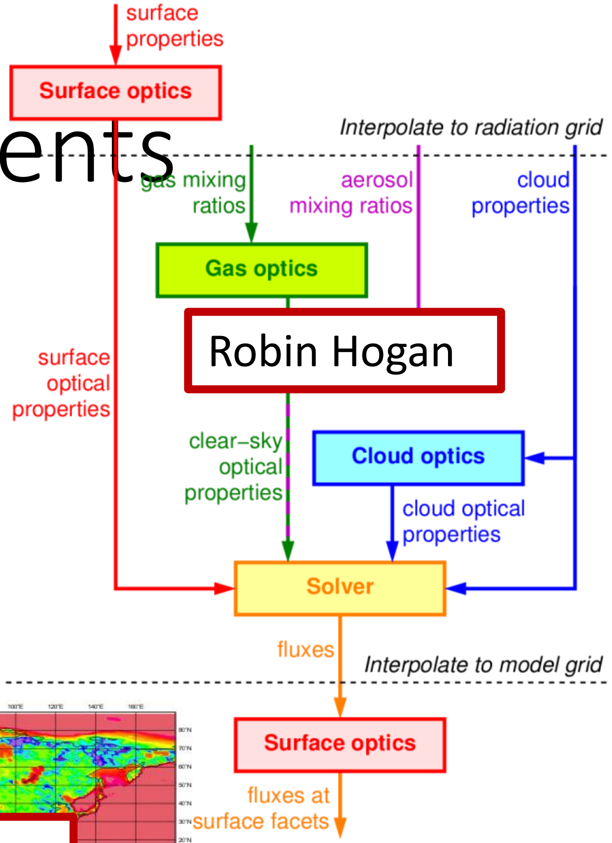
Summary and Thanks

Sue Gray and Bob Plant

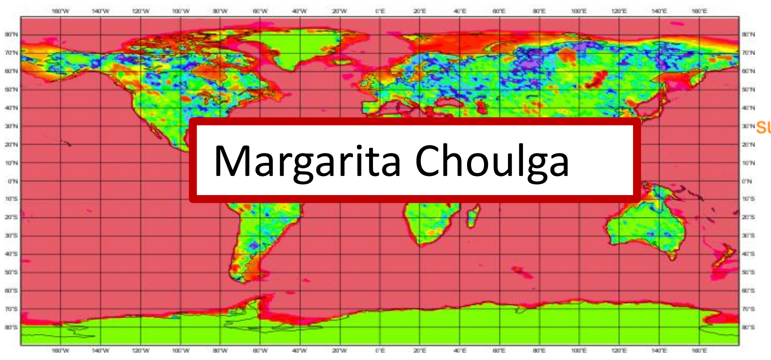
With apologies for the many good things that will get missed out

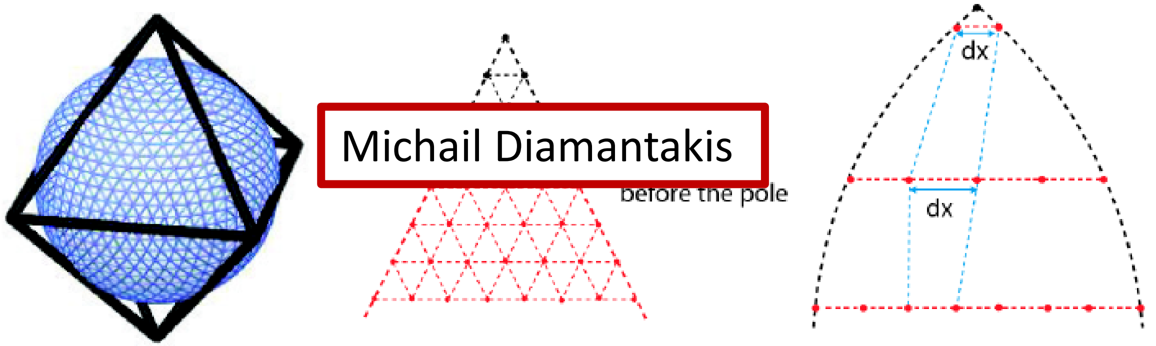
What we learned about OpenIFS developments within ECMWF

- Cycle 43r3 – we're the first to use this with openIFS!
- New developments in dynamics (such as cubic octahedral grid in cy43r3 reduces cost and improves mass conservation).
- ecRAD (new modular radiation scheme)
- Lake model (depth is the key parameter)



