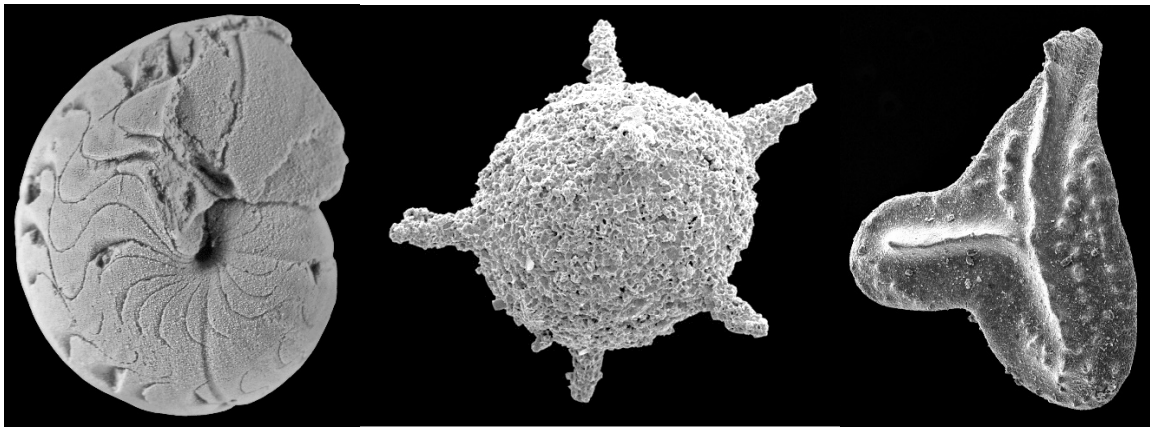
INTERNATIONAL UNION OF
GEOLOGICAL SCIENCES
COMMISSION ON STRATIGRAPHY

—s—D—s—

SUBCOMMISSION ON DEVONIAN STRATIGRAPHY

NEWSLETTER No. 38

R.T. Becker, Editor
Münster University,
Germany



November 2023 ISSN 2074-7268

Annual report for 2023

This report covers the interval from late 2022 to the end of August 2023. Activities of the Devonian Group at Münster included, as usual, a wide range of topics, from ammonoids and conodonts to foraminifers, trilobites, reefs, brachiopods, sedimentology, and plants, of course, in many cases in close cooperation with specialists that understand these topics better than the members of our group.

Fig. 1. Nodular limestone with septate, eroded Emsian anarcestid resembling "*Latanarcestes*" auct.; block on display in the Satun Geopark exhibition, Thailand.

A highlight in November 2022 was the participation in the International Palaeontological Congress in Thailand, and especially the field trip to the Satun Geopark in Peninsular Thailand, organized wonderfully by Clive BURRETT, Pol CHAODUMRONG, and collaborators. It included Cambrian to Carboniferous faunas, and, as a surprise, the first record of Emsian goniatites from the region and country, on display in the small Geopark museum (Fig. 1). However, the Devonian outcrops cannot compete with the Cambrian trilobite localities on low cliffs bordering the dream beaches on Tarotao Island, which is a recommended Natural Reserve. There is still much exploration potential in the Devonian of southern Thailand.

Equally splendid was the SDS-IGCP 652 Meeting in Geneseo in late July/early August 2023 in Geneseo and the associated field trips. All was wonderfully organized by Jeff OVER and his team, with the extraordinary field guidance by Carl BRETT, Gordon BAIRD, Chuch VER STRAETEN, Jay ZAMBITO, Alex BARTHOLOMEW, Joseph HANNIBAL, Randy BLOOD, and others. It was impressive to see the enormous progress in regional Devonian stratigraphy, as exemplified by the three outstanding new New York volumes presented at the conference dinner in the PRI Museum in Ithaca (see Devonian publications). And it was even possible to collect some more goniatites and nice trilobites at well-known localities during the pre-conference and Niagara area field trips.

