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1. Maria Curie-Skłodowska University Spitsbergen Expeditions

Localisation

The study area – NW part of Wedel Jarlsberg Land – is situated in the south-western fragment of Spitsbergen. Spitsbergen itself belongs to the Svalbard Archipelago[1], being the largest of its islands with an area of 39,044 km^2. The name 'Svalbard' also refers to an administrative unit of the Kingdom of Norway, which apart from islands of the archipelago also includes the islands of Bjørnøya and Hopen.

The main elements of Spitsbergen's natural environment depend on the bodies of seawater that surround it. The island's western shores are washed by the Greenland Sea, the eastern shores – by the Barents Sea, and the northern coast – by the Arctic Ocean (Fig. 1.1AB). Of crucial importance are also the ocean currents that flow around the island. From the point of view of our studies, one of the most interesting areas is south-western Spitsbergen where a large-scale exchange of warm and cold air masses and ocean waters takes place (Marsz & Styszyńska 2007). Warmth in the Arctic region is mainly transported by the West Spitsbergen Current, which is a branch of the North Atlantic Drift (Saloranta & Haugan 2004). It carries warm and salty Atlantic waters (Aagaard *et al.* 1987; Piechura & Walczowski 2009). On the other hand, we have the East Spitsbergen Current, with its chilled and freshened Arctic waters. Near the island of Hopen it separates into two distinct currents: Sørkapp and Bjørnøya. The Sørkapp Current flows to the west, passing the Spitsbergen headland (Sørkap Land) from the southern side, and then its waters travel northward. In consequence, the climate in individual regions of the island is hugely variable. The western part is warmer, and the climate of the inland area is more continental. It is also the place of clashes between cold masses of Arctic air coming from the north and warm, humid masses of Atlantic air from the south (the Arctic Front).

[1] The name *Svalbard* is a modern Norwegian name of the archipelago, which in past was known primarily with its English and Dutch name *Spitsbergen*, that before 1925 applied both to the largest island as well as to the whole archipelago. In period 1925-1969 the largest island was called *West Spitsbergen* in order to distinguish it, however after 1969 this confusion was reduced by using the name *Spitsbergen* only for the largest island and *Svalbard* for the whole archipelago.

