CPTEC
Centro de Previsão de Tempo e Estudos Climáticos

MINISTÉRIO DA CIÊNCIA E TECNOLOGIA
INSTITUTO NACIONAL DE PESQUISAS ESPACIAIS

REUNIÃO BRAMS 2016

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Grupo de Modelagem da Atmosfera e Interfaces

Cachoeira Paulista
Agosto de 2016

SUMÁRIO

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2. ETAPAS EM ANDAMENTO

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1. ETAPAS CONCLUÍDAS

Participação no projeto:

"**Evaluating aerosols impacts on Numerical Weather Prediction" (WMO/WGNE)** ✓

Saulo Freitas; Maurício Zarzur; Valter Oliveira; Denis Eiras

Início do Doutorado 2015.2

- Créditos requeridos pela instituição ✓
- Exame de qualificação ✓

Evaluating aerosols impacts on Numerical Weather

- This project aims to improve our understanding about the following questions:

- How important are aerosols for predicting the physical system (NWP, seasonal, climate) as distinct from predicting the aerosols themselves?

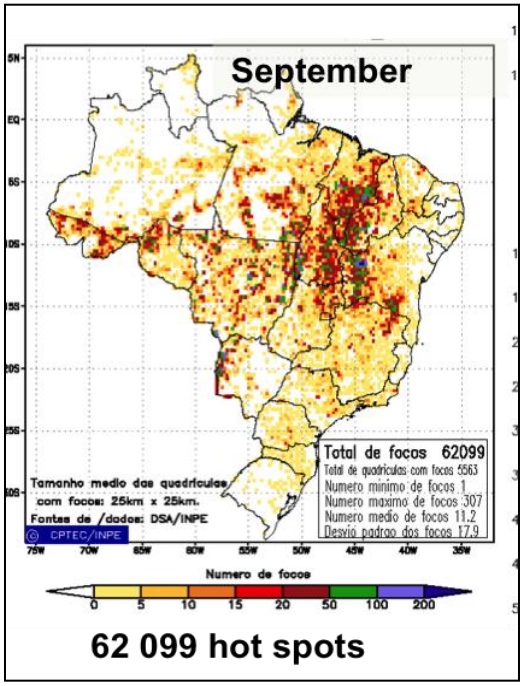
- How important is atmospheric model quality for air quality forecasting?

- What are the current capabilities of NWP models to simulate aerosol impacts on weather prediction?