Ongoing research in Morocco has a focus on our third volume on the Devonian of the Moroccan Meseta, which is planned, as the first two volumes from 2020 and 2021, for the open access main journal of the Hassan II Academy of Science and Technology of Morocco (*Frontiers in Science and Engineering, Earth, Water and Ocean, Environmental Sciences*). The work is based on close cooperation with our good friend Ahmed EL HASSANI. Volume 3 will cover regions and sections of the northern and eastern parts of the Western Meseta, such as the Tiflet and Oulmes regions, the Azrou Devonian (see Geneseo abstract, ABOUSSALAM et al. 2023), the Jebel ben Arab and Bou Khedra successions, as well as the Khenifra Palaeozoic (Ziyyar and Tabainout localities). As before, there will be a special focus on the biostratigraphic dating of facies changes, palaeogeographic trends, and synsedimentary Eovariscan reworking events.

Both in the Anti-Atlas and in the Sub-Meseta Zone at the southern base of the High Atlas, our collaboration with Heiko HÜNEKE, Arwed GIBB, Paul MEHLHORN and others from Greifswald university continues. It led to the publication of a new contourite model for the condensed pelagic successions of the Tafilalt Platform and a revised understanding of black styliolinites and *pumilio* limestones (HÜNEKE et al. 2023; GIBB et al. 2023a, full paper in submission). Another contribution on contourite sedimentation has been submitted to a *Geological Society Special Publication* volume. It is based on the Taliouine Lower Devonian in the Skoura region (GIBB et al. 2023b submitted). The stratigraphy and

tectono-sedimentary evolution of the Devonian to Lower Carboniferous Tisdafine Basin at the junction of the cratonic eastern Anti-Atlas and Variscan eastern Meseta has been fully published at the end of last year (TALIH et al. 2022). There are more unpublished conodont data for two important sections of that region, Oued Ferkla (especially for the Kacak Event Interval) and Bou Tisdafine SE. Detailed cyclostratigraphic work on the first locality has been started by Anne-Christin DA SILVA and her Ph.D. student Jarno HUYGH from Liége (see their report), whom we will support. At Bou Tisdafine SE, the F-F boundary and Kellwasser beds require more detailed work (Fig. 2).

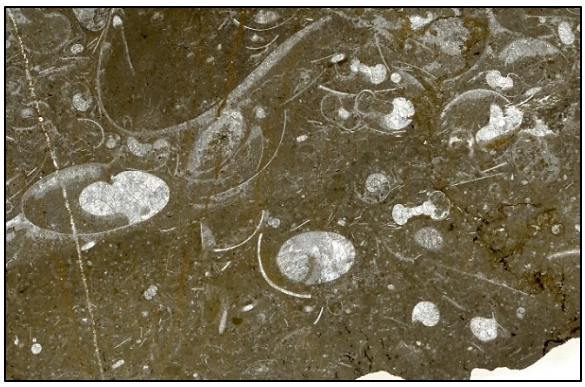


Fig. 2. Goniatite-rich Kellwasser facies at Bou Tisdafine SE, Sub-Meseta Zone, Morocco.

Because of the too many other projects, progress on ammonoid faunas from the Anti-Atlas region slowed down but is continuing (see student projects). This is also true for the trilobite and conodont faunas. For example, the first stable Gondwana *Gondwanaspis* was discovered after we had published on new Rhenish representatives of that genus (HELLING & BECKER 2022). We plan to pay attention to unpublished ammonoid-conodont-trilobite faunas at the middle-upper Givetian boundary. Apart from this, new work on Lower Carboniferous goniatites and trilobites from the eastern Tafilalt has been published (BECKER 2023) or will be submitted soon (Peter MÜLLER & Becker in prep.). We are also very pleased that a first part of the somewhat unique goethitic plant remains from the basal upper Givetian goniatite shale of Oum el Jerane in the southern Tafilalt are finally published (MEYER-BERTHAUD et al. 2023 in press).

