

MU-MIP Meeting 2

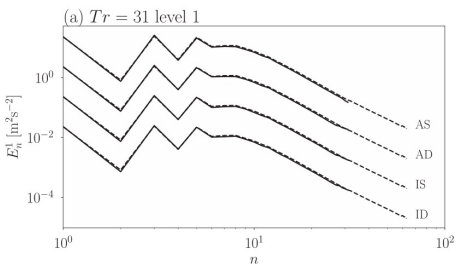
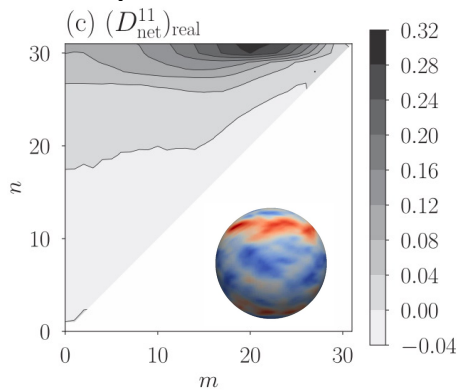
Wednesday 23 June, 15:00 BST, Zoom

Agenda

- Updates from participating groups (all)
- Funding opportunities (Hannah Christensen)
- Suggestion to broaden the scope of the project (Judith Berner)
- Website - comments and suggestions (Hannah Christensen)
- Next steps and timeline

Data driven stochastic subgrid parameterisations in scale space with additive noise reproduces statistics of high-resolution reference simulations across all resolved scales

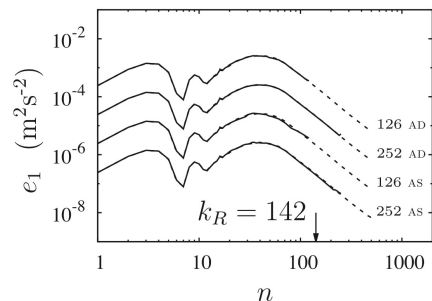
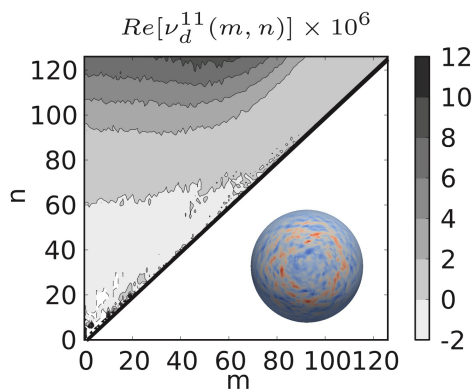
QG Atmosphere 2 level Spherical Harmonics



[Kitsios et. al. \(2012, JAS\)](#)

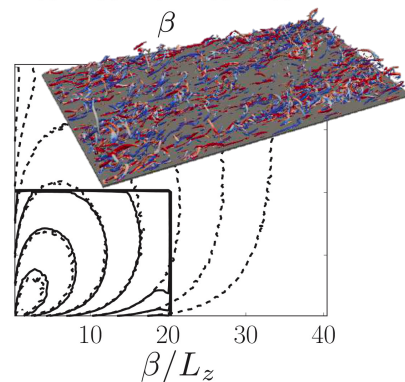
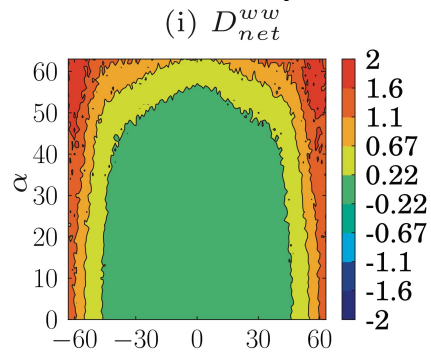
[Kitsios & Frederiksen \(2019, JAS\)](#)

QG Ocean 2 level Spherical Harmonics



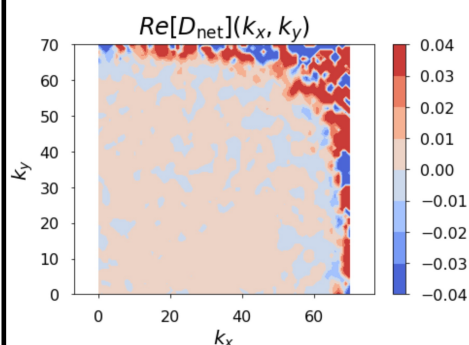
[Kitsios et. al. \(2013, OM\)](#)

