TRR 170
LATE ACCRETION
ONTO TERRESTRIAL PLANETS

> Editorial

Dear Colleagues,

In the meantime, we got used to living with Corona with all its facets like zoom meetings, home office, 3G or 2G etc. Nevertheless, or precisely because of this, we are determined to hold our first events in presence: the Summer School # 1 for our PhD students and some postdocs just took place in Nördlingen and we are looking forward to our first in-person annual retreat in Potsdam in November. As you can see we're making the best of the situation and with this newsletter we want to share some of these recent developments within TRR 170.

We are happy to announce that we have significantly revised the TRR 170 homepage and largely completed it. You can now find all important information regarding TRR 170, upcoming seminars and events, and the latest news on the webpage.

Our congratulations go to Gianluigi Ortenzi (DLR Berlin), Stamatis Flemetakis (WWU Münster) and Christian Riedel (FU Berlin), who successfully defended their doctorate in the last months. Further congratulations go to Julia Schmidt for winning a paper award.

We are excited to announce the establishment of the new TRR 170 gender board, which consists of eight people across TRR 170 and whose main task will be to initiate and plan activities in the area of gender equality: gender awareness measures, reconciliation of family and science, and career advancement for women scientists.

Please also note the schedule with some important dates, which you please add to your calendar! In addition, there is also a wide range of soft skill workshops and seminars for TRR 170 PhD students planned for the coming months.

We hope you will enjoy reading the newsletter.

All the best and stay healthy!

Sabine Hunze & Thorsten Kleine

TRR 170
LATE ACCRETION
ONTO TERRESTRIAL PLANETS

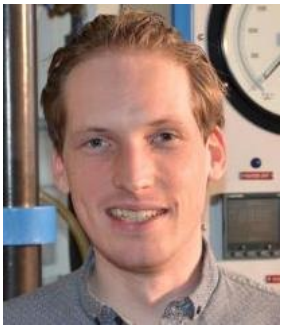
> Personnel

New PhD students

Alexander Esau (TU Berlin, project C5, supervisor: Heike Rauer)
alexander.esau@tu-berlin.de
The aim of my research will be the investigation and reconstruction of the early Earth's atmosphere during the magma-ocean period, especially the effect of the mantle redox state upon outgassing. Therefore, I will use and update the DLR's climate-chemistry model 1D TERRA, where I will implement the redox-dependent outgassing and impact-dependent escape processes. I have completed my master's degree in geosciences at the Freie Universität Berlin, where I could already deepen my interests in planetary sciences and astrophysics. During my master thesis at the MfN Berlin, where I investigated impact glasses from the Zhamanshin impact crater/Kazakhstan, I was able to gain further experiences in the field of planetary sciences and impact and meteorite research, which I will use during my PhD. I am very much looking forward to my future work and the opportunity to expand my personal and professional interests and desires through the TRR.
When I am not doing research or thinking about the formation and origin of our planet, I am spending my time with cycling, hiking, bouldering, listening and making music and enjoy as much time as possible with my family.

TRR 170
LATE ACCRETION
ONTO TERRESTRIAL PLANETS

New Postdoc



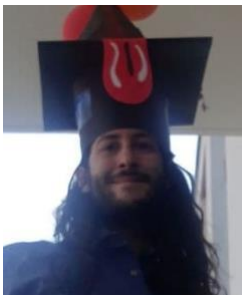
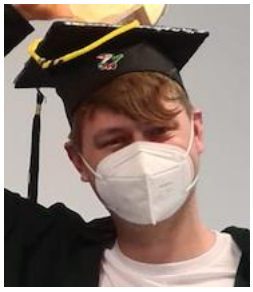
Dr. Edgar Steenstra (WWU, project B7)
esteenst@uni-muenster.de
My research interests lie in geochemical studies of planet accretion and subsequent magmatic differentiation. I am particularly interested in constraining the indigenous abundances and distribution of iron-loving (siderophile) and sulfide-loving (chalcophile) elements between silicates, sulfides, metals and during degassing processes, as well as the evolution of volatiles in planetary bodies.
Within the TRR-170 project, I hope to shed more lights into the degassing behavior of elements from metal melts, and apply this to volatile element depletions in iron meteorite suites. I also work on a wide range of side projects, including (1) elemental coordination in silicate melts, (2) distribution of halogens during magmatic differentiation, (3) partial melting experiments on the terrestrial mantle, (4) highly siderophile and chalcophile element partitioning behavior, (5) sulfide ore petrogenesis and (6) optimization of LA-ICP-MS analyses of copper heritage alloys.