In the Rhenish Massif, there was a focus on the Givetian/Frasnian reef complexes, especially in the northern part. A summary of Rhenish reef extinctions was presented at the Geneseo meeting (BECKER & ABOUSSALAM 2023), which was based on more than 20 years of work and numerous previous Münster B.Sc. and M.Sc. studies. We will continue to use the service of A. MAY (Unna) to get identifications of stromatoporoids, corals, and calcareous algae. Work is in progress in new sections, e.g. in the Wuppertal region (Hahnenfurt railway station), in the Neandertal, and south of the main Hönne Valley Reef. This research received a new significance and impetus because of the potential of deeply buried Devonian reefs as resources for deep geothermal energy exploration.

Apart from the reefs, various collectors supplied us with interesting goniatites, some of which really deserve publication. For example, Harmut KAUFMANN showed us, where to collect in the Kellerwald loose blocks of typical Odershäuser Limestone with its famous but poorly known Kacak Event goniatite fauna. He managed to find new rare specimens of *Kokenia* and *Bensaidites*.

In cooperation with David DE VLEESCHOUWER, Nina WICHERN, Tomáš KUMPAN (Brno), Lawrence PERCIVAL, and others, we intensified geochemical investigations at the Frasnian-Famennian boundary, for example at Beringhauser Tunnel, Steinbruch Schmidt, and Schlupkothen. We also included samples from the Montagne Noire (Coumiac, with the help of E. SCHINDLER) and Morocco (Anajdam, Meseta, and Rich Gaouz, Tafilalt). Tomáš KUMPAN also takes part in our ongoing research on carbon isotope events at the lower/middle Frasnian transition, again at Beringhauser Tunnel.

After we had published our proposed GSSP section for the revised Devonian-Carboniferous boundary at Borkewehr (HARTENFELS et al. 2022; HARTENFELS & BECKER 2022), we were asked to presentit and classical adjacent sections (Oese, Drewer) to the International DCB Task Group in July, just before the STRATI congress in Liége. Together with Sandra I. KAISER

(Stuttgart), I also submitted a review of the DCB in Morocco (see Documents section) and an elaborate discussion how to find and apply the recognized DCB steps in Rhenish sections. The latter submission will become part of a general review of their significance and regional recognition.

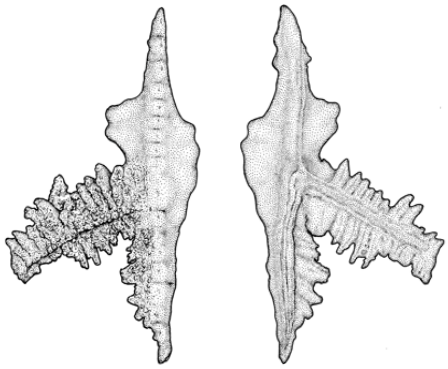


Fig. 3. Drawings (by Traudel FÄHRENKEMPER, Münster) of an intriguing new Famennian ancyrognathid from Wulankeshun, Junggar Basin, NE China.

From August 2022 to July 2023, WANG Zhihong from Wuhan joined our group as a visiting scientist. He wrote for the Chinese readership a summary of the Moroccan Devonian and we restarted our joint effort (with Sarah and Sven) to finish the second part of the Famennian conodont faunas from Wulankeshun in the Junggar Basin (Xinjiang). This will be mostly a taxonomic paper, naming and describing the various forms left in open nomenclature in the first paper published back in 2016 (WANG et al. 2016, *Palaeo x 3*, no. **448**). Another unfinished cooperation project concerns lower Emsian conodont faunas from South China that are rich in *Criteriognathus* and contain some rare, unknown icriodids. Zhihong also contributed significantly to our geochemical investigations at the F-F boundary, which astonishing results will not be told until we find the time to write it up.