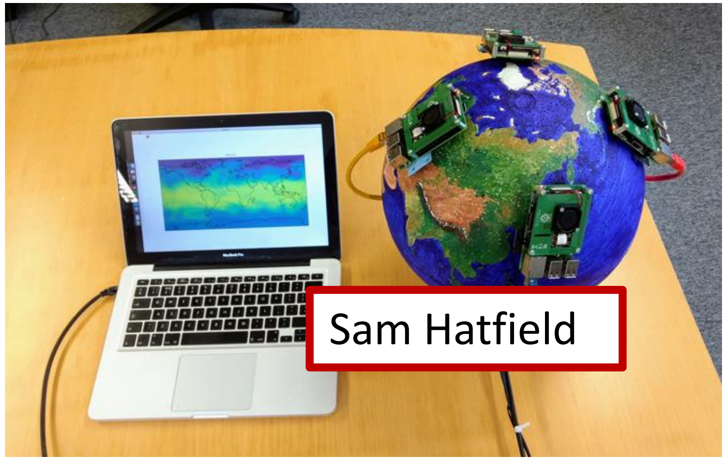
Lake mean depth, m

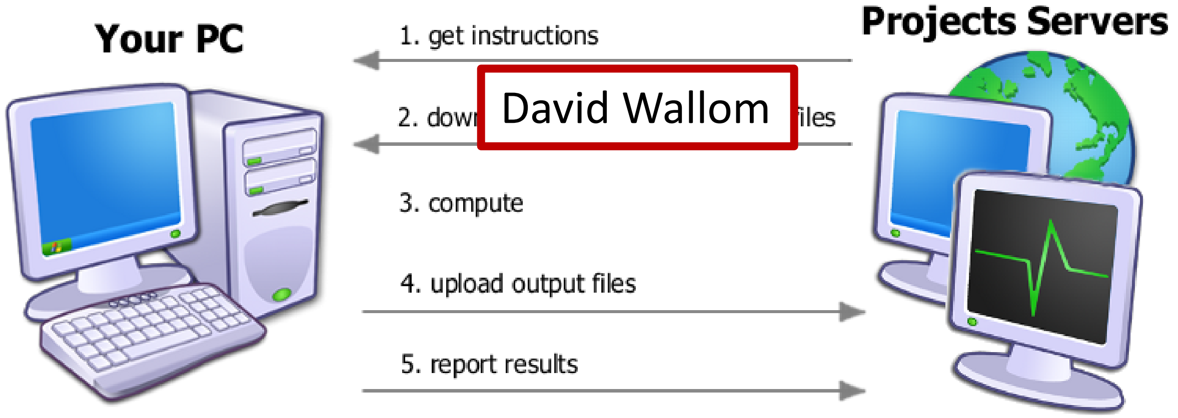


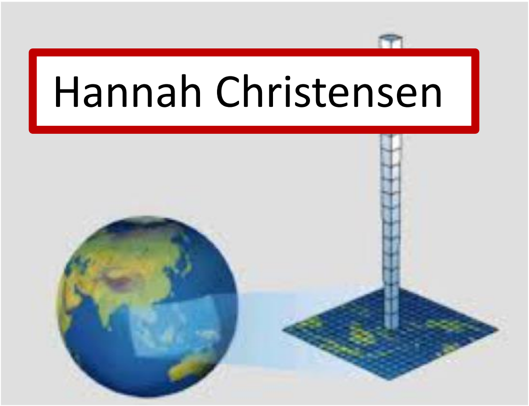


What we learned about OpenIFS developments outside ECMWF: 1

- OpenIFS can be run using 4 raspberry pi's glued to be a piece of wood.
- openifs@home is launched and results from 571 integrations were shown! (80% of 2000 integrations were returned in 50hrs).
- Uncertainty in parametrizations can be investigated by tiling regions with single column models at every grid point.