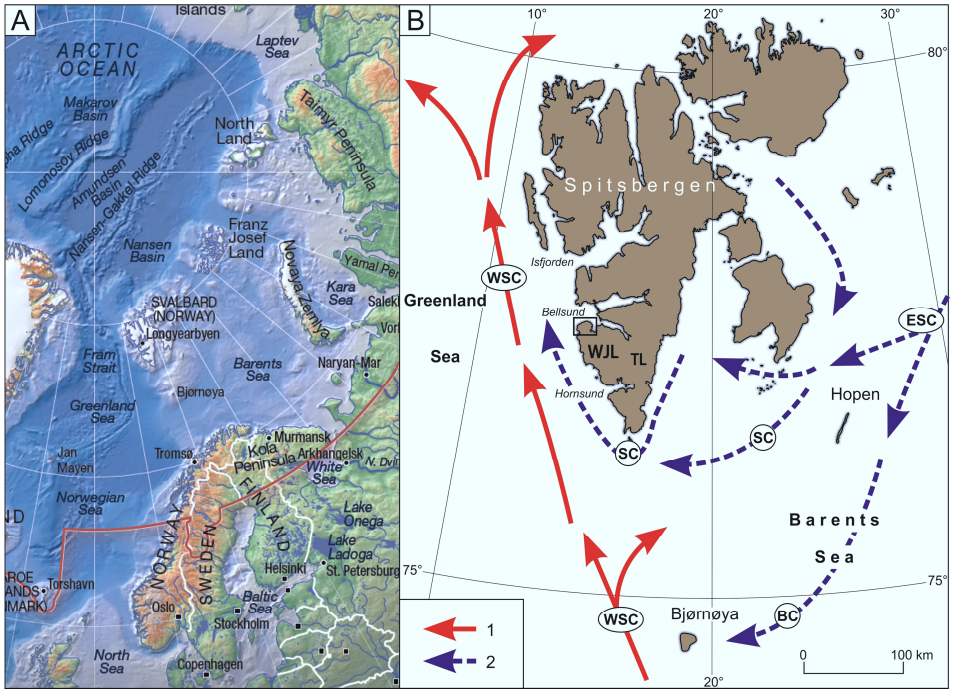

Fig. 1.1. A- location of Svalbard (UNEP/GRID-Arendal), B- location of study area, with a background of ocean currents: 1- warm currents (WSC- West Spitsbergen Current), 2- cold currents (ESC- East Spitsbergen Current, SC- Sørkapp Current, BC- Bjørnøya Current); WJL- Wedel Jarlsberg Land, TL- Torell Land.

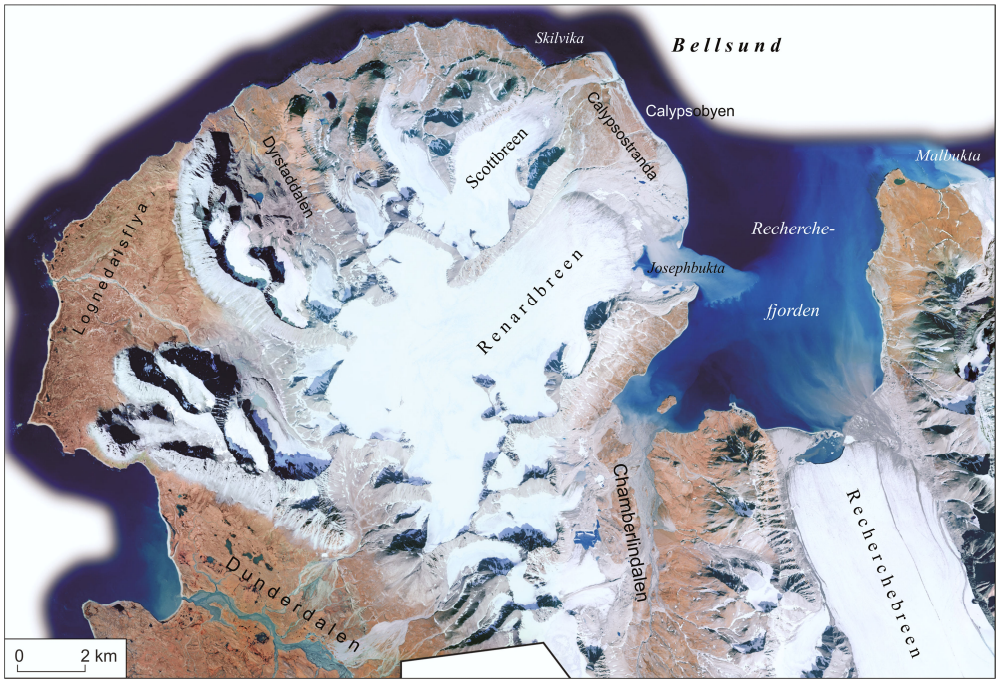

Fig. 1.2. Study area (Orthophotomap, Zagórski 2005).

Several regions have been defined within the borders of southern Spitsbergen. One of these is Wedel Jarlsberg Land (WJL). Its borders are marked by Bellsund and Van Keulenfjorden in the north, Hornsund in the south and Torell Land in the west (Fig. 1.1.B).

The study area is located in the north-western part of Wedel Jarlsberg Land, which forms a 'peninsula' between Dunderdalen in the west, Bellsund in the north and Recherchefjorden in the east (Fig. 1.2). A detailed description of the orographic relief of the area is presented in Chapter 5.1. The main research station during expeditions organised by the Maria Curie-Skłodowska University (UMCS) is Calypsobyen (Calypso settlement), located on the south-eastern coast of Bellsund, approx. 2 km from the mouth of Recherchefjorden, near the 22-30 m a.s.l. raised marine terrace (Calypso-stranda) (Photo 1.1).