Support Z project

Theodor Steller (WWU, project Z: TRR 170 homepage)
theo.stellar@uni-muenster.de
Since my bachelor studies I am interested in learning more about geochemical and cosmochemical processes by obtaining isotopic data. With this intent I joined Thorsten Kleine's cosmochemistry work group to complete my master's degree. My research project will primarily focus on early solar system processes and the origin of the loss of volatile elements in carbonaceous chondrites, using stable Zn isotope variations. As a student assistant I am also involved in managing the content of the TRR 170 website. Aside from my scientific interests I enjoy bouldering, meeting friends for a beer and playing the piano.

TRR 170
LATE ACCRETION
ONTO TERRESTRIAL PLANETS

Completed doctorates

	**Gianluigi Ortenzi** (DLR, project C6) gianluigi.ortenzi@dlr.de Supervisors: Frank Sohl & Lena Noack Date of defense: May 25, 2021 Title: Interior-surface-atmosphere interactions of rocky planets: simulation of volcanic outgassing and volatile chemical speciation in the C-O-H system
	**Stamatis Flemetakis** (WWU, project B4) stam.flemetakis@uni-muenster.de Supervisors: Stephan Klemme, Arno Rohrbach, and Timm John Date of defense: June 14, 2021 Title: Halogens in the mantle: An experimental and analytical study
	**Christian Riedel** (FU Berlin, project A3) christian.riedel@fu-berlin.de> Supervisors: Kai Wünnemann & Harald Hiesinger Date of defense: July 9, 2021 Title: Planetary Surface Evolution from Impact Cratering: A View from Applied Geospatial Methods

TRR 170
LATE ACCRETION
ONTO TERRESTRIAL PLANETS

> Publications (April – August 2021)

Grützner, Tobias; Hopp, Timo; Berndt, Jasper; Rohrbach, Arno; Klemme, Stephan (2021): Experimental investigation of Ru isotope fractionation between metal, silicate and sulfide melts, Chemical Geology 580. https://doi.org/10.1016/j.chemgeo.2021.120384

Hellmann, J.L., Hopp, T., Burkhardt, C., Becker, H., Fischer-Gödde, M., and Kleine, T. (2021): Tellurium isotope cosmochemistry: Implications for volatile fractionation in chondrite parent bodies and origin of the late veneer. Geochimica et Cosmochimica Acta 309, 313-328. https://doi.org/10.1016/j.gca.2021.06.038

Hopp, T. and Kleine, T. (2021): Ruthenium isotopic fractionation in primitive achondrites: Clues to the early stages of planetesimal melting. Geochimica et Cosmochimica Acta, 302, 46-60. https://doi.org/10.1016/j.gca.2021.03.016

Kadlag, Y., Tatzel, M., Frick, A.D., Becker, H., and Kühne, P. (2021): In situ Si isotope and chemical constraints on formation and processing of chondrules in the Allende meteorite. Geochimica et Cosmochimica Acta 304, 234-257.
https://doi.org/10.1016/j.gca.2021.04.022

Liu, T., Michael, G., Zhu, M.-H., and Wünnemann, K. (2021): Predicted Sources of Samples Returned from Chang'e-5 Landing Region. Geophysical Research Letters 48 (8). https://doi.org/10.1029/2021GL092434

Liu, T., Michael, G.,Haber, T., and Wünnemann, K. (2021): Formation of Small Craters in the Lunar Regolith: How Do They Influence the Preservation of Ancient Melt at the Surface? Journal of Geophysical Research: Planets 126 (5). https://doi.org/10.1029/2020JE006708