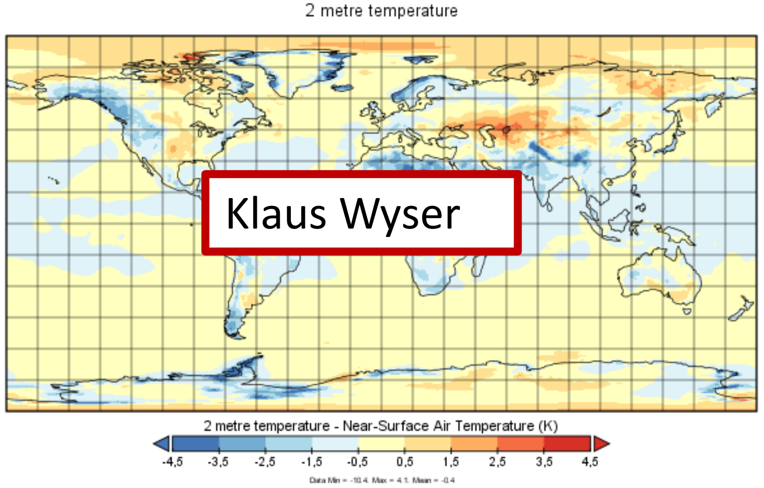




What we learned about OpenIFS developments outside ECMWF: 2

- OpenIFS initial conditions can be (more) easily generated from ERA reanalyses with AutoSubmit. Xavier Yepes Arbós
- OpenIFS (instead of IFS) will be used in the next generation of the EC-Earth model (ECEarth4).
- FOCI-OpenIFS exists as a flexible climate model for high-resolution simulations

ECE4 - ERA interim



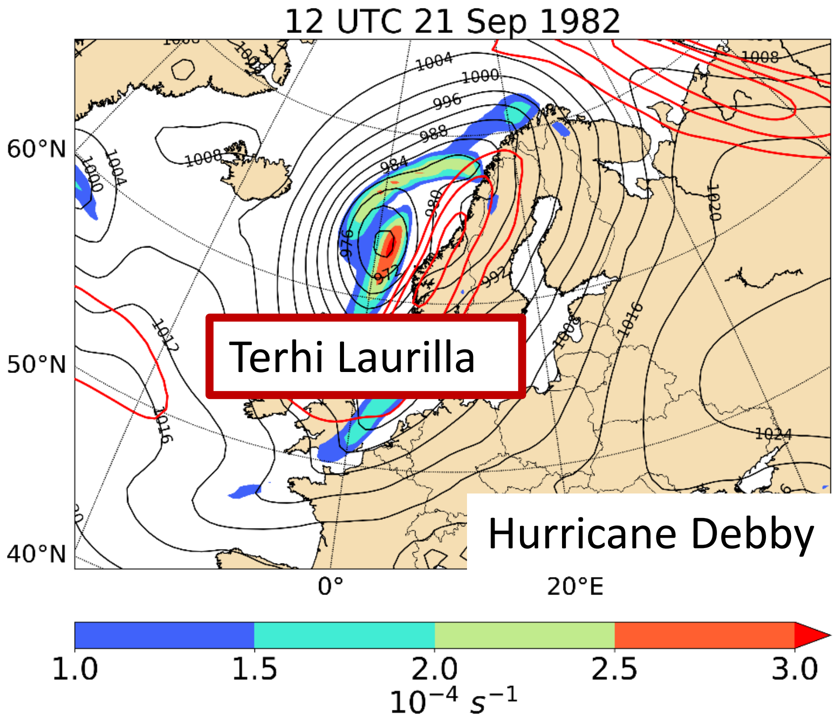
Klaus Wyser

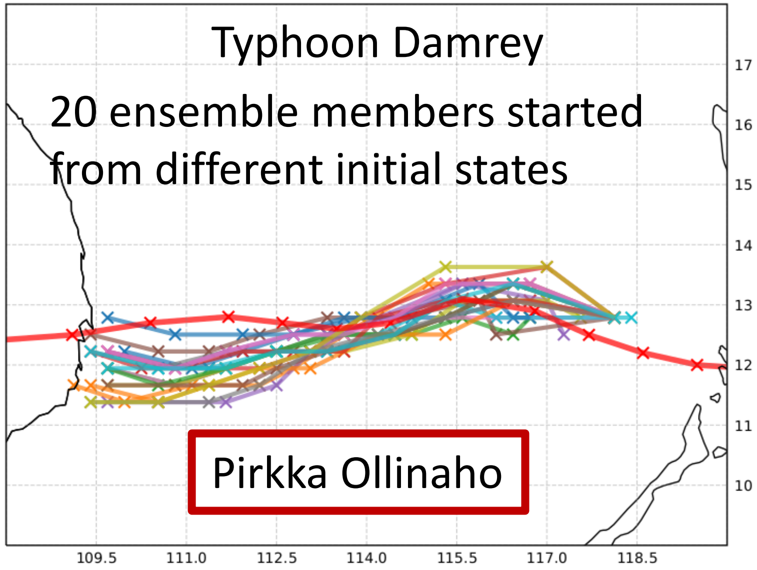
	OIFS	NEMO	Run time	Settings
FOCI-OIFS LR	TL159L91	ORCA05 L46	32 SYPD @ 760 CPU ~ 570 CPUh	No WAM
FOCI-OIFS MR	TL511L91		analysis in ss	No WAM
FOCI-OIFS ORION	~0.25°?	ORCA05 L46 (+ “ORION12”)	Planned for SO-CHIC	AGRIF nest over Southern Ocean
FOCI-OIFS VIKING	~0.25°?	ORCA05 L46 (+ VIKING10X)	Planned for new project	AGRIF nest over North Atlantic

