

The First International Conference on ‘Processes and Palaeo-Environmental Changes in the Arctic: From Past to Present’ (PalaeoArc)

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The new international network PalaeoArc (Processes and Palaeo-Environmental Changes in the Arctic: From Past to Present) held its first meeting in Poznań, 20–24 May 2019. The meeting was hosted by the Faculty of Geographical and Geological Sciences, Adam Mickiewicz University, Poznań, and organized by a local committee chaired by Witold Szczuciński.

PalaeoArc is an international research programme network which aims to understand and explain the climatically induced environmental changes in the Arctic that have taken place throughout the Quaternary and continue to the present-day. The network was established in 2018, building on and extending the rich legacy of the previous network programmes that include PAST Gateways (Palaeo-Arctic Spatial and Temporal Gateways), APEX (Arctic Palaeoclimate and its Extremes), QUEEN (Quaternary Environment of the Eurasian North) and PONAM (Polar North Atlantic

Margins – Late Cenozoic Evolution). There are four major themes of the programme: 1) the dynamics of the Arctic ice sheets, ice shelves and glaciers; 2) the dynamics of high latitude oceans and sea ice; 3) the dynamics of the terrestrial environment and landscape evolution; and 4) the climatic response to, and interaction between, these different parts of the Arctic system. As a research network, PalaeoArc strives to bring together and build bridges between scientists from different countries and career stages, and from different disciplines in Arctic science. This includes marine and terrestrial researchers working with empirical data or numerical modelling. A key focus of the network’s activities is an annual international conference that brings together Arctic scientists from a number of disciplines and typically includes an excursion.

The first PalaeoArc annual meeting held in Poznań was attended by 69 participants from 11 countries (Fig. 1). Enthusiastic participants, the ex-



Fig. 1. Participants of The First International Conference 'Processes and Palaeo-Environmental changes in the Arctic: From Past to Present' (PalaeoArc). Photo by Sz. Belzyt

cellent organization of the conference, and an exciting and well-planned field trip, made the meeting a great success.

The meeting started on Monday May 20th with registration at the Institute of Geology, Faculty of Geographical and Geological Sciences. Three different workshops were held for preregistered users. These workshops were 1) *Hands-on dendrochronology* (led by Agata Buchwał and Pawel Matulewski), 2) *AMS ¹⁴C Laboratory visit* (led by Karina Apolinarska and Tomasz Goslar) and 3) *Poland – a unique place to fund and run innovative and challenging research projects for young scientists* (led by Mateusz Strzelecki). The first day ended with a fantastic outdoor icebreaker and BBQ that facilitated a reunion of researchers and the opportunity to get to know new ones.

The conference was officially opened on Day 2 by Witold Szczuciński (Chair of the local organiz-

ing committee), Błażej Berkowski (Director of the Institute of Geology) and Astrid Lyså (Chair of PalaeoArc). A total of 17 speakers, including two keynote talks, presented new scientific results from the study of former ice sheets, ice-sheet dynamics, oceans, and sea ice in the Arctic. The outstanding keynotes by Kurt H. Kjær (*A large impact crater beneath Hiawatha Glacier in northwest Greenland*, Kjær et al., 2019) and Karl Stattegger (*Sea-level change and the role of polar ice sheets*, Stattegger, 2019) provided an excellent framework for the scientific topics and stimulated many fruitful discussions that continued during the refreshment breaks. At the end of the day, 27 posters were presented, eight of these by early carrier researchers competing for the best poster award.

The field trip on Day 3 was organized by Iza-bela Szuman-Kalita, Marek Ewertowski, Jakub



Fig. 2. Witold Szczuciński presents the story behind the impact craters at the Morasko Meteorite Nature Reserve. One of the water-filled craters is visible in the background. Photo by A. Emery

Kalita, Leszek Kasprzak, Mirosław Makohonienko, Krzysztof Pleskot, Witold Szczuciński and Aleksandra Tomczyk. The conference group was introduced to fascinating and exciting geological localities related to the last Scandinavian Ice Sheet in Wielkopolska and Mid-Holocene meteorite impact craters. Excellent guiding and engaged discussions among the participants reminded us that a field excursion is very important for gathering researchers and creating a friendly, constructive and open atmosphere among scientists.

Three sites were visited, the first of which was the Morasko Meteorite Nature Reserve (Fig. 2). The participants were introduced to meteorite craters superimposed on a belt of recessional moraines that were formed around 18,500 years ago, during the Poznań phase of the last glaciation (Karczewski, 1976; Chmal, 1990; Kozarski, 1995; Stankowski, 2001, 2008). Impressive amounts of data have been collected and published over many years, leading to the interpretation of the depressions as impact craters, which were likely to have been formed around 5000-5500 years ago. This is largely based on environmental studies of sediments at the crater rim and from lake sediments close to the craters (e.g., Szczuciński et al., 2016; Pleskot et al., 2018; Szokaluk et al., 2019). Studies of meteorites related to this event have resulted in the discovery of two new minerals, moraskoite (Karwowski et al., 2015) and czochralskiite (Karwowski et al., 2016).