Mari, N., Riches, A.J.V., Hallis, L.J., Marrocchi, Y., Villeneuve, J., Gleissner, P., Becker, H., and Lee, M.R. (2019): Syneruptive incorporation of martian surface sulphur in the nakhlite lava flows revealed by S and Os isotopes and highly siderophile elements: implication for mantle sources in Mars. Cosmochimica Acta 266, 416-434.
https://doi.org/10.1016/j.gca.2019.05.025

Metzler, K., Hezel, D.C., Barosch, J., Wölfer, E., Schneider, J.M., Hellmann, J.L., Berndt, J., Stracke, A., Gattacceca, J., Greenwood,R.C., Franchi, I.A., Burkhardt, C., and Kleine, T. (2021): The Loongana (CL) group of carbonaceous chondrites. Cosmochimica Acta 304, 1-31. https://doi.org/10.1016/j.gca.2021.04.007

Storz, J., Ludwig, T., Bischoff, A., Schwarz, W.H., Trieloff, M. (2021): Graphite in ureilites, enstatite chondrites, and unique clasts in ordinary chondrites – Insights from the carbon-isotope composition. Geochimica et Cosmochimica Acta 307, 86-104. https://doi.org/10.1016/j.gca.2021.05.028

Zhu, K., Moynier, F., Schiller, M., Becker, H., Barrat, J.-A., Bizzarro, M. (2021): Tracing the origin and core formation of the enstatite achondrite parent bodies using Cr isotopes. Geochimica et Cosmochimica Acta 308, 256-372. https://doi.org/10.1016/j.gca.2021.05.053

TRR 170
LATE ACCRETION
ONTO TERRESTRIAL PLANETS

> INF project and database TRR170-DB

The first data webinar of the Information and Data Infrastructure (INF) project took place on May 18, 2021. 19 doctoral students and postdocs participated in a webinar about research data management and data management plans. For those who are interested or did not attend: useful information is available at the TRR170-DB Events website.

The TRR170-DB website has been updated for information on how to deposit data. Resources around research data management also inform about data guidelines, policies, and data licenses. Check back for regular updates.

TRR170-DB is now registered with re3data, a global registry of research data repositories co-funded by the German Research Foundation (DFG). The registry provides information about more than 2450 research data repositories from different academic disciplines that meet common standards for data sharing and access. TRR170-DB is now also listed on NFDI4Earth's website for repositories.

If you have any questions, please contact Elfrun Lehmann (elfrun.lehmann@fu-berlin.de) or Harry Becker (hbecker@zedat.fu-berlin.de).

TRR 170
LATE ACCRETION
ONTO TERRESTRIAL PLANETS

> Gender Board

The TRR 170 gender board was founded in July and consists of eight members of all status groups and participating institutions in Münster and Berlin.


Doris Breuer


Alexander Esau


Thomas Haber


Sabine Hunze


Elfrun Lehmann


Tomke Lompa


Lena Noack


Sabrina Schwinger

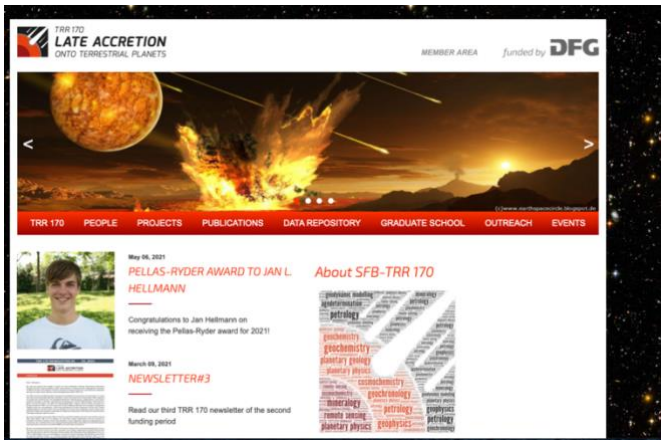
The main focus of the board is to strengthen the exchange on gender topics, to collect a diversity of opinions and share our individual experiences. Thus, we will plan various measures related to gender equality. This planning includes to collect ideas and concretise and implement measures.