Case Studies

1) Dust over Egypt: 4/2012

2) Pollution in China: 1/2013



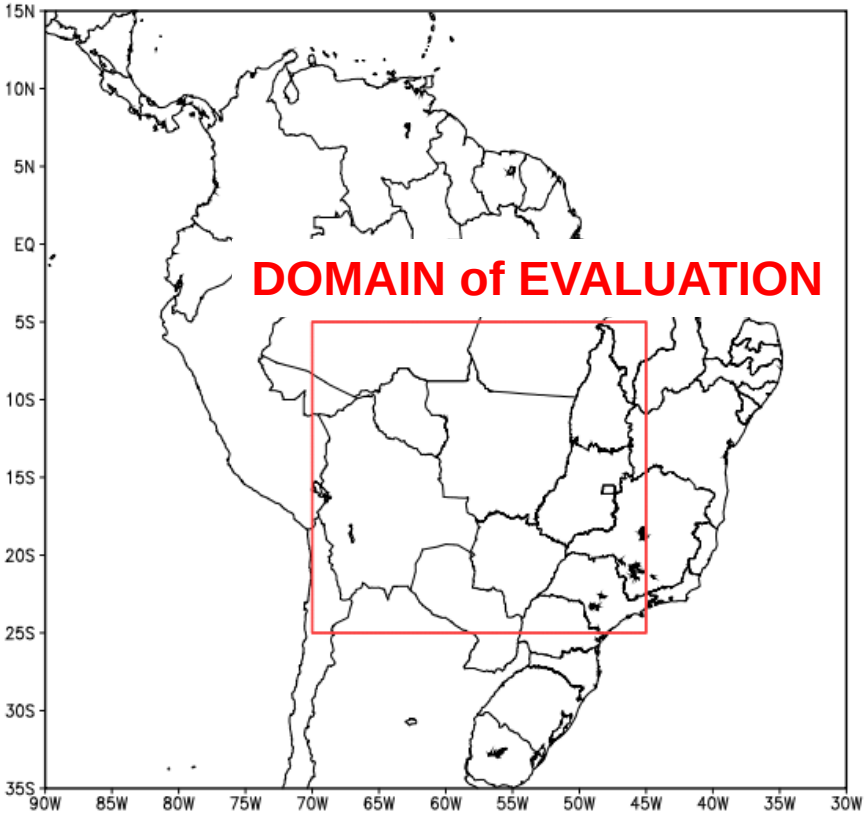
3) Smoke in Brazil: 9/2012

Participants

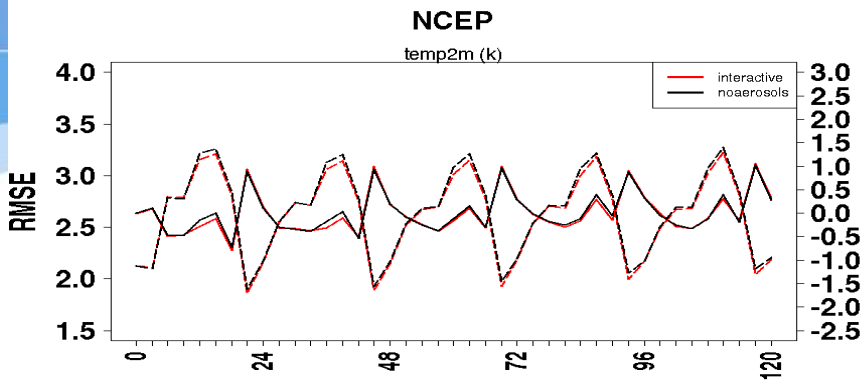
Participants	Case 1	Case 2	Case 3	Type of model	**Status of the data**	**People Involved**
CPTEC			**X**	**R**	aerosol direct effect only	Saulo Freitas, Mauricio Zarzur, Julliana Larise
JMA	**X**	**X**	**X**	**G**	ind, dir, ind+dir, no-aer	Taichu Tanaka, Chiasi Muroi
ECMWF	**X**	**X**	**X**	**G**	(aerosol direct effect only	Angela Benedetti, Samuel Remy, Jean-Noel Thepaut
Météo-France/Met. Serv. Algeria	**X**			**R**	aerosol direct effect only	Morad Mokhtari, Bouyssel Francois
ESRL/NOAA		**X**	**X**	**R**	aerosol direct and indirect effect only	Georg Grell
NASA/Goddard	**X**	**X**	**X**	**G**	(direct effect only)	Arlindo da Silva
NCEP	**X**			**G**	(direct effect only)	Sarah Lu, Yu-Tai Hou, Shrinivas Moorthi, and Fanglin Yang
Barcelona Super. Ctr.	**X**			**R**	(aerosol direct effect only)	Oriol Jorba Casellas

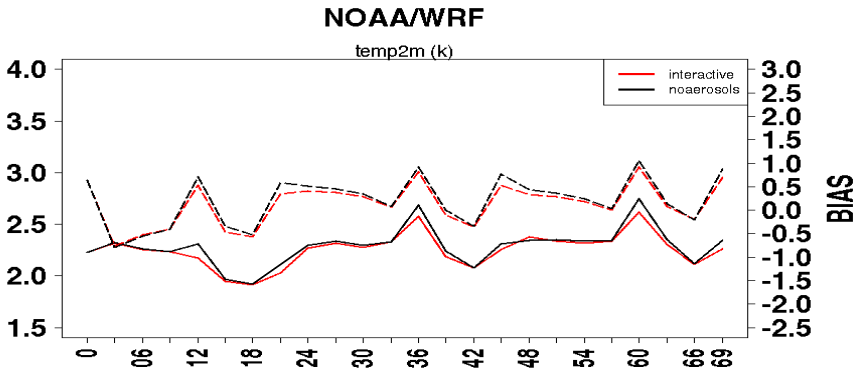
Case 1 – Smoke in Brazil
Quantitative evaluation for the SAMBBA case