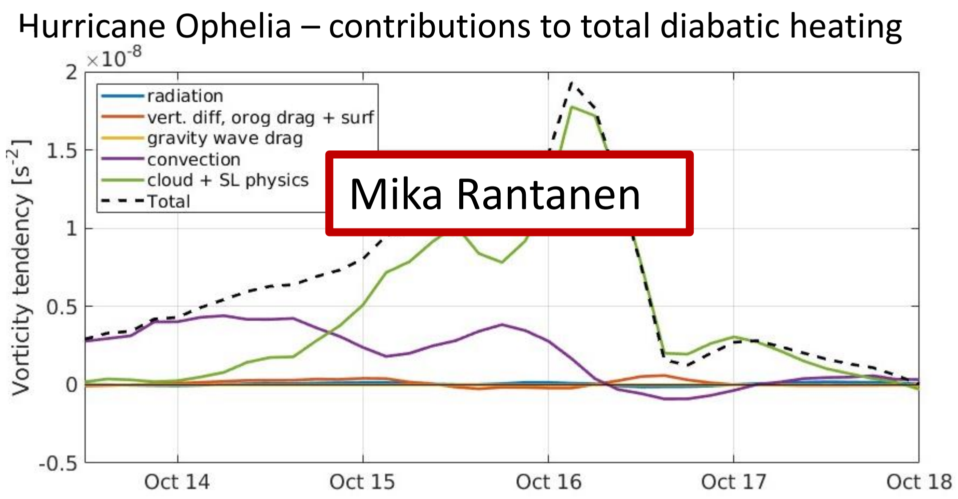
Joakim Kjellson

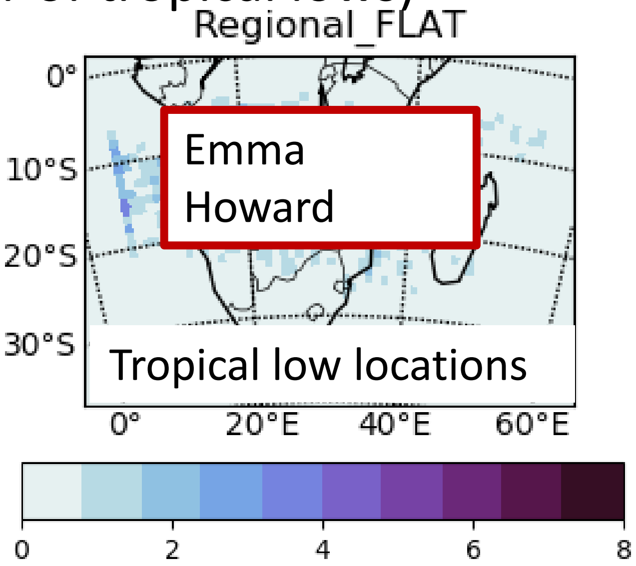
What we learned about science being pursued with OpenIFS

- OpenIFS is a great tool for analysis of case studies (e.g. Hurricanes Debby and Ophelia)
- OpenIFS is a great tool for idealised applications such as the Held-Suarez test
- OpenIFS can be used for ensemble forecasts (Typhoon Damrey)
- OpenIFS can be used for sensitivity studies (flattening the south African orography decreases the number of tropical lows)



