



## 3<sup>rd</sup> SFB1502 DETECT Newsletter

### Gaining momentum

During the summer months most of the remaining positions in the central and scientific projects have been filled, and project work has since gained momentum.

We have been able to fill the positions for DETECT's central administrative coordination. Dorothee Berkle-Müller started as Administrative Manager to support the Management Board and Nicolas Jennrich as Technician to support the measurement projects. Starting 1<sup>st</sup> of October, Sandra Juraga supports the DETECT Secretariat on a 25% position. We are happy to have all three in our team! Dorothee introduces herself in the interview of this issue.

The construction works on our new DETECT office in Kekuléstraße 39a were finalized in September and the basic desk furniture has just been delivered. Dorothee Berkle-Müller and Nicolas Jennrich have already moved into their new offices. Also some of our PhDs and PostDocs will have their offices there. All those who are interested are most welcome to visit the new DETECT home!

At the same time, field work continues on various projects. Project A03 is reporting in this issue from their Summer campaign in the south of France for the quantification of the transpiration / evapotranspiration (T/ET) ratio of a sunflower crop from water stable isotopic monitoring.

In addition, the training of our PhDs has gained momentum. Read about the exciting impressions from the High Performance Scientific Computing TerrSyS Fall School organized by the Geoverbund at Forschungszentrum Jülich.

Enjoy reading!

Sincerely,

[Jürgen Kusche](#)  
DETECT'S Speaker

[Silke Hüttel](#)  
DETECT'S Co-Speaker

[Harry Vereecken](#)  
DETECT'S Co-Speaker

[Frank Siegismund](#)  
DETECT'S Scientific Coordinator



## Report from Cluster A03 Summer Campaign in Toulouse, France

by Daniel Schulz, Nicolas Brüggemann, Youri Rothfuss



ICOS Research station Auradé, sunflower field

**A03's PhD student Daniel Schulz deployed the "Isomobile" with help of PIs Brüggemann and Rothfuss for the first time in the framework of DETECT in one Mediterranean site in the south of France (ICOS Research Station 'Auradé' near Toulouse) for the quantification of T/ET ratio of a sunflower crop from water stable isotopic monitoring.**

The Isomobile is a laboratory on wheels equipped with state-of-the-art laser spectrometers for the online monitoring of water vapor mixing ratio and isotopic compositions in the atmosphere of an ecosystem. It can be deployed to various environments (if a power socket is to be found), from agricultural crops to forest sites. It features an automatized calibration and adaptative sampling system.



Isomobile (right) near the ICOS mast (left)

In Auradé, one associated ICOS site managed by the CESBIO (Center for space studies of the Biosphere, CNES - CNRS – University of Toulouse) and in close collaboration with their staff, water vapor was continuously collected across a height profile (up to a height of three

meters) in and above a sunflower crop at three locations in the field to investigate the temporal dynamics and lateral heterogeneity in transpiration to evapotranspiration ratio from end of June to end of July 2022. These were the driest summer month ever recorded in the Occitanie region since 1976.



A03's own PhD Student Daniel Schulz!

After a short stop at the Research Center Jülich in August, the Isomobile has been back on the road and is currently installed on the ICOS site "Rollesbroich" of the TERENO Eifel/Lower Rhine Valley Observatory until mid- October to monitor the T/ET ratio of another Plant Functional Type implemented into CLM, namely a temperate grassland.



