ACESSING THE MODEL FOR PREDICTION ACROSS SCALES–ATMOSPHERE (MPAS-A) SHORT RANGE FORECASTS SKILL FOR THE CATARINA HURRICANE

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INTRODUCTION

- The Catarina Hurricane (Mar, 2004) is the first ever recorded Hurricane in the Southern Atlantic (SAt)[1]
- Up to this day, accurate representations of the systems development, as well it's trajectory reamains a challenge for numerical models

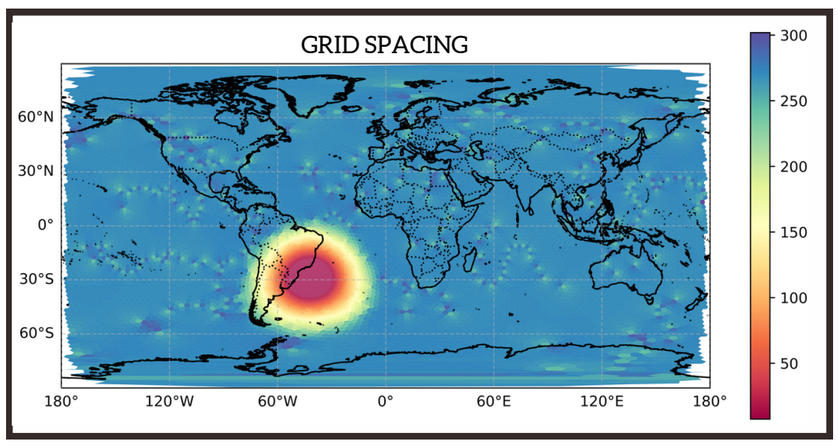
GOALS

1 Test which distinct combinations of microphysics and convections schemes for simulating the Catarina Hurricane with the MPAS-A

2 Determine the impact of the choosen schemes on the energetics of the Catarina on the perspective of the Lorenz Energy Cycle

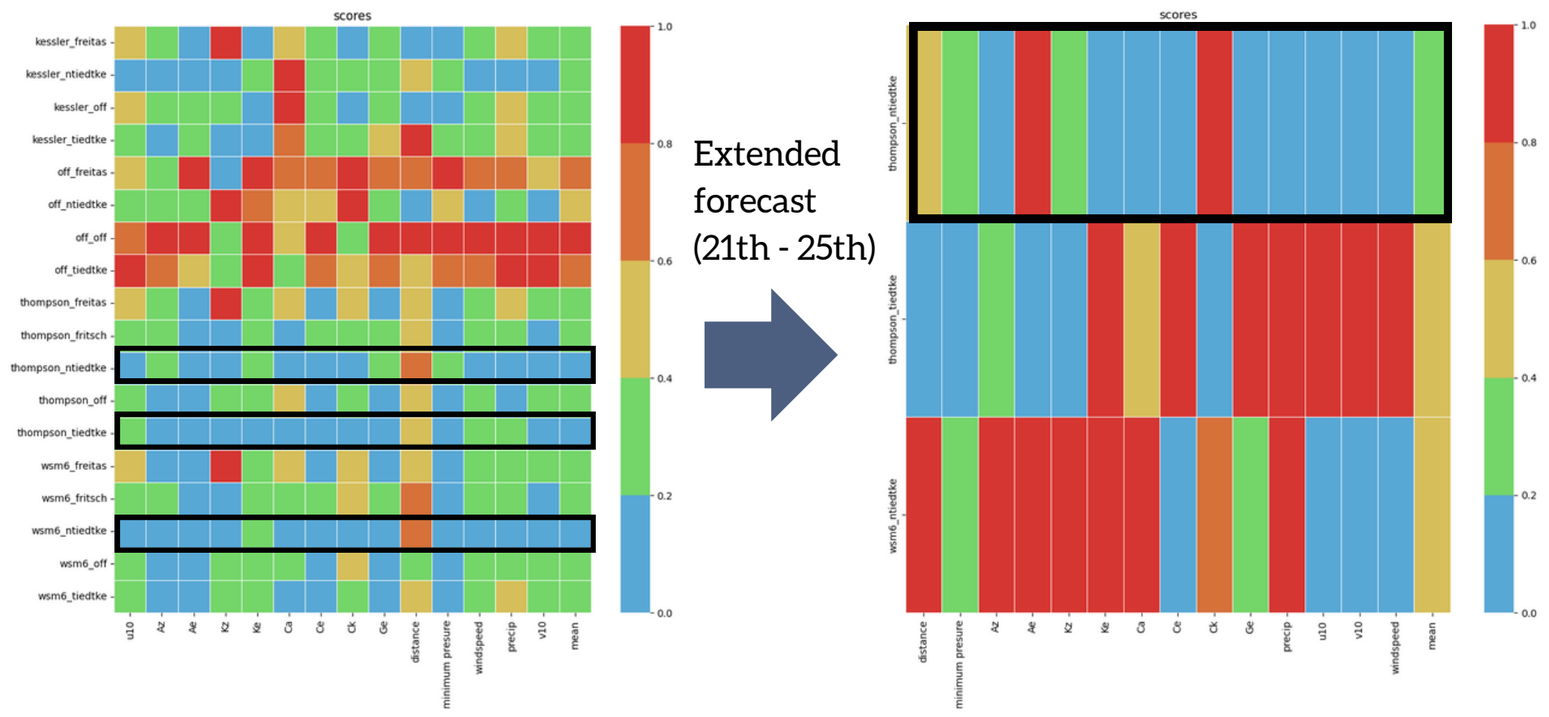
METHODS

- The MPAS model[2] was set to 250km-8km grid spacing
- All combinatons of physics schemes were tested
- Integration starts at 21st March and ends at the 23rd March (Tropical Transition)[3]



Microphysics	Convection
Kessler	*Grell-Freitas*
Thompson	*Ntiedke*
WSM6	*Tiedke*
Off	*Kain-Fritsch**
	Off

RESULTS



- The LEC shows that the most problematic terms were the ones related to zonal kinetic energy (**Kz, RKz, ∂Kz/∂t and BKz**) and eddy kinectic energy (**Ke**)
- This indicates that the model may have systematic **errors on representing zonal jets** - possibly sub-polar jet (needs to be further explored)
- Errors on Ke might related to the the model not representing the system full intensity (central pressure higher than obs.)
- RKz accounts for **sub-grid errors** - processes not fully resolved by the model

CONCLUSION AND NEXT STEPS

- For the short range forecasts, despite the experiments where microphysics were turned off, all options presented similar results
- For the extended experiments, the experiment with **thompsom microphysics and the ntiedtke convection scheme** presented the best results
- Despite representing realistic tracks, the results from the energetic analysis indicate model bias on representing zonal jets
- Future experiments will investigate the source of model bias and attempt to improve simulations
- Short range experiments for other periods of Catarina's development will be performed

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2. Heinzeller, D., Duda, M. G., & Kunstmann, H. (2016). Towards convection-resolving, global atmospheric simulations with the Model for Prediction Across Scales (MPAS) v3. 1: An extreme scaling experiment. Geoscientific Model Development, 9(1), 77-110.
3. Veiga, J. A. P., Pezza, A. B., Simmonds, I., & Silva Dias, P. L. (2008). An analysis of the environmental energetics associated with the transition of the first South Atlantic hurricane. Geophysical Research Letters, 35(15).