Topics of possible measures are: (1) gender awareness, (2) combability of family and science, and (3) enhance women's careers taking into account the usage guidelines of the DFG.
The board is involved in its university structures and is cooperating with the equal opportunity officers of the participating departments at the different institutions in Münster and Berlin.

TRR 170
LATE ACCRETION
ONTO TERRESTRIAL PLANETS

> Outreach

TRR 170 Homepage



Please take a look at our new and revised TRR 170 homepage:
trr170-lateaccretion.de

In addition to the basic information such as projects and people you will find all important information regarding TRR 170, such as conferences and workshops, seminars and colloquia as well as templates for posters and talks.

TRR-170 in Europlanet Science Congress (EPSC) 2021

EUROPLANET SCIENCE CONGRESS EPSC2021

The Europlanet Science Congress (EPSC) is an annual international congress with a general focus on planetary science and planetary missions. It aims at bringing together several different scientific topics to cover the widest area possible regarding the current evolution of research in planetary science. Every year, around 1.000 people are attending the meeting. This year, EPSC2021 will be held as virtual meeting (13-24 September 2021). EPSC2021 is divided into 6 different groups. Among them, one is dedicated to Terrestrial Planets. A total of 21 sessions have been proposed for this group.

TRR 170 will be well represented at EPSC2021, where three different sessions involving TRR members have been proposed. These sessions are:

TP3: Multi-disciplinary perspective on late accretion processes: from impact processes to early differentiation. Convener: Laetitia Allibert, Co-conveners: Gregor Golabek, Thomas Kruijer, Lena Noack, Sabrina Schwinger, Julien Siebert

TP4: Impact Processes in the Solar System, Co-organized by OPS/SB. Convener: Elena Martellato, Co-conveners: Chrysa Avdellidou, Christopher Hamann, Isabel Herreros, Robert Luther, Jens Ormö

TP 20: Lunar surface: samples, (mega)regolith, observations. Convener: Tiantian Liu, Co-conveners: Philipp Gläser, Wajiha Iqbal, Thomas Kruijer, Stephanie C. Werner

TRR 170
LATE ACCRETION
ONTO TERRESTRIAL PLANETS

Best Paper Award for Julia Schmidt

Julia Schmidt won the best paper award at the Thirteenth International Conference on Advanced Geographic Information Systems, Applications, and Services, GEOProcessing 2021, July 18-22, Nice, France.
The title of her paper is “Parametrising a Model of Clinopyroxene/Melt Partition Coefficients for Sodium to Higher Upper Mantle Pressures”.
The paper has been selected as one of four "Best Papers" based on the reviews of the original submission, the camera-ready version, and the presentation during the conference. The authors of these papers will receive invitations to submit an extended article version to one of the IARIA Journals.

Let’s go to Venus
Author: Doris Breuer (SLR)

In a very short time, three Venus missions have been selected for launch between 2028 and 2032: two under NASA's Discovery Programme, VERITAS (launch 2028) and DAVINVI+ (launch 2020), and an ESA M-class mission, EnVision (launch 2032).

Although Venus is a hell of a place today, NASA and ESA are interested in finding out if it has always been this way. Among the missions' overall goals is to better understand how Venus became an inferno-like world when it has so many other features similar to Earth's - and may have been the first habitable world in the solar system, complete with an ocean and an Earth-like climate.
One mission will focus on refining our understanding of the Venusian atmosphere itself (DAVINCI+); the other two (Veritas and EnVision) will finally unlock the secrets of Venus' internal structure, landforms, geology and tectonic history. Of our TRR members, Doris Breuer is involved in the Veritas mission as Co-I and is part of the ESA Study Science Team for EnVision.