Site 2, where glaciofluvial sand and esker sediments near Tomice were visited, was in an interstream zone between ice streams at the foreland of the Poznań phase. At this site, diamicton occurred at the surface, and complicated deformation structures were visible in the underlying sediments. Permafrost-related structures were observed, as well

as loading structures and glaciotectionised deformation structures, such as recumbent folds and thrust planes. Large-scaled glaciotectionic structures were also visible at Site 3, the Kuślin site, which is located near to ice-marginal position (Fig. 3). In contrast to Site 2, subglacial till was not observed at the surface of Site 3, with glaciotectionised stratigraphy truncated by a planar surface, onto which Holocene and recent soils were deposited. Research on sedimentological and chronological analysis of this recently discovered site is in progress. Both Sites 2 and 3 led to many discussions and stimulated exchange of ideas about the large variety of deformation structures and ice-stream behaviour.

The last two days of the conference comprised 22 talks and the final poster session. A further keynote talk by Thomas Opel (*Ice wedges: a powerful continental climate archive?*, Opel et al., 2019) marked an interesting introduction to the terrestrial environment and landscape evolution in the Arctic. This was the perfect introduction to the PalaeoArc theme on the climatic response to, and interaction between, the different parts of the Arctic, which was the focus of many of the talks over the last two days. As with the first day of presentations, there were numerous fruitful and interesting discussions.

A further highlight of a fantastic, well-organized, friendly and inspiring PalaeoArc conference was the conference dinner at the Galeria Tumska restaurant in Poznań on Day 4. During the dinner, many speeches were given, including by Astrid Lyså, the chair of the PalaeoArc Steering Committee, who thanked the local organization committee and the field guides for the effort and the excellent work behind the entire conference event. A further highlight was the speech by Professor Emeritus Jan Mangerud (Fig. 4), the internationally renowned



Fig. 3. Large-scaled glaciotectionic deformation at the Kuślin site. Photo by A. Lyså



Fig. 4. Jan Mangerud giving a speech at the conference dinner. Photo by A. Emery

glacial geologist, who was one of the initiators of the first PONAM network in the late 1980s. In addition to several entertaining anecdotes, he emphasized the importance that this type of network has in gathering researchers at different career stages. As the PalaeoArc network aims to build bridges between researchers at different career levels, students were encouraged to give poster presentation during the conference. The PalaeoArc steering committee selected a 'best poster' from the many interesting student posters. During the dinner, the winner was announced. The prize which was a certificate accompanied by a book about Poland, was handed over to the winner, Bor-Jiun Jong, by Andy Emery, the young scientists' representative on the PalaeoArc steering committee (Fig. 5). Bor-Jiun is from the National Taiwan University, and was awarded the prize for the poster entitled '*Ba/Ca ratios and oxygen isotopic composition of planktonic foraminifera in the Arctic Ocean as a tool for reconstructing paleo-river-*



Fig. 5. The prize for the best student poster was handed over to the winner Bor-Jiun Jong (to the right) by the PalaeoArc steering committee student representative Andy Emery. Photo A. Lyså

ine freshwater input', which was presented together with co-authors Ludvig Löwemark and Chih-Kai Chuang.

Before closing the PalaeoArc First International Conference, the steering committee announced that the PalaeoArc Second International Conference will be held in Pisa, Italy, on 25-29 May 2020. Caterina Morigi, at the University in Pisa, will be chair of the local organising committee.

Acknowledgements

The organisers are thanked for a very well-organized conference and field trip, and for introducing the PalaeoArc community to the exciting and interesting glacial geology close to the Weichselian ice sheet margin in Wielkopolska, and the impact craters in the Morasko Meteorite Nature Reserve. Members of the local organizing committee were Witold Szczuciński (chair), Krzysztof Pleskot (secretary), Karina Apolinarska, Agata Buchwał, Marek Ewertowski, Leszek Kasprzak, Karolina Leszczyńska, Mirosław Makohonienko, Jakub Mafecki, Krzysztof Rymer, Mateusz Strzelecki, Izabela Szuman-Kalita and Paweł Wolniewicz. All the participants of the conference are warmly thanked for inspiring presentations and for engaging discussions around PalaeoArc's key themes. The Dean of the Faculty of Geographical and Geological Sciences, Professor Leszek Kasprzak is thanked for financial support to the meeting.

