

TM R. Thomas BECKER, CM Z. Sarah ABOUSSALAM, CM STEFAN HELLING, and the Münster Group

The past year, since the last report in Newsletter 32, was dominated by the organization of the 10th International Cephalopod Symposium, which took place in Fes, Morocco, in March 2018 (Fig. 1). The very successful meeting was small but included many highly interesting presentations, and had a very productive, most pleasant atmosphere. Of course, our group presented Devonian cephalopod studies. Without our Moroccan friends, especially without the help of CM Ahmed EL HASSANI, the symposium would have been impossible to organize. The post-symposium excursion visited the Jurassic of the Middle and High Atlas on the way south but had a clear focus on the Devonian of the eastern Anti-Atlas. Therefore, we had invited SDS Members to join, especially if they hadn't seen the superb and extremely fossiliferous Moroccan Devonian before. This offer was taken by two Devonian non-cephalopod workers from South America (Juan RUSTAN and Luiza PONCIANO).



Fig. 1. 10th ICS field lunch at the wall of Mdoura (famous from the the last James BOND movie): Christian KLUG (left), Heiko HÜNEKE (foreground), René HOFFMANN, Juan RUSTÁN, Sarah, and Sven.

Conference abstracts and field guide were published as separate parts of Volume 110 in our institute journal, the *Münstersche Forschungen zur Geologie und Paläontologie*. In the Devonian publications section (see above) you can find the SDS relevant content of the volume. Chapters on the Bou Tchrafine reference section, the world-famous Hamar Laghdad mudmound region, the Jebel Mech Irdane basal Givetian GSSP, the southern Maïder Famennian, the Aguelmous Syncline succession etc. are not just summaries but are presented in a refined

stratigraphic order, with many new faunal records and numerous illustrations of section logs. Unfortunately, the volume is already sold out; but all papers are available as pdf via ResearchGate (or on request from us). Two chapters on Mdoura-East and the D-C transition did not make it into the printed version and were published online only (see free ResearchGate downloads).



Fig. 2. The highly fossiliferous Emsian at Tizi Ourthi NNE of Ouarzazate, with the Daleje Event Interval as a marl unit in the middle, between top lower Emsian massive limestones (foreground) and goniatite-rich upper Emsian nodular limestones.

During the excursion, some important faunal discoveries were made. A new, oldest, monospecific ammonoid level of the region was found at the northern slope of Jebel Mech Irdane. It will be described in a joint paper in the symposium proceedings volume in the Swiss Journal of Palaeontology. Before the meeting, RTB and Sören STICHLING joined the Greifswald group around Heiko HÜNEKE and Oliver MAYER in the frame of their DFG project on Devonian contourites (MAYER et al. 2017, 2018). In the focus were this time poorly studied but thick sections in the SW Tafilalt near Ottara, in the NE Maïder near Bou Dib (top-Eifelian to Givetian), and in the Skoura region NE of Ouarzazate (Fig. 2). The latter outcrops lie at the foot of the High Atlas, providing laterally similar successions across the southern Variscan Front. This shows that the post-sedimentary tectonic boundary does not correlate with any interruption of Devonian facies. There was complete continuity of sedimentation from the southern margin of the Variscan Moroccan Meseta to the stable craton of NW Gondwana. We followed Lochkovian black limestones with giant orthocones (*Deiroceras*) and a *Mimagoniatites* marker level at the top of the lower Emsian: We also re-discovered the very rich upper

Emsian anarcestid faunas mentioned 80 years earlier by E. ROCH. Rather unexpectedly, we also found a thick Givetian shaly/marly succession at Taliouine, just below massive Eovariscan conglomerates and breccias. In several sections, this unit yields isolated (transported but not exhumed) top-Givetian to Frasnian corals (e.g. phillipastreids); the age of the first major Eovariscan tectonic episode clearly pre-dates the F-F boundary.

In the Tafilalt, we used the occasion to re-sample the fossiliferous Seheb-el-Rhassal section S of Erfoud across the middle/upper Givetian boundary. Since the better Ouidane Chebbi section to the East is now in a military zone, with difficult access, this is currently our prime candidate for a basal upper Givetian GSSP locality in the region. Sören, Sven HARTENFELS, and several M.Sc. students of our group stayed longer in the region in order to sample various sections for their M.Sc. projects and for planned new work on the F-F boundary.

