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The Queen of the Arctic: Louise Arner Boyd

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Аннотация

Louise Boyd (1887–1972) was a female pioneer in Arctic research whose legacy includes the exploration of north-east Greenland. In this Perspective piece, we use a broad interdisciplinary approach to investigate her career as a photographer and expedition leader. When documenting glacial retreat during the 1930s, she was at the forefront of the development of glaciology as a research discipline. Without family obligations and with seemingly inexhaustible financial resources, she used Arctic exploration to create an independent and self-defined life for herself.

Ключевые слова: gender, Greenland, Norwegian polar history, photography, Polar exploration, glaciology

Introduction

On 28 July 1939, a young Norwegian geology student named Brit Hofseth met the legendary hunter–trapper Gerhard Antonsen, also known as “the King,” when going ashore in north-east Greenland with a group of glacier researchers. Antonsen had spent seven winters there alone and was on the point of having reluctantly to return to Norway for medical help after he had got a knife in the eye during a violent winter storm. Two days later, Antonsen took the researchers in his boat from the hunting station Revet to Leirvåg, where they would spend a few summer weeks. After Hofseth had served dinner, the party spent a pleasant evening in front of her tent. “Antonsen said he was overwhelmed,” she noted in her expedition diary. “Many people, hot food and a woman. He had only seen Miss Boyd and Madame Smet in 7 years” (Hofseth 1939, diary entry 30 July; our translation).

Hofseth’s anecdote is revealing of the area of the Arctic and the period this paper discusses. North-east Greenland was uninhabited, but throughout the 1930s constantly visited by hunters and researchers, especially from Norway and Denmark. Encouraging this activity was the ongoing dispute about sovereignty of the area, where both countries used research and a continued presence to assert national interests (Blom 1973). As Antonsen’s experience shows, visitors were, almost without exception, men. The French Mathilde Smet accompanied her brother, Count Gaston Micard, on a trip to north-east Greenland in the summer of 1933. In contrast, the American Louise Arner Boyd was a regular. She went to the Arctic repeatedly and she did not travel as a man’s companion but as the leader of four research expeditions. The first took place in 1931, the year before Antonsen’s first overwintering, but he encountered her in the summers of 1933, 1937 and 1938. While she attracted notice as a woman in the Arctic, as a female expedition leader she was a sensation. A singular figure in polar research during the interwar period, she was regularly referred to in the American press as “the Queen of the Arctic.”

Two kinds of primary sources elucidate the unique position that Louise Arne Boyd (1887–1972) attained in international polar research during the 1930s: the books Boyd published about her expeditions to Greenland and the extensive archival material she left behind. The fiord region of east Greenland (1935) and The coast of northeast Greenland (1948) recount her activities as a photographer,

topographer and expedition leader. Boyd's introductory chapters, in which she figures as an expedition leader and a pioneer in the documentation of glacial retreat, are significant contributions to the Arctic expedition literature. The many photographs she took of geological formations, glaciers and iceberg-studded fjords, which lavishly illustrate the books, show an Arctic landscape in constant change. The images were used for mapping purposes, but they may also be considered from a purely aesthetic perspective (Rule 1998).

The archival material reflects the public attention Boyd received during her lifetime and shows how well-known she was on both sides of the Atlantic. Most of it is kept in various US archives but has not yet been fully researched, despite the publication of two biographies (Anema 2013; Kafarowski 2017). The AGS at the University of Wisconsin Libraries in Milwaukee has thousands of photographs and many maps; the National Archives in Washington, DC has 150 film reels (Amidon 2010). Miscellaneous material, from correspondence and private papers to scrapbooks, contracts with researchers and transcripts of radio interviews, are stored in large boxes in two archives—the SRPL and the MHM—in her home state of California. There is also material about her in several Norwegian archives, much of which reveals close collaboration with Norwegian and Nordic polar researchers.

Through her books and archival material, we can trace the development of Louise Boyd's career as a female pioneer in Arctic research and mapping. Situating her in terms of the history of science, we emphasize her roles as photographer and expedition leader, especially in relation to the development of glaciology as a research discipline. Finally, we highlight the continuing value of her contributions.

Money equals freedom

Education in one form or another is the basis for scientific contributions. Some of the women interested in science have looked for, and sometimes found, alternatives when the official doors were difficult to open. Since the 1920s, they have gained greater access to academic studies, at least in the industrialized part of the world, but many research disciplines are still characterized by gender inequality (Hulbe et al. 2010). While higher education for both genders was limited by class, Boyd was one of many middle- and upper-class women born in the late 19th century who despite economical resources did not receive a formal academic education

and therefore could have lost the opportunity to develop their full potential.