There are various other cooperations and projects. Ahmed ZEGHARI finished the first joint manuscript on Lower Devonian microbialitic sediments in the southern Tindouf Basin of Algeria (see his brief report). Kathleen HISTON twisted Thomas´ arms to give at the IPC in Thailand a presentation on the state of the art concerning the revised Treatise volume on the Devonian ammonoids. A summary of the talk has been submitted for a joint publication in *Earth Sciences History*. Publication of the big volume on the Central European Variscides (Ulf LINNEMANN, ed.) has been promised for the end of the year – but it seems that one paper was still missing in early September. It will include a lengthy review on the European expression of the complete sequence of Devonian and Lower Carboniferous global events (BECKER 2023 in press). In the Eifel Mountains, a joint manuscript under the lead of Jan BOHATY has been written on new Frasnian crinoids from Wallersheim Loch (Büdesheim region). The paper will include a revision of the regional lithostratigraphy and give some new goniatite records.

CM Zhor Sarah ABOUSSALAM

During the first day of the post-meeting field trip in conjunction with the Geneseo Meeting, and twenty years after finishing her Taghanic Crisis Ph.D., Sarah was eventually given the chance to see Taughannock (Taghanic) Falls in reality. Unfortunately, there was no time for cooling the legs of excursion participants in “Taghanic Water”; the banquet was waiting.

Since the last report, Sarah was very busy with the identification and SEM documentation of the many conodont faunas from the sections to be included in the 3rd Moroccan Meseta volume. She also dealt with the numerous thin-sections, which are partly complex due to the Eovariscan reworking events (Fig. 4). Results for the Azrou Devonian were presented at the Geneseo Meeting (ABOUSSALAM et al. 2023). The biostratigraphically significant conodont data for the Tisdafine Basin in the Sub-Meseta Zone of Morocco were contributed to the Ph.D. study of Amine TALIH (TALIH et al. 2022) but there are more data. They are especially significant for the conodont record across the Kacak Event and Kellwasser Crisis (Fig. 2).

Far away, there are new contacts concerning Devonian ammonoids from Colombia. This resulted in a new collaboration and a first SDS

Member for that country, Andrés Felipe PASTOR-CHACÓN. Next year, he will report in our Newsletter on the research on the Colombian Devonian, with options that SDS may hold a field meeting there in the future.

Fig. 4. Thick and complex Eovariscan breccia bed (late lower Frasnian) with reworked reefal fauna at the top of our new section north of Azrou (local base of Bou Ighial Formation).

Sarah also helped with the identification of the Emsian conodonts from South China brought by Zhihong and looked after Famennian icriodids for the Wulankeshun paper. She co-supervises the M.Sc. project of Mieke LÖW and the B.Sc. project of Verena BUSCHHAUS (see below). In addition, there are the Rhenish conodont samples needed for the ongoing dating of reef extinctions (see STICHLING et al. 2022, BECKER & ABOUSSALAM 2023, second Geneseo abstract) and the samples stemming from the cooperation with the "Greifswald Contourite Group" (HÜNEKE et al. 2023; GIBB et al. 2023 submitted).

CM Felix SAUPE

completed succesfully his Ph.D. on upper Frasnian conodont biodiversity in the Rhenish Massif in spring 2023. But, unfortunately, he left research and academic life completely at the end of August. His second voluminous manuscript, on the upper Frasnian to basal Famennian conodonts of Beringhauser Tunnel, based on ca. 40.000 Pa elements, and jointly with Thomas, is in its final stage and will be soon submitted to *Palaeobiodiversity and Palaeoenvironments*. A third contribution on the top-Frasnian and F-F boundary at Schlupkothen, in the southeastern part of the Velbert Anticline, is still more incomplete.

CM Till SÖTE published with Thomas at the end of 2022 the revision and new descriptions of Büdesheim tornoceratids in *Palaeontographica*. Regrettably, he then left the university and academic research. There are two nearly finished manuscripts on the upper Frasnian tornoceratids of Oued Mzerreb (Dra Valley, SÖTE & BECKER 2022) and Ouidane Chebbi (eastern Tafilalt; SÖTE & BECKER 2022b), both southern Morocco, which require only a little bit more work. In addition, there is the unfinished manuscript on the lower Famennian ammonoids of the Canning Basin, Australia, which just awaits some time of Thomas.