Due to the time consuming symposium preparations, other running projects had to slow down. This applies to the description of further pharciceratid faunas from Morocco, jointly with Jürgen BOCKWINKEL, and to the finalization of a long awaited paper on new Emsian goniatites from Victoria, Australia. Gladly, there was enough time to finish the joint manuscript, with ZHANG and MA Xueping, on the first cymaclymeniid fauna from the Hangenberg Black Shale of South China (ZHANG et al. 2018). The global review of previous occurrences made it clear that the taxonomic complexity of these opportunistic survivors is far from fully understood.

Close cooperation with Polish colleagues resulted in a paper on the provenance of D-C boundary siliciclastics (e.g. Hangenberg Shale and Sandstone) of the northern Rhenish Massif (KOLTONIK et al. 2018). This showed that the material was not shed from uplifted areas/islands in the core of the Sauerland, as it was claimed in the "PAPROTH Palaeogeography", but that it had typical Old Red Continent zircon populations. We are currently working jointly with Greg RACKI, Agnieszka PISARZOWSKA, and others on a paper on the carbon isotope stratigraphy near the lower/middle Frasnian boundary.

Other work in the Rhenish Massif were the essential parts of the Ph.D. study of Sören and of various B.Sc. projects (see below). We concentrate on the Velbert Anticline in the NW (partly with M. SALAMON, D. JUCH and G. DROZDZEWSKI from the Geologischer Dienst, Krefeld), on the Höne Valley

between Menden and Balve, and on the Beringhauser Tunnel F-F section. In the latter case, Tomas KUMPAN kindly agreed to study the trace element geochemistry of that rather mysterious (in terms of microfacies) succession. In autumn 2017, we started in the frame of the new IGCP Project 652 a cooperation with David DE VLEESCHOUWER (Bremen) and Peter KÖNIGSHOF on Upper Devonian cyclostratigraphy. For a start, the complex cyclicality of the Effenberg Quarry was examined, with a focus on the pre-*Annulata* to post-Dasberg Event part of the section, where cycle thicknesses suggest Milankovitch frequencies. Sven and I continued the existing bed-by-bed collecting for conodonts, ammonoids and microfacies to the top of the exposure (ca. to the middle part of the Wocklumian or Famennian VI, uppermost Famennian).



Fig. 3. Summer visit of QIE W., HUANG J., and LI, Q. (Nanjing) in the Rhenish Massif (group photo in a Höne Valley Quarry, with Sören and Sven)

In summer 2018, right before the Paris ICP, we were pleased to lead QIE Wenkun and colleagues (HUANG J. and LI, Q.) from Nanjing to classical Devonian sections of the Rhenish Massif (Fig. 3); this was intended to be part of a long-term cooperation. During the summer holiday time, Maya ELRICK also visited Rhenish sections, in order to take samples for uranium isotopes; she was looked after by Felix LÜDDECKE. In the course of a student field trip, the top part of the Blauer Bruch and the basal Famennian of the famous Steinbruch SCHMIDT (both in the Kellerwald) were re-sampled - once more. The latter now shows clear evidence for reworking and mass flow deposition right above the F-F boundary.

We re-submitted our extensive research proposal to the DFG. The planned project intends to study jointly with Ahmed EL HASSANI, Lahssen BAIDDER,

Carl BRETT, and others, the very poorly known Devonian “Appalachian Seaway” between SW Morocco and eastern North America. It has often, but wrongly, been called a part of the Rheic Ocean. We plan to focus on its facies history and viability for faunal migrations, especially for conodonts, ammonoids, and trilobites. At the end of October we still keep our fingers crossed for funding.



Fig. 4. The true level of the Hangenberg Extinction (Hangenberg Black Shale) in the Ardennes? Basal limestone of the Hastiere Limestone at Royseux, Bed 104a, showing a crinoidal limestone rich in the last phacopids sharply overlain, with an undulating erosional unconformity, by a strictly laminated (not graded) dark (Hangenberg) shale with isolated (floating) brachiopods that lack a consistent convex-up orientation, which excludes a current deposition.