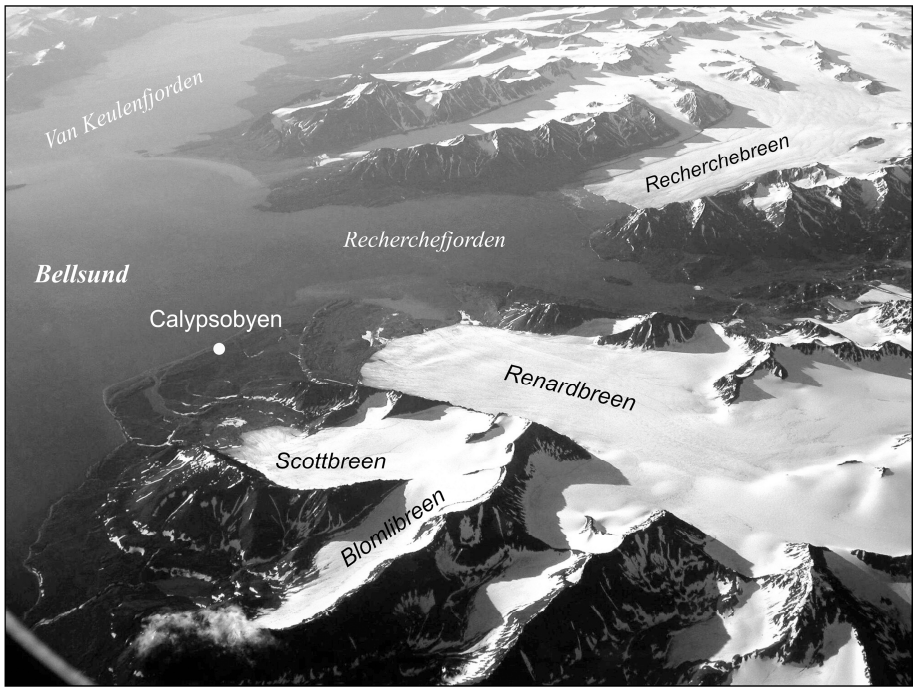

Photo 1.1. Location of the Polar Station in Calypsobyen (Photo M.Grześ 2003).

Overview of historical, political and legal background of scientific activities

From the scientific perspective[2], Svalbard Archipelago offers excellent opportunities for multi- and interdisciplinary research. Its position in the Arctic region (proximity to the North Pole combined with relatively easy accessibility), distinctive climatic conditions as well as rich land and sea fauna and flora have made Svalbard

[2] This research was supported by National Centre for Science post-doctoral fellowship under the grant: DEC-2011/04/S/HS5/00172

a desired place of extensive and comprehensive research in polar sciences carried on by representatives of many nations. It should be however highlighted that scientific activities on Svalbard are carried on also in an exceptional political and legal environment, determined by the unique status of the archipelago, defined both in the sphere of international and internal laws.

The history of the archipelago is closely connected with the history of exploration of the Arctic region, exploitation of its natural resources and scientific research. The Svalbard itself was discovered in 1596 by the Dutch explorers lead by William Barents and for next two centuries has become an arena of competition among different European trading companies and hunters trying to acquire its different natural resources. These activities finished in the mid-19th century and then the archipelago became *terra nullius*, i.e. no man's land that is not a subject to any state's sovereignty. From legal point of view this indicated that there was no state possessing an overall authority over the archipelago and therefore all interested states could benefit of its resources. European scientists began to pay more attention to Svalbard islands in the 19th century and since that moment a large number of expeditions were made to study the archipelago's flora, fauna, geology and geography.