TRR 170
LATE ACCRETION
ONTO TERRESTRIAL PLANETS

Virtual experiments

Münster University geophysicists research the Earth's origins on the computer

Author: Christina Hoppenbrock (translated from the German by Ken Ashton)

Looking for answers to the question of how the Earth was formed: Prof. Ulrich Hansen (left) and Dr. Christian Maas.

Although Dr. Christian Maas does his research only on the computer, it's sometimes as if he were standing in a laboratory. "I do experiments," he says. By means of his virtual experiments, geophysicist Maas is investigating a question that couldn't be answered in any lab in the world: the question of the how the Earth came into being.

To be precise, he is researching the role which the magma oceans in the Earth's interior played in the Earth's formation. In order to find possible answers to this question, Maas has to go back around 4.5 billion years. At that time, the still-young Earth was subjected to a collision of unimaginable force: a precursor of a planet – a "protoplanet" – around the size of Mars hit the Earth. As a result, not only was the moon created from rocks hurled into space in the collision, but the mantle round the Earth also became red hot, melted down to a depth of several thousand kilometres, and became the magma ocean. There followed countless impacts of further smaller protoplanets.

How did the Earth we know today develop from this state? This is the key question behind Maas' doctoral thesis, which he completed in 2020. One important question regarding the detail is: To what extent did the Earth's rotation play a role? At the time, the Earth rotated much faster than it does today, with one day only lasting two to five hours. As a result, the Coriolis force, which deflects moving bodies from their path within a rotating system, was far stronger. The geodynamics working group led by Maas' PhD supervisor, Prof. Ulrich Hansen, was the first team worldwide to consider this phenomenon. That was in 2015. "Previously," says Hansen, "it hadn't been possible to examine the magma oceans in greater detail because there weren't any computers with sufficient computing capacity."

You can read the whole article here:
https://www.uni-muenster.de/news/view.php?cmdid=11916

TRR 170
LATE ACCRETION
ONTO TERRESTRIAL PLANETS

> Upcoming events

2021			
Workshop online	Python (basics) *Simon Schneider (Universiteit Utrecht, NL)*	Sept 16+17, 2021	PhD students
Summer School #1 Nördlingen	Impact processes in the solar system *TRR members*	Sept 19-24, 2021	PhD students & postdocs
Workshop	Introduction in the management of research data II *Elfrun Lehmann*	Oct 20-22, 2021 (1/2 day)	All interested TRR 170 members
Annual Retreat Potsdam	TRR 170	Nov 15-17, 2021	**All** TRR 170 members (participation is **mandatory**!)
2022			
Workshop online	Intermediate Leadership I *Frohnen (impulsplus)*	Jan 22, 2022	Postdocs
Workshop online	Scientific Writing *Klebensberger & Föll (NaWiK)*	March 21/23/25, 2022 (3x1/2 day)	Postdocs
Summer School #2 Bingen	Origin of the Earth-Moon System *International lecturers*	May 2-6, 2022	TRR 170 PhD students & postdocs, external PhD students
Workshop	Writing in English *Celeste Brennecka*	June 6-10, 2022 (1 day)	PhD students

TRR 170
LATE ACCRETION
ONTO TERRESTRIAL PLANETS

> Impressum

Editor:
Institut für Planetologie
Westfälische Wilhelms-Universität Münster
Wilhelm-Klemm-Straße 10
48149 Münster
Mail: › trr170@uni-muenster.de
Web: › www.trr170-lateaccretion.de

Editorial staff:
Sabine Hunze (Scientific Coordinator TRR 170)
Phone: (02 51) 83 – 3 90 81
E-mail: shunz_01@uni-muenster.de

Photos:
Logo: Bianca Schewe (bdsign)
Photos: Esau (p. 2), Steenstra, Steller (p. 3), Ortenzi, Flemetakis, Riedel (p. 4),
Breuer, Esau, Haber, Hunze, Lehmann Lompa,, Noack, Schwinger (p. 8), b-connect Berlin (p. 9), VR2Planets (p. 10), Hoppenbrock (p.11)