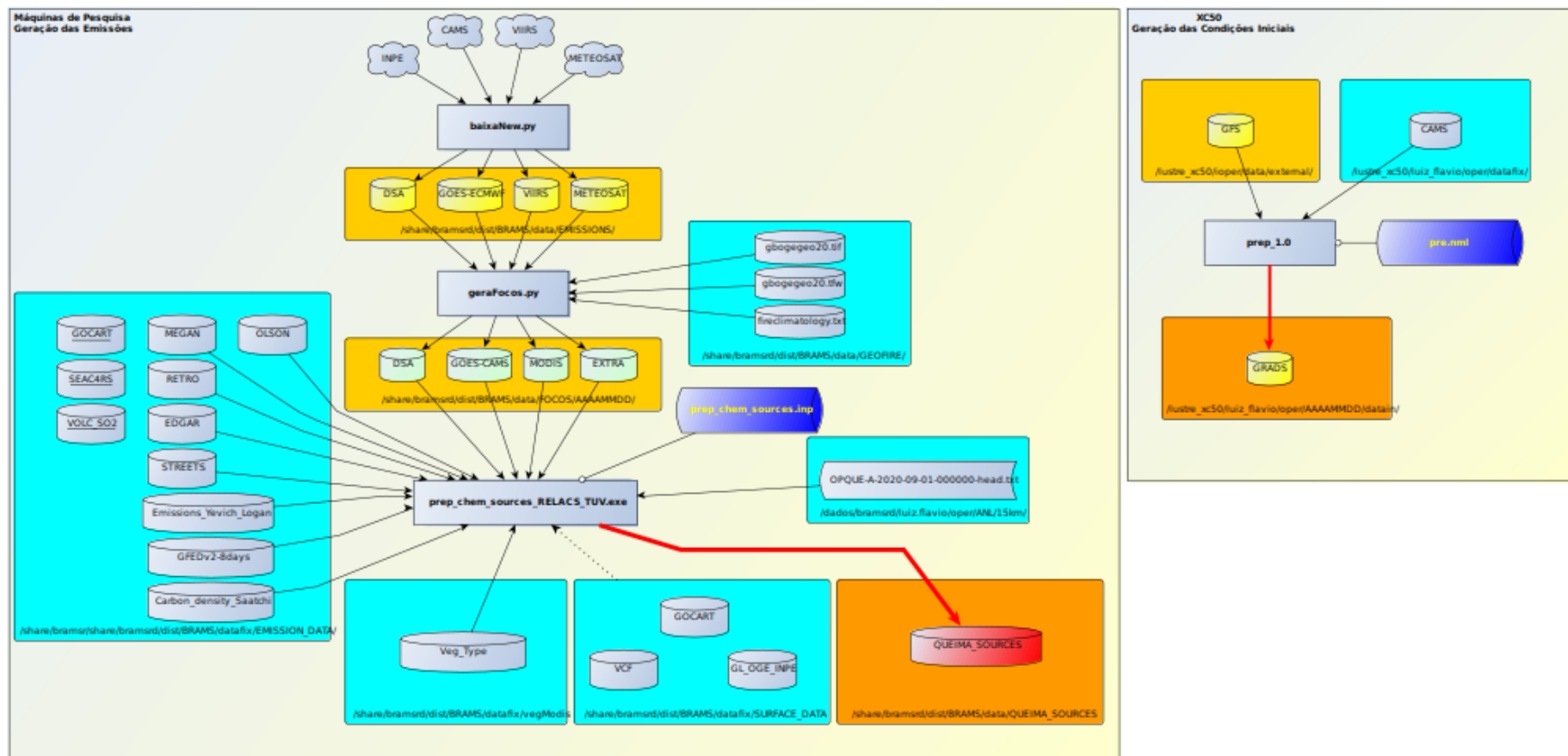


Evolução do Modelo BRAMS Ambiental

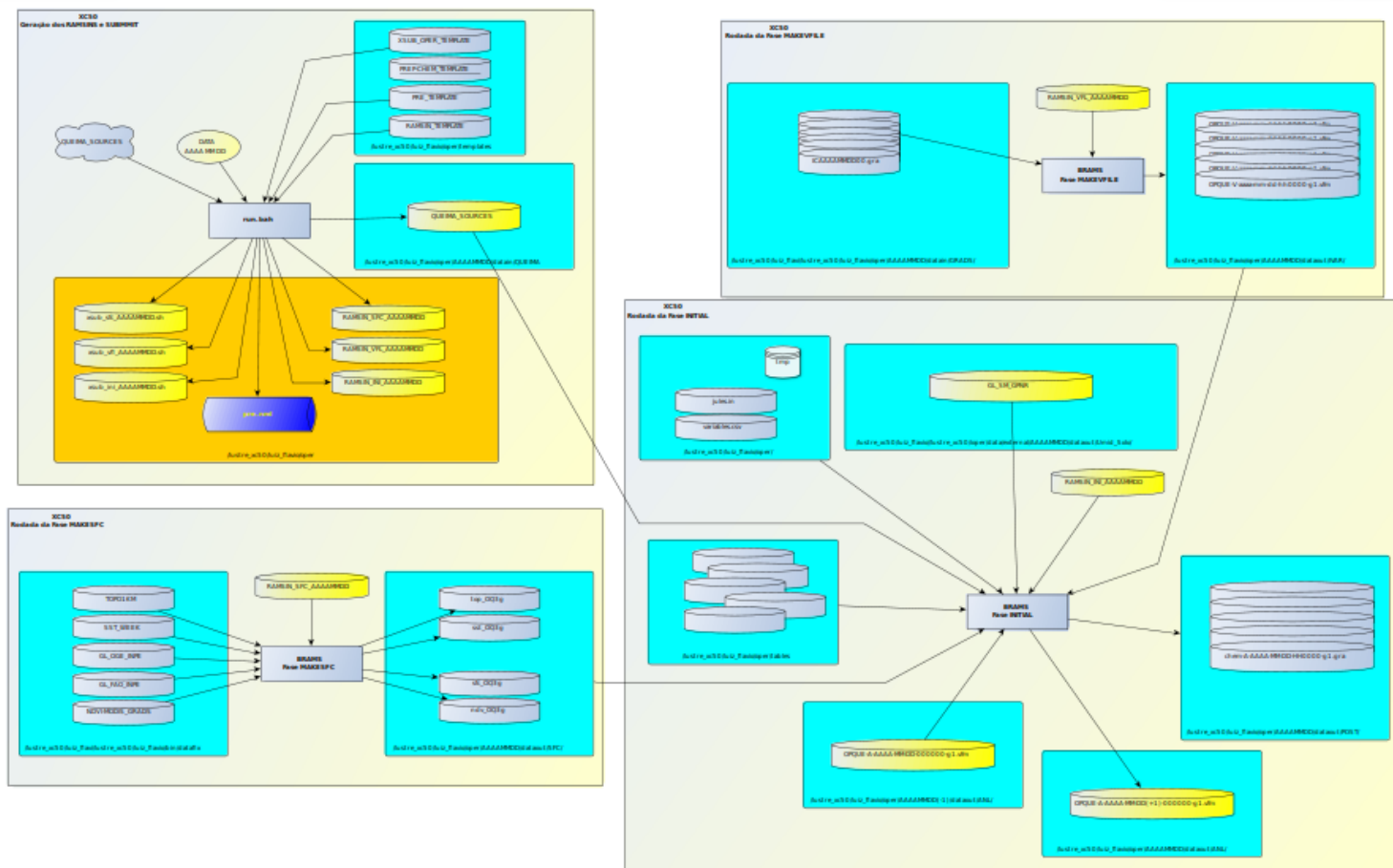
Luiz Flávio Rodrigues
Saulo Ribeiro de Freitas
Karla Maria Longo
Gabriel Pereira

Implementação Operacional no CPTEC

Scripts e Pré-Processamento



Fases do Modelo



Evolução entre Máquinas Tupa (XE6) e XC50 – Primeira tentativa Abr/20

	XE6	XC50
Modelo Versão	BRAMS 4.3	BRAMS 4.3 modificado para XC50 (Não compilava)
Compilador	Portland	Cray
Pre	Scripts Grads/Programa Fortran	Scripts Grads/Programa Fortran (fora do XC50)
CI/CC Meteorológico	GFS	GFS
CI Química/Aerossóis	MOCAGE	MOCAGE
Emissões	DSA, WABBA, MODIS, VIIRS	DSA, WABBA***, MODIS***, VIIRS
Pós Processamento	RAMPOST	Não foi testado
Dinâmica	LeapFrog + Walcek	LeapFrog + Walcek
Superfície	Leaf	Jules
Radiação	CARMA	CARMA
Microfísica	RAMS 6.0 CSU	Single Moment GT
Resolução	20 km	20 km
Processadores	1200/1800 (?)	800 (tentativa de manter os mesmos tempos)
Tempo para 3 dias	2h40/2h00(?)	2h49 (tentativa de manter os mesmos tempos)