Poland's participation in research programmes was initiated during the *Second International Polar Year*, when the first official Polish expedition to the Arctic spent about 13 months on the Bear Island at the turn of 1932 and 1933 conducting many important measurements (Barr *et al.* 2010). Before the outbreak of the World War II Poland organised three further expeditions to Spitsbergen. Under the umbrella of the *International Geophysical Year* (1957-1958) series of subsequent expeditions were organised, whose main achievement, for the further development of Polish polar research, was the establishment of Polish Polar Station in 1956 (Szupryczyński 2007). This station is the northernmost Polish research facility operating continuously year-round and it is located on the shore of Isbjørnhamna (Isbjørn Bay, Polar Bear Bay) in Hornsund in Spitsbergen.

Exactly 30 years later, after several months of planning and preparation, researchers from Maria Curie-Skłodowska University (UMCS) initiated so-called 'Lublin Expeditions' to the Arctic. The main area of interdisciplinary research projects, carried out during several expeditions, was the north-western part of the Wedel Jarlsberg Land and especially the southern part of the Bellsund. The decision to undertake research in this area was made partly due to the possibility of obtaining suitable infrastructural facilities, namely a summer base, which with consent of the Norwegian authorities was set up in some old buildings placed at a beach extending just north-west of Recherchefjorden (Repelewska-Pękalowa & Pękala 1999). This group of buildings, called Calypsobyen, is a former settlement established by the Northern Exploration Company (NEC) in 1918-1919 which tried to extract coal in the Bellsund area. The beach (Calypsostranda) and the cluster of buildings (Calypsobyen) were named however after the HMS Calypso, which belonged to the British Navy Training Squadron that surveyed the

area in 1895. Due to very small deposits of coal and very harsh weather and shipping conditions in this place the NEC mine was shut down in 1920 and later on it was bought by the Government of Norway in 1932. It is worth to note that Calypsobyen become a place of cultural heritage within the Sør-Spitsbergen National Park[3] (South Spitsbergen National Park) established by the Norwegian authorities in 1973 (Lier *et al.* 2012) (Fig. 1.3.).

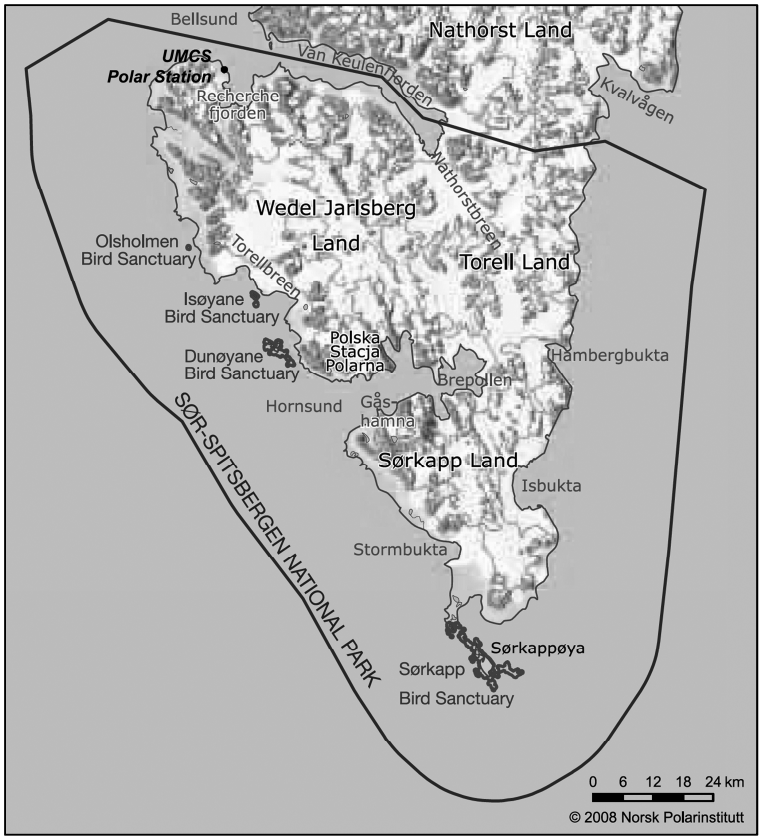

Fig. 1.3. The border of the Sør-Spitsbergen National Park (South Spitsbergen National Park) and location of Bird Sanktuary's (after: Lier *et al.* 2012).

