



TRR 181 NEWSLETTER

ENERGY INFLOW

BACK IN REAL LIFE AGAIN

We are very happy to announce: We did it: finally a picture of a group meeting without the zoom frame! After 1,5 years of social distancing we finally managed to meet in person again at our Annual Retreat held in Lüneburg at Seminaris Hotel. Thankfully it turned out to be a safe meeting with all the hygiene measurements we took.

After the summer break we now start to go back to academic life again. The RTG with a lot of fundamental courses for the Early Career Scientists and in October then starting with a new TRR seminar program and the first career development workshop for female scientists in November. Some of you can already attend conferences again in person, some will still be held online.

In this Newsletter you find:

- a **report of the Annual Retreat**
- **reports** from our new PhDs in M5 and L2
- as usually the new publications and outlook of what will happen in the next weeks

If you want to contribute to the newsletter, don't hesitate to get in touch with me.

All the best,
Jennifer



Retreat: Happy to be able to meet in person again!

REPORT ANNUAL RETREAT 2021

Text by Nicolas Dettling

From Wednesday to Friday, September 22-24, the first Annual Retreat of our TRR 181 after 2 years absence due to the Corona Pandemic took place in Lüneburg, Seminaris Hotel.

Science is a collaborative process. We are inspired by the work of others, rely on the expertise of our colleagues and sometimes have to defend our ideas against our critics. After relying on an online version of scientific discourse for so long, TRR 181 members were finally able to meet in person for our annual retreat taking place in Lüneburg, September 22-24.

After a short welcome and introduction by TRR speaker Carsten Eden, the scientific program started right away. Throughout the retreat, every TRR subproject would have the chance to introduce itself in a PICO presentation and a poster session. From a start, this presentation format was well received and lively discussions were held in front of the posters. Especially the wide range of disciplines and topics represented in the TRR offered something new for everyone to learn.

A retreat also provides the opportunity to collaboratively work on topics other than science. One of those is the TRR's Gender Workshop Program, introduced by Lisa Horvath

and Sabine Blackmore. The program will contain structured training touching topics such as gender awareness, conflict management and fair hiring practices as well as workshops specifically designed to support our female TRR colleagues. In the first session, Lisa Horvath explained that everyone is subject to personal biases that subconsciously influence our judgment based on for example gender, nationality or looks. Thinking of differences and similarities between oneself and other TRR members was a useful exercise to become more aware of these biases and to get to know each other better. In the end, only an environment of inclusion and fairness will make the TRR a space for everyone to thrive and it was good to be reminded to keep doing the work in this regard.

Starting with another round of PICO presentations and posters, the second day was then dedicated to discuss future directions of the TRR's work in breakout groups. Lively discussions on the future of the IDEMIX model, the upcoming SONETT cruise, RTG courses on atmospheric sciences and the outreach project Art&Science with two attending artists show that there is still a lot of more interesting projects to come in the second

phase of TRR181. Meanwhile, the second day also offered the possibility for PhD students to meet their Postdoc mentors in person and to discuss both science and life as an early career researcher.

The final day of the retreat started with the last round of flash talks and poster presentations, completing the picture of diverse projects joined under the roof of TRR181. The third day was also the day of looking beyond the conference room to the rest of the country, where people came together for the Fridays For

"A retreat also provides the opportunity to collaboratively work on topics other than science."

Future national climate strike. This is why the retreat schedule was adjusted and many of the retreat participants went to show their support at the local climate strike in the city center of Lüneburg. Putting our scientific expertise at the service of society should be one of our main goals as scientists and everyone may find his or her own way to do that. We therefore thank the board and the other participants for their patience allowing the departure from the retreat schedule.

To conclude the scientific schedule, a challenging keynote lecture was promised and delivered by Vittorio



M. Canuto (NASA Goddard Institute for Space Studies New York). Connecting to the retreat from the city of New York, Dr. Canuto shared his views on "Parameterisation and implications of SM", demonstrating once again the relevance of TRR topics for the international research community.

At lunch members of the Gender & Diversity Task Group - previously known as Gender Task Group - met with PhDs and postdocs who are interested in the topics and are considering joining the task group. Together they discussed the existing measures, which mainly focus on gender issues and supporting scientists with family obligations, and ideas for future activities of the task group, e.g. compiling online resources on gender issues and organising workshops on intercultural communication, particularly between supervisors and Early Career Scientists.

In the afternoon, all attendees reconvened one last time for the first in-person general assembly in the second phase of the TRR181. First votes were cast to elect Urs Schaefer-Rolffs (IAP) and Nils Brüggemann (Uni HH) as new

TRR board members. We congratulate the new board members and wish them great success in exercising their new duties. Additionally, we extend a warm welcome to our new members Bing-Ying "Luby" Lu (UHB) and Sergiy Vasylykevych (UHH). Luby and Sergiy have already actively contributed to the TRR in the past and now formally obtained membership status. Well deserved!

