

Meeting Report

CONFERENCE REPORT: “ACROSS THE END-PERMIAN GREAT EXTINCTION: FROM FIELD STUDIES TO SCIENTIFIC RESULTS”, UNIVERSITY OF LAUSANNE, SWITZERLAND, AUGUST 29 TO SEPTEMBER 2, 2023

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The “Across the End-Permian Great Extinction” Conference was held at the Synathlon Building on the campus of the University of Lausanne, from August 29th to September 2nd, 2023. Nearly 50 scientists attended the Conference and 40 presentations were given during three days.

During the opening ceremony, a welcome address was given by Professor Niklaus Linde, Dean of the Faculty of Geosciences and Environment and by Professor Allison Daley, Director of the Institute of Earth Sciences.

Professor Torsten Vennemann, Professor in the Faculty of Geosciences and Environment, highlighted in his talk the new results from the Permian-Triassic scientific program in Switzerland, quantifying decamillennial changes in carbon cycling, and climatic and biotic responses to Late Permian-Early Triassic volcanism within the research program of a Sinergia collaborative project funded by the Swiss national Science Foundation. Contributor to the Sinergia program, Aymon Baud also looked back to fifty-five years of continuous Permian-Triassic field research and corresponding publications in collaboration with the Geological Institute of University of Lausanne, Switzerland. Illustrated with 5 posters during the conference, the corresponding text will also be published in the *Mémoire de Géologie*, volume 50, Lausanne. This publication is scheduled to be on online from February 2024.

The talks were organized thematically into a plenary session followed by 6 main sessions:

1. Biotic responses to extreme climatic and environmental crises with 3 keynote talks, those of Sara Pruss, of Elke Schneebeli and of Amalia Spina, and talks of William Foster, Xaiokang Liu, Charline Ragon, Monica Gomez-Correra, Jood Al Aswad, Sylvie Bourquin and Benoit Beauchamp.
2. Paleogeographic views with a keynote talk by Lillit Sahakian, talks by Dimitri Papanikolaou, Karmen Fio-Firi, Christian Vérard, Charles Henderson, Benoit Beauchamp and Sylvain Richoz, and a poster presented by Bilal Wadood.
3. New geochemical tools and modelling with a keynote talk by Jonathan Payne, and talks by Torsten Vennemann, Stella Buchwald, Franziska Blattmann, Moghadam Mahdi

Maaleki, Oluwaseun Edward and Thierry Adatte.

4. Biochronology, and new time calibrations of the Permian to Triassic transition with a keynote talk by David Ware and talks by Thomas Brühwiler, Marc Leu, Charles Henderson and Ali Murat Kiliç.
5. Specific facies - Fossil-Lagerstätten and Coquina limestones with a keynote talk by Arnaud Brayard and talks by Aymon Baud and Sakineh Arefifard (by zoom).
6. Introduction to the local Triassic deposits and to the field trip by Aymon Baud.

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The international team of speakers presented data on Permian and Triassic rocks and fossils from around the world, including between Arctic and Gondwana margin mid latitude and low latitude key examples.

The main Triassic data in the Arctic were presented first by Dr. Elke Schneebeli (2023) who gave a keynote talk entitled Mass extinction survival guide – plants in the Arctic, and showed that Late Permian and lower Triassic are similar in taxonomical composition, a spore peak existing at the Griesbachian-Dienerian transition.

On the Spitzbergen (Svalbard) side, the lipid biomarkers at the Permian/Triassic boundary were the subject of the talk of Suzana Buchwald (Buchwald et al. 2023). They indicate that Permian biomarker composition differs from the Triassic biomarker inventory.

Franziska Blattmann (Blattmann et al. 2023) presented her work examining the Carbon Cycle Perturbations during the Smithian-Spathian in Central Spitsbergen, noting a change in phosphorus cycling across the SSB.

In the continental western Tethys, Sylvie Bourquin (2023), searching climatic implications of Late Permian - Early Triassic, studied different European transects and noticed the lack of biostratigraphic records during Early Triassic due to relief rejuvenation and unconformities. But she demonstrates a hyper-arid climate during Olenekian and gave attention to the underestimated aeolian deposits, proof of aridity.

In the marine Siusi section of Southern Alps, Italy, the

Ostracod body size at the Permian-Triassic transition was the subject of the talk presented by Monica Gómez-Corra (Gómez-Corra et al. 2023). At the top of the Bellerophon Formation they founded an ostracod unit with 260 specimens belonging to 27 taxa and 16 genus and studied the change in ostracod assemblages in the overlying Tesero and Mazzin Member of the Triassic Werfen Formation.

In East Croatia, new data on Permian-Triassic boundary sections were shown by Karmen Fio-Firi (Fio-Firi et al. 2023), looking at stress events preserved in Permian-Triassic transition successions with very interesting new results on paleontology, sedimentology and stratigraphy of the Lower Triassic.