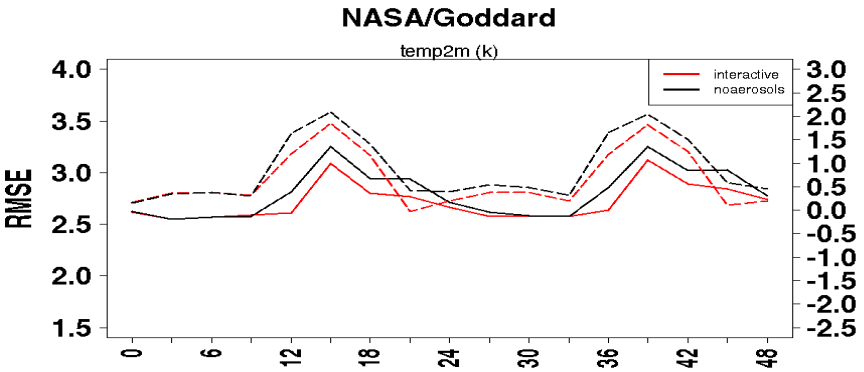
- Parameters:
  - 2-meter temperature.
  - 10-meter wind (mag and direction)
  - rainfall
- Observational data: meteo surface stations over S. America
- Evaluated time period: 5 – 14 SEP, up to 240-hour forecast.

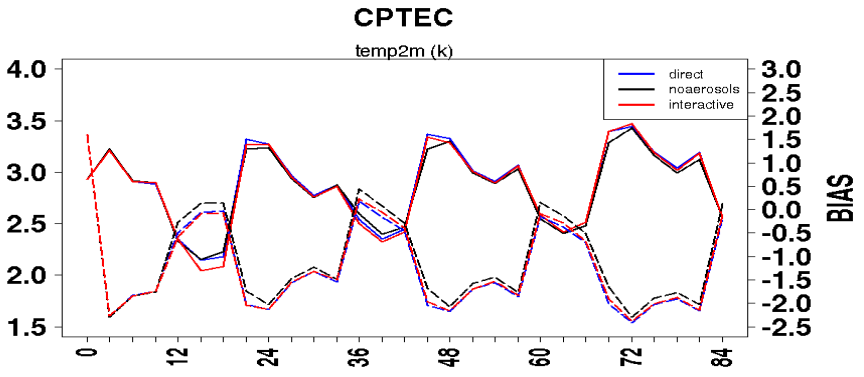


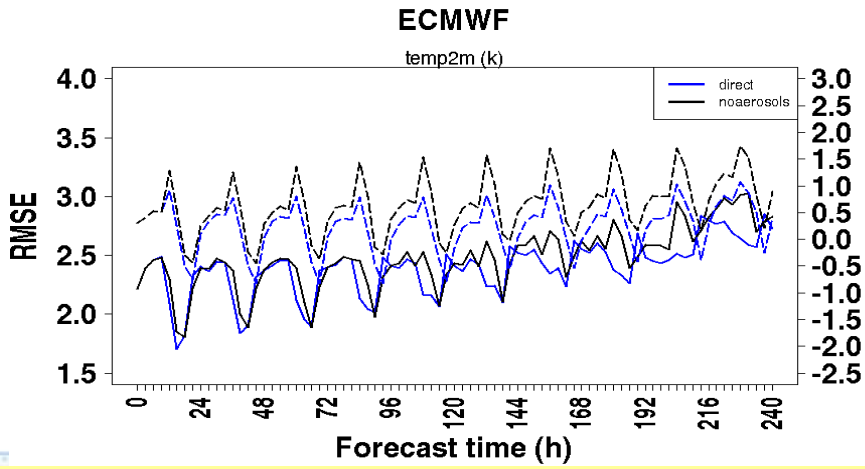
RMSE/BIAS: 2-m Temperature (K)