It should be pointed out that the southern-western part of the Spitsbergen is strongly linked with a history of the Archipelago, as it has been named after Fredrik Wedel Jarlsberg (1855-1942). He was the Minister of Foreign Affairs of Norway three times and also the leading negotiators of an international agreement on the international legal status of Svalbard during the negotiations run in Paris after the end of the World War I.

[3] Protected: 1973; Land area: 5,030 km^2; Marine area: 8,198 km^2. The Sør-Spitsbergen National Park covers all the southern part of Spitsbergen. The mountains on the west side are tall and jagged, while those on the east side are flatter and rounded. The Hornsund area is on a very important east-west migration route for polar bears. The park also has many valuable cultural heritage remains (Lier *et al.* 2012).

As it was already mentioned, in the mid-19th century Svalbard Archipelago became *terra nullius*, and due to (or despite) competitive interests in, and claims to, the islands expressed by British, Dutch, Norwegians, Swedes, Danes, Russians and Americans, the question of sovereignty still remained unsettled. Further development, mainly in the mining operations in the beginning of the 20th century, however called for new rules in this respect. After gaining independence in 1905 Norway notified to other states a need for establishment of a new legal regime based on Svalbard's *terra nullius* status. The issue was discussed at three following conferences attended by Norway, Sweden and Russia, however, negotiations on a new regime failed because of the World War I. In the situation in 1919 due to Wedel Jarlsberg's efforts the Spitsbergen Commission was established in connection with the Paris Peace negotiations. The Commission approved a treaty based on Norwegian sovereignty[4], while preserving earlier *terra nullius* rights by allowing equal rights for other states to 'exercise and practice of all maritime, industrial, mining or commercial enterprises'. The treaty also implicitly offers a foundation for scientific activities in the Archipelago[5]. Additionally, the peaceful use of Svalbard was to be ensured through a prevention against the establishment of naval bases and fortifications and its use for warlike purposes. The Svalbard Treaty was signed on 9th February, 1920 and entered into force on 14th August, 1925[6].

To date, 40 countries participants in the treaty, which is perceived as the first international legally binding agreement dealing with the Arctic and can serve as inspiration for a regional multilateral regime in such topics as a peaceful management of resources, environmental protection or scientific cooperation (Numminen 2011). Although most of the contracting parties ratified the Treaty in the 1920s, two states have joined the Treaty relatively recently: Iceland in 1994 and Czech Republic in 2006. Poland signed the Treaty on 2nd September, 1931 (Machowski 1994) and however the political basis and expectations pertaining to this step still remain unclear (Łuszczuk 2013) it can be argued that 'becoming a party of the Svalbard Treaty stimulated further development of Polish polar research' (Graczyk 2012).

It should be added that today – in the era of growing geopolitical importance of the Arctic region-the Svalbard's status has become again the issue of some controversies (Churchill & Ulfstein 2010; Anioł 2010; Pedersen 2006; Pedersen 2009; Scother

[4] The parties to that treaty decided to recognize Norway's sovereignty over Svalbard according to the stipulations of the treaty, what meant that Norway could set a local government and legislate for the archipelago independently from other states, subject only limitations explicitly put in the 1920 Treaty. Accordingly, the Norwegian authorities, after the extension in 1925 of their sovereignty on archipelago and declaration that it became a province and part of the Kingdom of Norway under the historic name Svalbard, began to establish there a legal regime for the exercise of their rights and jurisdiction there (Machowski 1995).