Ph.D. students

Anna SAUPE completed her Ph.D. on Quaternary foraminiferes at Cologne University but returned to our Münster Group for half a year in order to finish her work on the impact of the *Annulata* and Dasberg Events on Famennian foraminifer assemblages. The manuscript on the Ziyyar successions will be part of our 3rd Moroccon Meseta volume. Unfortunately, but understandably, she left together with her husband Felix to work in future outside academia.

Stephan EICHHOLT is only slowly making progress with his paper on the reef microfacies and development of the Oulmes region but it will be done eventually.

Sören STICHLING works full-time with the Geologischer Dienst NRW – Landesbetrieb - in Krefeld but still hopes to finalize his/our project on the Hönne Valley Reef in the northern Rhenish Massif by studying cores of the lagoonal Asbeck Member. He is mostly involved with geological mapping in the Rhenish Massif, currently in western parts (Velbert Anticline), moving gradually eastwards.

M.Sc. Students

Alexander KLEMENT is gradually finishing his project on the morphometry, taxonomy, and

palaeobiogeographic relationships of middle Famennian ammonoids from the Canning Basin.

Mieke LÖW continued her project on the revision of upper Frasnian manticoceratids from the Rhenish Massif, based on type material, topotypes, and morphometry. It turned out to be more difficult than anticipated, as type designations are lacking, have been unclear or contradictionary. Presentations of the project outline and problems were given at the IPC in Khon Kaen in Thailand (November 2022, LÖW & BECKER 2022b).

Jannes NAUERT started a M.Sc. project on the ontogenetic morphometry, taxonomy and regional biodiversity of upper Famennian clymeniids (Cymaclymeniidae, Cyrtoclymeniidae, and Kosmoclymeniidae) in the basinal facies of the Maider Basin of southern Morocco.

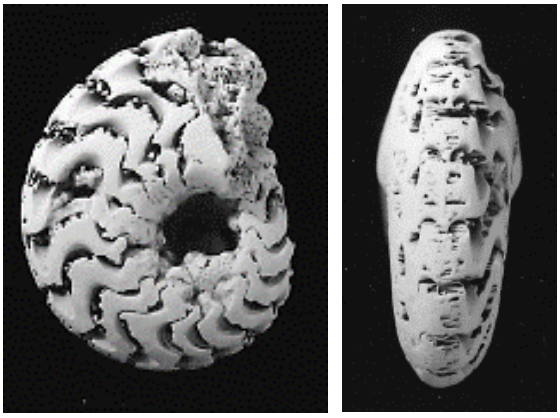


Fig. 5. New species of *Koenenites* from the lower Frasnian Sadler Formation of the Canning Basin, Western Australia.

B.Sc. students

Verena BUSCHHAUS started a project on an unusually rich actinopterygian scale and teeth occurrence in the initial, biostromal part of the Upper Hofermühle Reef (´Velbert Anticline, Rhenish Massif). The assemblage is early upper Givetian in age.

Maximilian GROßKLAUS began a thesis on the morphometrics and taxonomy of lower Frasnian goniatite of the Canning Basin (Fig. 5), collected 30 years ago by Michael HOUSE, Bill KIRCHGASSER, and Thomas.

Viola KÖNIG CASTRO decided to do a B.Sc. project on phacopid trilobites from around the Taghanic Crisis of the Tafilalt, Morocco.

Publications

Peer-reviewed papers 2022-2023

AFHÜPPE, L & BECKER, R. T. (2022). A new discosorid and some other nautiloids from the Givetian of the Rhenish Massif, Germany. - Palaeobiodiversity and Palaeoenvironments, **102**: 613-627; doi.org/10.1007/s12549-022-00541-3.