Work on the D-C boundary revision progressed slowly but Sven and I finished the re-sampling of the Borkeweher or Wocklum section, which is the type locality of *Protognathodus kockeli*. It is clear that the earliest post-Hangenberg protognathodids are rather different from the *kockeli* type specimens (HARTERNFELS & BECKER 2018). The review of Rhenish D-C boundary sections is due towards the end of the year. Conodonts from Royseux (Belgium, Fig. 4) have been picked but not yet been identified. The shallow-water Klein-Steinkothen section in the

NW Rhenish Massif, unfortunately, hardly has any conodonts. In the near future, we will come back to the Lalla Mimouna and other Moroccan sections.

RTB cooperated within the German SDS on the explanation chapter for the stratigraphical chart of Germany, STD 2016. It came out early in 2018 (SCHINDLER et al. 2018) and it was written simultaneously in German and English. For ICS, RTB has started to revise the Devonian chapter for the GTS 2020 volume. Co-authors will be Anne-Christine DA SILVA, John MARSHALL, and Felix GRADSTEIN. Manuscript deadline is at the end of November, 2018. Other papers in progress will deal with the Kacak Event in Morocco (jointly with Sarah, for the Devonian Event volume of G. RACKI), (led by Sarah) with the timing of Devonian reef growth and extinction in Morocco, and with the discovery of basal Famennian tornoceratids in the Ardennes (jointly with Stijn GOOLAERTS and Bernard MOTTEQUIN).

CM Z. Sarah ABOUSSALAM

In the last year, Sarah participated in the organization of the 10th Cephalopod Symposium and took part in the Anti-Atlas field trip. She identified various conodont samples for the Devonian contourite project of the Greifswald Group and additional samples from the Moroccan Meseta. The main goal of the latter is to finalize joint manuscripts on the timing of reef growth and extinctions and on the age of Eovariscan block faulting, slumping and re-deposition. The revision of supposed Devonian reef limestones from the S of Marrakesh has been published in the volume in honor of the late G. LANE (ABOUSSALAM et al. 2017). Ongoing efforts with Thomas concern the Kacak Event at Oued Ferkla, just N of the Tafilalt.

The collaboration with Carl BRETT, Jay ZAMBITO and others on the Kentucky Givetian led to a very detailed paper in “Palaeo x 2” (BRETT et al. 2018). She hopes that this pleasant cooperation can be continued in the frame of the planned project on the “Afro-Appalachian Seaway”. Sarah also assisted the group around MA Xueping in the identification and publication of Givetian conodonts from Yunnan (ZHANG et al. 2018). Other still unfinished Chinese work (waiting for Thomas...) includes the missing taxonomic descriptions of various polygnathids and icriodids from the Junggar Basin (Wulankeshun section; see WANG Zhihong et al. 2017).

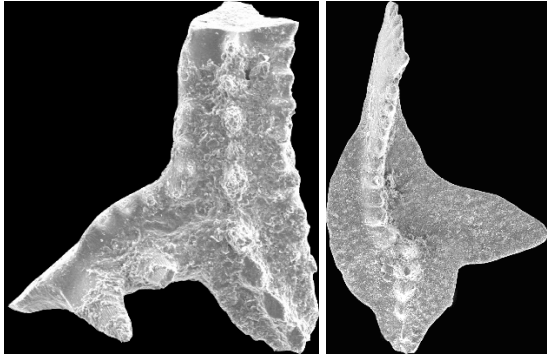


Fig. 5. Two conodonts from the top-Frasnian (upper MN Zone 13a) of borehole B102 in the Hönne Valley: *Ancyrognathus iowaensis* and *Palmatolepis muelleri*.

In the Rhenish Massif, Sarah provided conodont data for various projects, from the gastropod work of Maro-Pascal ELLERKAMP (ELLERKAMP et al. 2018), to the mapping and regional geology of the Neandertal and Wülfrath Reefs, and to Sören's Hönne Valley Ph.D. (Fig. 5; STICHLING et al. 2018, manuscript in prep.). Conodont faunas from Padberg in the eastern Sauerland will be published jointly with Polish colleagues, who searched for carbon isotope perturbations around the lower/Middle Frasnian boundary in the Rhenish Massif.

The search for possible middle/upper Givetian boundary GSSP sections was continued (e.g. BECKER & ABOUSSALAM 2018, initial meeting of IGCP 652), for example at Blauer Bruch and in the Tafilalt (Seheb-el-Rhassal). Thomas collected (with the help of Nacho and Theresa) some samples from the Pyrenees for comparison.