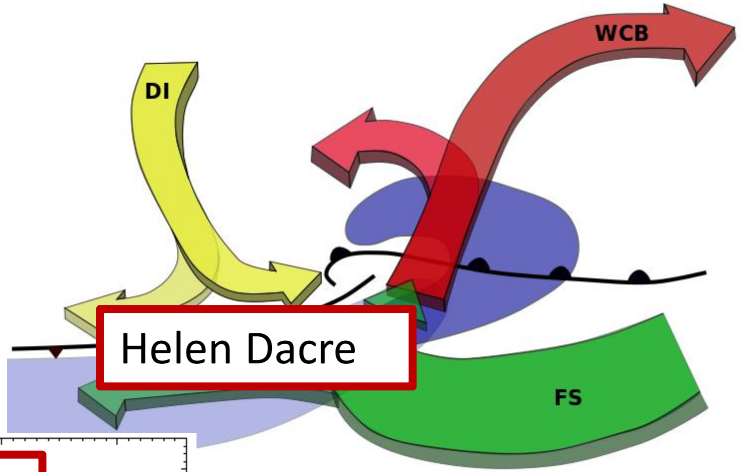


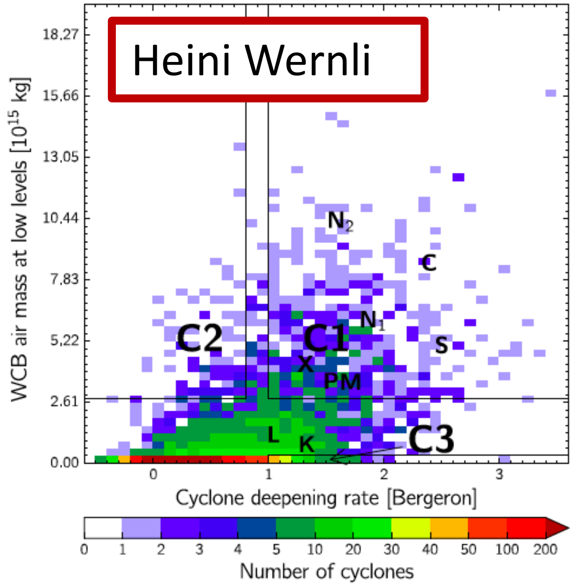


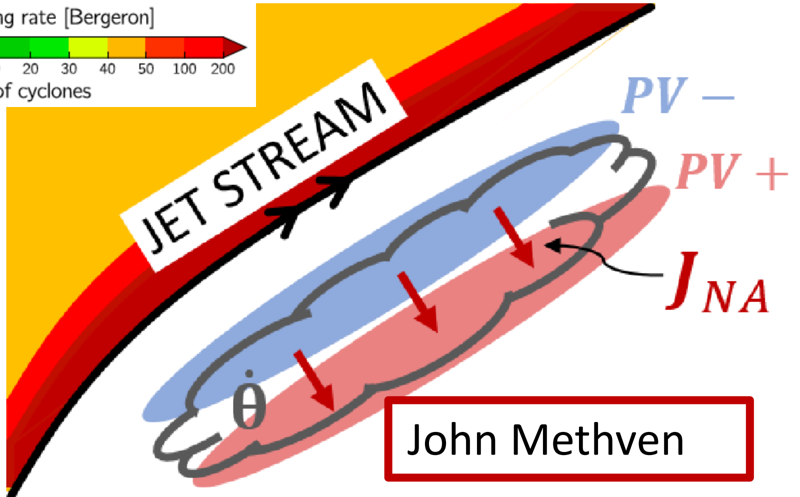


What we learnt about diabatic processes and forecast error: 1

- Atmospheric rivers and precipitation from ascending warm conveyor belts can have a common cause: a feeder airstream.
- Stronger warm conveyor belts (i.e. more latent heating) are associated with more intense cyclones (for C1 cyclones).
- The effects of heating in large-scale vertical wind shear are systematic and can cause (real) negative PV.