N-S boundary layer 385 level Fourier & Chebyshev



[Kitsios et. al. \(2017, C&F\)](#)

UMMIP progress Fourier

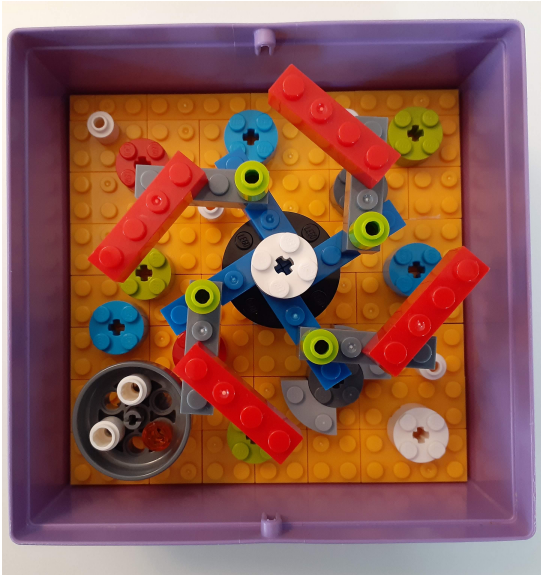


- Calculated subgrid coefficients for zonal velocity at 200hPa of ECMWF Christensen et. al. (2018) data in Fourier space
- Only 2 samples used to calculate coefficients as a test, typically require $>10^3$
- Cusp-like properties are ubiquitous in all flows assessed thus far

Introducing my pet vortex Edwina

- A homage to what got me through 4 covid lockdowns in Melbourne!