BECKER, R. T. (2023a online). A unique pericyclid from the Viséan of the eastern Anti-Atlas (Morocco) and other Helicocyclinae n. subfam. (Goniatitida). – Paläontologische Zeitschrift, **97** (4); doi.org/10.1007/s12542-023-00655-9.

BECKER, R.T. (2023b in press). Devonian and Lower Carboniferous global events in the Central Variscan orogen. – In: LINNEMANN, U. (ed.), Geology of the Central European Variscides and its Avalonian-Cadomian precursors; Springer.

BOHATY, J., AUSSICH, W. I. & BECKER, R. T. (2023 submitted). Frasnian crinoid associations of the Prüm Syncline (Eifel, Rhenish Massif, Germany) – biostratigraphic framework and macrofossil assemblages. – Journal of Paleontology.

GIBB, M. A., HÜNEKE, H., PINGEL, N., GIBB, L. M., RICHTER, C., MAYER, O., ABOUSSALAM, Z. S., BECKER, R. T.& EL HASSANI, A. (2023b submitted). Early Devonian bioclastic contourites in the High Atlas: a plastered drift recording the convergence between Gondwana and Laurussia (Sub-Meseta Zone, Morocco). – In: Oceanic gateways: modern and ancient analogues and their conceptual and economic implication. Geological Society, London, Special Publication.

GROOS-UFFENORDE, H., SCHINDLER, E., BECKER, R. T., DOJEN, C., BROCKE, R. & JANSEN, U. (2022). Late Early Devonian ostracodes from the Torkoz area (SW Morocco) and the Emsian/Eifelian boundary. - Paläontologische Zeitschrift, **96** (4): 689-747; doi.org/10.1007/s12542-022-00603-z.

HARTENFELS, S., BECKER, R. T., HERBIG, H.-G., QIE, W., KUMPAN, T., DE VLEESCHOUWER, D., WEYER, D. & KALVODA, J. (2022). The Devonian-Carboniferous transition at Borkewehr near Wocklum (northern Rhenish Massif, Germany) – a potential GSSP section. - Palaeobiodiversity and Palaeoenvironments, **102**: 763-829; doi.org/10.1007/s12549-022-00531-5.

HELLING, S. & BECKER, R. T. (2022). Two new species of *Gondwanaspis* (Trilobita, Odontopleurida) from the Givetian-Frasnian transition of the northern Rhenish Massif (Germany). - Palaeobiodiversity and Palaeoenvironments, **102**: 697-709; doi.org/10.1007/s12549-022-00525-3.

HÜNEKE, H., GIBB, A., MAYER, O., KNIEST, J. F., MEHLHORN, P., GIBB, L. M., ABOUSSALAM, Z. S., BECKER, R. T., EL HASSANI, A. & BAIDDER, L. (2023). Bioclastic bottom-current deposits of a Devonian contourite terrace: Facies variability and depositional architecture (Tafilalt Platform, Morocco). – Sedimentology, **70**: 1075-1109.

LÖW, M., SÖTE, T., BECKER, R. T., STICHLING, S., MAY, A., ABOUSSALAM, Z. S. & ZOPPE, S. F. (2022). The initial phase of the Hönne Valley Reef at Binolen (northern Rhenish Massif, Middle Devonian). – Palaeobiodiversity and Palaeoenvironments, **102**: 573-612; doi.org/10.1007/s12549-022-00540-4.

MEYER-BERTHAUD, B., BERT, C., DECOMBEIX, A.-L., LACAND, M., MERLIN, R., BECKER, R. T., KLUG, C., EL HASSANI, A. & BAIDDER, L. (2023 in press). The euphyllophytes of a new Givetian plant assemblage from the eastern Anti-Atlas, Morocco. – Geobios.