[5] Although there is no international convention regulating scientific activities on Svalbard while article 5 of the Treaty stipulates conclusion of such conventions 'laying down the conditions under which scientific investigations may be conducted', they are performed and conducted according to the well-developed practices and procedures elaborated throughout all years. After 1925 the scientific research on Svalbard was institutionalised in result of the establishment in 1928 of the Institute for Investigation of Svalbard and the Polar Seas which in 1948 was transformed into the Norwegian Polar Institute, with the task to organize regular and permanent research in close cooperation with scientists from other nations. Today, all research activities on the archipelago are coordinated by the Svalbard Science Forum, a platform created by the Norwegian government, and chaired by the Research Council of Norway.

[6] LNTS, Vol. 2, No. 1, 1920 at 7-19; USTS, No. 686, 1924 at 1-16; AJIL, Vol. 18 Suppl., 1924, at 199-208.

2011). The existing disputes around the Spitsbergen Treaty are related to its interpretation: the scope of the rights of contracting parties and the extent of Norway's sovereign rights[7]. Hopefully those issues will not have any negative impact on the further progress in polar research.

Polar Station in Calypsobyen

Since 1986 the UMCS Expeditions have been using buildings of Calypsobyen (Calypso settlement) as a research station. In 1932, Calypsobyen became the property of the Norwegian state and according to Norwegian law all traces of human activity on Spitsbergen from before 1946 are under protection. As a result, nowadays the settlement is a collection of wooden buildings, each preserved to a different degree, and constitutes a heritage park of industrial construction. Moreover, due to the fact that Calypsobyen as well as the whole NW part of Wedel Jarlsberg Land is under protection as part of the Sør-Spitsbergen National Park, there are certain additional, significant limitations regarding human presence and any kind of activity in the region. Members of UMCS Expeditions carried out numerous repairs in the area that were required to make the place habitable and suitable for research work. Much effort has been put in all the refurbishment and repair works, so as to preserve the original appearance of all structures. In the last couple of years the Norwegian administration of the island was responsible for the renovation of settlement.

The oldest construction in Calypsobyen is building (C) called *'Camp Jacobsen'* (*Strandhuset, Michelsenhuset*) or 'the house near the Tyvjobekken' ('hus near Wydrzyca Stream') (Figs. 1.4 and 1.5, Photo 1.2). It was built in 1901 by the members of expeditions sent by the businessman/politician Christian Michelsen (1857-1925) – who was the Prime Minister of Norway in the years 1905-1907. This building is also considered to be one of the oldest ones related to the history of excavating minerals on Svalbard. Originally it was covered with birch bark and a layer of tundra. At the beginning of the 20th century it was still used by trappers during certain seasons as a base camp. However, due to its size and construction, the building was difficult to heat.

The main buildings of Calypsobyen, that still exist and are in use today (A, B) were erected in the years 1918-1919 by NEC Building (B) was originally a housing facility– inside it you can see clear signs of partitions that divided the interior into smaller rooms. The building is currently used for storage purposes. It has one large room, two smaller ones and an annexe – 'power generator room'.

[7] When the Treaty was concluded in 1920, international law did not know any maritime zone beyond the territorial sea, and legal concepts, such as Exclusive Economic Zones (EEZs), were yet to be found and developed. The breadth of territorial waters was not set indicated in the Treaty, but at the time Norway explained its territorial sea as extending 'the distance of the customary sea mile from the outermost island or islet, not washed over by the sea'. Disputes related to Norway's sovereignty and rights of the Spitsbergen Treaty parties came up when UN Convention on the Law of the Sea offered new maritime zones, such as continental shelf, fisheries zone and the EEZ to the areas under the jurisdiction of coastal state (Øystein & Rottem 2010).

The second building (A) served as workshop for as long as the mine was operational, but later on, after 2 new rooms have been added inside, it became a residential building. Having been adapted and extensively repaired in the years 1986-1987 by the participants of the first UMCS Expeditions, it now serves as the primary housing facility for polar expeditions (Photo 1.3.). Close to building (A) are the remains of another construction (floor), which was once a workshop too.