That Boyd would become a pioneering polar researcher was therefore not in the cards. She grew up in a wealthy family in San Rafael, near San Francisco, where her father, who had made a fortune during the gold rush in California in the 1870s, ran an investment company. The education she received from governesses and in private girls' schools hardly qualified her for anything other than the role of a society wife. Yet instead of marrying, she began working for the Boyd Investment Company, eventually taking over its management and gaining valuable organizational experience that she later benefited from as an expedition leader (Anema 2013; Kafarowski 2017). As a young woman and only surviving child, she was responsible for the care of frail parents. When both died within a period of six months, she became the sole heir at the age of 32 to the family mansion in San Rafael and a large fortune.

Without family obligations and with seemingly inexhaustible financial resources, Boyd was able to forge an independent and self-defined life. "I realized that for my own good I must disconnect myself from the past and find and create new interests not associated in any way with the sadness that so completely absorbed many years" (4 pp. ms., MHM), she wrote in an autobiographical note about the new direction her life had taken after her parents' death. "The most difficult mental obstacle I had to overcome was the fact that after being a definite part of other people's lives for so many years, I was no longer needed" (4 pp. ms., MHM). She was evidently looking for a mission or sense of purpose.

The same note describes an attraction to the North. On holiday in the Nordic countries in 1924, Boyd went on a tourist ship to Spitsbergen (later Svalbard) and the edge of the pack ice. "This was the part of the trip to which I had looked forward the most, because through my reading I had formed a very vivid impression of the appearance of pack ice," (4 pp. ms., MHM) she wrote. She told the captain that she was not satisfied by a tantalizing glimpse of the ice: "I want to be in there some day, looking out; not here, looking in" (4 pp. ms., MHM). Two years later, this wish was fulfilled. With the help of an English guide with extensive experience in organizing tourist expeditions to the Arctic, she chartered the Norwegian Arctic ship H obby and went with some friends to Franz Josef Land. On the way through the polar ice, they combined trophy hunting with photography and filming.

Boyd described this trip in an unpublished 57-page manuscript (Boyd 1952), probably written during the 1930s and obviously intended as the introduction to a planned book about “the lighter side of her Arctic explorations and expeditions” (note dated 5 August 1952, SRPL). Here she tried to put into words her first crucial polar experiences. Ice is the leitmotif of the text. Repeatedly she let herself be overwhelmed by the vast expanses of Arctic Ocean ice, which rendered people insignificant: “I realized it was I, not the iceberg, that was transient!” (Boyd 1952: 11). She described the various ice formations in detail and wrote that she could not imagine doing “objectless sightseeing” (Boyd 1952: 18). Instead, she defined photography as her work: “Not trained as a scientist, but trained with a camera, my eyes and theirs must do constructive and intelligent recording. Therefore, my job was a two-fold one, that of the leader and photographer, and that was the simple foundation upon which my succeeding expeditions were built” (Boyd 1952: 18; Fig. 1).

Fig. 1 As a skilled landscape photographer, Louise Boyd contributed to Arctic research and the dissemination of the beauty of Arctic landscapes. This is a still from her film about the search for Roald Amundsen in the summer of 1928. (Photo: United States National Archives.) Inset: Boyd photographed in Tromsø on 28 June, a few days before the start of the search. (Photo: Anders Beer Wille, Norsk Folkemuseum.)

The heroic rescue attempt

In 1928, she again chartered Hobby for a new trophy hunting trip with friends. The planned destination was Greenland, but when Roald Amundsen went missing she offered to make the ship and crew available without cost for the Norwegian search effort. The world-renowned polar explorer had disappeared on 18 June with the

French seaplane Latham on its way to Svalbard to assist the international rescue operation for the airship Italia, which had crashed in the ice on its return from the North Pole. Boyd's only prerequisites were that she and her guests would participate and the ship would sail under the American flag. She argued that Hobby, designed for ice, would be able to search where other ships could not. "I had to promise to do what I could so that Hobby would be used as efficiently as possible," wrote the Norwegian naval officer Gunnar Hovdenak, who coordinated the search operation for Amundsen, "and to treat it as if there were only men on board" (Hovdenak 1934: 90–91; our translation). On both this and her later expedition she was firmly opposed to special treatment of women.

Boyd's offer, which covered all the costs of operating a fully equipped ship in the Arctic Ocean indefinitely, was gratefully accepted by the Norwegian authorities. When Hobby left Tromsø on 3 July for Svalbard, to join the international search operation and take on board two seaplanes and their pilots, Boyd was no longer a private polar tourist. She completely dismissed the hunting trip from her mind, telling a Norwegian newspaper: "I am willing to carry out any instructions that the Norwegian government may give me" (Afte nposten 1928a).