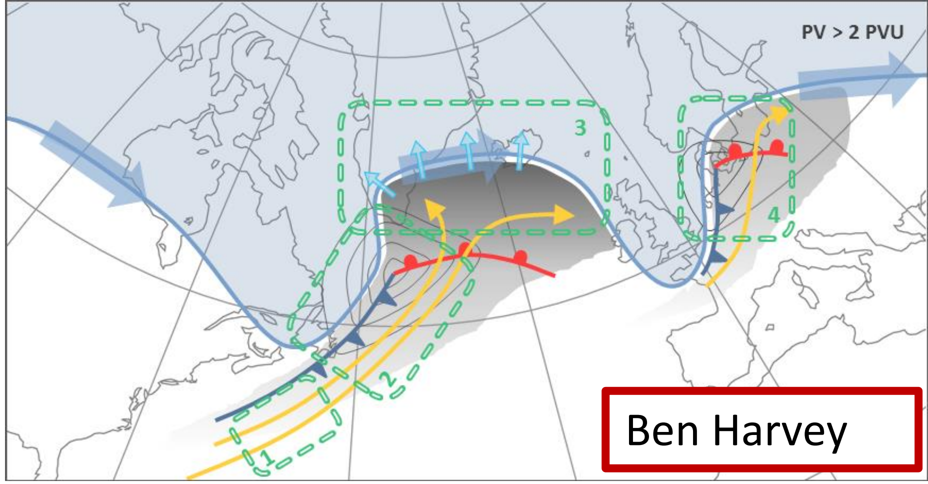


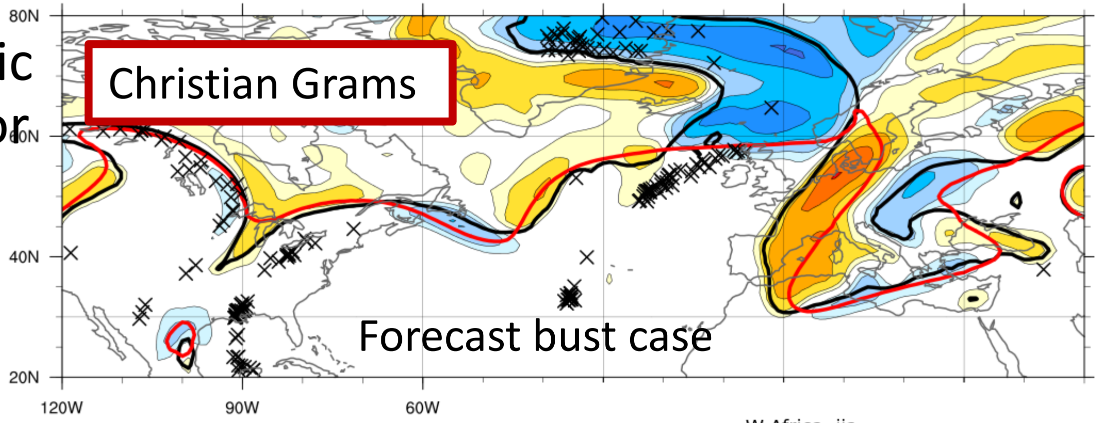


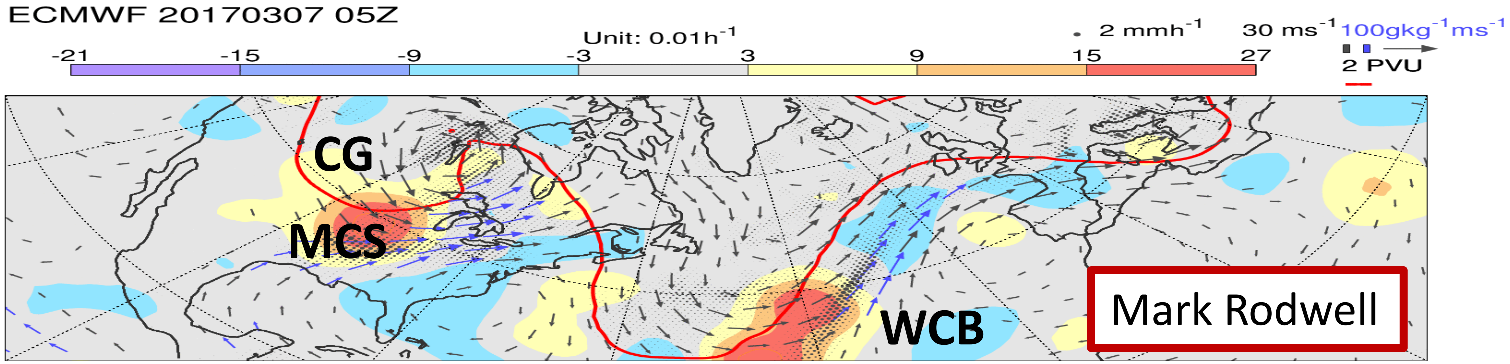


What we learnt about diabatic processes and forecast error: 2

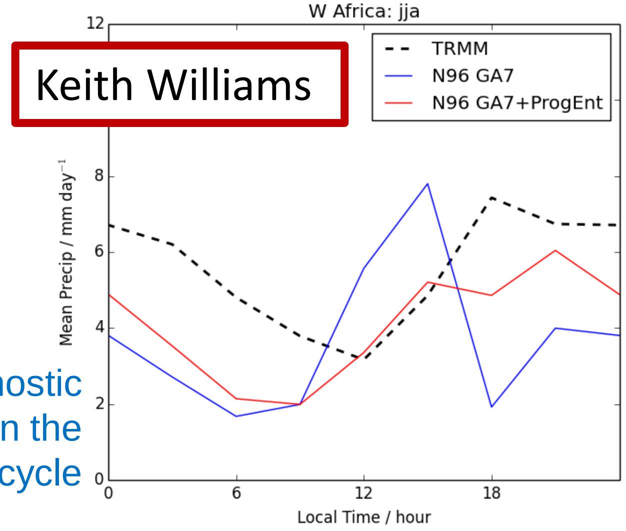
- Warm conveyor belts outflows amplify ridges and the tropopause PV gradient and jet speed.