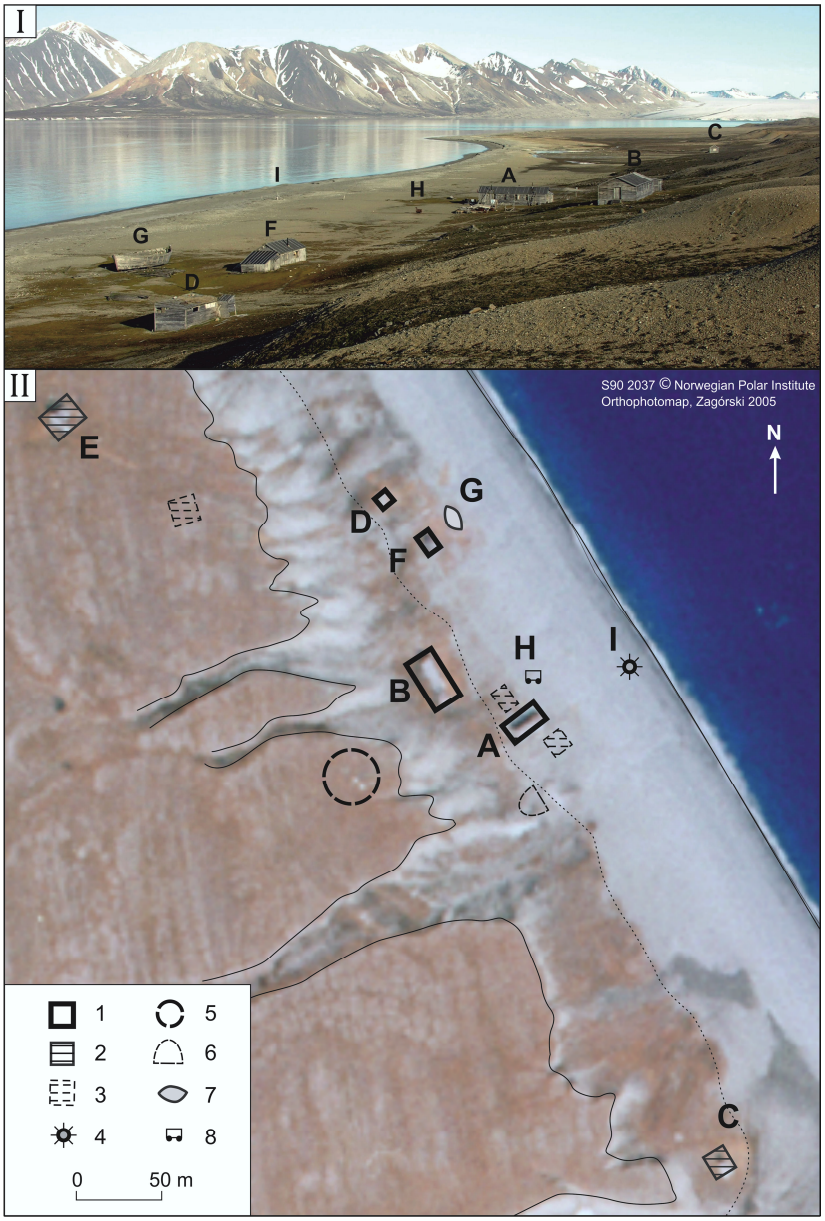

Fig. 1.4. The main objects of the Calypsobyen: I- general view (Photo P. Zagórski 2005); II- location of objects: 1- used buildings, 2- other buildings in good conditions, 3- non-existet buildings, 4- capstan, 5- meteorological station, 6- mining shaft, 7- transport barge (welbot), 8- mining truck.