Finally, there has been the opportunity to discuss our science and to get to know each other better during a coffee break, bowling match or the occasional visit to a local brewery. We have come far in these three days: We can draw new inspiration from the work of our fellow TRR members, we got to know the expertise of our colleagues and we are better prepared to face our critics. Success!

We thank all participants for their contributions to the retreat and especially Lea Diederichsen and Jennifer Fandrich for organizing this successful event!



DECOMPOSITION OF VERTICAL MOMENTUM FLUXES IN THE TROPICAL ATMOSPHERE

by *Valentino Neduhal, PhD, L2*

Greetings dear reader! My name is Valentino and I work as a PhD student at the University of Hamburg under the supervision of Dr. Nedjeljka Žagar (Universität Hamburg). I am a part of the TRR subproject L2 named "Quantifying Dynamical Regimes in the Ocean and the Atmosphere". I am originally from Croatia where I spent all of my education years. I have Bachelor in Physics/Geophysics from the University of Zagreb and a Masters in Meteorology and Physical Oceanography that I acquired with the thesis on "Implementation of the empirical orthogonal functions analysis to determine nonstationarity of time series" from the University of Zagreb.

I started my work as a part of TRR in May of 2021. with the goal of my work being the quantification of vertical momentum fluxes in the tropical atmosphere. To do this we will employ

normal mode decomposition (NMD) to decompose atmospheric motions to different dynamical regimes. More precisely we will be using the MODES NMD package developed by Žagar et al., for the horizontal velocity and an associated novel spectral approach for the vertical velocity decomposition. Based on MODES we will develop a tool for the computation of vertical momentum fluxes from high-resolution ERA5 data.

Then, we will analyze climate models in the same way and compare the results with those for reanalysis to quantify missing momentum fluxes across scales. The results will be then used to quantify the missing momentum fluxes in climate models that are still running at a much lower resolution. The quantification of vertical momentum fluxes associated with the inertia-gravity waves in analysis data can become valuable validation metrics

of new parameterizations and upscale transfers in ICON-a and other climate models. The results will provide, among others, a novel scale-dependent quantification of the vertical momentum fluxes associated with different atmospheric regimes in analyses and climate models.



REDUCING SPURIOUS MIXING IN OCEAN MODELS

by *Tridib Banerjee, PhD, M5*

Hey everyone, I am Tridib, and I am a PhD student employed at Jacobs University but also working at the Alfred Wegener Institute. I am excited to share with you who I am and what my project is.



Beginning with a bit about myself, I did my Bachelor in Mechanical engineering, my Master in Aerospace Engineering, and currently, I am pursuing my PhD in Mathematics. Some of my proudest moments from academia include winning the gold medal and being the first ever in my Bachelor's university from core engineering to score a perfect ten semester GPA, being the only one from my Master's university in core engineering to win the prestigious DAAD scholarship for four semesters consecutively, and hopefully, being the first member of my family to ever get a PhD.

I am heavily invested outside academia as well. I love fine arts and

landscape photography. My photograph of the Singapore National Museum was publicly voted as the third-best entry in a photography contest. I also love video editing and have worked on campaigns for business start-ups. I love digital painting too. Above all, my most prideful endeavour remains my involvement with nature conservation and animal rescue operations. Some of the significant differences that we were able to achieve include - preserving the rich biodiversity of nearly 130 acres of the Amazon forest in the Loreto and Ucayali

regions of Peru vide the Rain Forest Trust, being part of the biggest ever Asian moon bear rescue operation from the bile farms in Vietnam and Nanning, southern China through the Animal Asia Foundation and being able to adopt countless abused and malnourished animals including an elephant named Yin Dee through the Save Elephant Foundation, which I am particularly fond of.

From bungee jumping to queuing for the next Dan Brown, I try not to miss out on good things in life.

Coming to my PhD project, I am working under the supervision of Dr. Sergey Danilov on the TRR subproject M5. Every simulation ever done in human history includes some compromise. Real world is infinitely complex, and whenever we try to model something mathematically, we can only pick our battles. We are limited by our computational resources, machine precisions, and of course, the discoveries we are yet

to make. The same goes for the ocean. In such a case, our estimated solution approximates the real-world physical solution only to a certain level of accuracy. One of the consequences of this deviance is the “spurious mixing” or numerical mixing, which produces the same effect as real-world mixing, but has no physical reason to exist. These affect the ocean models greatly, reducing their prediction accuracy for phenomena like meridional overturning, overflows, and tracer transport. It impacts any numerical experiment reliant on density structures highly. They also affect our model parametrizations to an unknown extent, making them even more undesirable. My PhD includes exploring the reasons behind the spurious mixing in ocean models and finding ways to mitigate them. Currently, I am working with the ocean model FESOM 2.0. I am looking into different time-stepping schemes for the layer transport and

barotropic sub-time stepping accuracy with a plan to look into layer motions within the true Arbitrary Lagrangian-Eulerian (ALE) framework by the end of this year.