CM Stephan HELLING

From September 2017 to May 2018, Hans Martin WEBER, Anna SAUPE, Christoph HARTKOPF-FRÖDER, and I conducted excavations at a construction site in Upper Devonian (late Famennian) shales in Wuppertal Uellendahl (Bergisches Land, northern Rhenish Massif). This was part of a palaeontological conservation project since the construction ground is an official geological monument since several years, due to its rich trilobite fauna (WEBER et al. 2018). Besides the trilobites, ostracods, bivalves, and ammonoids were associated rare fossil groups. Preparations and taxonomic work just started and will last until 2019.

In cooperation with the LWL Museum für Naturkunde Münster, I worked on some rare trilobite specimens from the eastern Rhenish Massif, mainly upper Emsian to lower Eifelian in age. Results

(HELLING & SCHÖLLMANN 2018 in press) will be published soon in the updated LWL journal "Geologie und Paläontologie in Westfalen", which will also be available online.

Work on the Pragian trilobite faunas from Taourirt n'Khellil ("Ait Issa", southern Variscan Front) and Ain-Al-Aliga (Oued Cherrat Valley region of the Moroccan Meseta) is nearly finished; these manuscripts will be finalized at the end of 2018 and early in 2019.

Ph.D. Students

Stephan EICHHOLT is working full-time for an environmental geology company, which leaves him very little time to continue his work on the Givetian/Frasnian reefs of the Moroccan Meseta. A paper on the biostromes of the Oulmes region and on isolated, often reworked reef facies to the East is ca. half-written.

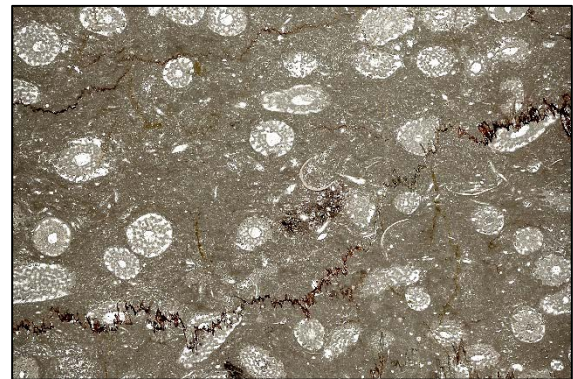


Fig. 6. Typical lagoonal, micrite-rich *Amphipora* Bafflestone from the upper part of the Hönne Valley reef, borehole HON_1101.

Sören STICHLING completed his last (third) year on the very thick reef complex of the Hönne Valley (northern Rhenish Massif), financed by the Rheinkalk GmbH/Lhoist Group. New results concerning the initial biostromal phase were presented at the IPC in Paris (STICHLING & BECKER 2018). A joint manuscript (with Sarah and Sven) on the reef drowning and extinction (for *Facies*) is close to completion. It combines outcrop and borehole data (Fig. 6). Conodont faunas from the small core samples were unexpectedly rich; eventually these will have to be documented in a separate publication. The last project phase concentrated on the microfacies-based correlation of several cores from the thick, main part of the bioherm. From autumn 2018 on, Sören will start to work at the Geologischer Dienst in Krefeld. Congratulations, but,

unfortunately, the new job will slow down his Ph.D. progress.

M.Sc. Students

Anna SAUPE continued and finished her study on the comparison of Famennian faunas of agglutinated foraminifers along a palaeolatitudinal gradient, from the Rhenish Massif, Saxothuringia, to the Montagne Noire (Col de Tribes section) and Moroccan Meseta (Ziyyar). Impacts of the *Annulata* and Dasberg Events on foraminifer biofacies and assemblage structures were a main point. The extensive results were outstanding and will have to be published in a monograph. Anna presented them at the GeoBonn congress in September 2018 (SAUPE et al. 2018). Her work earned her a Ph.D. position at Cologne University, where she will change to much younger, Neogene/Quaternary forams. In addition, Anna work for the excavation project at Wuppertal-Uellendahl (WEBER et al., 2018).



Fig. 7. *Praemeroceras* n. sp. with distinctive dorsolateral varices from the lower Famennian of the Canning Basin.