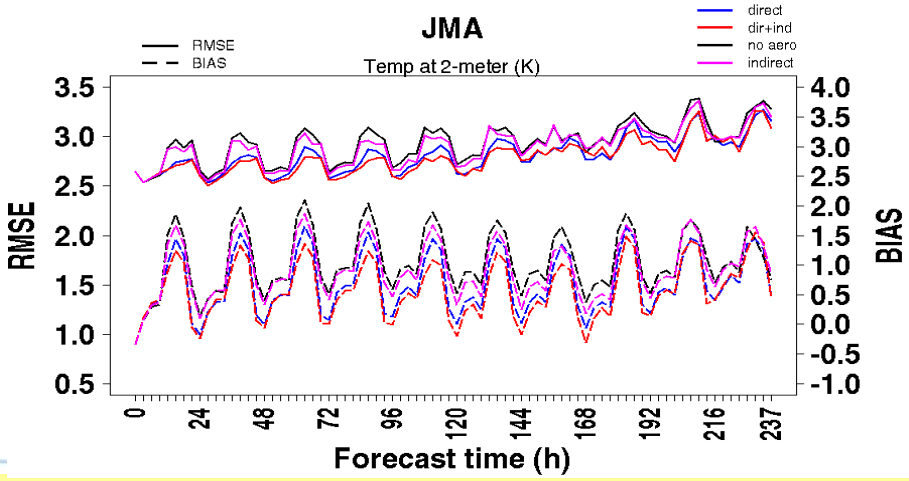












BIAS: dashed line **RMSE: continuous line**

General overview of impacts on the prediction skill

Variable	ECMWF		JMA		NASA		NCEP		NOAA		CPTEC	
Skill score	RMSE	BIAS	RMSE	BIAS	RMSE	BIAS	RMSE	BIAS	RMSE	BIAS	RMSE	BIAS
2-m temp	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
10-m wind speed	✗	✗	✗	✗	✓	✓	✗	✗	✓	✓	✓	✓
10-m wind direction	✓	✓	✗	✓	✗	✓	✗	✗	✗	✓	✓	✓
rainfall	✓	✓			✗	✗	✗	✗	✓	✗	✓	✓

✗	Negligible impact
✓	Significant impact
	Skill is degraded
	Skill is improved
	Mixed improvement/degradation

Quantitative evaluation for the SAMBBA case

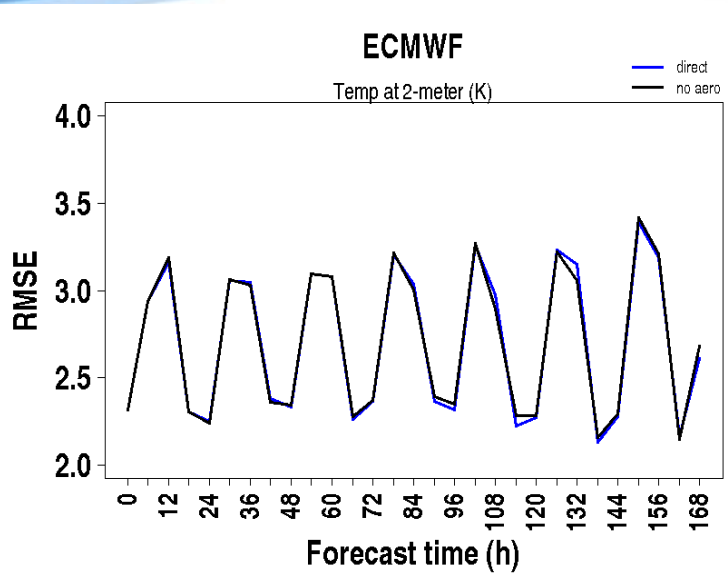
- Parameters:
  - 2-meter temperature: more significant impact
  - 10-meter wind (mag and direction): low impact
  - Precipitation : low impact