SAUPE, F. & BECKER, R. T. (2022). Refined conodont stratigraphy at Martenberg (Rhenish Massif, Germany) as base for a formal middle/upper Frasnian substage boundary. - Palaeobiodiversity and Palaeoenvironments, **102**: 711-761; doi.org/1007/s12549-022-00537-z.

SÖTE, T. & BECKER, R. T. (2022). Upper Frasnian ammonoids (Tornoceratidae) from Büdesheim (Eifel Mountains, Rhenish Massif, Germany). – Palaeontographica, Abt. A, **325** (1/6): 1-67.

STICHLING, S., BECKER, R. T., HARTENFELS, S., ABOUSSALAM, Z. S. & MAY, A. (2022). Drowning, extinction, and subsequent facies development of the Devonian Hönne Valley Reef (northern Rhenish Massif, Germany). - Palaeobiodiversity and Palaeoenvironments, **102**: 629-696; doi.org/10.1007/s12549-022-00539-x.

TALIH, A., ABOUSSALAM, Z. S., BECKER, R. T., SAADI, M. & BENMLIH, A. (2022). Stratigraphy and tectono-sedimentary processes of allochthonous Devonian deposits of the Tisdafine Basin, Eastern Anti-Atlas, Morocco. - Bulletin de l`Institute Scientifique, Rabat, **44**: 27-53.

WANG, Y.-N., MA, X.-P., EBBIGHAUSEN, V. & BECKER, R. T. (2023). Spiriferide and spiriferinide brachiopods from the Frasnian (Upper Devonian) of the Bergisches Land, Germany. – Paläontologische Zeitschrift, **97** (1): 19-35.

WANG, Y.-N., MA, X.-P., EBBIGHAUSEN, V. & BECKER, R. T. (2023). Spiriferide brachiopods from the early Famennian (Late Devonian) of the Ardennes (western Europe). - Acta Palaeontologica Sinica, **62** (2): 1-30.

WICHERN, N.M.A., BIALIK, O. M., PERCIVAL, L. M. E., KASKES, P., NOHL, T., BECKER, R. T. & DE VLEESCHOUWER, D. (2023 preprint). Astronomically-paced climate and carbon-cycle feedbacks in the lead up to the Late Devonian Kellwasser Crisis (Winsenberg section, Rhenish Massif, Germany). – Climate of the Past.

Abstracts (autumn 2022 to summer 2023)

ABOUSSALAM, Z. S., BECKER, R. T., HARTENFELS, S. & EL HASSANI, A. (2023). Devonian conodont stratigraphy and facies development of the Azrou region (eastern part of western Moroccan Meseta). - In: OVER, D. J. (ed.), Subcommission on Devonian Stratigraphy and IGCP 652 Reading geologic time in Paleozoic sedimentary rocks, Geneseo, New York, 27 July – 06 August 2023, Program and Abstracts: 14-15.

BECKER, R. T. (2022). The Treatise volume on Devonian ammonoids – a tale of unreadable disks, photo boxes, and outdated taxonomic concepts. – In: 6th International Palaeontological Congress, 7th to 11th November 2022, Khon Kaen, Abstracts, Session 3: 1 p.

BECKER, R. T. & ABOUSSALAM, Z. S. (2023). Impact of global events on the drowning and extinction of Givetian/Frasnian reefs in the northern Rhenish Massif (Germany). – In: OVER, D. J. (ed.), Subcommission on Devonian Stratigraphy and IGCP 652 Reading geologic time in Paleozoic sedimentary rocks, Geneseo, New York, 27 July – 06 August 2023, Program and Abstracts: 19-20.

BECKER, R. T., SAUPE, F. & ABOUSSALAM, Z. S. (2022). The enigmatic end-Frasnian pelagic mass extinction (top Kellwasser Crisis) – new evidence for correlation with a peak of seismically induced sedimentary events. - In: 6th International Palaeontological Congress, 7th to 11th November 2022, Khon Kaen, Abstracts, Session 9: 1 p.