*** - Muitos problemas para aquisição dos dados/Mudança de satélite e problemas de bibliotecas

Evolução entre Máquinas Tupa (XE6) e XC50 – Ação Final

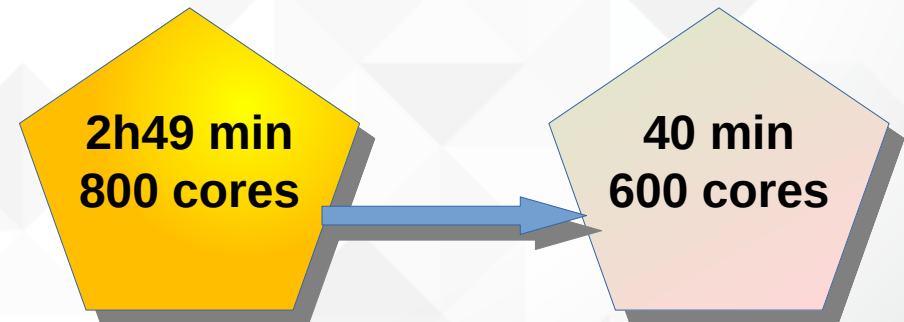
	XE6	XC50
Modelo Versão	BRAMS 4.3 (*)	BRAMS 5.6(*)
Compilador	Portland	Cray
Pre	Scripts Grads/Programa Fortran	Programa Fortran
CI/CC Meteorológico	GFS	GFS/GEOS5/ECMWF/BAM
CI Química/Aerossóis	MOCAGE	CAMS
Emissões	DSA, WABBA, MODIS, VIIRS	DSA, CAMS-GOES, METEOSAT, MODIS, VIIRS
Pós Processamento	RAMPOST	Nativo
Dinâmica	LeapFrog (o=2)	RK (O=5) + WALCEK
Superfície	Leaf	Jules
Radiação	CARMA	RRTMG (OPT)
Microfísica	Single Moment GT	Greg-Thompson
Resolução	20 km	15 km
Processadores	1200/1800	600
Tempo para 3 dias	2h40	35/40 min

* - NO XE6 haviam dois modelos BRAMS, ambiental=4.3 e para meteorológico=5.0. Agora os dois modelos foram unificados no 5.6.

Mudança de Resolução de 20 km para 15 km

Fatores de decisão

- Os dados de CI/CC CAMS estão com resolução de 25km
- Melhora das plumas com resolução maiores
- Unificação dos códigos computacionais
- Unificação futura das rodadas dos modelos ambiental e meteorológico
- Garantir qualidade dos dados
- Melhorar a performance
- Garantir estabilidade das rodadas
- Garantir redução do tempo de rodada