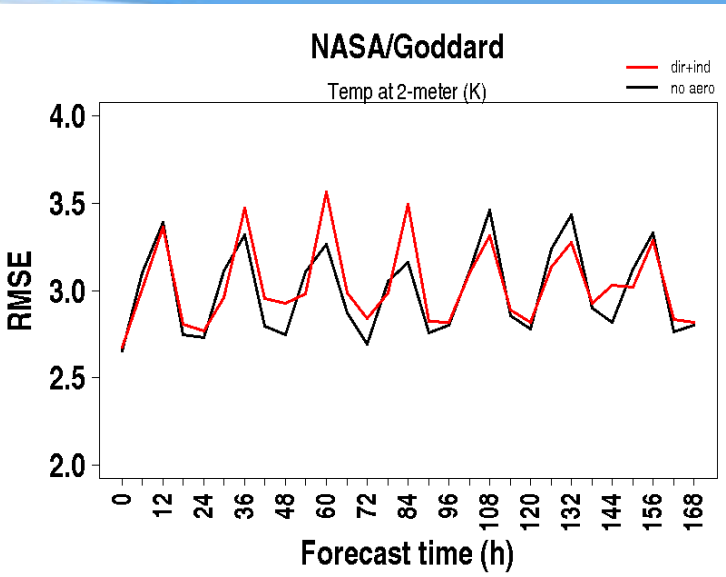
Case 2- Extreme Pollution in Beijing

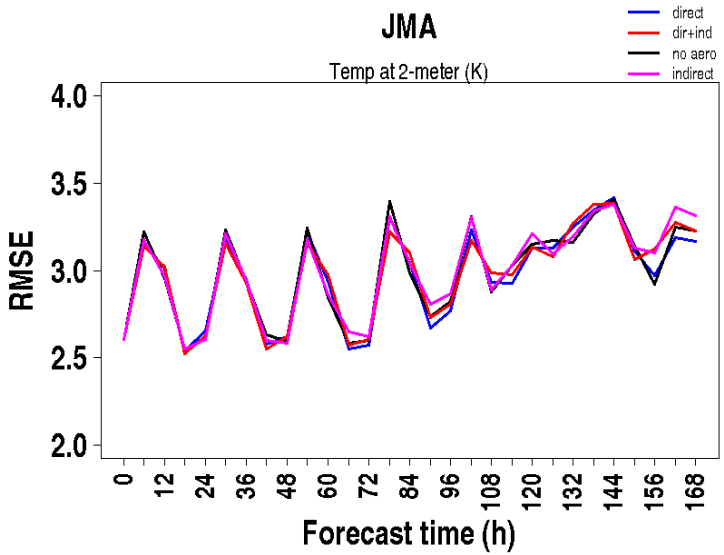
- January 2013
- Forecasts
  - January 7-21 2013
  - From 0 or 12 UTC
  - 10 day forecasts
- Center of domain
  - 116E, 40N
- Model configuration
  - Same as for NWP
- Direct & Indirect effects

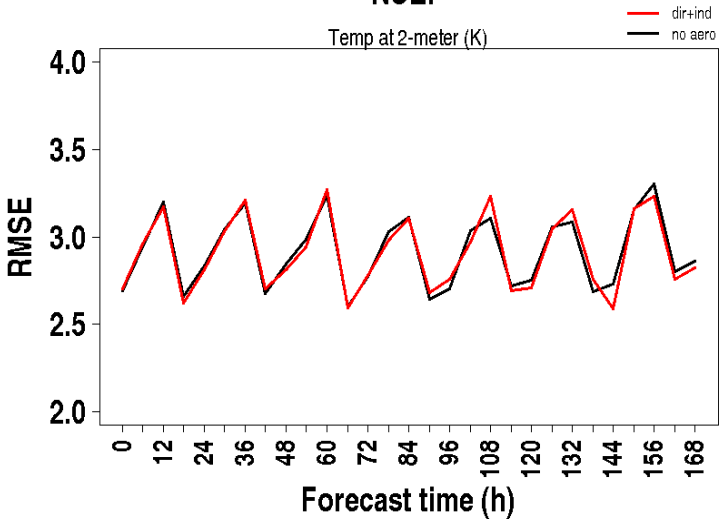
With updates from JMA

RMSE: 2-m Temperature (K)