PUBLICATIONS

Have you also published your work, but cannot find it here? Please get in touch with the [project coordination](#). Members of the TRR 181 are printed in bold.

Peng, J., Dräger-Dietel, J., North, R. P., & Umlauf, L. (2021). **Diurnal Variability of Frontal Dynamics, Instability, and Turbulence in a Submesoscale Upwelling Filament**, *J. Phys. Oceanogr.*, 51(9), 2825-2843, doi: <https://doi.org/10.1175/JPO-D-21-0033.1>.

Bauer, T. P., Holtermann, P., Heinold, B., Radtke, H., Knoth, O. & **Klingbeil, K.** (2021). **ICONGETM v1.0 – flexible NUOPC-driven two-way coupling via ESMF exchange grids between the unstructured-grid atmosphere model ICON and the structured-grid coastal ocean model GETM**. *Geosci. Model Dev.*, 14, 4843–4863, doi: <https://doi.org/10.5194/gmd-14-4843-2021>.

Noethen, F. (2021). **Computing Covariant Lyapunov Vectors in Hilbert spaces**. *J. Comput. Dyn.*, 2021, 8 (3): 325-352. doi: [10.3934/jcd.2021014](https://doi.org/10.3934/jcd.2021014).

Li, Q., Bruggemann, J., **Burchard, H., Klingbeil, K., Umlauf, L., & Bolding, K.** (2021). **Integrating CVMix into GOTM (v6.0): a consistent framework for testing, comparing, and applying ocean mixing schemes**. *Geosci. Model Dev.*, doi: <https://doi.org/10.5194/gmd-14-4261-2021>.

Prugger, A. and Rademacher, J. D. M. (2021). **Explicit superposed and forced plane wave generalized Beltrami flows**. *IMA J. Appl. Math.*, doi: <https://doi.org/10.1093/imamat/hxab015>.

UPCOMING EVENTS

October 7, 2021

RTG ENERGY Meeting

Every second Thursday at 3 p.m. the TRR PhDs and Postdocs meet online to discuss their research and talk about current TRR issues.

October 21, 2021

RTG ENERGY Meeting

October 25-28, 2021

RTG: Fundamentals of Ocean Circulation Ocean Modelling

Theory: from the Munk Gyre to GCMs
Topical workshop with Martin Losch for interested TRR PhDs and postdocs

October 29, 2021

Equality Slam

At the first Uni Bremen Equality Slam, women* text artists will slam for

and against everything that has ever preyed on their mind: stereotypes, gender clichés, obstacles and hurdles on the path to studying at the uni and throughout academia.

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October 29, 2021

Outreach Event

At Übersee Museum in Bremen there will be talks and an interactive game presented by TRR members.

November 4, 2021

RTG ENERGY Meeting

November 18, 2021

RTG ENERGY Meeting

November 22, 2021

RTG Course: Fundamentals of Meteorology

The course will be split in multiple sessions, which will be spread across the weeks of November 22 and 29, 2021

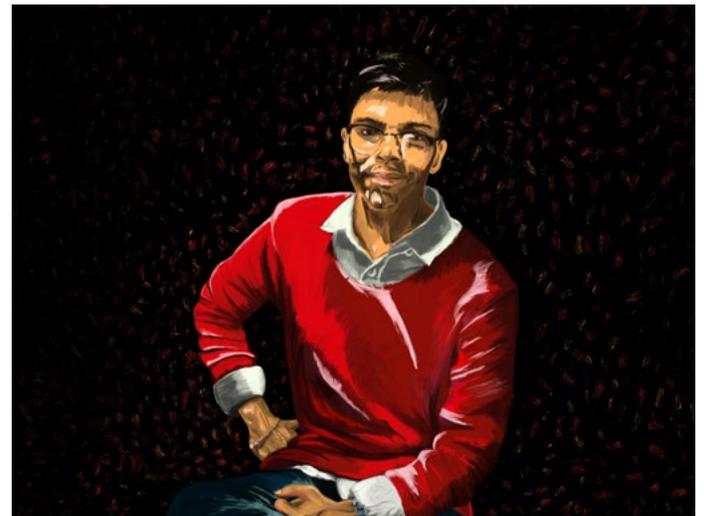


SOMETHING ARTSY FOR THE END

by Tridib Banerjee



The chosen photo of Singapore National Museum.



Digitally drawn self-portrait

Main content created by Jennifer Fandrich other authors are credited respectively

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