Ten years later, she described the demanding search in a portrait interview with the journalist Alma Kitchell in the series Let's talk it over on NBC radio. When asked how it was carried out, she answered that while planes were searching over large expanses of ocean, those on board the ship used binoculars to scan each foot of the ice to the extent that visibility allowed: "We all took our turn at the watch day and night, looking not only for the plane and the men, alive, but also for any telltale wood or wreckage and for bodies that might be floating. Many times we stopped for what turned out to be false alarms—what often looked like a body would, on investigation, turned out to be black ice" (transcript of Let's talk it over interview 19 December 1938, SRPL). After more than two months, the search formally ended when a fishing boat picked up a float from Latham ne ar a lighthouse in northern Norway.

For Boyd personally, this experience was a turning point. Although the search was fruitless, she was honoured as a hero and on 18 October appointed a Knight 1st Class of the Royal Norwegian Order of Saint Olav, "as a visible proof of the Norwegian people's gratitude" (Aftenposten 1928b). Six days later, she was among the guests of honour at a large memorial meeting for Amundsen arranged by the Norwegian Geographical Society in Oslo (Aftenpost

en 1928c). Here she must have become acquainted with the central Norwegian polar researchers. All indications are that she was accepted by a Norwegian polar elite long before she herself explicitly relinquished polar tourism for research and four years before she published her first research article in October 1932. This was solely due to her contribution to the search for Amundsen. She was obviously aware of the international status it gave her to be able to associate her name with one of the greatest polar explorers (Boyd 1935; Willman 2016). Her recognition in the US several years later was the result of Arctic expeditions with American researchers.

Institutional affiliation and an independent network

Boyd was fully aware that it was her personal fortune that had enabled her to create a leading role outside established structures (Hulbe et al. 2010). A footnote on the first pages of the introductions to her books, states that Miss Boyd had financed the expeditions. She did not attempt to hide where the money had come from. Her first research article includes a footnote that explains why she wanted to call a newly discovered mountain peak in the Kjerulf Fjord in north-east Greenland “J.F.B. Mountain” after her father: “I wish to have the mountain so named in memory of my father, a pioneer in the mining industry of the west of the United States of America, through whom my Arctic voyages have been made possible” (Boyd 1932: 546).

Her willingness to use her own disposable wealth to fund research led to her collaboration with the renowned AGS. From 1931 all her expeditions were officially sponsored by the AGS. An independent institution whose purpose was to disseminate geographical knowledge to the general public, it accepted members on the basis of relevant experience, not necessarily academic merits (McManis 1996; Monk 2003). Boyd’s connection with the AGS helped her recruit researchers for her expeditions. In return, she donated all the results to the geographic society. The books she published were part of their series of special editions but she paid for their production, according to a report entitled A brief history of Miss Louise A. Boyd’s relation with American Geographical Society (Archive, 6 January1960, AGS Archive). It was a win–win situation: she gained prestige through her affiliation with AGS; the

organization received valuable scientific material and fully funded expeditions and publications.

As an independent researcher, Boyd avoided expending time and energy building a career within the constraints of the academic world. At the same time, reading lists in the MHM's archives, in Novato, show that over time—and probably on the advice of researchers in both the Nordic countries and the US—she built up extensive polar knowledge on her own. Her correspondence in the archives shows that she established and maintained a valuable network of contacts. The available sources also indicate that she was welcomed as a colleague by Nordic polar researchers. It was Danish polar researchers who suggested naming an area of land and a glacier in Greenland after her (Fig. 2). In a glaciological historical context, she is an example of how women with private financial resources were able to create leading roles outside established structures (Hulbe et al. 2010).