Till SÖTE studied the ontogenetic morphometry, taxonomy, and palaeobiogeographic relationships of lower Famennian goniatites of the Canning Basin, collected in the 80ties and 90ties by RTB and Michael HOUSE. At a close look, there are more differences to European and North African contemporaneous faunas than recognized originally, for example in comparison with the monograph by Morris PETERSEN from 1975. This resulted in the recognition of several new species and of a surprising complexity of early dimeroceratids (Fig. 7). Results were presented at the Fes symposium and at the IPC in Paris. Till has started to write jointly with RTB a lengthy manuscript. He will continue as a research assistant and for a Ph.D. at Münster. The new project will deal with the taxonomy, phylogeny, and palaeodiversity of tornoceratid goniatites from

the upper Frasnian into the lower Famennian. He will begin with an undescribed fauna from between the two Kellwasser levels of the Eifel Mts. (Büdesheim), collected mostly by Jürgen BOCKWINKEL and the late Volker EBBIGHAUSEN.

Felix Lüddecke is about to finish his M.Sc. on the Famennian conodont biostratigraphy and biofacies of the long neglected Minervois Nappe of the Montagne Noire, southern France. Preliminary results were presented at the IPC in Paris and GeoBonn (HARTENFELS & LÜDDECKE, 2018; LÜDDECKE & HARTENFELS 2018). In autumn 2017, he participated in the joint conference of the Paläontologische Gesellschaft and of the Palaeontological Society of China in Yichang. His presentation on Famennian conodont biofacies (LÜDDECKE et al. 2017) was awarded by a prize for the best young palaeontologists. Before the congress, Felix and Sven were invited by QIE Wenkun to field work in South China, with a focus on the D-C boundary. It is planned that Felix continues after his M.Sc. completion as a research assistant and Ph.D. student in Münster. He will have to deal with the enormous amount of often incredibly rich F-F boundary conodont samples that we assembled in the last decade. There will be a focus on ontogeny, taxonomy, palaeodiversity and extinction patterns across climatic and facies gradients, and on conodont biofacies and palaeobiogeography.

Lukas AFHÜPPE only just started with his M.Sc. project on the taxonomy, morphometry, variability, and palaeogeography of Middle/Upper Devonian oncoceratids from southern Morocco. He presented his B.Sc. results on various, rare cyrto-, gyro- and torticonic Devonian nautiloids at the Fes Cephalopod Symposium (AFHÜPPE et al., 2018). Some of his taxa made it into field guide chapters; therefore, he became a co-author of some of them.

Lara HOLDERIED began a M.Sc. on the morphometry and taxonomy of middle Frasnian goniatite faunas of the Canning Basin, in comparison with German type material. She also presented her B.Sc. results, on the taxonomy and stratigraphy of Canning Basin Paratornoceratinae (lower Famennian), at Fes. Her contribution earned her the 2nd prize of the Poster Awards.

Maro-Pascal ELLERKAMP is in the final part of his M.Sc. Thesis on the comparison of middle/upper Givetian gastropod assemblages from the shallow-water (peri-reefal) Rhenish Massif and from the pelagic black shale facies of the eastern Dra Valley of southern Morocco (unpublished collections of

RTB and ZSA). It was not really a surprise that there are several new taxa in the Moroccan faunas but these belong to the same genera that are common in neritic facies. He presented preliminary results at GeoBonn (ELLERKAMP & BECKER 2018). His diverse B.Sc. faunas from the reef at Hofermühle were announced in a popular science contribution (ELLERKAMP et al. 2018); a more detailed manuscript is ca. half way through.

After an intensive excursion into the field of hydrogeology, **Phillip HERBERS** decided very recently to return for a M.Sc. to palaeontology, where he did his B.Sc. conodont project. Using unpublished Montagne Noire samples as a starting point, he will try to give precision to Famennian conodont biofacies models using cluster analyses.

Another new M.Sc. student is **Konrad SEYFFERT**, who graduated at the Free University Berlin. After some negotiations, Stephan agreed to let him work on the morphometry, taxonomy and facies distribution of phacopid trilobites from the Emsian of Morocco.

B.Sc. Students

Patrick KRISPIN's B.Sc. provided extraordinary results, the first recognition of Devonian calcareous-walled nanospheres in pelagic micrites. Results shall be published in a high level journal. Patrick moved on to Bonn University, where there is a new M.Sc. program that combines biology and palaeontology.