## Report from the Fall school “High-Performance Scientific Computing in Terrestrial Systems (HPSC TerrSys)” 2022, Bonn

by Charlotte Hacker

From Monday, 26.09. to Friday, 30.09. the Geoverbund ABC/J with its competence Centre for High-Performance Scientific Computing in Terrestrial Systems (HPSC TerrSys) offered the HSPC TerrSys Fall school 2022. It took place in Bonn and was implemented by experts from the Institute of Bio- and Geosciences, section Agrosphere (IBG-3), at the Forschungszentrum Jülich, the Jülich Supercomputing Centre (JSC) and invited guests from the Alfred Wegener Institute (AWI), as well as the Universities of Reading and Twente. The topics over the week ranged from the introduction to high performance computing and its use in Earth system modelling over computational aspects like boosting the efficiency and finding costly calculation operations in a code to ensemble data assimilation, the fusion of observations with a model, and the aspects of data science. The mornings were mostly dedicated to lectures and the afternoons to practical work. During the coffee and lunch breaks, both the participants, the speakers and the team of IBG-3, who made this Fall school possible, had the opportunity to exchange their ideas, gained insights and expertise.



The following short recaps of the days, will provide an impression of the event week.

**Monday, September 26:** Welcome to the huge world of HPC and Earth system modelling. The morning was filled with introduction lectures on both mentioned topics. The afternoon was dedicated to the supercomputer JURECA, logging on the system and running the first small MPI (Message Passing Interface) based parallel script on the supercomputer.

**Tuesday, September 27:** How to bring the soil-water-plant-energy interaction into a model and what does this interaction include? What is performance portability (the ability of programs to be independent of the operating platform) and what does that include? These questions were the basis of the lectures. The hand-on exercise focused on building and setting up the Terrestrial System Modelling Platform (TSMP) for an idealized testcase (a horizontally homogeneous 30 x 60 x 55 km domain).

**Wednesday, September 28:** Parallel performance and profiling or how to reduce the runtime of your program and determine costly operations. A challenging task, especially, if the code you are working on was not written by yourself. During the lecture various tools were introduced to help with the aforementioned tasks. In the practical work we applied the concepts on components of TSMP.

**Thursday, September 29:** Observations are measurements of the Earth surface. The model output is based on physical and functional relationships implemented in the models. Data assimilation is the mathematical framework to join both, model and observations. Ensembles are multi run through, allowing to sample the



underlying distribution function. So much for the theory, in the practical work we applied the theory to the surface and subsurface part of TSMP.

**Friday, September 30:** The last day of the Fall School was filled with a real data test case scenario. We used all three model components, subsurface, surface and atmosphere to model the conditions on June 25 2021 over the Pan-European area and analyzed the output. During the morning lecture the topics data science, file

handling and machine learning were introduced.





## **23 September 2022: Get-together Workshop between Uni Bonn and the European Centre of Medium-Range Weather Forecasts (ECMWF) Bonn**

by Jürgen Kusche

This meeting, hosted in the Uniclub Bonn, brought together weather, climate, Earth Observation and computer scientists from the university and from the new ECMWF branch in Bonn. The workshop purpose was to inform each other about ongoing research and bigger programs, exchange ideas, and simply get to

know our new neighbours better. DETECT was strongly involved, with contributions from our members Petra Friederichs, Leonie Esters, Jürgen Kusche, Petra Mutzel, and Jakob Rhyner.



## DETECT administrative staff

Interview with Dorothee K. Berkle-Müller, responsible for the administrative coordination at DETECT's Collaborative Research Centre

### ***Dorothee, what attracts you to work in DETECT?***

I like (no, I really do love!) development work. Despite the strict framework conditions on the one hand, creativity is required on the other hand. That's indeed challenging, but also very exciting.

I have already accompanied such developmental processes twice in different professional contexts. The work at DETECT, specifically the international environment, the administrative development and of course YOU, the nice and diverse DETECT-Team sweeten my busy everyday work which I really enjoy very much... However, nobody had told me what the relocation to the new DETECT building and coordinating it would mean... ;-).