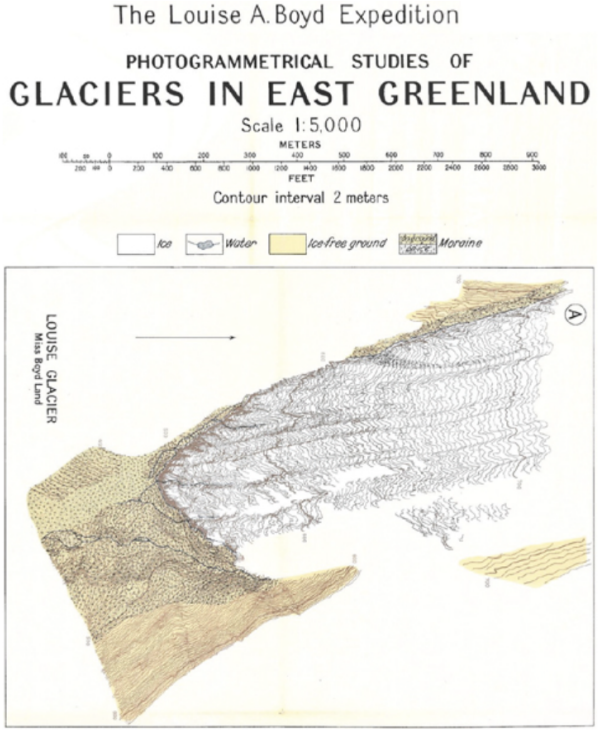

Fig. 2 Example of a topographic map based on photographs and measurements taken by Louise Boyd in the field in 1933. The Danish government recognized Boyd's work by naming this area Miss Boyd Land and the glacier Louise Glacier. Boyd is the only female polar pioneer who had land named after her in north-east Greenland. (Image assembled from several maps in the American Geographical Society Library.)

Embracing and refining modern technology

Though Boyd's expeditions were comparatively "small in size both in terms of personnel and ship" (Boyd 1984: 493), she was confident that investing in state-of-the-art equipment and techniques would yield results:

> Being a firm believer that geography, certainly that of the Polar Regions, can best be studied by explorers and scientists equipped with the most precise and practical instruments that modern times have developed, and which would enable them to obtain the most thorough and detailed knowledge of areas not easy of access and where time plays an all important factor, I spared no effort or expense in order to equip every branch of our work along those lines. (Boyd 1984: 493)

Her books provide detailed descriptions of the equipment and show how technology helped the researchers make the most of the short summer seasons, in spite of serious ice problems off the east coast of Greenland on every expedition.

Boyd understood early on the importance of mapping not only the visible landscape, but also what was below sea level. Before the First World War, bathymetric maps were based on rudimentary measurements from ships. However, during the 1920s, the echo sounder was developed, an instrument that made it possible to map the underwater topography along continuous profiles instead of just taking point measurements. Thanks to useful contacts and a well-stocked bank account, Boyd was not only able to buy the most modern equipment available for surveying the seabed, but also to contribute to its technological development. On her second expedition to north-east Greenland, in 1933, she used echo sounders, but it turned out that the system had shortcomings. Before the next expedition four years later, the instrument was improved using Boyd's own resources. This improved echo sounder was called the Hughes Veslekari Model Echo Sounder, after the ship she chartered, and it was later put into production and used by others to sound large depths (Boyd 1948: 8–9). It contributed to the discovery of the ridge in the seafloor between Bjørnøya (Bear Island) and Jan Mayen,

which, at the suggestion of Norwegian polar researchers, was later named after Boyd.

Her wealth also made it possible to invest in the best photographic equipment on the market. Before aerial photography became commonplace, photogrammetry was used to achieve a three-dimensional representation of landscapes. It requires photographs of a given place from several perspectives. It is clear from her own writing and the expedition participants' accounts that she devoted much energy into developing techniques to reconstruct the appearance of glaciers from images taken from different angles and she learned to adapt her instruments to local conditions. Her quality-conscious approach was honed by Isaiah Bowman, the AGS director, as revealed in their correspondence in the MHM. On the basis of the photographs produced during Boyd's 1928 expedition to Greenland —which she had called "a photographic reconnaissance" (1932: 532, 1935: 2)—Bowman advised her about what she ought to photograph on her next expedition and the contextual information she should provide for the images. Following his guidance, armed with cameras better suited to the polar environment and taking advantage of better summer weather, Boyd took photographs on her next expedition that showed such marked improvement that Bowman could "hardly believe that they were taken by the same woman! You have done a first-class job" (letter from Bowman to Boyd 15 March 1932, MHM; letter from Boyd to Bowman 25 March 1932, MHM). As a result, the AGS subsequently prepared (with her financing) detailed and accurate topographic maps (Fig. 3). She donated all her photographs to the AGS.

Fig. 3 This photograph, of Hisingen Glacier, in Dickson Fjord, Greenland, on 6 August 1931, is one of many annotated by Louise Boyd to show the location of the view on a corresponding map. In this way, the photographs could be used as a basis for the construction of better maps. (Photo: Louise Arner Boyd / American Geographical Society Library.)

Boyd told Bowman that she had been in contact with the Scott Polar Research Institute, in Cambridge, where they had asked for more of her pictures of ice forms and moraines. Geologist Frank Debenham, who had been with polar explorer Robert Scott to Antarctica in 1910 and was the institute's first director, recommended that she publish collections of "ice photographs," for example, in the form of albums with short explanatory captions. This would make the images available to students interested in glaciology. He wrote that he thought she was inclined to be "too humble minded about the value of the photographic work you have done," and that in his opinion the pictures were extremely valuable. He therefore hoped that she would invest in such a publication (letter from Debenham to Boyd 12 June 1931, MHM). The encouragement from someone like Debenham must have boosted her confidence and may have been an important inspiration for the publication and format of her two books, which are largely collections of Arctic landscape portraits.