Avaliação Aerossóis

BRAMS x MERRA-2

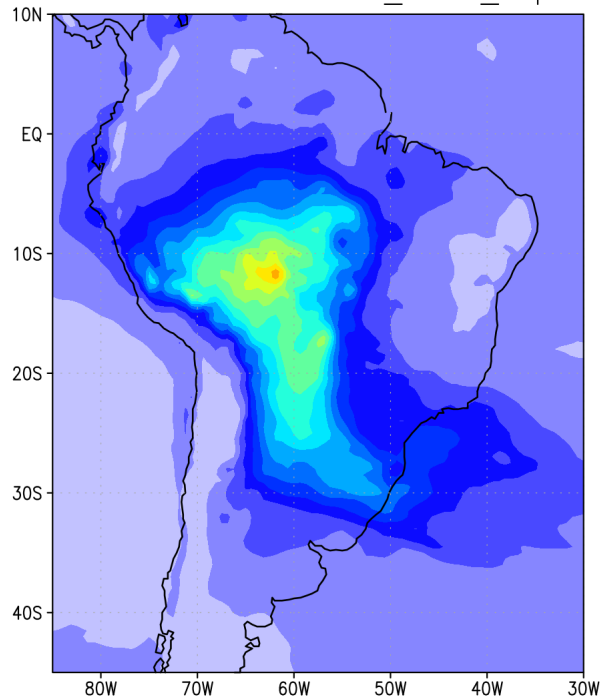
AOT 550nm – Set 2020

MERRA-2
50 km

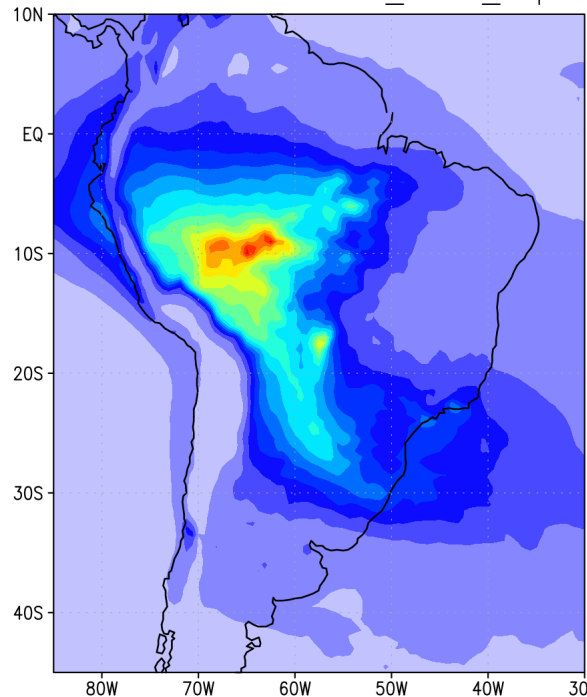
BRAMS
Regrid – 50 km

BRAMS
Original – 15 km

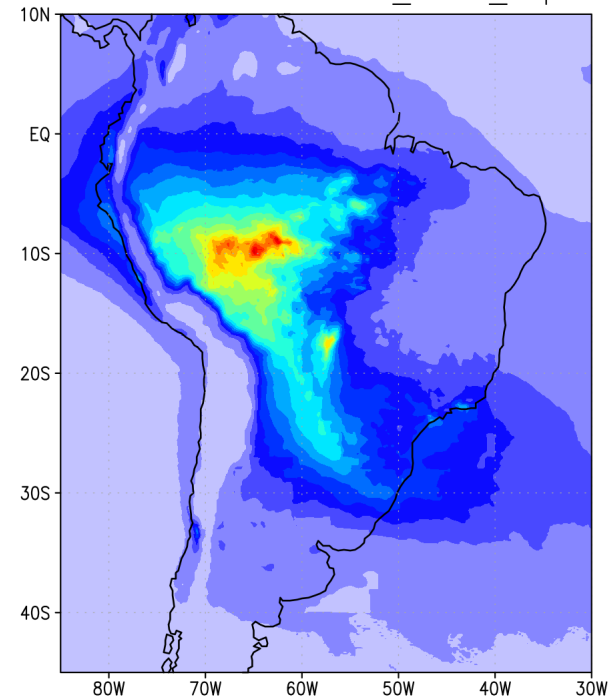
MERRA-AOT-550nm:_1-30_Sep



BRAMS-AOT-550nm:_1-30_Sep



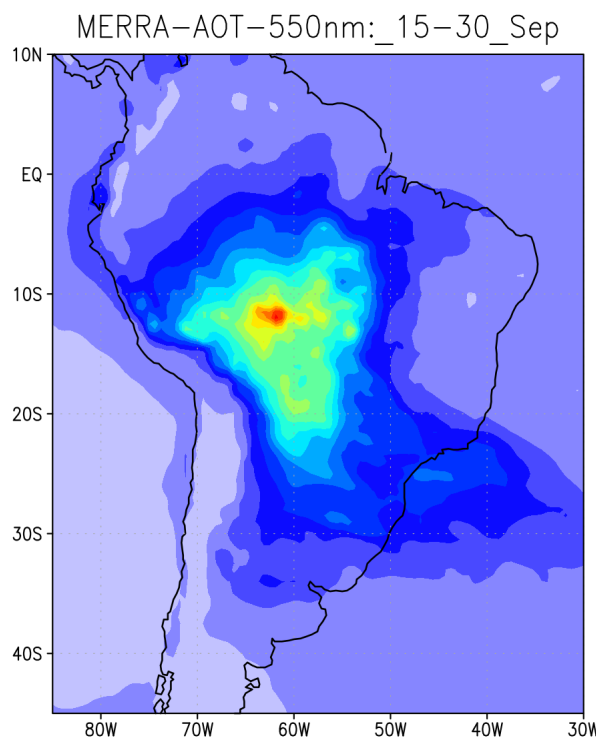
BRAMS-AOT-550nm:_1-30_Sep



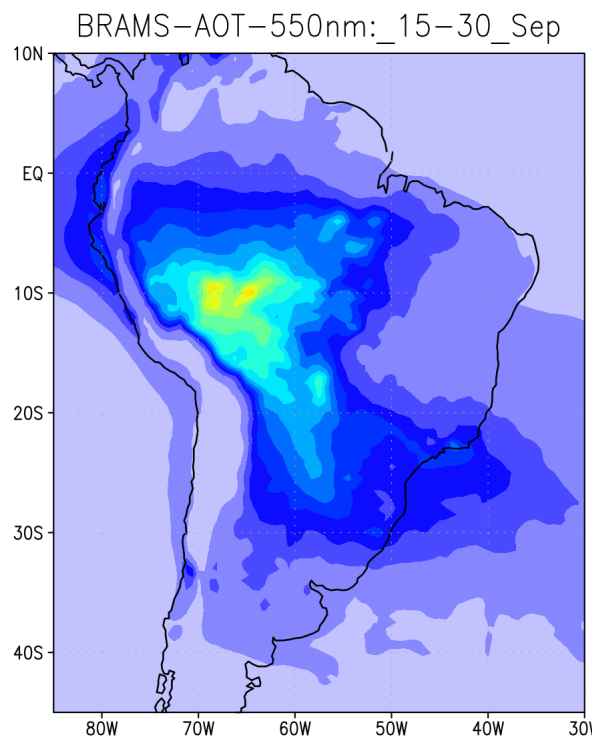
BRAMS x MERRA-2

AOT 550nm – 15-30 Set 2020

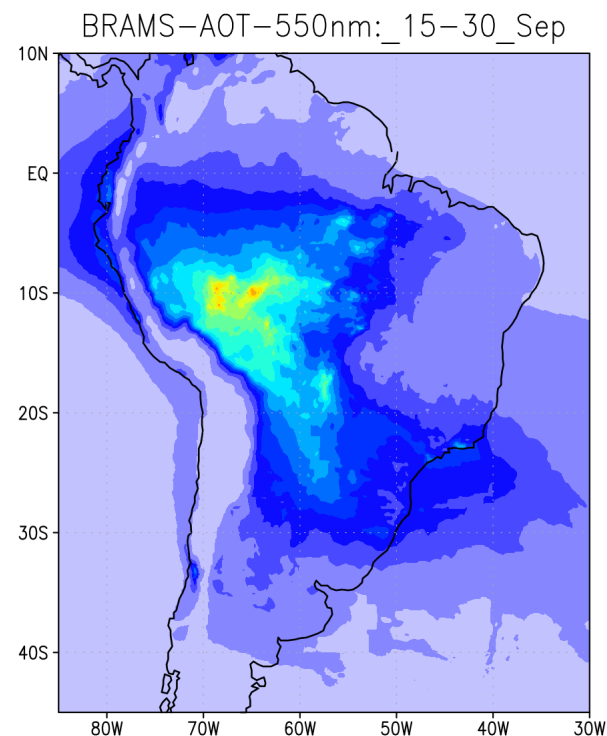
MERRA-2
50 km



BRAMS
Regrid – 50 km



BRAMS
Original – 15 km



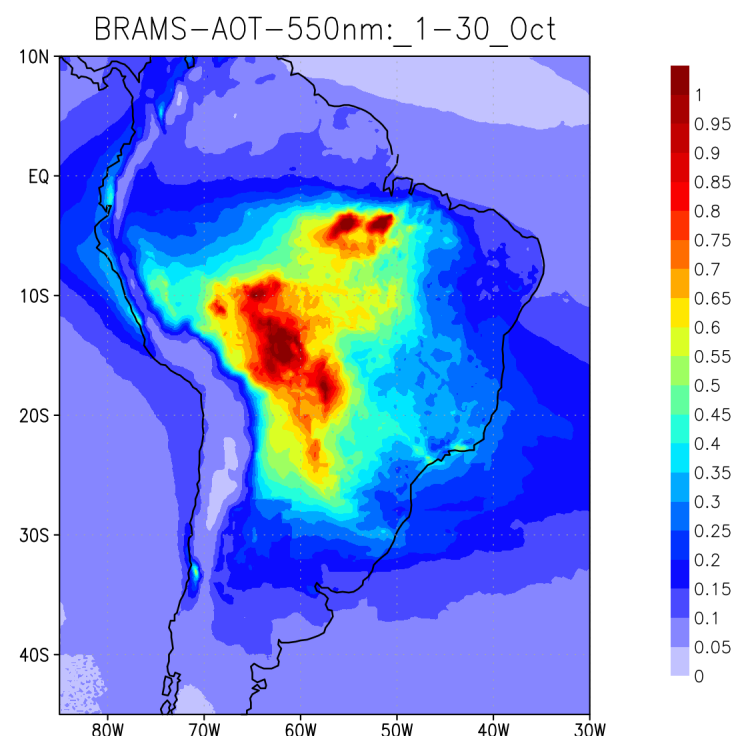
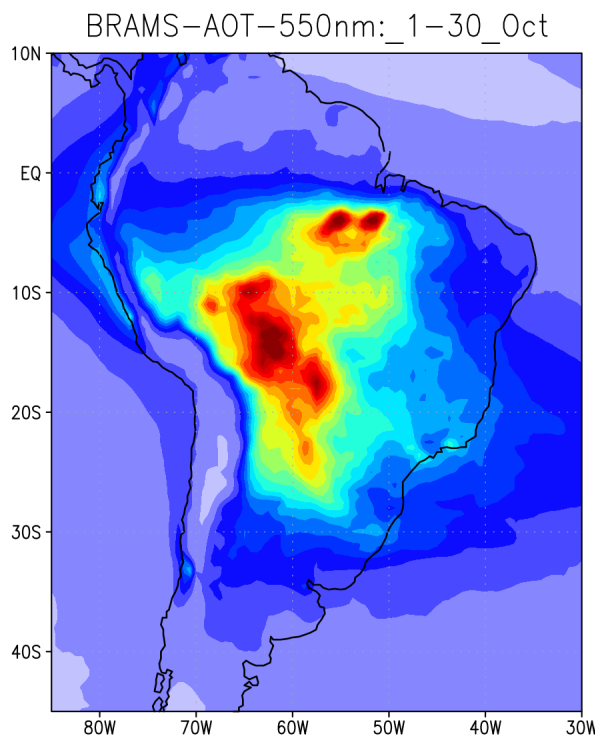
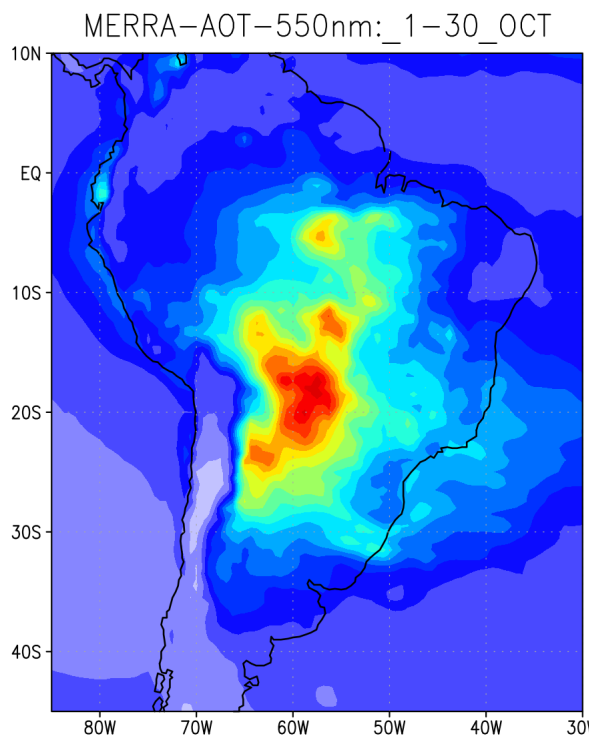
BRAMS x MERRA-2