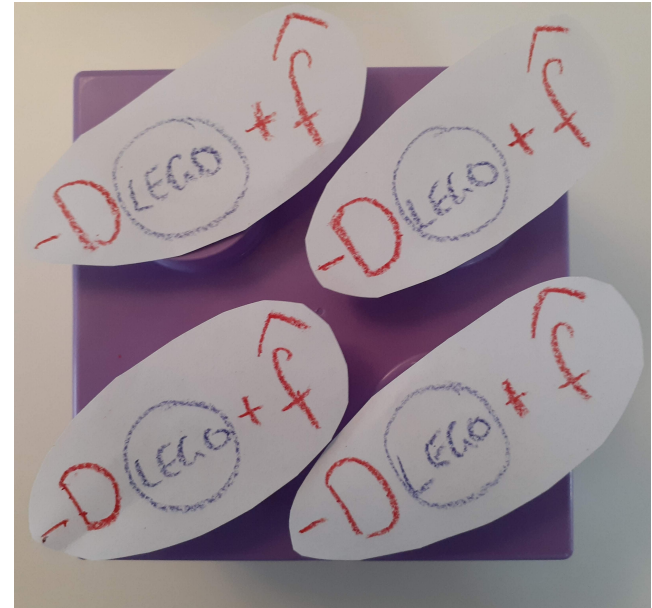
Direct Numerical
Simulation



Truncated Large Eddy
Simulation



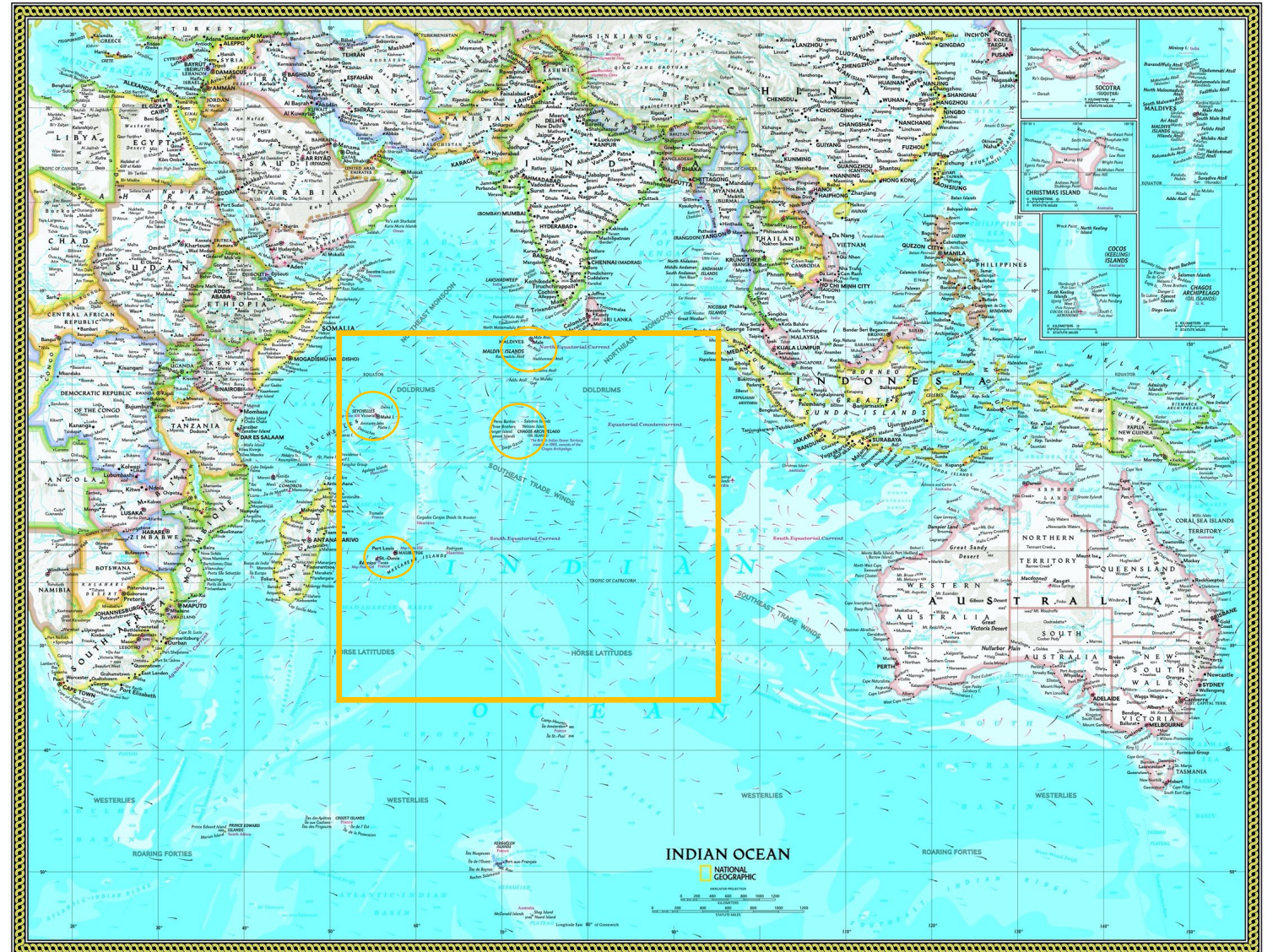
Truncated Large Eddy
Simulation with Stochastic
Subgrid Parameterisation



Update: input fields

Headline summary

- Preliminary coarse grained fields available for others to look at
- 0.2° resolution, Indian Ocean region 35°S-5°N, 51-95°E



Further details

- cdo conservative regridding to remap ICON 2.5 km run onto 0.2° grid
 - thoroughly tested for unstructured mesh
 - equivalent to limited area averaging as used in Christensen 2020
- No vertical interpolation (ICON model levels)
- No temporal interpolation (3-hourly)
- Following variables provided:
 - 3D: p , T , θ , U , V , w , q_v , q_l , q_i , q_t , r_v , r_l , r_i , r_t
 - 3D forcing: advective tendencies of $[T, \theta, U, V, q_v, q_t, r_v, r_t]$, U_g , V_g ,
 - 2D: surface pressure,
 - 2D forcing: surface temperature, $sshf$, $slhf$, u^* (surface friction velocity)

“pseudo-DEPHY” format

- Dimensions, Naming conventions, attributes etc follow DEPHY
- Inconsistencies arise because ...
 - DEPHY has different variables for initial conditions and nudging fields.
 - DEPHY uses attributes for certain fixed fields
- To DEPHY-ize:
 1. Interpolate all files onto required vertical levels if necessary
 2. Select the files corresponding to timestamps of interest
 3. Copy the variables for the first timestamp, $X_t \rightarrow X$, where $X = \{ps, height, pressure, u, v, temp, theta, qv, ql, qi, qt, rv, rl, ri, rt\}$
 4. Rename $X_t \rightarrow X_{forc}$, where $X = \{ps, height, pressure\}$
 5. Rename remaining $X_t \rightarrow X_{nudging}$. The first file should have both X and $X_{nudging}$ for all state vars
 6. Concatenate the files into a single file as a function of time.
 7. Decide whether to use $z0$ or $ustar$ surface forcing and set global attribute accordingly
 8. Decide whether to use $surfaceFlux$ or $surface$ temperature forcing and set global attribute accordingly
 9. Split the concatenated file into individual columns
 10. Use variables $[zorog]$ and $[z0]$ to create global attributes $[zorog]$ and $[z0]$ for each column
 11. Use variable $[lsm]$ to create global attribute $[surfaceType = \langle\langle ocean \rangle\rangle / \langle\langle land \rangle\rangle]$ for each column