Additional material

Book of abstracts: <http://palaeoarc.amu.edu.pl/wp-content/uploads/2019/05/PaleoArctic-Abstracts.pdf>

Field trip guide: <http://palaeoarc.amu.edu.pl/wp-content/uploads/2019/05/PaleoArctic-Guide.pdf>

Twitter: <https://twitter.com/PalaeoArc>

PalaeoArc website: <http://www.palaeoarc.no/>

Interview with Prof. Jan Mangerud <https://glaciologia.wordpress.com/2019/05/25/rozmowa-prof-jan-mangerud-bez-ciekawosci-nie-bedziesz-dobrym-naukowcem/>

References

- Chmal, R., 1990. *Detailed geological map of Poland at scale 1:50 000. Poznań sheet*. PIG-PIB, Warsaw.
- Jong, B-J., Löwemark, L. & Chuang, C-K. 2019. *Ba/Ca ratios and oxygen isotopic composition of planktonic foraminifera in the Arctic Ocean as a tool for reconstructing paleo-riverine freshwater input*. *1st Interna-*

- tional Conference 'Processes and Palaeo-environmental changes in the Arctic: from past to present' (PalaeoArc). Book of abstracts. Poznań, 66.
- Karczewski, A., 1976. Morphology and lithology of closed depression area located on the northern slope of Morasko Hill near Poznań. [In:] H., Hurnik (Ed.): *Meteorite Morasko and the region of its fall*. Seria Astronomia. Adam Mickiewicz University Press, Poznań, pp. 7–20.
- Karwowski, Ł., Kusz, J., Muszyński, A., Kryza, R., Sitarz, M. & Galuskin, E.V., 2015. Moraskoite, Na₂Mg (PO₄) F, a new mineral from the Morasko IAB-MG iron meteorite (Poland). *Mineralogical Magazine* 79, 387–398.
- Karwowski, Ł., Kryza, R., Muszyński, A., Kusz, J., Helios, K., Drożdżewski, P. & Galuskin, E.V., 2016. Czochralskiite, Na₄Ca₃Mg (PO₄)₄, a second new mineral from the Morasko IAB-MG iron meteorite (Poland). *European Journal of Mineralogy* 28, 969–977.
- Kjær, K.H., Larsen, N.K., Binder, T., Bjørk, A.A., Eisen, O., Fahnestock, M.A., Funder, S., Garde, A.A., Haack, H., Helm, V., Houmark-Nielsen, M., Kjeldsen, K., Khan, S.A., Machguth, H., McDonald, I., Morlighem, M., Mouginot, J., Paden, J.D., Waight, T.E., Weikusat, C., Willerslev, E. & MacGregor, J.A., 2019. A large impact crater beneath Hiawatha Glacier in northwest Greenland. *1st International Conference 'Processes and Palaeo-environmental changes in the Arctic: from past to present' (PalaeoArc)*. Book of abstracts. Poznań, 23.
- Kozarski, S., 1995. Deglaciation of Northwestern Poland: environmental conditions and geosystem transformation (~20 ka - 10 ka BP). *Dokumentacja Geograficzna IGiPZ PAN* 1.
- Opel, T., Meyer, H., Wetterich, S., Dereviagin, A., Laeple, T. & Murton, J., 2019. Ice wedges: a powerful continental climate archive? *1st International Conference 'Processes and Palaeo-environmental changes in the Arctic: from past to present' (PalaeoArc)*. Book of abstracts. Poznań, 37.
- Pleskot, K., Tjallingii, R., Makohonienko, M., Nowaczyk, N. & Szczuciński, W., 2018. Holocene paleohydrological reconstruction of Lake Strzeszyńskie (western Poland) and its implications for the central European climatic transition zone. *Journal of Paleolimnology* 59, 443–459.
- Stankowski, W., 2001. The geology and morphology of the natural reserve "Meteoryt Morasko". *Planetary and Space Science* 49, 749–753.
- Stankowski, W., 2008. Meteoryt Morasko, osobliwość obszaru Poznania – Morasko meteorite, a curiosity of the Poznań region. Adam Mickiewicz University Press, Poznań. *Geologia* 19, 93 pp.
- Stattegger, K., 2019. Sea-level change and the role of polar ice sheets. *1st International Conference 'Processes and Palaeo-environmental changes in the Arctic: from past to present' (PalaeoArc)*. Book of abstracts. Poznań, 48.
- Szczuciński, W., Szokaluk, M., Bronikowska, M., Jagodziński, R., Muszyński, A. & Wünnemann, K., 2016. Identification and dating of small impact crater ejecta deposits, case of Morasko craters, Poland. *32nd IAS International Meeting of Sedimentology Marrakech, Morocco*.
- Szokaluk, M., Jagodziński, R., Muszyński, A. & Szczuciński, W., 2019. Geology of the Morasko craters, Poznań, Poland - small impact craters in unconsolidated sediments. *Meteoritics & Planetary Science* doi: 10.1111/maps.13290.