AOT 550nm – Out 2020

MERRA-2
50 km

BRAMS
Regrid – 50 km

BRAMS
Original – 15 km



BRAMS x MERRA-2

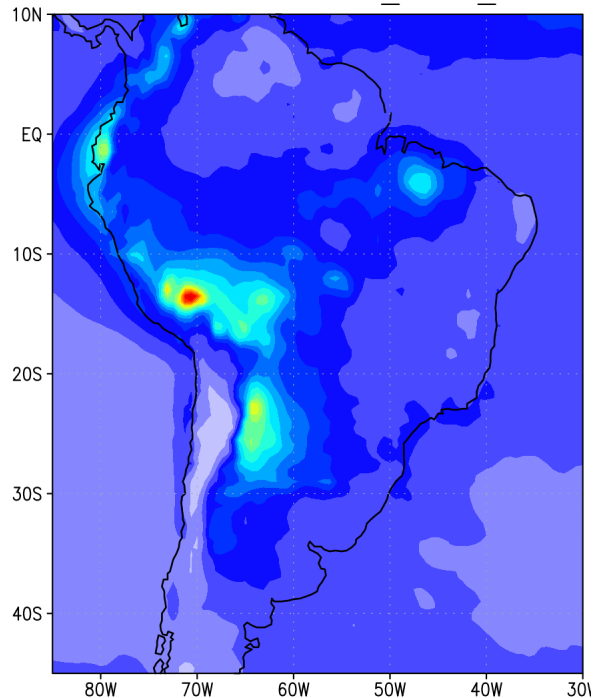
AOT 550nm – Nov
2020

MERRA-2
50 km

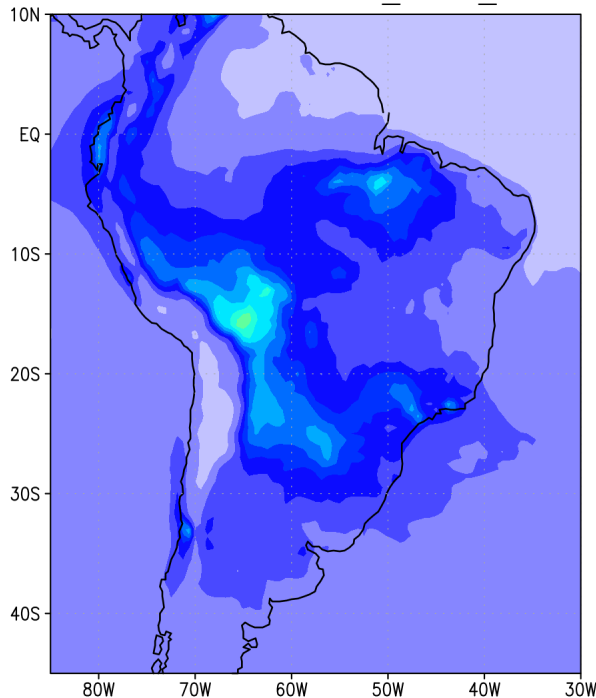
BRAMS
Regrid – 50 km

BRAMS
Original – 15 km

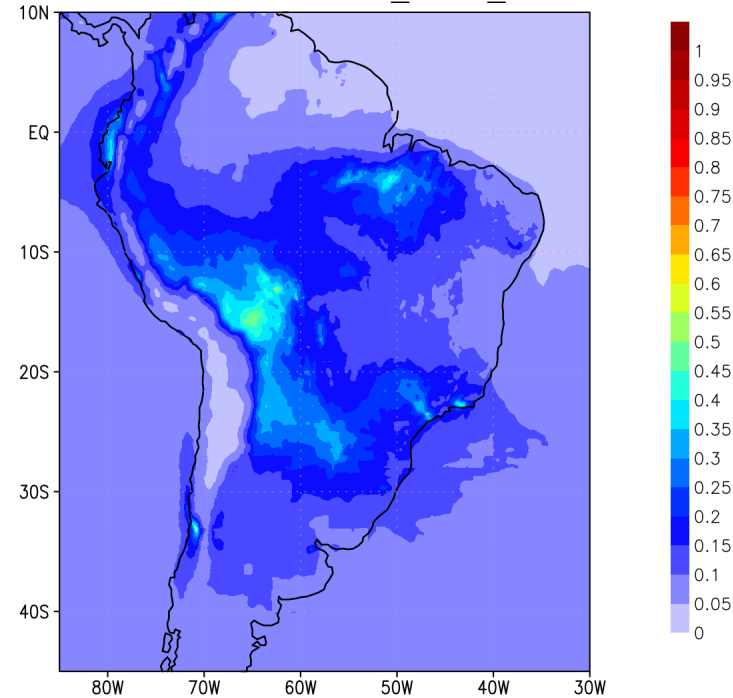
MERRA-AOT-550nm:_1-30_NOV



BRAMS-AOT-550nm:_1-30_Nov



BRAMS-AOT-550nm:_1-30_Nov



BRAMS x MERRA-2

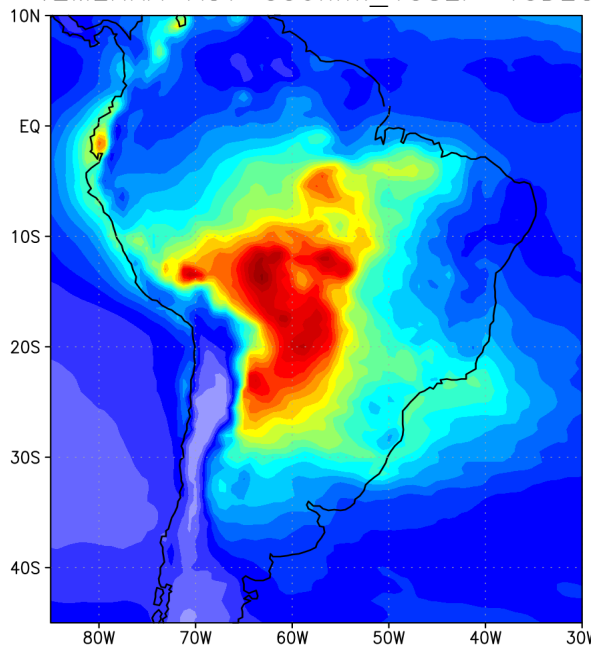
AOT 550nm – 15 Set – 16 Dez 2020

MERRA-2
50 km

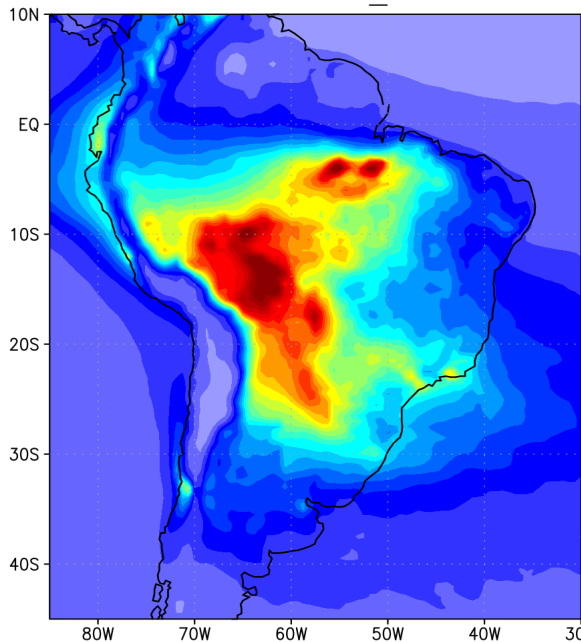
