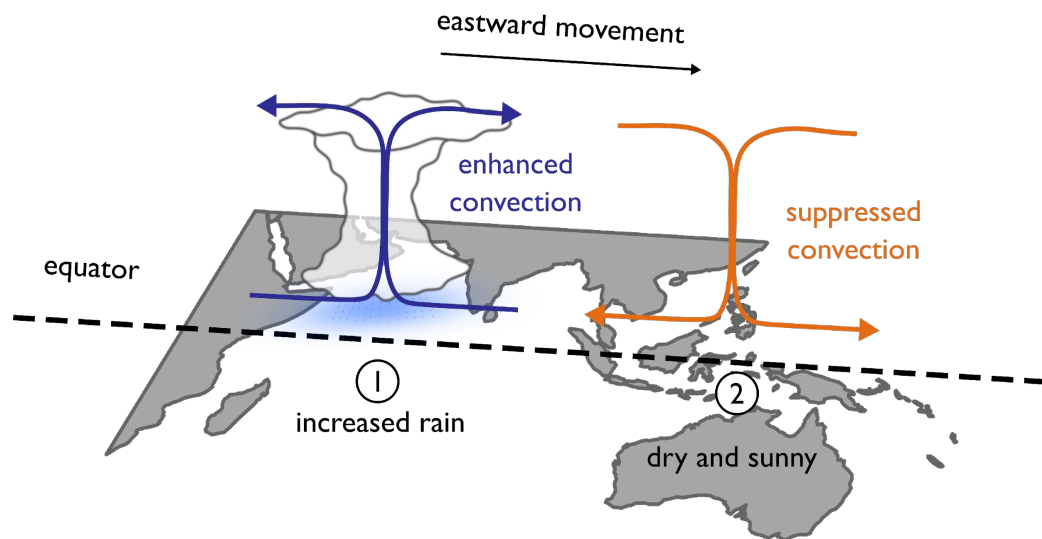


# Sea surface temperature impact on Madden-Julian Oscillation convection in the Met Office coupled and atmosphere-only forecast models



Comparison of coupled and atmosphere-only NWP systems of the Met Office.

Aims of this talk:

- How do the models perform in predicting the MJO?
- What are the reasons for differences between the models?

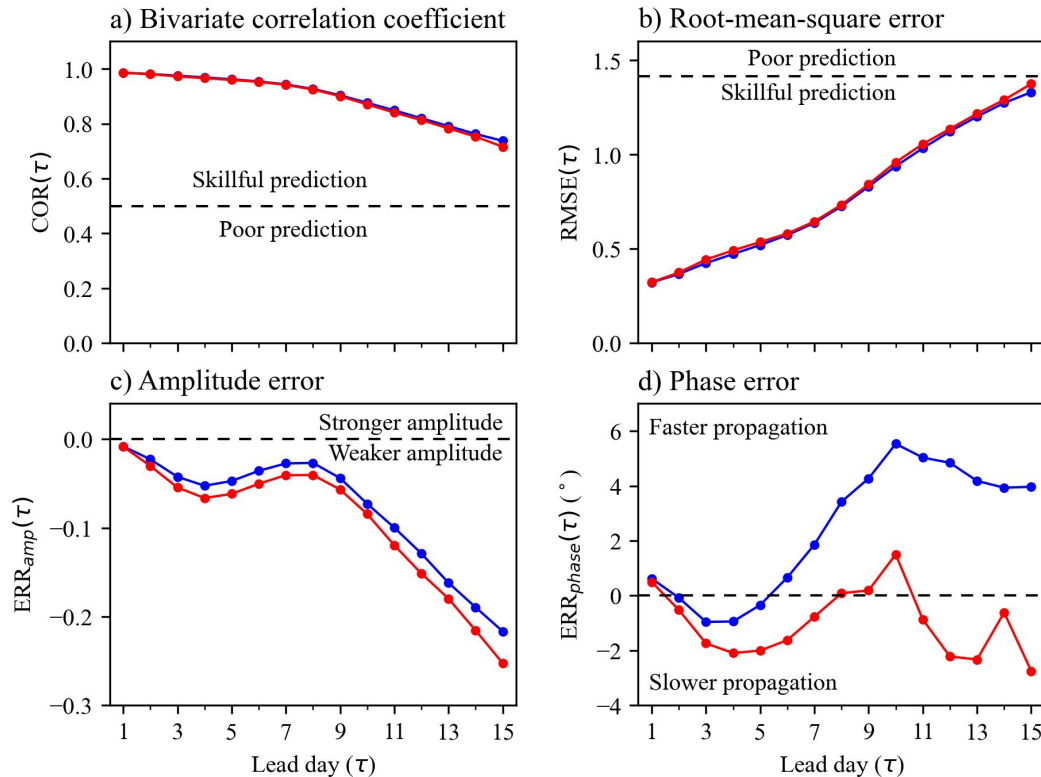


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# General model performance in MJO prediction