### ***What do you think is the most exciting administrative challenge for the CRC?***

As we all know: The administrative jungle is the natural enemy of science! So let's be honest. It will of course challenge us all to comply with both the University and DFG regulations,

especially with the so-called *principle of annuality*, which I have chosen as the word of the month now that the end of the year is approaching. Knowing about the contrasts quoted above, this will of course also mean challenges for our collaboration. So please, dear scientists: don't forget, we are not elaborating bureaucratic processes against you, but FOR our overall benefit, with the aim to efficiently implement our goals within the framework setting, the achievement of which – if we all do a good job - will enable us to set up the next project phases... Because simple, but wise: No money, no cookies! 😊 So let's "struggle" together for really worthwhile goals and the necessary funds.

### ***And what do you see as your personal challenge in your role in DETECT?***

As mentioned above, constantly finding the balance between specifications, bureaucratic effort and the achievement of the project-objectives without losing my faith (in you and myself) and in having fun at work.

### **About Dorothee K. Berkle-Müller**

Certified translator for the Spanish and court-approved translator for the English and Spanish languages, court-approved interpreter for Spanish, official trainer for non-violent communication processes, more than 30 years of professional experience in administrative contexts in both private and public sector at home and abroad





## Recent and Upcoming Events

### **18-20 October 2022: GRACE/GRACE-FO Science Team Meeting 2022**

The GRACE/GRACE-FO Science Team Meeting 2022 will take place at the Helmholtz Centre Potsdam – GFZ German Research Centre for Geosciences, Potsdam, Germany, October 18-20, 2022.

The meeting will be held in a hybrid format with a time schedule adjusted to local time at Germany (morning and afternoon sessions). Remote participants will be able to join the oral sessions (Live) using Zoom including the option to give an oral presentation. It is planned that recordings of the oral sessions can be viewed on demand to account for time zone differences. The option to present a poster is only available for on-site participants. More info [here](#).

### **19-20 October 2022: INTERGEO**

Frontiers of Geodetic Science (previously Geodätische Woche) will be held Oktober 19 and 20, 2022 as part of the INTERGEO conference in presence in Essen. The Frontiers of Geodetic Science provides a forum for discussion of current scientific developments and applications in geodesy. In particular, all employees of university and research institutes in the field of geodesy are addressed, but also representatives of neighboring disciplines and users. The five subject areas listed below are intended for information and the exchange of ideas. In particular, all young scientists are encouraged to submit contributions to the Frontiers of Geodetic Science 2022. More info [here](#).

### **31 October - 04 November 2022: OSTST Meeting**

The yearly Ocean Surface Topography Science Team meeting includes plenary sessions, the splinter working sessions and poster sessions. In addition to the traditional in-depth analysis of TOPEX/Poseidon-Jason legacy missions, analysis from other missions bringing reciprocal benefits are welcome. This should be our first OSTST meeting after the launch of Sentinel-6A/Jason-CSA, special emphasis will be placed on this new mission. More info [here](#).

### **14 - 16 November 2022: GGOS Days 2022**

GGOS (Global Geodetic Observing System) Days is the annual meeting of GGOS to report on recent activities and present plans for the coming year. This year we have invited keynote speakers who will present on four very interesting topics about new geodetic developments and studies on the impacts of climate change. Everyone is encouraged to attend! More info [here](#).

### **12-16 December 2022: AGU**

Be part of leading the future!

AGU (American Geophysical Union) Fall Meeting is the most influential event in the world dedicated to the advancement of Earth and space sciences. Every year, AGU Fall Meeting unites the Earth and space science community to share findings, connect like-minded scientists from around the world, and advance our profession and shared passion for the impact of science. More info [here](#).

### **06-10 February 2023: 13th Coastal Altimetry Workshop - Coastal altimetry Training**

The Coastal Altimetry Community (<http://www.coastalt.eu/community>), that is the international community of scientists, engineers and managers working on developing applications of altimetry in the coastal zone, invites you to the Universidad de Cádiz for the 13th Edition of the Coastal Altimetry Workshop (CAW-13) on 6-10 February 2023, including a Coastal Altimetry Training for Early Career Scientists and Engineers. More info [here](#).