Stephanie ROSCHIG followed the question whether there was a single pantropical ammonoid genpool in the Famennian Palaeotethys, stretching from Europe-Morocco far eastwards to Iran and the Canning Basin. She used two sporadoceratids of different age (*Maeneceras subvaricatum*, UD II-G, and *Sporadoceras angustisellatum*, UD III-B/C) as a case study. Results were interesting but somewhat equivocal, partly due to preservation problems. We will continue the highly interesting story.

Sascha MIKOLAEWSKI mapped the Devonian succession at the southern margin of the Velbert Anticline, in the famous Neandertal area, and, along the Düssel River, towards the NW limb of the Remscheid-Altena Anticline (Millrath-Gruiten region). The idea was to find out how significant facies transitions in the subsurface of the narrow Herzkampe Syncline have been. Differences stem mostly from the individual reef developments. There are important new data for the extinction of the Neandertal Reef but, unfortunately, the majority of his numerous conodont samples were barren. In any

case, the regional lithostratigraphy (formation names) will have to be changed completely.



Fig. 8. The hardly studied, now lake-filled, well-bedded middle Givetian reef limestone quarry north of the Neanderthal Valley. The quarry wall collapse to the right ended most of the active operations.

Publications

Journal articles and book chapters (for MÜFO 110 contributions see Devonian Publications section)

HELLING, S. & SCHÖLLMANN, L. (2018). Trilobiten aus dem Grenzbereich Emsium/Eifelium (Devon) im Raum Winterberg/Züschen (östliches Sauerland). - *Geologie und Paläontologie in Westfalen*, **90**: 25-65.

ZHANG, M., BECKER, R.T., MA, X., ZHANG, Y. & ZONG, P. (2018). Hangenberg Black Shale with cymaclymeniid ammonoids in the terminal Devonian of South China. - *Palaeodiversity and Palaeoenvironments*, **98** (4): 14 pp., doi.org/10.1007/s12549-018-0348-x.

ZHANG, Y.-B., MA, X.-P., ABOUSSALAM, Z.S. & ZHANG, M. (2018). Conodonts from the Yidade Formation at the Panxi section of Yunnan, South China. - *Journal of Stratigraphy*, **42** (3): 301-312 [in Chinese with English summary].

KOLTONIK, K., PISARZOWSKA, A., PASZKOWSKI, M., SLAMA, J., BECKER, R.T., MARYNOWSKI, L., KRAWCZYNSKI, W. & HARTENFELS, S. (2018 online). Provenance of Famennian siliciclastics from the northern Rhenish Massif - paleostructural, paleogeographical and paleoclimatic implications. - *International Journal of Earth Sciences*, doi.org/10.1007/s00531-018-1628-4.

BRETT, C.E., BAIRD, G.C., ZAMBITO, J.J. IV, ABOUSSALAM, Z.S., BECKER, R.T. & BARTHOLOMEWS, A.J. (2018). Litho-, Bio-, Chemo-, and Sequence Stratigraphy of the Boyle-Portwood Succession (Middle Devonian, Central Kentucky, U.S.A.). - *Palaeobiodiversity*

and Palaeoenvironments, **98** (2): 331-368, doi.org/10.1007/s12549-018.0323-6.

SCHINDLER, E., BROCKE, R., BECKER, R.T., BUCHHOLZ, P., JANSEN, U., LUPPOLD, F.W., NESBOR, H.-D. SALAMON, M., WELLER, H. & WEYER, D. (2018). The Devonian in the Stratigraphic Table of Germany 2016. – Zeitschrift der Deutschen Gesellschaft für Geowissenschaften, **168** (4): 447-463.

ABOUSSALAM, Z.S., BECKER, R.T., EL HASSANI, A., EICHHOLT, S. & BAIDDER, L. (2017). Late Lower Carboniferous conodonts from a supposed Middle Devonian reef limestone of the Marrakech region (Morocco). – Stratigraphy, **14** (1/3): 7-14.

BECKER, R.T. & HARTENFELS, S. (2016). Species list of *Palmatolepis*. – SDS Newsletter, **31**: 35-44.