- Real-time Multivariate MJO index (RMM) to extract MJO signal
- both models are skilful within 15 lead days
- RMSE is below threshold
- both models show weaker MJO than observed
- coupled model predicts faster MJO

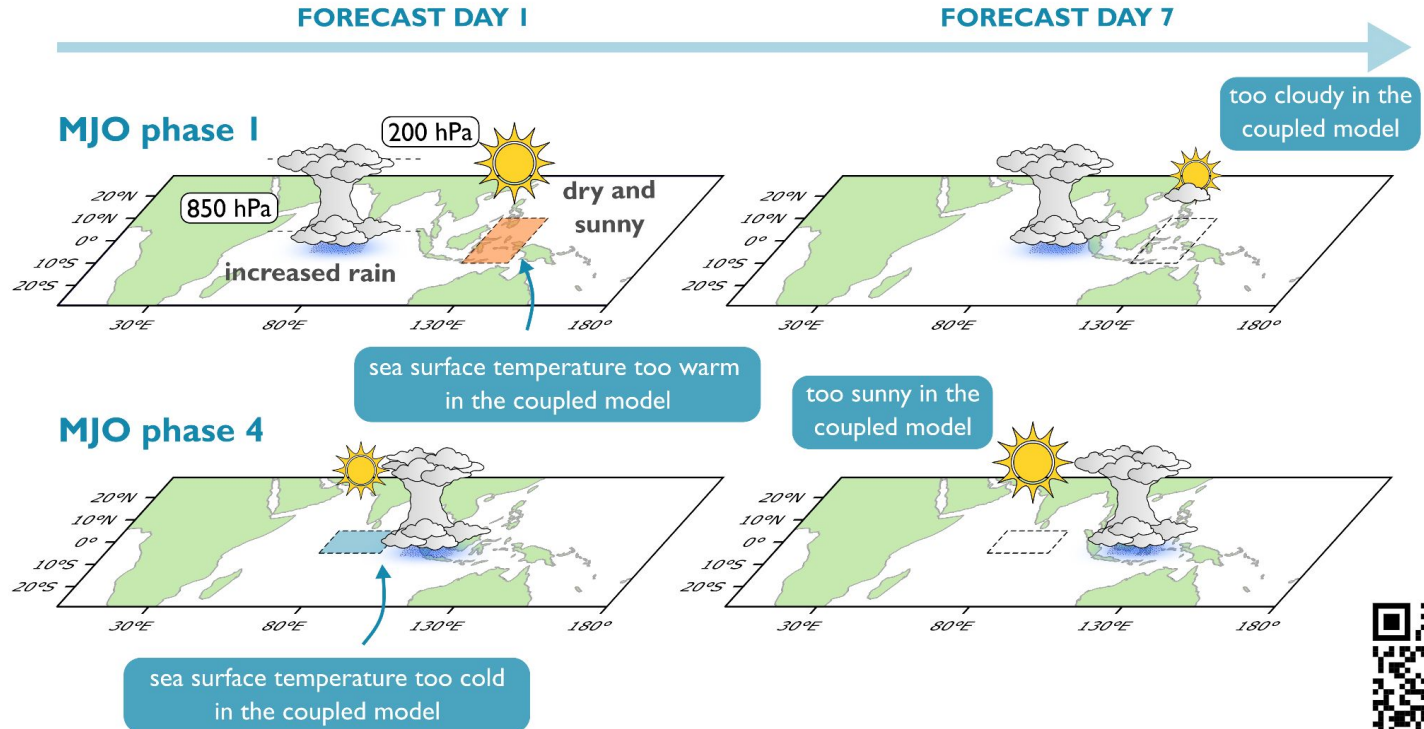
**Coupled model**

**Atmosphere-only model**

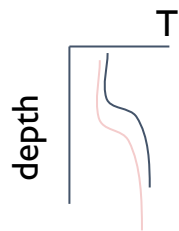


Data period: 2016/11/01-2021/03/01 (Nov-Apr; active MJO)

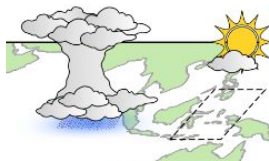
# Why is MJO faster in the coupled model?



Ocean model biases, such as too deep mixed layer can cause too cold SST



Convection responding to dynamically predicted SST



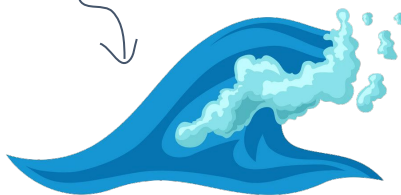
More background moisture in the equatorial belt



## Biases in the models vs. Coupling benefits

Coupling unleashes existing biases in the atmosphere model (e.g. surface fluxes biases)

too much incoming shortwave flux can cause too warm SST



MJO is atmosphere-only phenomenon in the models, assisted by the ocean



25th May 2022, Vienna, EGU conference

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This work was supported by the Natural Environment Research Council and ARIES DTP [grant number NE/S007334/1]

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