### **11-20 July 2023: IUGG 28th General Assembly of IUGG → Deadline of Abstract Submission: 14th of February 2023**

The 28th IUGG General Assembly will be held 11-20 July 2023 at the Messe Berlin – City Cube, Berlin, Germany. This is a special opportunity for participants from around the world to come together and share their science and culture. Join us for a host of scientific activities, including special public lectures, keynote Union lectures and a wide variety of themed sessions. More info [here](#).



## Announcements – save the date!

### ***Activities within DETECT***

#### **DETECT Seminar:**

Mondays at 10:15 ([link](#))

- 17 Oct.: Juan Baca Cabrera, Guillaume Lobet ‘Modulation of water fluxes by plant hydraulics’
- 31 Oct.: Jürgen Kusche, Charlotte Hacker, , ‘Modeling Terrestrial Water Storage’
- 21 Nov.: Hugo Storm, Josef Baumert, ‘crops class prediction models using (probabilistic) machine learning approaches’
- 28 Nov.: TBD
- 19 Dec.: Thomas Gaiser, Dominik Behrend: ‘Modeling water and nutrient fluxes in cropping systems’
- 16 Jan.: Jan Börner, Marco Ferro, ‘empirical and modelling techniques to analyse LULCC’
- 30 Jan.: Wulf Amelung, Heike Schimmel, ‘Ecosystem parameterization’

#### **IRTG Lecture Series**

To introduce the PhD students to interdisciplinary science conducted in the CRC, a lecture series is held twice a year. The series addresses the different disciplines in an introductory fashion, including concepts and techniques relevant for research in modelling and observation of the water cycle, as well as of the land surface and its use, also beyond what is applied in current CRC projects.

The number of participants for specific courses might be limited. Anyone interested to participate in a specific course has to check admission with the responsible lecturer listed in the table of lectures below.

- 19 Oct., 8:30-11:30: Johan A. Huisman, Hydrogeophysics
- 19 Oct., 13:00-16:00: Michael Leyer, Service operations
- 15 Nov., 8:00-11:00: Silke Hüttel, Agricultural economics
- 15 Nov., 13:00-16:00: Stefan Seifert, Productivity analysis
- 20 Dec., 8:00-11:00: Petra Friederichs, Statistical methods in weather and climate research

- 20 Dec., 13:00-16:00: Olaf Stein, Data management and high-performance computing
- 17 Jan., 8:00-11:00: Arianna Valmassoi, High-resolution atmosphere modeling
- 17 Jan., 13:00-16:00: Gabrielle de Lannoy, Observation of the water cycle

#### **21 Dec.: DETECT-Team-Meeting**

We are currently planning an online meeting for the whole DETECT-Team on Dec. 21, 10:00-14:00.

We will talk about and discuss scientific project work as well as supportive central issues of the Z projects. An agenda will follow.

#### ***Other announcements***

16 Nov., 18:15: ‘Sustainability of coastal forests’. Sustainability of coastal forests in the delta of the Mississippi River in the face of sea-level rise Seminar by Prof. Dr. Richard Keim, Louisiana State University.

Where: University of Bonn, Department of Geography, Alfred-Philippson-Hörsaal, Meckenheimer Allee 166, 53115 Bonn.

More info [here](#).

#### ***Courses at Jülich Supercomputing Centre (JSC)***

15-17 Nov.: training course on Software Development in Science, which includes Git usage. More information is available [here](#) This course may be useful even for those not strictly developing software, as Git is a great platform to share scripts, workflows and documentation.

21-24 Nov.: Introduction to Supercomputing. For those that will be using JSC systems, it is strongly advisable to register for this course. More information is available [here](#).

#### **Publications**

Vereecken, H., Amelung, W., Bauke, S.L. et al. Soil hydrology in the Earth system. Nat Rev



Earth Environ 3, 573–587 (2022).  
<https://doi.org/10.1038/s43017-022-00324-6>.  
See also [here](#).

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