BRAMS
Regrid – 50 km

BRAMS
Original – 15 km

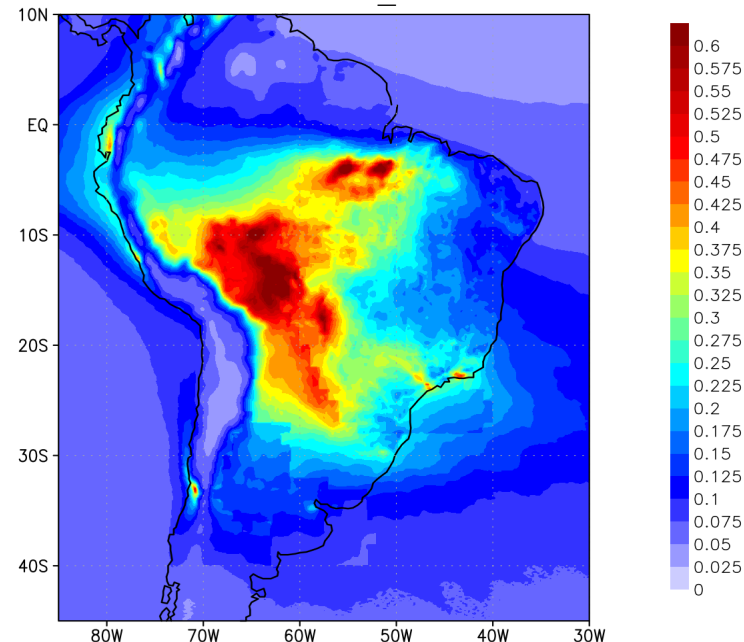
v2MERRA-AOT-550nm:_15SEP-15DEC



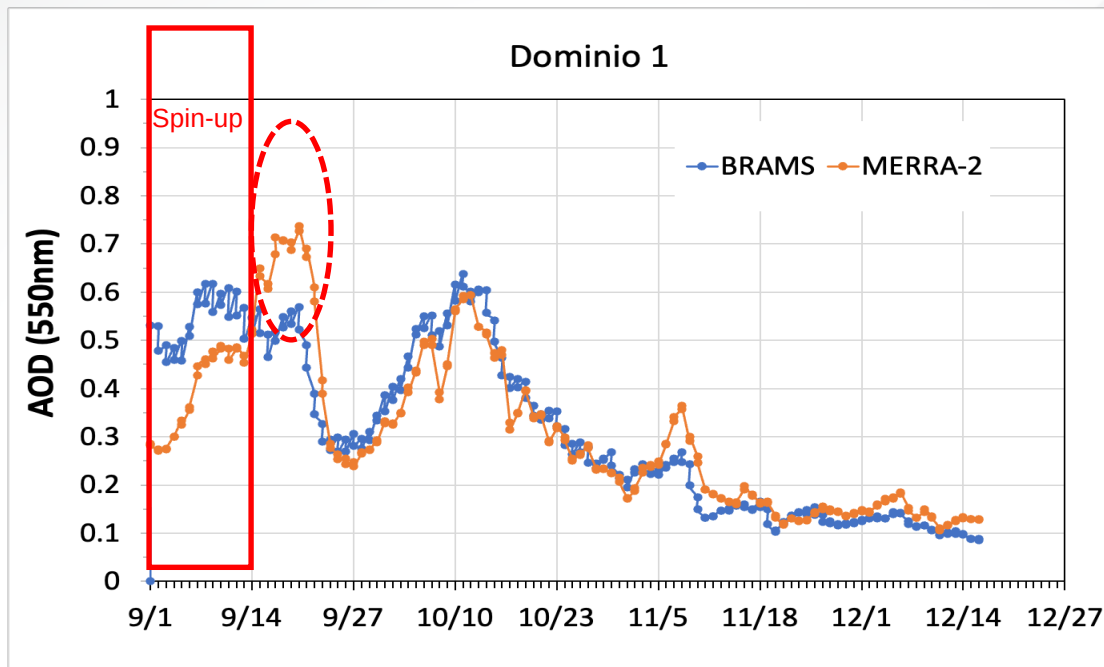
v2BRAMS-AOT-550nm:_15SEP-15DEC



v2BRAMS-AOT-550nm:_15SEP-15DEC

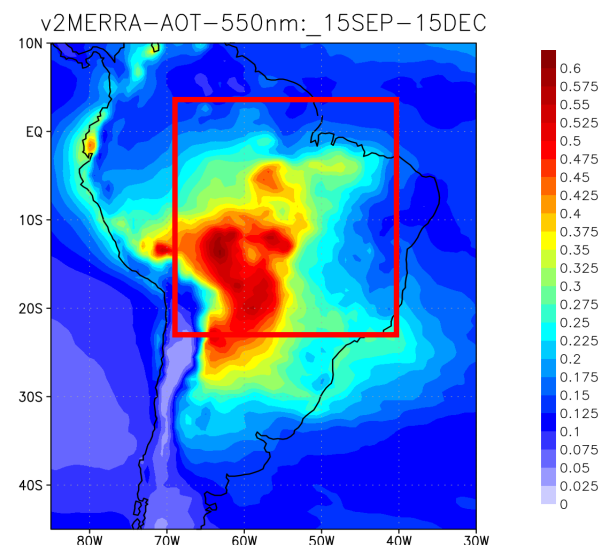


BRAMS x MERRA-2

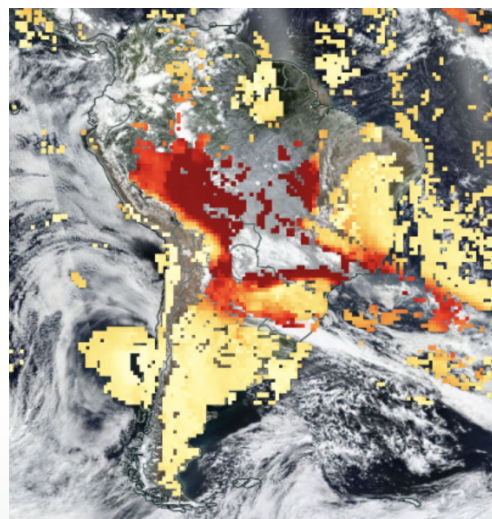
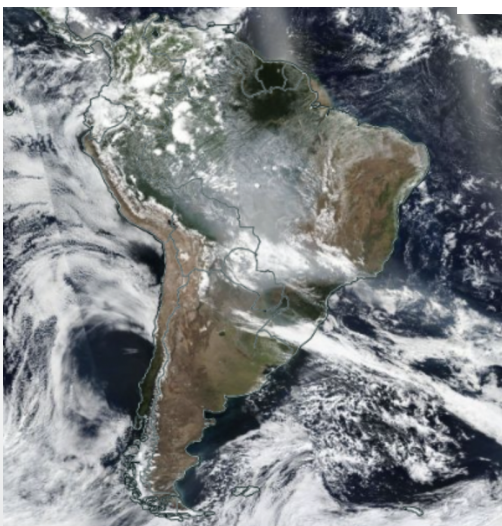


AOT 550nm – 15 Set – 16 Dez 2020

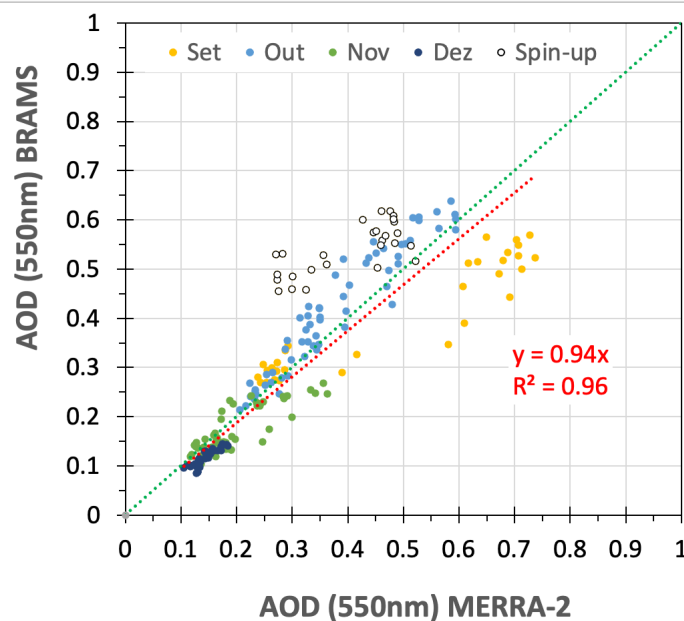
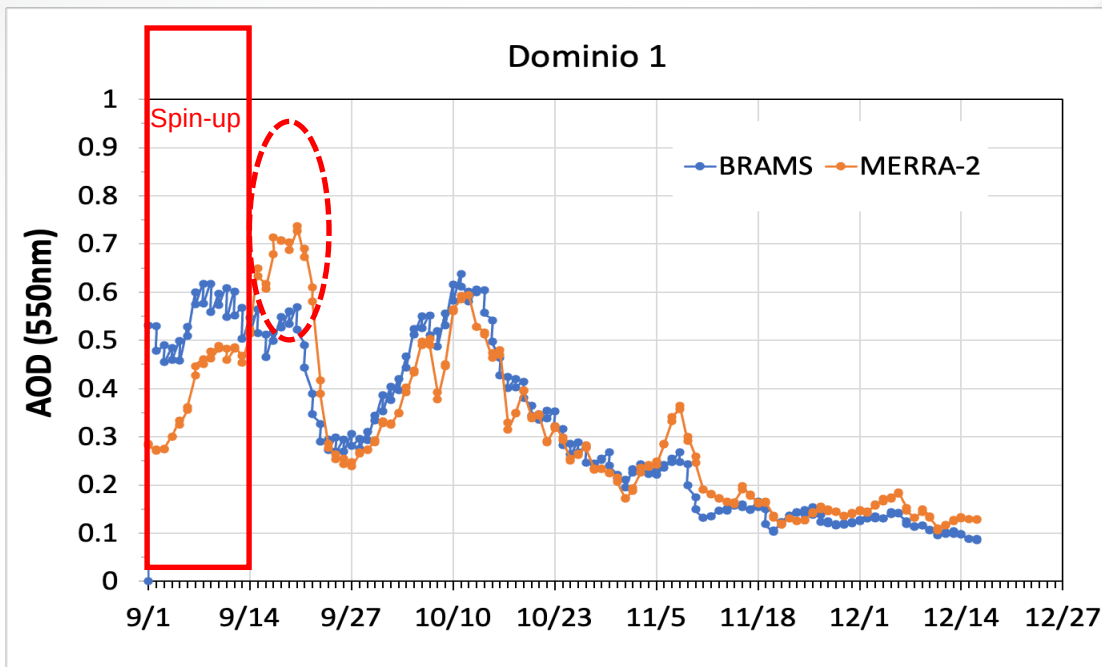
MERRA- 50 km