BECKER, R. T., ABOUSSALAM, Z. S., SAUPE, F. & HARTENFELS, S. (2023). Givetian to Tournaisian substages – significance, multi-disciplinary approaches, and GSSP potential in the Rhenish Massif (Germany). – GeoBerlin, Geosciences Beyond Boundaries – Research, Society, Future, Berlin, 3-8 September 2023, Abstracts, https://www.conftool.pro/geoberlin2023/index.php?page=browseSessions&abstracts=show&form_session=93.

HARTENFELS, S. & BECKER, R. T. (2022). The evolution of early *Protognathodus* and their significance for the redefinition of the Devonian/Carboniferous boundary. – In: SCHWEIGERT, G. (ed.), 93. Jahrestagung der Paläontologischen Gesellschaft, Sep. 19th to 23rd at the Staatliches Museum für Naturkunde Stuttgart, Abstract Volume: 18.

GIBB, A., HÜNEKE, H., MEHLHORN, P., GIBB, L., ABOUSSALAM, Z. S., BECKER, R. T., EL HASSANI, A. & BAIDDER, L. (2023). Frasnian contourite channel-drift system: Dense shelf-water cascading of anoxic water from the northern Gondwana Epeiric Sea (Tafilalt, Morocco). – In: The 4th Deep Water Circulation Research Conference, 24-26 May 2023, Edinburgh, Abstracts: 1 p.

LÖW, M. & BECKER, R. T. (2022). Revision of upper Frasnian Rhenohercynian manticoceratids (Gephuroceratidae, Ammonoidea). - In: 6th International Palaeontological Congress, 7th to 11th November 2022, Khon Kaen, Abstracts, Session 3: 1 p.

SÖTE, T. & BECKER, R. T. (2022a). The Frasnian ammonoid succession of Ouidane Chebbi (eastern Tafilalt, Morocco). - In: SCHWEIGERT, G. (ed.), 93. Jahrestagung der Paläontologischen Gesellschaft, Sep. 19th to 23rd at the Staatliches Museum für Naturkunde Stuttgart, Abstract Volume: 61.

SÖTE, T. & BECKER, R. T. (2022b). The Frasnian ammonoid succession of Oued Mzerreb (Dra Valley, Morocco). - In: 6th International Palaeontological Congress, 7th to 11th November 2022, Khon Kaen, Abstracts, Session 9: 1 p.

WICHERN, N. M. A., BIALIK, O. M., PERCIVAL, L. M. E., KASKES, P., NOHL, T., BECKER, R. T. & DE VLEESCHOUWER, D. (2023). Deciphering the role of terrestrial/atmospheric interactions in Late Devonian Kellwasser black shale deposition: A High-Resolution Cyclostratigraphy study of the Winsenberg section (Rhenish Massif, Germany). – In: EGU General Assembly 2023, Vienna, Austria & Online, 23-28 April 2023, Abstracts, 1 p.

WICHERN, N., BIALIK, O. M., NOHL, T., PERCIVAL, L.M.E., KASKES, P., BECKER, R. T. & DEVLEESCHOUWER, D. (2023). Deciphering the role of terrestrial/atmospheric interactions in Late Devonian Kellwasser black shale deposition: A high-resolution cyclostratigraphic study of the Winsenberg section (Rhenish Massif, Germany). - In: OVER, D. J. (ed.), Subcommission on Devonian Stratigraphy and IGCP 652 Reading geologic time in Paleozoic sedimentary rocks, Geneseo, New York, 27 July – 06 August 2023, Program and Abstracts: 80-81.

Devonian thesis

SAUPE, F. (2023). Conodont bhiostratigraphy and palaeodiversity in the upper Frasnian of the Rhenish Massif. – Ph.D. Thesis, Münster University, 247 pp.

SÖTE, T. (2022). Systematics and evolution of the Tornoceratina (Ammonoidea) at the Kellwasser Crisis (Frasnian, Upper Devonian). – Ph.D. Thesis, Münster University, 292 pp.