Assessment of RegCM4.3 over the CORDEX South America Domain

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Simulation Design

Domain: Cordex

Grid Points: 202 latitudes x 192 longitudes
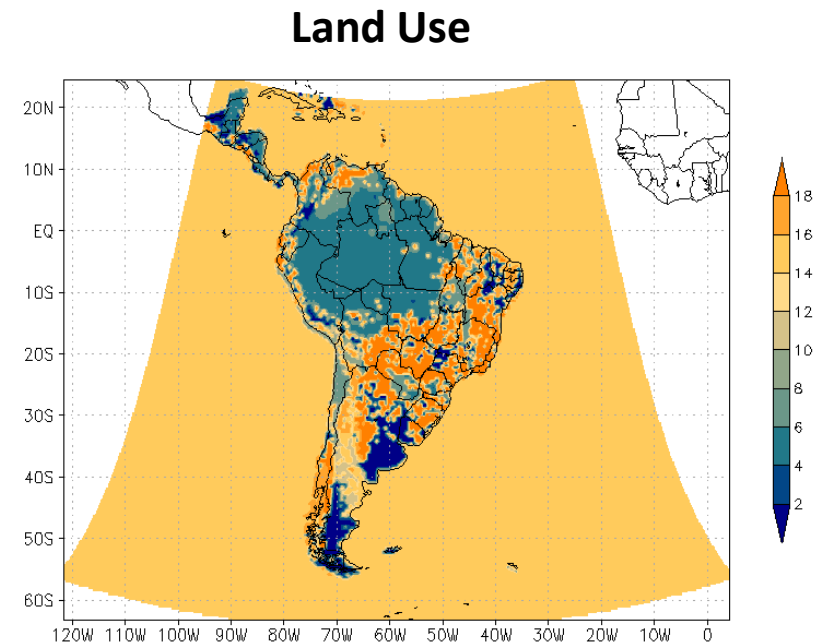
Projection: Rotated Mercator

Horizontal Resolution: 50 km

Vertical Levels: 18

Boundary Conditions: ERA-Interim and OI Weekly

Period: 01/01/1990 – 01/01/1994 (4 yrs)

Ocean Fluxes: Zeng et al. (1998)

Land Use

Time Parameters		
dtrad	=	30
dtabem	=	18
dtsrf	=	900
dt	=	100

Experiments	Physics Schemes		
	Surface Scheme	Boundary Layer	Cumulus Convection
exp_CTRL	BATS	Holtslag (1990) Ibltyp=1	Grell over land and Emanuel over ocean icup=99
exp_Tiedtke	BATS	Holtslag (1990) Ibltyp=1	Tiedtke (1986) icup=5 Modifications: entrpen = 1.0D-4 to 0.5D-4 cmtcape = 40.0D0 to 20.0D0 ctrigger = -1.1D01
exp_BM	BATS	Holtslag (1990) Ibltyp=1	Betts-Miller (1986) icup = 4
exp_MIT	BATS	Holtslag (1990) Ibltyp=1	Emanuel (1991) icup=4 Modification elcrit = 0.011D0 to 0.00011D0, coeffr = 1.0D0 to 2.0D0
exp_PBL	BATS	UW PBL (Bretherton and McCaa, 2004): Ibltyp=2 Modification atwo=15.0D0 to atwo=10.0D0	Grell over land and Emanuel over ocean icup=99
exp_PBL_MIT	BATS	UW PBL (Bretherton and McCaa, 2004): Ibltyp=2 Modification atwo=15.0D0 to atwo=10.0D0	Emanuel (1991) icup=4
exp_CLM	CLM	Holtslag (1990) Ibltyp=1	Grell over land and Emanuel over ocean icup=99
exp_CLM_MIT	CLM	Holtslag (1990) Ibltyp=1	Emanuel (1991) icup=4 Without modifications

We are doing 8 experiments.

Two are still running.

Experiments	Physics Schemes		
	Surface Scheme	Boundary Layer	Cumulus Convection
exp_CTRL 👍	BATS	Holtslag (1990) Ibltyp=1	Grell over land and Emanuel over ocean icup=99

Previous studies showed that this configuration can represent the phase of the annual cycle; however there are dry biases.

Like Rosmeri's presentation.

To have a better simulation over SA we are testing other convective schemes.

Experiments	Physics Schemes		
	Surface Scheme	Boundary Layer	Cumulus Convection
exp_CTRL	BATS	Holtslag (1990) Ibltyp=1	Grell over land and Emanuel over ocean icup=99
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exp_MIT	BATS	Holtslag (1990) Ibltyp=1	Emanuel (1991) icup=4 Modification elcrit = 0.011D0 to 0.00011D0, coeffr = 1.0D0 to 2.0D0

Experiments	Physics Schemes			
	Surface Scheme	Boundary Layer	Ocean Fluxes	Cumulus Convection

To understand the impact of UW PBL scheme in the climate (stratus clouds in the coast of Peru/Chile).
(Holstlag et al (1990) – does not simulated this feature)

exp_PBL 👍	BATS	UW PBL (Bretherton and McCaa, 2004): lbltyp=2 Modification atwo=15.0D0 to atwo=10.0D0	Zeng et al. (1998) iocnflx=2	Grell over land and Emanuel over ocean icup=99
exp_PBL_MIT 👍	BATS	UW PBL (Bretherton and McCaa, 2004): lbltyp=2 Modification atwo=15.0D0 to atwo=10.0D0	Zeng et al. (1998) iocnflx=2	Emanuel (1991) icup=4

Experiments	Physics Schemes		
	Surface Scheme	Boundary Layer	Cumulus Convection

Mixed convection (Grell=land, MIT=ocean) with BATS scheme underestimate the precipitation over the tropics.
So we are testing the coupling between CLM and convective schemes and their impacts over SA precipitation.

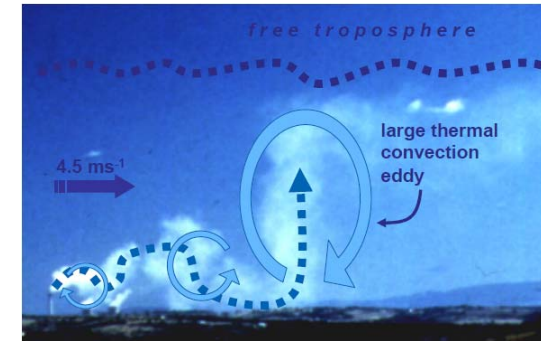| Experiments	Surface Scheme	Boundary Layer	Cumulus Convection
exp_CLM 👍	CLM	Holtslag (1990) Ibltyp=1	Grell over land and Emanuel over ocean icup=99
exp_CLM_MIT 👍	CLM	Holtslag (1990) Ibltyp=1	Emanuel (1991) icup=4 Without modifications

Experiments Comparisons

Convection

- Exp_CTRL
- Exp_Tiedtke
- Exp_MIT
- Exp_BM

Land Surface

- Exp_CTRL
- Exp_CLM
- Exp_CLM_MIT

PBL

- Exp_CTRL
- Exp_PBL
- Exp_PBL_MIT

Preliminary Design of Analysis

Variables to be analyzed
air temperature
precipitation

Spatial patterns
DJF and JJA maps

Box Averages
Annual Cycle
Time Series