Richly illustrated with maps and photographs, the books are addressed to a general audience. Almost all the images are dated, probably because they show landscapes, ice conditions and glacial

formations that were constantly changing. As Debenham had suggested, all have short explanatory captions. The photographs have a documentary purpose, but at the same time Boyd clearly wanted to convince readers of the aesthetic value of the Arctic landscapes. As she wrote in The fiord region of east Greenland, “I have sought to bring east Greenland before the eyes of the specialist and of all interested persons, and to do so in a form that reflects both the beauty of the region and its scientific importance” (Boyd 1935: 56).

The Greenland expeditions

Boyd’s first expedition to Greenland with the chartered Arctic ship Veslekari left Ålesund, in southern Norway, on 1 July 1931. Glaciers in the Northern Hemisphere had shown signs of retreat, something that was generally ascribed to “climate improvement” (Sörlin 2009: 242–243). Up to date on these discussions, Boyd concentrated on Greenland partly because the glaciers there showed “a variety of form and of glacial action probably unsurpassed” (Boyd 1932: 529). Moreover, accurate topographic maps—crucial for mapping glacier fronts—were lacking for large areas of north-east Greenland.

Veslekari was designed in 1918 as a sister ship to Amundsen’s Ma ud, with a heavy solid wooden hull and a rounded bow profile that made it possible to glide over or plough through sea ice (Ellefsen & Berset 1957; Kjær & Sefland 2005). Although the ship was constructed for pelagic hunting and belonged to the shipping entrepreneur Elling Aarseth, in Ålesund, it had been chartered several times for Norwegian research expeditions in the Arctic. It became a platform for Boyd’s next three expeditions to north-east Greenland. Each time, it was rebuilt with deckhouses that served as cabins, darkrooms and “depots for her optical and photographic equipment” (Ellefsen & Berset 1957: 153; our translation).

The Swedish cartographer Carl-Julius Anrick, who with his wife Calla participated in the 1931 expedition, later called it “simply a tourist trip” (Anrick 1932: 175; our translation). The probable reason is that he was the only participant who was a researcher, while the other guests on board were friends of Boyd. One of them, Robert Menzies, was known as an amateur botanist. With a snub to the formally unqualified Boyd, Isaiah Bowman had apologized that the researchers he was trying to recruit were engaged in “other expeditions under scientific leadership” (quoted by Kafarowski 2017:

131). However, that was before he had been impressed by the quality of Boyd's photographs. On her expedition two years later, all the invited participants—with the exception of the wife of one of the researchers—were well-known scientists. The expedition in 1931 was nevertheless the beginning of Boyd's serious research career.

The staff on the 1931 expedition included 23-year-old Erik Bratseth, from Ålesund, who had been hired "exclusively as Miss Boyd's camera carrier" (Anrick 1932: 175; our translation). Bratseth's diary (Bratseth 1931) from the trip gives a vivid picture of Boyd as expedition leader and photographer and the physical demands of photographing under extreme conditions. On the voyage to Greenland, Veslekari stopped at the island of Jan Mayen. There, on 10 July, Bratseth noted that the fog cleared so much that "Miss Boyd could try her large camera for colour photography. It is a very sizable device with two large handles to hold it up against the chest. Enormous lens and wide film strip with 25 consecutive images" (Bratseth 1931, diary entry 10 July; our translation). The heavy and cumbrous camera equipment, including glass plates and developing fluids, was not easy to bring out into the terrain, and it was Bratseth's task to assist on such trips.

During the expedition, it became clear that Boyd had identified an area of north-east Greenland that had not been explored and where she could make a valuable contribution with her photographs. At Ymer Ø, at the entrance to Kaiser Franz Joseph Fjord, Bratseth wrote that the expedition participants understood that "a correction of the map was obviously needed here" because the distance between Kjerulf Fjord and Dickson Fjord was less than what was marked on the map (Bratseth 1931, diary entry 10 August; our translation). Bratseth speculated that "Miss Boyd was probably a little disappointed that she had not discovered any new floating area between the two fjords, but it was probably a consolation to her to discover that the map was wrong" (Bratseth 1931, diary entry 10 August; our translation).