19/set

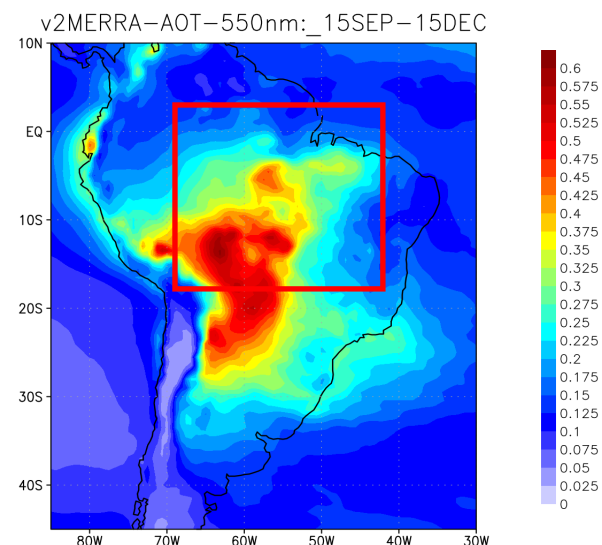


BRAMS x MERRA-2

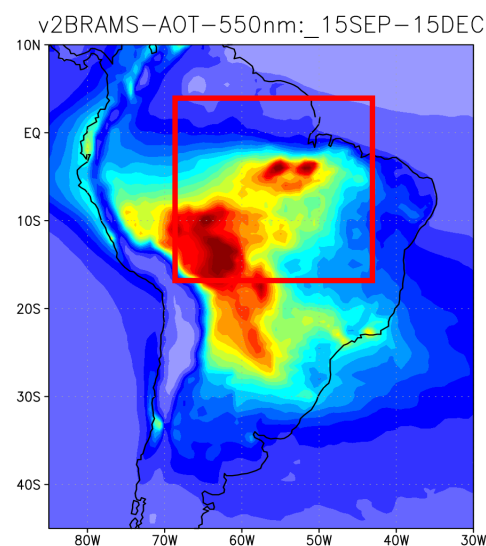


AOT 550nm – 15 Set – 16 Dez 2020

MERRA- 50 km



BRAMS – regrid 50 km



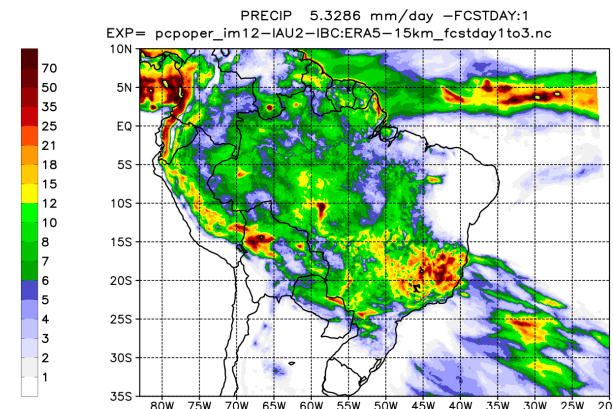
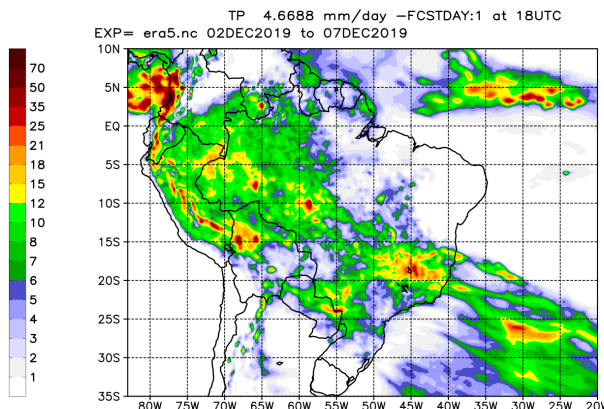
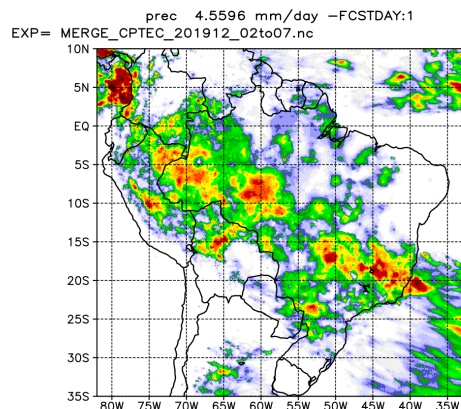
Avaliação Meteorologia

Precipitação Previsão 0-24h

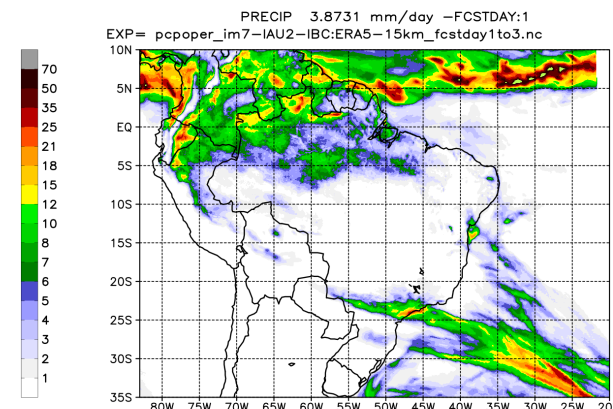
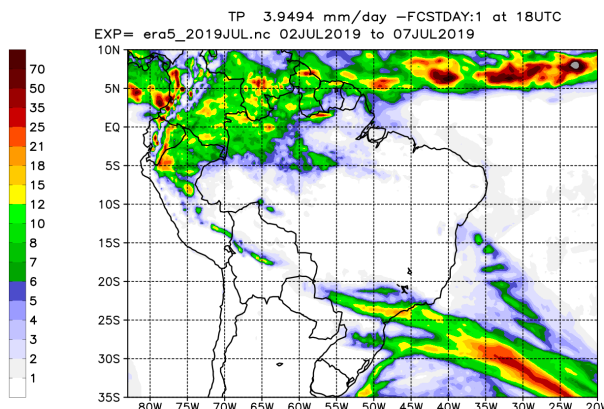
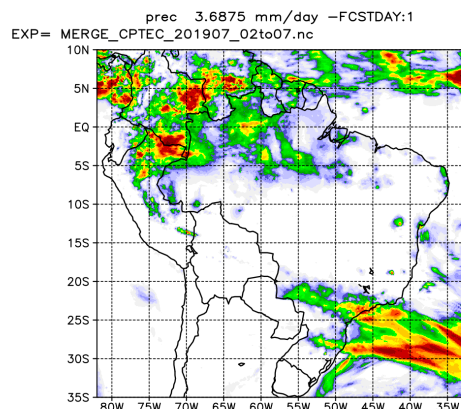
MERGE

ERA-5
BRAMS-8km

02-07 DEZ



02 - 07 JUL

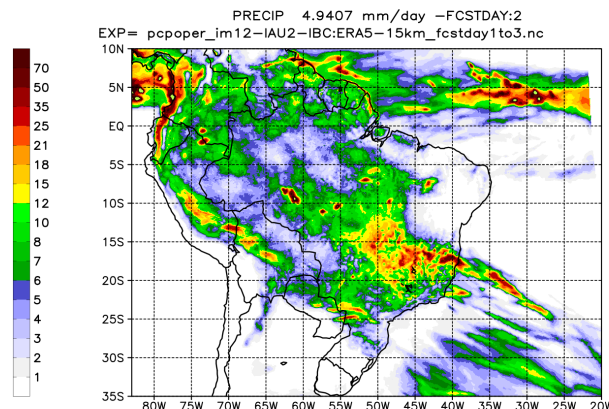
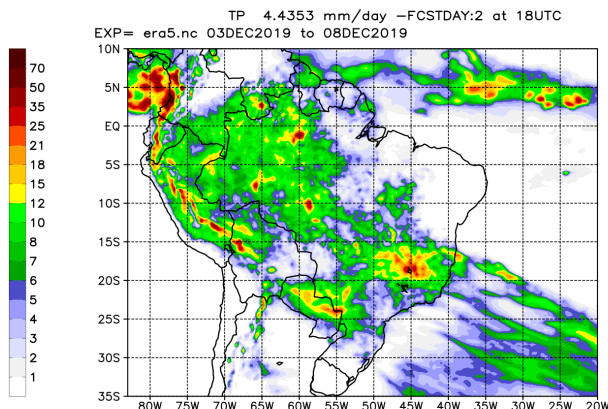
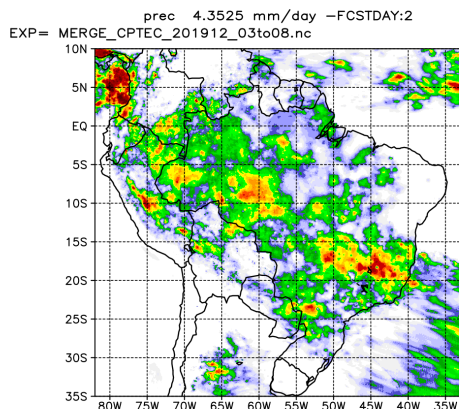


Precipitação Previsão 24-48h

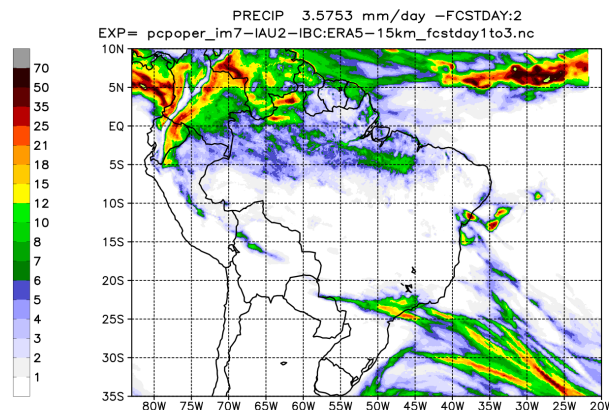
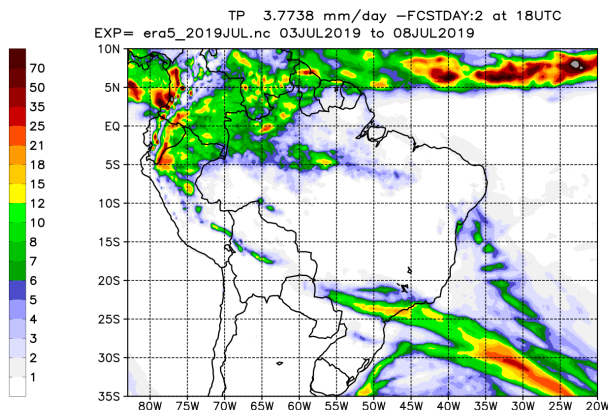
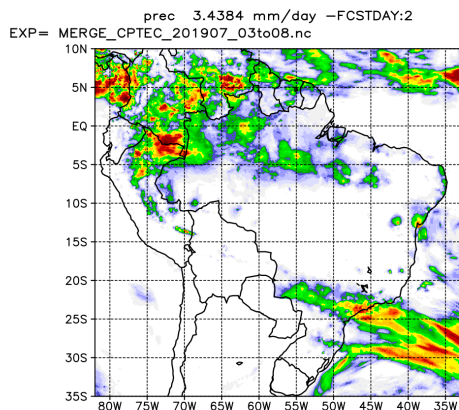
MERGE