BECKER, R.T. (2016). Addition to the *Polygnathus* (s.l.) species list. – SDS Newsletter, **31**: 31-34.

Editorials

DE VLEESCHOUWER, D., KÖNIGSHOF, P., HARTENFELS, S. & BECKER, R.T. (Eds., 2018). Middle to Late Paleozoic Sedimentary Rocks in the Rhenish Massif. Reading time in Paleozoic sedimentary rock. - IGCP-652 Opening Meeting, Bremen, Fieldtrip Guidebook, 102 pp.

HARTENFELS, S., BECKER, R.T., EL HASSANI, A. & LÜDDECKE, F. (Eds., 2018). 10th International Symposium “Cephalopods – Present and Past”, Fes, 26th March – 3rd April 2018, Field Guidebook.- Münstersche Forschungen zur Geologie und Paläontologie, **110**: 109-306.

EL HASSANI, A., BECKER, R.T., HARTENFELS, S. & LÜDDECKE, F. (Eds., 2018). 10th International Symposium “Cephalopods – Present and Past”, Fes, 26th March – 3rd April 2018, Program & Abstracts. - Münstersche Forschungen zur Geologie und Paläontologie, **110**: 1-108.

HARTENFELS, S. & HELING, S. (Eds, 2017). 88. Jahrestagung der Paläontologischen Gesellschaft, Münster, 26.-30. März 2017, Programm – Kurzfassungen. – Münstersche Forschungen zur Geologie und Paläontologie, **109**: 1-87.

Popular Science contributions

ELLERKAMP, M.-P., BECKER, R.T., SCHLÖSSER, M. & ABOUSSALAM, Z.S. (2018). Die einzigartige Schneckenfauna aus dem Grenzbereich des

Mittel- und Oberdevons von Hofermühle. – Archäologie im Rheinland, **2017**: 33-35.

HARTENFELS, S., BECKER, R.T., DROZDZEWSKI, G., JUCH, D. & ABOUSSALAM, Z.S. (2018). „Kommen und Gehen“ einer bisher unbekanntem Gesteins- und Fossilabfolge beim A 44-Neubau bei Hülsbeck. – Archäologie im Rheinland, **2017**: 36-38.

WEBER, H.M., HELING, S., SAUPE, A. & HARTKOPF-FRÖDER, C. (2018). Neue spät oberdevonische Fossilfunde von Wuppertal-Uellendahl. - Archäologie im Rheinland, **2017**: 39-41.

EL HASSANI, A., ABOUSSALAM, Z.S., BECKER, R.T., EL WARTITI, M. & EL HASSANI, F. (2017). Patrimoine géologique marocain et développement durable: l'exemple du Dévonien du Tafilalt, Anti-Atlas oriental. – Geologues, Revue Officielle de la Société Géologique de France, Géosciences appliquées, **194**: 112-117.

Abstracts (for contributions to the IPC in Paris see the Devonian publications section)

BECKER, R.T. & ABOUSSALAM, Z.S. (2018). The upper Givetian – strange mid-Palaeozoic interval with maximum biostratigraphic time resolution and rapid eustatic fluctuations. – Opening Meeting IGCP 652 “Reading Time in Paleozoic sedimentary Rock”, 12th – 13th September 2018, Bremen, Germany, Oral Presentations: 2 pp.

SAUPE, A., HARTENFELS, S. & BECKER, R.T. (2018). Biofacies analysis of agglutinated foraminifers along an Upper Devonian transect from Central Europe to North Africa. - In: GeoBonn 2018, 2-6 September 2018, Bonn, Germany, Abstracts: 266.

BECKER, R.T. (2018). Iterative evolution as the rule – not exception – in ammonoids and other cephalopods. - In: GeoBonn 2018, 2-6 September 2018, Bonn, Germany, Abstracts: 253.

HARTENFELS, S. & BECKER, R.T. (2018). Borkwehr near Wocklum (northern Rhenish Massif), a possible future Devonian/Carboniferous boundary GSSP section. - In: GeoBonn 2018, 2-6 September 2018, Bonn, Germany, Abstracts: 252.

ELLERKAMP, M.-P. & BECKER, R.T. (2018). A comparison of Givetian gastropod faunas from the Tata region (Dra Valley, southern Morocco) and the Rhenish Massif. - In: GeoBonn 2018, 2-

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