Update: input fields

Remaining questions

1. Where to put data for easy access by other groups
 2. What to do with land points within region
 - mask? mask and interpolate?
-
- HC next steps: testing with DEPHY-ized IFS SCM
 - Other groups free to start testing concurrently

Funding

- To what extent is funding to hire PDRAs a limiting factor on participation for each group?
- What funding opportunities are available to address this need, either individually or as groups of participants?



Research Project Grants

For researchers based at universities, institutions of higher education or registered charities with university-equivalent research capacity, to undertake an innovative and original research project

Value

The maximum grant value is £500,000.

Duration

Research Project Grants may be held for up to five years.

Before beginning your application, please read the information below.

Eligibility +

What the Trust offers +

How to apply +

Key Dates

Open all year

Outline Applications

There are no deadlines; successful applicants are invited to submit a Detailed Application

Detailed Applications

Closing dates are the same each year

21 March, 4pm

Decision: mid July

1 September, 4pm

Decision: early December

1 December, 4pm

Decision: end March

Grant deadlines remain unchanged at this time but the situation will be kept under review

Outline assessment normally completed within three months

e.g. aim for September submission of outline, hear back at Christmas, then try for March deadline

Making an Application

Why might this be suitable?

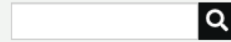
- “Up to 3 co-applicants from the same or different UK institutions may also be included. **Overseas co-applicants are allowable.**”
- “Where appropriate, it is **possible to employ a local researcher**, if the relevant research takes place outside the UK and it is more suitable to employ personnel local to the area than a UK-based person paid to travel to the region.”
- Leverhulme confirmed that it will be allowable to host local researchers in various Met Offices.
- £500,000 no overheads
 - Oxford rule of thumb: £100k = one postdoc year, 50% of which is overheads
 - £500k = 10 postdoc years without overheads
- We could therefore put in a single application to fund research in 4 institutes
 - arguably more competitive bid than many smaller grants

Caveats

- Overheads not covered: “At least 75% of the resources requested must be used to provide funding for research staff (research assistants, doctoral students) who will each work specifically on the project with the applicant.”
- “Co-applicants may not claim a salary from the Trust, therefore they cannot be the named researcher/student on the proposal. Replacement teaching costs can be added for the Co- applicants. To be eligible for these, they must be currently employed by a UK University on a continuing basis.”

Outline applications

- Why the Leverhulme trust?
- Proposal Summary (1000 words / 2-pages) + References + Justification of resources
- Detailed Budget (this cannot be changed if invited to make a full application)



Home

Welcome to the Model Uncertainty - Model Intercomparison Project (MUMIP)

An initiative of the WCRP Working Group for Numerical Experimentation and the WWRP Predictability, Dynamics and Ensemble Forecasting Working Group

Introduction




MU-MIP is an international project which seeks to characterise systematic and random component of model error across many different climate models. This is the first coordinated intercomparison of random model error, and will be used to inform stochastic parametrisation development.

Some key questions:

- How should we best represent model uncertainty/random error using stochastic approaches?
- To what extent should this representation be model specific or a fundamental property of atmospheric models?
- Are current approaches justified? How can they be improved?

The MU-MIP team consists of scientists from nine institutes spanning four countries. Please get in touch (hannah.christensen 'at' physics.ox.ac.uk) if you would like to get involved!

News

	<p>Second MU-MIP Team meeting</p> <p>20 May 2021</p>		<p>NOAA Developmental Testbed Center funding for MUMIP work</p> <p>24 March 2021</p>
	<p>MUMIP launch meeting</p> <p>22 September 2020</p>		



Next steps

- Science
 - Test new coarse-grained input fields
 - SCM automation software demo?
- Admin
 - Grant proposal?
 - Website edits