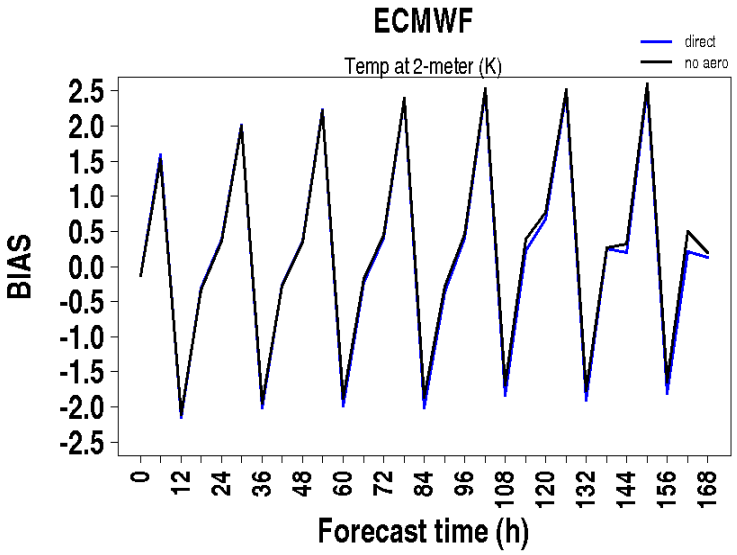


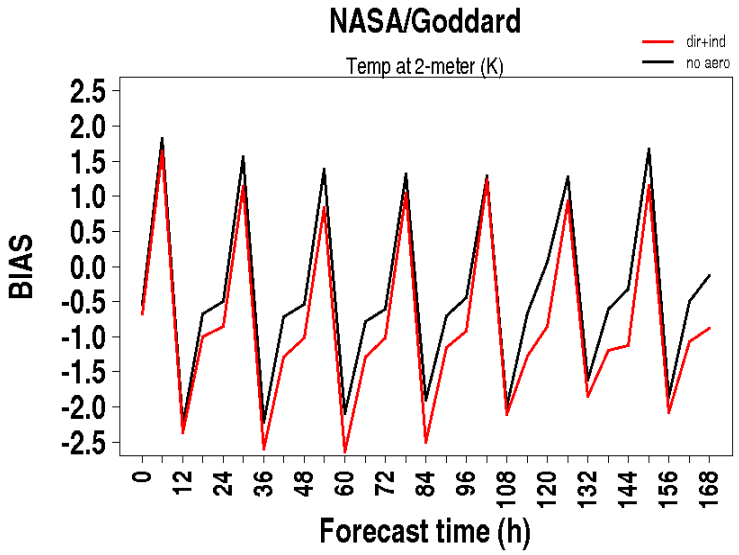


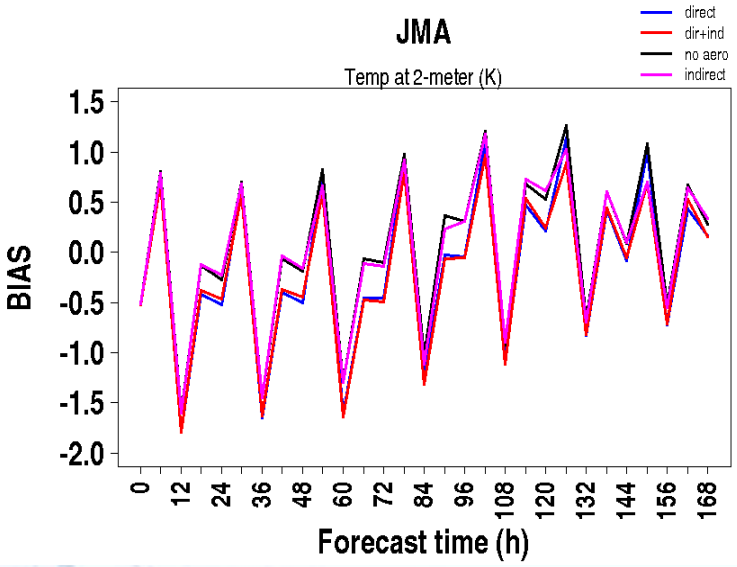


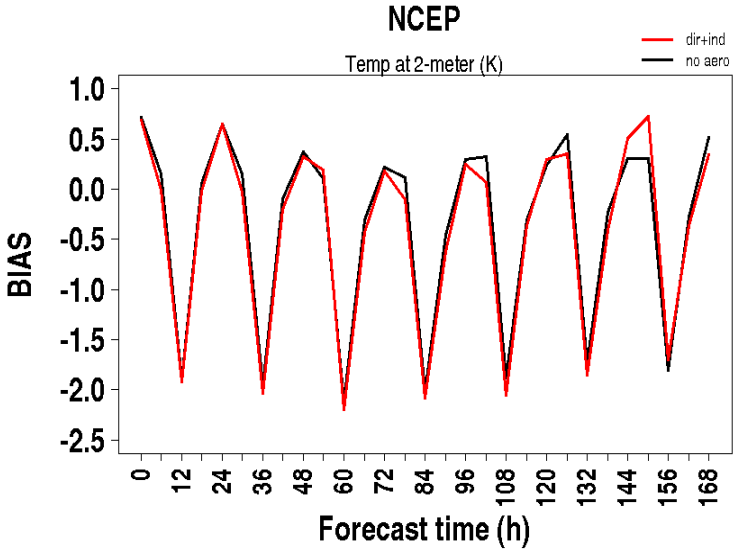


BIAS: 2-m Temperature (K)









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2-m temp	✗	✗	✓	✓	✓	✓	✓	✓
10-m wind speed	✗	✓	✗	✗	✓	✓	✓	✓
10-m wind direction	✓	✓	✗	✓	✓	✓	✓	✓
rainfall	✗	✗			✓	✓	✗	✗

✗	Negligible impact
✓	Significant impact
	Skill is degraded
	Skill is improved
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2. ETAPAS EM ANDAMENTO

Impacto dos aerossóis de queimadas na previsão climática sazonal

Elaboração projeto FAPESP (~ 50%)

Prazo: set 2016

Escrevendo proposta para o Doutorado (~40%)

Prazo: nov 2016

3. ETAPAS FUTURAS

Estágio Doutorado Sanduíche (2017)
NASA/Goddard – Saulo Freitas

Escrever o artigo/tese (2018.1)

Defesa da tese(2018.2)

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