Within the Middle East, a key Permian-Triassic area, the Armenian paleogeography was the subject of the keynote talk by Lillit Sahakian (2023), with description of the Geohazards specialized Geopark and the famous Chanakhchi Geosite within this unique Permian-Triassic succession.

Maaleki Moghadam (Moghadam et al. 2023) reconstructed local marine redox conditions of the Tethys Area during the End Permian Mass Extinction using I/Ca with application to the Chanakhchi section of Armenia and to the Kisejin section in the Elburz Mountain of N Iran.

The Triassic of the Sultanate of Oman Gondwana margin was the topic of three talks presented at the Conference. Thomas Brühwiler (Brühwiler & Bucher 2023), working on the Hallstatt-type exotic blocks in Oman, presented 4 new blocks that add to the completeness of the Oman Early Triassic ammonoid record,



Group photo of excursion participants.

but faunas from the latest Smithian and the early Spathian are still missing. Torsten Vennemann (Vennemann et al. 2023), working on clumped isotope thermometry, traced temperature and oxygen isotope compositions on a well-dated Lower Triassic succession of Oman. These data show that Early Triassic seawater temperatures are within the range of modern equatorial sea surface temperatures. Aymon Baud (2023) presented the marked contrast that appears between the euxinic, near azoic shallow water carbonate platform, slope and basinal post-extinction sediments of Oman, and the well-oxygenated open sea high or plateau built of shell beds or skeletal accumulations of crinoidal meadows full of ammonoids recorded in well dated Griebachian blocks, that may have functioned as refuge or oases.

On the Indian-Kashmir side, Marc Leu (Leu et al. 2023) gave an account of the Smithian-Spathian transition interval of Guryul Ravine (Himalayan Kashmir) showing the best documented worldwide conodont succession, encompassing both segminate and segminiplanate forms.

David Ware (Ware et Dai, 2023), after re-sampling of two previously known localities and sampling of two other new outcrops spanning Griesbachian to Smithian time interval in Himalayan-Tibet, gave a review on Early Triassic ammonoid biostratigraphy, evolution and biodiversity dynamics.

The Qiakong section in S China was, among two other Oman sections, the study subject of Oluwaseun Edward (Edward et al. 2023) observing at the Smithian-Spathian transition the marine Sulphur isotope records and environmental changes.

More general subjects presented during the conference include Early Triassic climate modelling, the taxonomic homogenization of marine ecosystems, and the genetic memory of Triassic conodonts.

Speaking to this last subject, Ali Murat Kiliç (Kiliç et al. 2023) showed high speciation rates in conodonts during the lower Triassic, followed by intensive radiations during the Middle Triassic and the decline of survival species during the Upper Triassic up to the total extinction in the late Rhaetian.

Jood Al Aswad (Al Aswad et al. 2023), looking at the wake of the end-Permian mass extinction showed, using the Paleobiology Database, that global terrestrial and marine ecosystems were depleted in taxonomic diversity and became more cosmopolitan. The post-extinction homogenization is due to survivors tracking their preferred aerobic habitats.

Charline Ragon (Ragon et al. 2023), working on the reconstructed Permian-Triassic paleogeography of Vêrard et al., (2023), built a climate model with two robust steady states and applied a multi-stability framework to this Permian-Triassic climate evolution that can help to understand the oscillations in the Early Triassic records.

After three days of scientific presentations and posters, participants received the excursion guide booklet prepared by Aymon Baud, and then embarked for the day on September 2 to local Triassic outcrops, starting with a presentation by Jean-Luc Epard of the regional geology made in La Corniche on the UNESCO Lavaux site. The excursion continued with an examination of the Anisian limestone at Saint-Triphon, followed by a visit to the Late Triassic salt mine at Bex, with a look at the growth of local vineyards on Triassic rocks. In Saint-Triphon,

participants visited the Fontenaille quarry (Lower-Middle Anisian) and the Andonce quarry (Middle Anisian). In the Bex salt mine, participants saw anhydrite and gypsum rocks of Norian age. The links between landscape and underlying geology were also highlighted by comparing vineyard growth on gypsum and on limestone.

The day ended with the tasting of a local dish, cheese-raclette, on the terrace restaurant of an alpine chalet in Prafandaz above the village of Leysin, a unique location with a view of the Rhône flowing into Lake Lemman and the whole Jura chain rising beyond the hillsides.

Lausanne Organizing Committee, Earth Science Institute

Prof. Allison Daley, Michel Jaboyedoff, Jean-Luc Epard, Torsten Vennemann, Thierry Adatte; coordinator Dr Aymon Baud.

Scientific Committee

Prof. Benoit Beauchamp (University of Calgary), Hugo Bucher (University of Zurich), Charles Henderson (University of Calgary), Nicolas Goudemand (ENS Lyon), Jonathan Payne (Stanford, USA), Sara Pruss (Smith College, Northampton, Massachusetts).

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