ERA-5
BRAMS-8km

03-08 DEZ



03-08 JUL

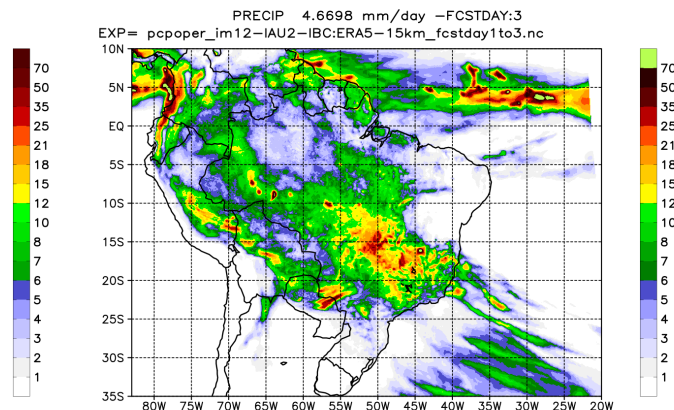
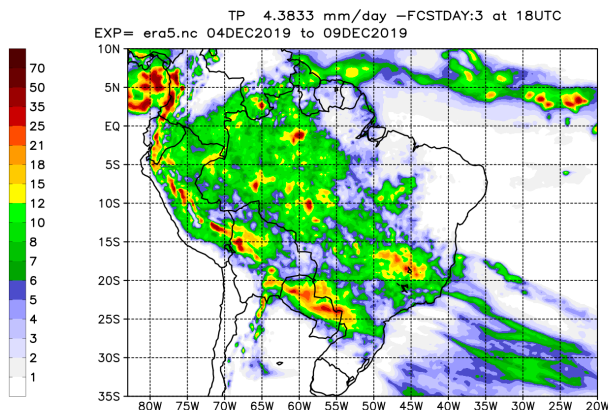
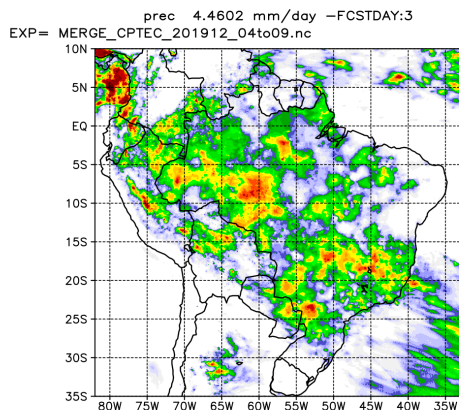


Precipitação Previsão 48-72h

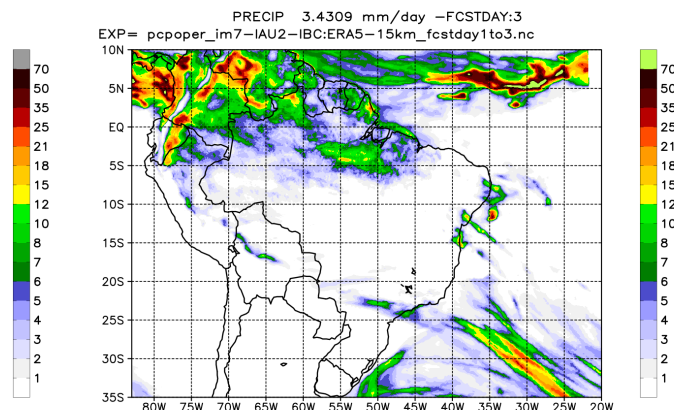
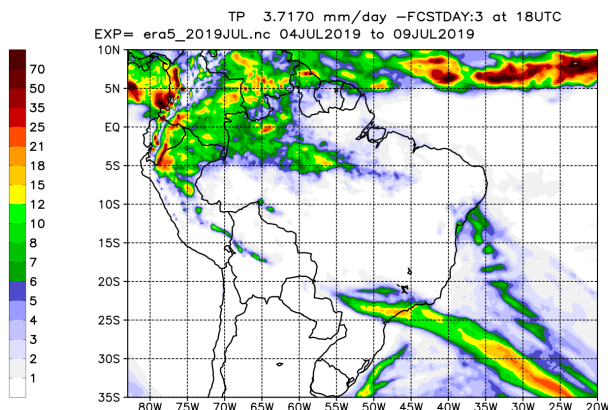
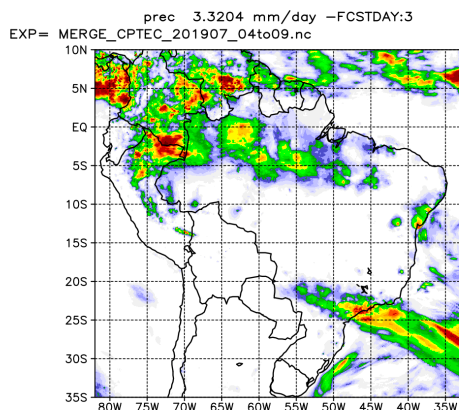
MERGE