On this expedition Boyd laid the foundation for the topographical work that required photographic precision, refining the photographic and topographical mapping technology that she had learned to use. On all subsequent expeditions she brought with her a professional topographer. "When I was photographing for the purpose of recording typical topographic forms, glaciers, ice, fine scenery, animal life, and forms, no day was ever long enough for the fascinating work," she wrote many years later (Boyd 1948: 87):

> It was quite a different matter, however, to spend hour after hour photographing for mapping purposes. There the surveyor and I worked together as a unit, he with his plane table and I with my cameras, recording the material from which detailed maps could be worked up by him after the return of the expedition. This is to be recommended as an ideal method for mapping when time is short. (Boyd 1948: 87)

Even Anrick admitted in his report that the challenges of the ice in the eastern part of Greenland made the trip in 1931 worthy of being called an expedition. He could also have emphasized that they were the first ever to cross the ice at the entrance to Icefjord on the north-east coast and that they discovered several other places where existing maps were incorrect. Altogether, the expedition visited all the fjords between Kaiser Franz Joseph Fjord and King Oscar Fjord. Whenever possible they went ashore, and Boyd photographed the same landscapes from different clearly defined vantage points, which often required a good deal of climbing for her and her young camera carrier (Boyd 1948, 1984). Boyd also gained a general understanding of the weather and ice conditions in the ocean surrounding Greenland, knowledge that was important in planning future voyages.

The expedition in 1931 was the last for which Boyd left the logistics to others. On her next expeditions to north-east Greenland, she had full command. In addition to being responsible for funding, she took charge of all the practicalities: chartering research vessels, scheduling, selection of participants, ordering provisions and equipment—everything that did not concern the collection of research data.

In 1933, with the assistance of Bowman at AGS, she put together a group of researchers with competence in what she considered important. In the small group of researchers who were selected to participate, two were devoted to cartographic work on land and two were geologists. On her last two expeditions, in 1937 and 1938, which were planned as a unit, she also brought with her a hydrographer with expertise in handling the echo sounder. It was clear that she had gradually prioritized innovation over more traditional research methods: “Greater emphasis was to be put on the hydrographic work than had been the case in any of my previous expeditions,” she wrote in The coast of northeast Greenland, “and a hydrographer, who was to be in charge of the sounding program,

current studies, and tide-gauge recording, was therefore added to the staff" (Boyd 1948: 4).

Echo-sounder profiles were made of several fjords, and fairly continuous sound lines were also made between Norway and Greenland. The collection of this type of data was an important contribution to the ongoing debate on landscape development and the effect of different types of erosion. Clearly, the debate on continental drift—which would not be settled for several decades—also benefited from better knowledge of what was hidden beneath the sea surface.

The expedition leader

In Louise Boyd's time, polar expeditions often included several types of researchers because there were many aspects to study: botany, glacier fronts, geology, geomorphology—in addition to the necessity of mapping large areas. Then as now, the organization of successful expeditions depended on knowledge of logistics and meteorology and, not least, leadership skills. Boyd was not only the expedition leader, she also participated in the research as a photographer and therefore had to master various roles on her expeditions.

Boyd reflected on her roles in a portrait written in advance of her 1938 expedition by the well-known journalist Russell Owen for the N ew York Times Magazine. Initially she did not want to talk about herself, telling Owen that "I did not know when I started out if I was suited for leadership, particularly with a group of men; and second whether I could contribute anything of value" (Owen 1938: 6). She was nevertheless convinced that she has contributed new knowledge and believed that she has succeeded as a leader: "as for the men, most of them go back with me each voyage. We get along fine" (Owen 1938: 6). Even though she claimed that her leadership of expeditions, in which all the other participants were men, was unproblematic, the available sources indicate that she downplayed the challenges of asserting herself as a woman in the male-dominated world of polar science.

When asked in a radio interview in 1939 what particular obstacles she had had to overcome in her polar career, she stated that "being a woman" and the lack of formal scientific qualifications had been problems: "When I first went to the Arctic, people definitely seemed to feel, and openly told me so, the Arctic was a place only for men—that for me to go where I did was an eccentricity and hobby and not

to be taken seriously," she said (transcript of It can be done radio interview, 3 May 1939, SRPL). Neither mapping nor photography required a university degree, but her lacking academic education made her feel less valued, even though "In many cases, it has happened that I have had more actual experience and field work than those so-rated scientists whose knowledge was limited only to books and who did not have the practical application of it" (transcript of It can be done radio interview, 3 May 1939, SRPL).

However, there are many indications that Boyd usually managed to command respect as the expedition leader. Before researchers could join her expeditions, they had to sign contracts that gave her full control over the dissemination of their results. It is interesting to study the contract she created for Professor J. Harlen Bretz of the University of Chicago, who was a physiographer on the 1933 expedition. It shows both a confidence in her own capacity as leader and a clear understanding of the academic process (contract signed 22 March 1933, MHM; letter from Bretz to Boyd 28 March 1933, MHM). In this context Boyd must have benefited from her knowledge and experience of the business world.