- Forecast busts in ridge building can occur if poor diabatic processes lead to poor representation of warm conveyor belt branches.
- Uncertainty growth is associated with moist processes: warm conveyor belts and mesoscale convection.
- Parametrization improvements such as prognostic entrainment (memory) can reduce model biases.







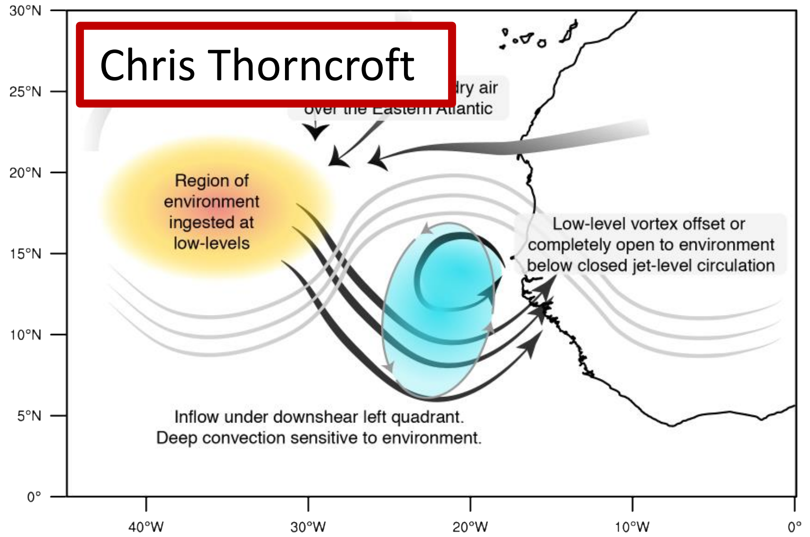
Uncertainty growth-rate along the truth trajectory