ERA-5
BRAMS-8km

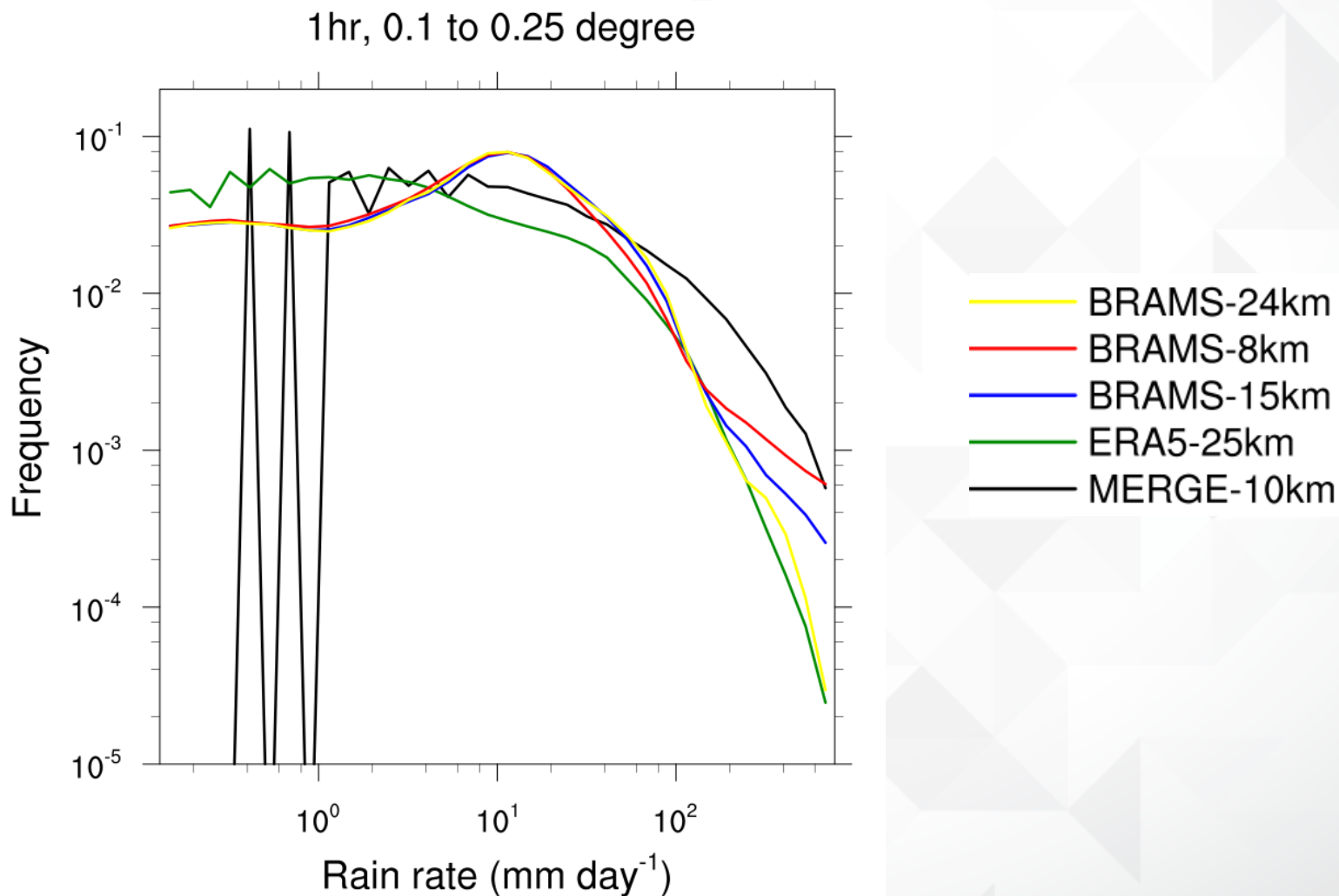
04 - 09
DEZ



04 - 09
JUL



Histograma de Precipitação Previsão 0-24h

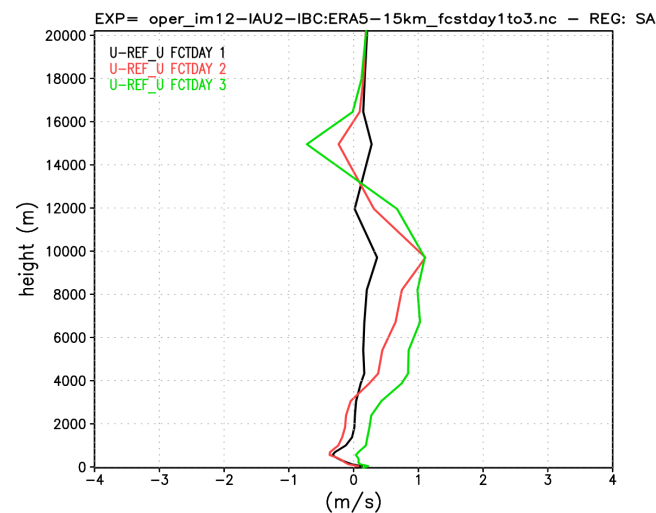
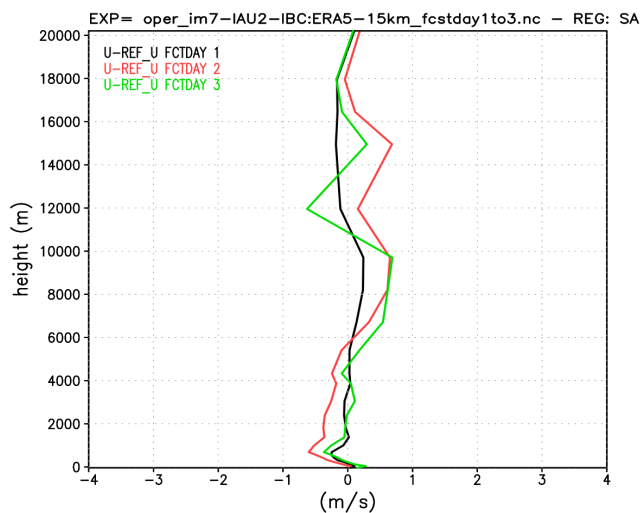


Viés médio do vento horizontal

Julho

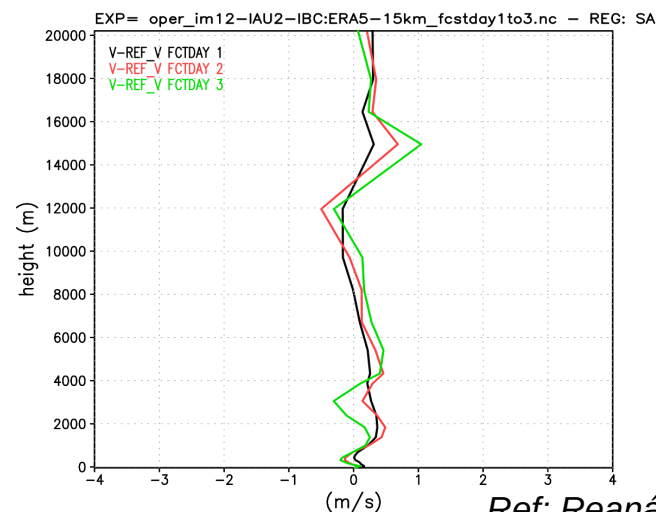
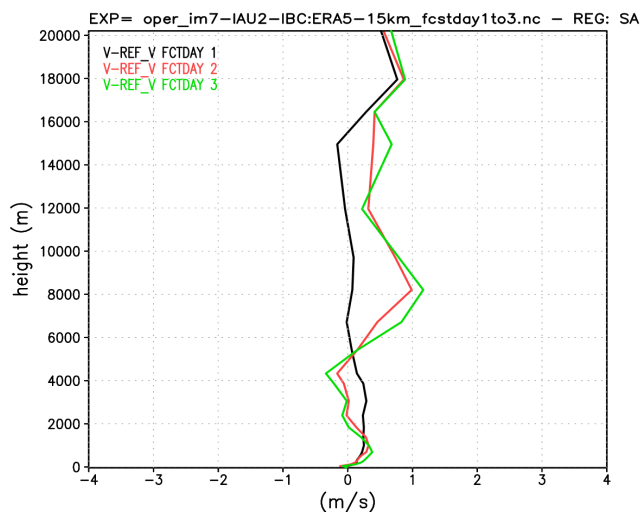
Dezembro

Componente U



FCT DAY 1
FCT DAY 2
FCT DAY 3

Componente V



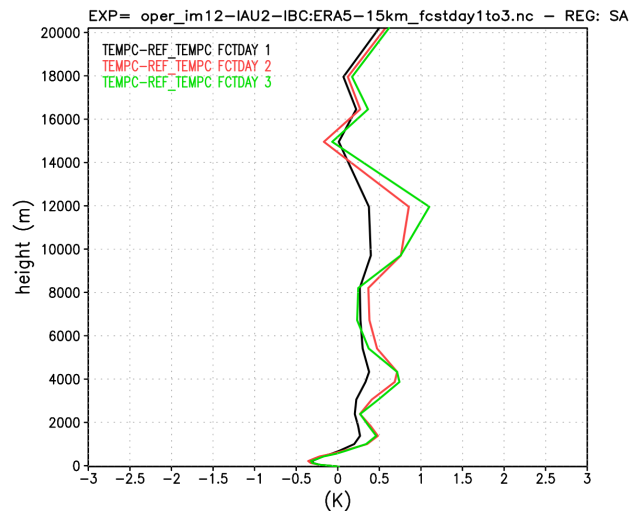
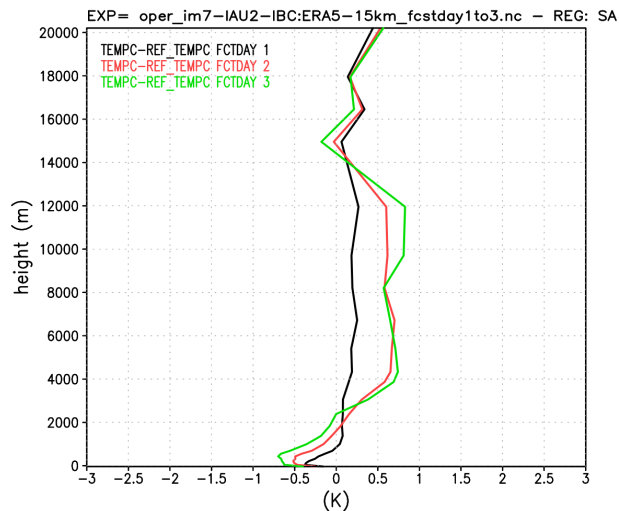
Ref: Reanálises ERA5 / ECMWF

Viés médio da temperatura e razão de mistura do vapor de água

Julho

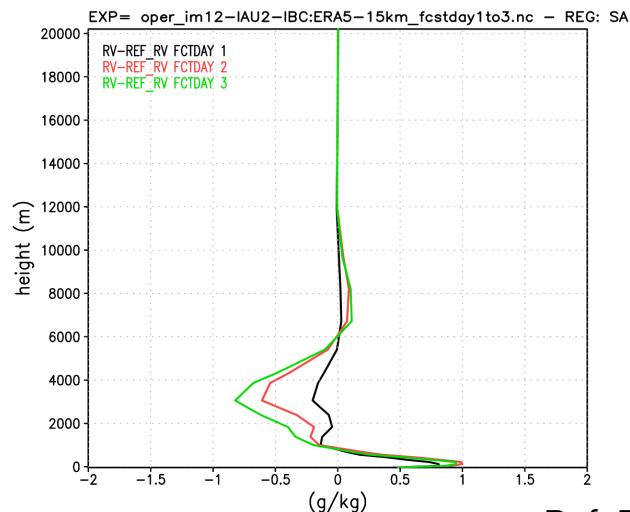
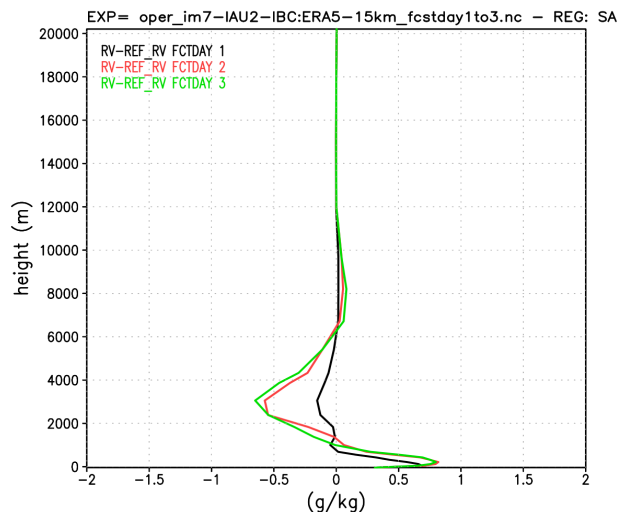
Dezembro

Temperatura



FCT DAY 1
FCT DAY 2
FCT DAY 3

Qv



Desenvolvimentos em andamento

- Modelo de aerossóis MATRIX
- Acoplamento do MATRIX com microfísica de 2 momentos
- (Thompson's com aerossóis *water-friendly* e *ice-friendly*)
- Emissões de queimadas FRP
- Atualização das emissões antrópicas
- Atualização do mapa de propriedades ópticas dos aerossóis, com inclusão de dados de 40 sites da AERONET
- Assimilação de dados
- Limpeza completa do código
- Refatoração do código
- Otimização
- Revisão 5.7





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