Apparently, she got along well with the crews on the Norwegian ships she chartered. In the preface to The coast of northeast Greenland, she praised both the captain and first mate of Veslekari: "Greater loyalty and greater efforts than theirs on our behalf could not have been possible," she wrote (Boyd 1948: x). "Their long hours of work, their tenacity in getting the ship through difficult ice conditions, their interest in making it possible for us to reach our objectives, often under the most trying circumstances, deserve the highest admiration and respect" (Boyd 1948: x). Since the same crew, with some exceptions, participated in all her research expeditions, the respect and admiration were probably mutual.

The fact that Boyd never suffered from seasickness may have contributed to her gaining the crews' respect. According to the authors of a book about her expedition vessel, Veslekari, the captain was impressed with her seamanship.

> She was an expert in knotting, splicing and tackling, she even demonstrated wire splicing with brilliance. If the weather was ever so rough and the ship ever so rolling, she came striding out of her cabin on the foredeck, found her sea legs and entered the wheelhouse on her daily cross-examination about everything between heaven and earth. (Ellefsen & Berset 1957: 159; our translation)

Her camera carrier, Bratseth, recounted something similar in a diary note about a violent storm on the trip to Greenland: “Miss Boyd enjoyed herself immensely,—heavy sea, accompanied by the howls of female expedition members and the crash of cups falling to the floor and breaking en masse” (Bratseth 1931, diary entry 14 July; our translation).

As the leader of polar expeditions, Boyd—like others in the same situation—faced many challenges in terms of competence, gender and social class. The ability to create a well-functioning working environment on an expedition is crucial to the success of the research itself. An experienced society hostess, Boyd transferred her sophisticated habits to an expedition setting. On her expeditions, no expense was spared, not even of first-class provisions (Kafarowski 2017: 165–167). Professor Bretz was critical of the lavish catering on Veslekari: “In the middle of this riot of Nature untamed, we sup in royal fashion, a highball for aperitif, port with the last of the meal,” he wrote in his diary (quoted by Kafarowski 2017: 178). Boyd had undermined the manly tradition of simple living in the field and Bretz clearly disliked both the luxury and the female influence. The plant ecologist Henry J. Oosting, who participated on Boyd’s 1937 expedition, likewise complained in his diary of the “La femme atmosphere” on the vessel (quoted by Kafarowski 2017: 205).

In his diary, Bretz did not hide his contempt for Boyd as leader. He complained about “her awful irrelevance, her terrible clack, her frightful sentences, her selfishness, her incompetence to lead a scientific expedition” (quoted by Kafarowski 2017: 179). There is no reason to think that Boyd was actually an incompetent expedition leader: it is her manner and character that are attacked here, by a prominent male researcher whose private writings reveal his misogynistic attitudes. How representative he was is hard to say. He may have been an exception, or other scientists on her expeditions may have shared the same views without expressing them either publicly or privately.

Like other women in traditionally masculine roles, Boyd found herself between the devil and the deep blue sea. As a female leader, she could be undermined by men like Bretz. She also felt compelled to explain that leading polar expeditions had not made her masculine: “I like the pleasant things most women enjoy, even if I do wear breeches and boots on an expedition, even sleep in them at times,” she told Owen in 1938. “I have no use for masculine women. At sea I do not bother with my hands, except to keep them from

being frozen, but I powder my nose before going on deck, no matter how rough the sea is. There is no reason why women can't rough it and still remain feminine" (Owen 1938: 6). Yet no matter what people around her thought of her as a woman and leader, she was in charge. She not only paid for everything, but also organized and led the expeditions and controlled the dissemination of the results.

Boyd's glaciological legacy

People's interest in looking beyond the beauty of ice masses and seeking to understand how they work grew strongly during the 19th century, partly because in inhabited areas one could see with one's own eyes evidence of how past glaciers had advanced (Clarke 1987). In scientific circles it became generally understood during this time that the glaciers of earlier epochs were considerably larger. Likewise, it was accepted that glacial erratics (rocks left behind by retreated glaciers) and glacial striae (stripes scraped into rock by moving glaciers) were evidence that ice-free areas had previously been covered by ice, and that ice movements had had a great impact on the landscape development (Boulton 1987). Moreover, it became increasingly clear that glaciers had been greatly influenced by the modern climate. This contributed to systematic studies of glaciers to understand how they functioned, which led to the emergence of glaciology as a separate research discipline.