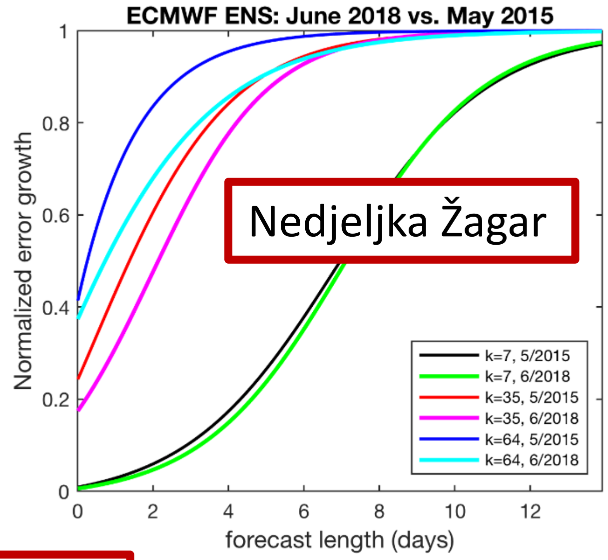


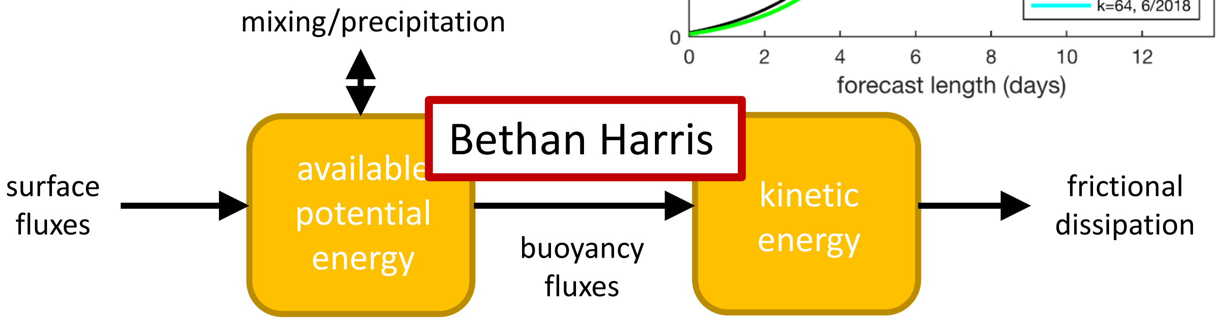
Impact of prognostic entrainment on the diurnal cycle

What we learnt about diabatic processes and forecast error: 3

- Moisture injection can be critical to predict which African Easterly Waves will trigger tropical cyclones.
- There is little to be gained from reducing initial condition error at the synoptic scale in terms of global predictability, but improvements at the sub-synoptic scales are possible.
- It is possible to construct a closed budget of Available Potential Energy density for a tropical cyclone.

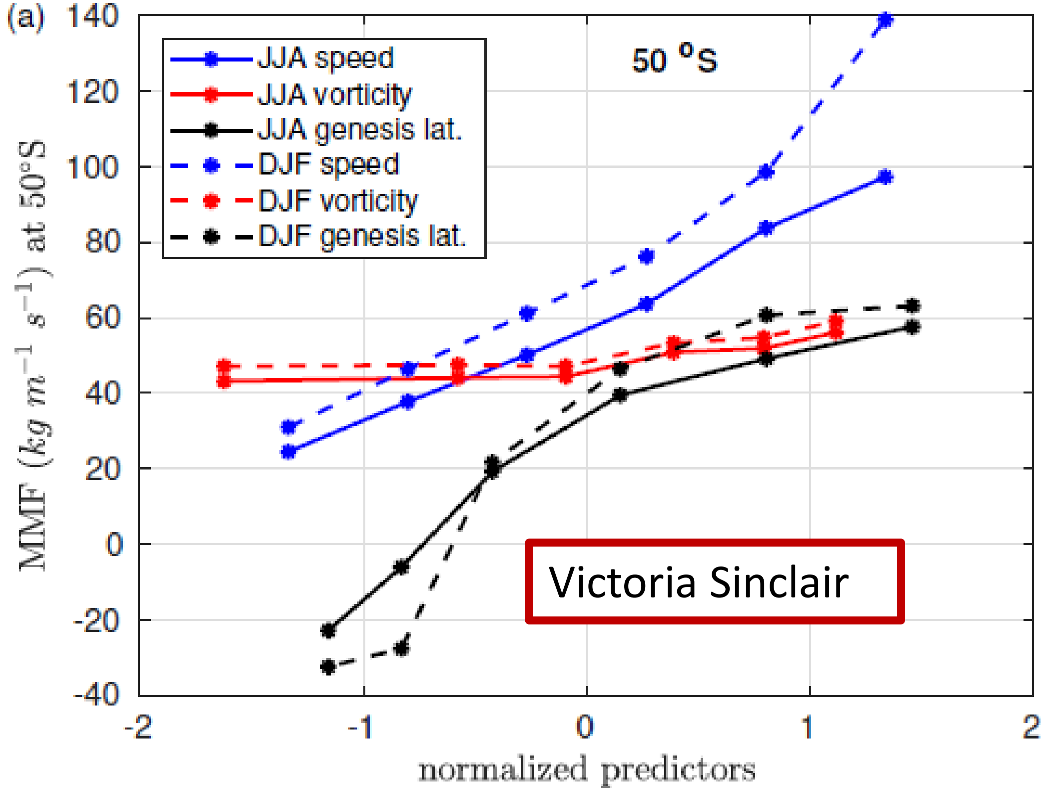






What we learnt about diabatic processes and forecast error: 4

- For southern hemisphere meridional moisture flux (MMF) variability the strongest relationship is with **genesis latitude** (closely followed by **speed**) but changing the **intensity of cyclones** has a small impact.



Thanks!

- To Gabi, Marcus and Glenn from ECMWF for all their work in preparing the case study
- To Maria for supporting and troubleshooting all our IT needs
- To Kathryn for all the practical arrangements and behind-the-scenes work
- To all of our speakers for their informative and intriguing talks

- And to all of the participants for some imaginative experiments, nice posters and contributions to discussions