





Attribution Analysis of Southwestward Shift of the South Atlantic Convergence Zone-related precipitation during the last decades

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Acknowledgments:

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Conselho Nacional de Desenvolvimento

Científico e Tecnológico







# **INTRODUCTION AND MOTIVATION**



Diaz and Vera 2017)



↓ precipitation and number of rainy days (Zilli et al. 2018)

- Eastern Brazil ↑ Intensity and frequency of extreme events (Zilli et al 2018)
  - Discrepancies among CMIP5 projections
  - $\square$   $\uparrow$  precipitation
  - Correctly reproduced climate models'
  - historical scenarios (Vera et al. 2006; Chou et al. 2014a, b)
  - Attributed to anthropogenic-related
    - forcing (Zhang et al. 2016; Diaz and Vera 2017)

#### CHANGES IN SACZ LOCATION AND INTENSITY

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# **INTRODUCTION AND MOTIVATION**



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### DATA AND METHODOLOGY



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# **CLIMATOLOGY AND TRENDS**



2.00 1.75 1.50 1.25 1.00 0.75 0.50 0.25 0.00 0.25 0.50 0.75 1.00 1.25 1.50 1.75 2.00 Standard Deviation

# **CLIMATOLOGY AND TRENDS**

**GPCP** 





-1.0 -0.8 -0.6 -0.4 -0.2 0.0 0.2 0.4 0.6 0.8 1.0

## **ATTRIBUTION ANALYSIS**



#### **ATTRIBUTION ANALYSIS**





NORTH	$\overline{PP}$	τ
GPCP	4.68	-0.22
HIST	4.81	-0.16
NAT	4.81	-0.12
ANTHROP	4.81	-0.04

RMSE		
NORTH	$\overline{PP}$	τ
HIST	0.31	1.03
NAT	0.32	1.03
ANTHROP	0.31	0.98



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#### **ATTRIBUTION ANALYSIS**

#### MMoM – NATURAL



RMSE		
SOUTH	$\overline{PP}$	τ
HIST	0.45	1.12
NAT	0.48	0.98
ANTHROP	0.46	1.13



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# FINAL REMARKS

SACZ climatology → 4 out of 17 CMIP5 models

- SACZ trends  $\rightarrow$  2 out of 17 models
- Multi-model mean trend:
  - ▶  $\downarrow$  (↑) precipitation over EBr (SESA)
  - SACZ North: contribution from NAT and ANTHROP
  - SACZ South: ANTHROP forcing offset by NAT
- Discrepancy in simulated precipitation -> models do not correctly represent mechanisms related to the SACZ



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# FUTURE DEVELOPMENTS

- "Tropical-extratropical cloud bands over South America" project under CCSP-Brazil partnership headed by Neil Hart at the University of Oxford (neil.hart@ouce.ox.ac.uk)
- Do partner-institute climate models simulate these dynamics? (BESM, Hadley Models, Hi-Resolution simulations)
- What are the implications of this change on the synoptic-scale weather systems?
- How does this change into the future?
- What role will potential drying of the tropical Amazon have on this mean state?
- How does this modify rainfall in subtropical Brazil?



# **OBRIGADA**

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