Given very few opportunities to participate in fieldwork, many of the female pioneers of glaciology excelled in other ways, carrying out laboratory work and book projects, for example (Hulbe et al. 2010). Some women in the profession chose to live without domestic obligations, which gave them more freedom to take advantage of the chances that presented themselves, and Boyd can be considered one of them. Her glaciological legacy lies mainly in her photographs of glaciers and landscape forms from her four expeditions to Greenland.

With the rapid global warming that is now taking place, glacial ice is shrinking at breath-taking speed and contributing to global sea level rise. Because warming has increased three times as fast in the Arctic as in nearby geographical areas, Greenland's ice cover has received enormous attention in recent decades. After all, the ice in Greenland corresponds to 7 m of sea level. Glaciers that calve into the ocean are sensitive not only to atmospheric warming but also to ocean currents and water temperatures. Since it has been shown that the Greenland ice sheet does not behave as a homogeneous

mass, scientists today seek to understand individual glaciers and how each behaves. Historical archives, including Boyd's photographs and topographic maps, have proven to be a valuable resource. Scanning the photographs and applying modern photogrammetric processing techniques have yielded accurate topographic data that may be compared with recent images taken from aircraft, drones or satellites.

Ninety years after Boyd photographed Greenland's glaciers, Danish glaciologist Anders Björk photographed several of the same glaciers again, allowing him to document changes in their front positions and calculate volume changes (Bjørk et al. 2018; Fig. 4).

Fig. 4 Boyd's photograph of Morainless Glacier is an example of the high technical quality of her images, which make it possible to study the different structures in the ice. (Photo: Louise Arner Boyd / American Geographical Society Library.)

“Why feminist glaciology?” ask Carey et al. (2016), in a controversial article about women and gender in glaciological research. In addition to calling for a focus on women’s contributions to the development of the field, they also ask to what extent the discipline itself is gendered. They claim that glaciology—especially when it is associated with rock climbing and polar expeditions—is characterized by a masculine discourse that privileges physical achievement, heroism and conquest (Carey et al. 2016: 5). It is striking that these qualities are missing in Boyd’s descriptions of her own expeditions. She does not deny that the weather and nature conditions were often challenging, but instead emphasizes what can be called her dialogue with the Arctic. As her books show, it was within this dialogue that her photographs were created.

Carey et al. (2016) conclude that as a research discipline glaciology must be seen in the context of the global environmental challenges humanity is facing, and that it is therefore important to take a broad humanistic and social-science perspective on studies of ice. They claim that “alternative representations,” such as art and literature, can help to articulate new versions of the relationship between humans and glaciers (Carey et al. 2016: 14). Thus, ice will not only be the subject of measurements, mapping and quantifying investigations, but also of an emotional, aesthetic approach (Carey et al. 2016). In this sense, Boyd’s photographs are exemplary. On the one hand, they have the status of scientific data; on the other hand, they open our eyes to the beauty of Arctic landscapes.

A pioneer

In a book about the ship Veslekari, the authors characterized Boyd as “a filthy rich female, tanned like an Arctic skipper,” but they also recognized her as “one of the world’s few women polar scientists” (Ellefsen & Berset 1957: 150–151; our translation), suggesting that they understood that she had uniquely managed to straddle the expectations of the society into which she was born and an unparalleled polar career. One may surmise that she was more easily accepted—and her accomplishments more readily recognized—in Scandinavia because she was an exotic element there.

The Louise Boyd Collection at the AGS archive in Milwaukee contains several thousand photographs of icebergs, glaciers, snow, sea ice and landscape formations. Today’s readily available photographic technology has made it easy to forget the physical challenges behind the old pictures in various archives. Photographs

and maps are important visual cultural monuments, and Boyd's detailed historical documentation is an invaluable treasure for posterity precisely because the landscape in the polar regions is changing so rapidly. Her images are being used in today's glaciological research and their value will not diminish in the future.

During the 1930s, Boyd was able to participate in modern polar research because she had personal economic resources. Her independent economic situation opened many doors, but she would not have come far without intelligence, ingenuity, ambition and a capacity for hard work. Lacking academic qualifications, she nevertheless became accepted in a male-dominated environment because she took chances, established a contact network and made herself competent in the relevant fields. As an expedition leader and photographer, she pointed forward. She participated in the emergence of glaciology as a modern research discipline. Most importantly, her many photographs of disappearing polar landscapes survive her.

Writing in 1950, Boyd called the small expeditions she organized in the 1930s insignificant—"a dot among the others and of very questionable good" (Boyd 1984: 499)—compared to the enormous research activity in the Arctic after World War II. Still, she expressed pride in what she had accomplished: "We pioneered where others now carry on" (Boyd 1984: 499).

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