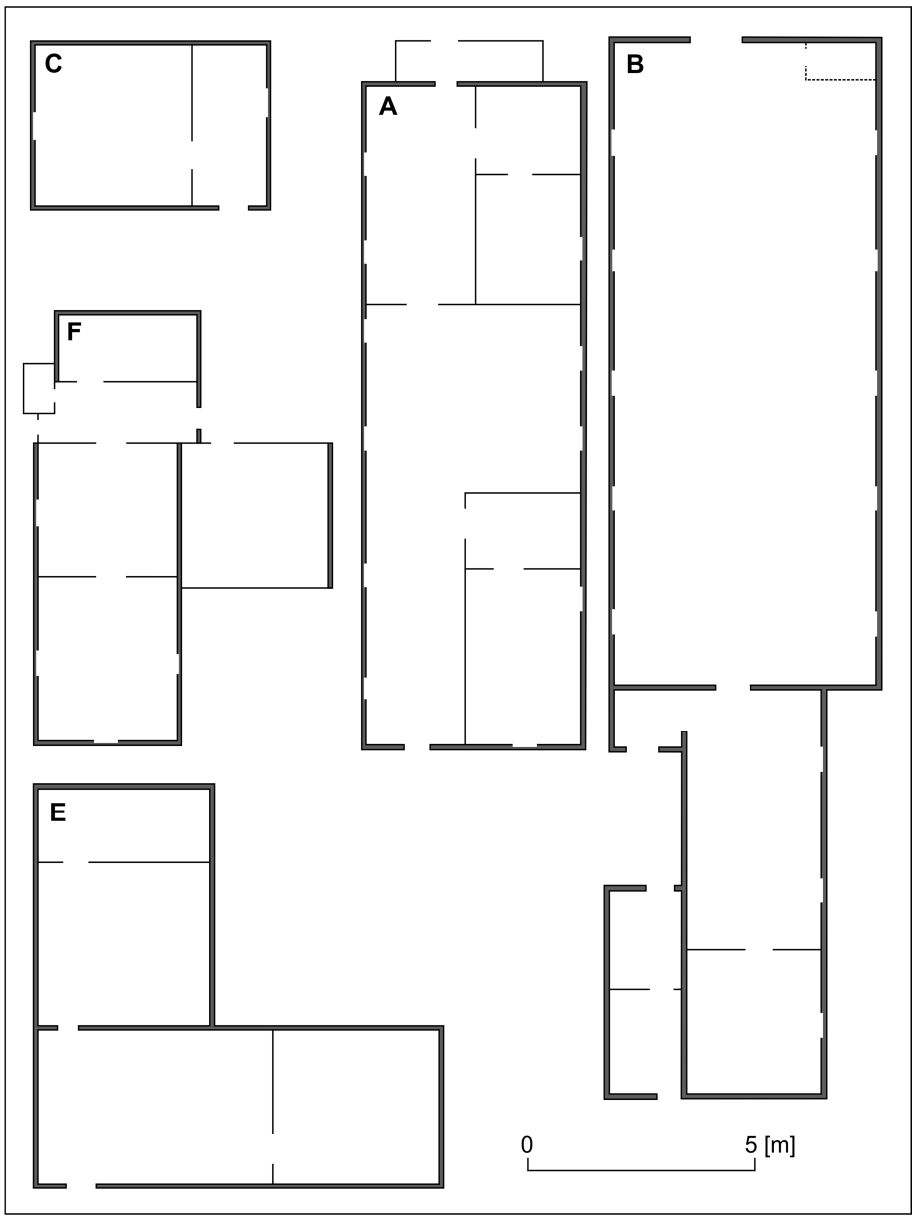

Fig. 1.5. Plans for the main buildings of Calypsobyen - explanation in the text (after: Krawczyk & Reder 1989).

Another construction related to the NEC activities is the farm building (D). It has two rooms, each with a separate entrance. One of the rooms was probably a smithy. While the NEC was still operating, a telegraph station (E) was built on a near-by raised marine terrace (Figs. 1.4 and 1.5). During the World War II it was used by the Germans as a radio station. The building had two floors and included a residential area. A knocked-over radio mast lies in front of it today (Pękala & Repelewska-Pękalowa 2007b).

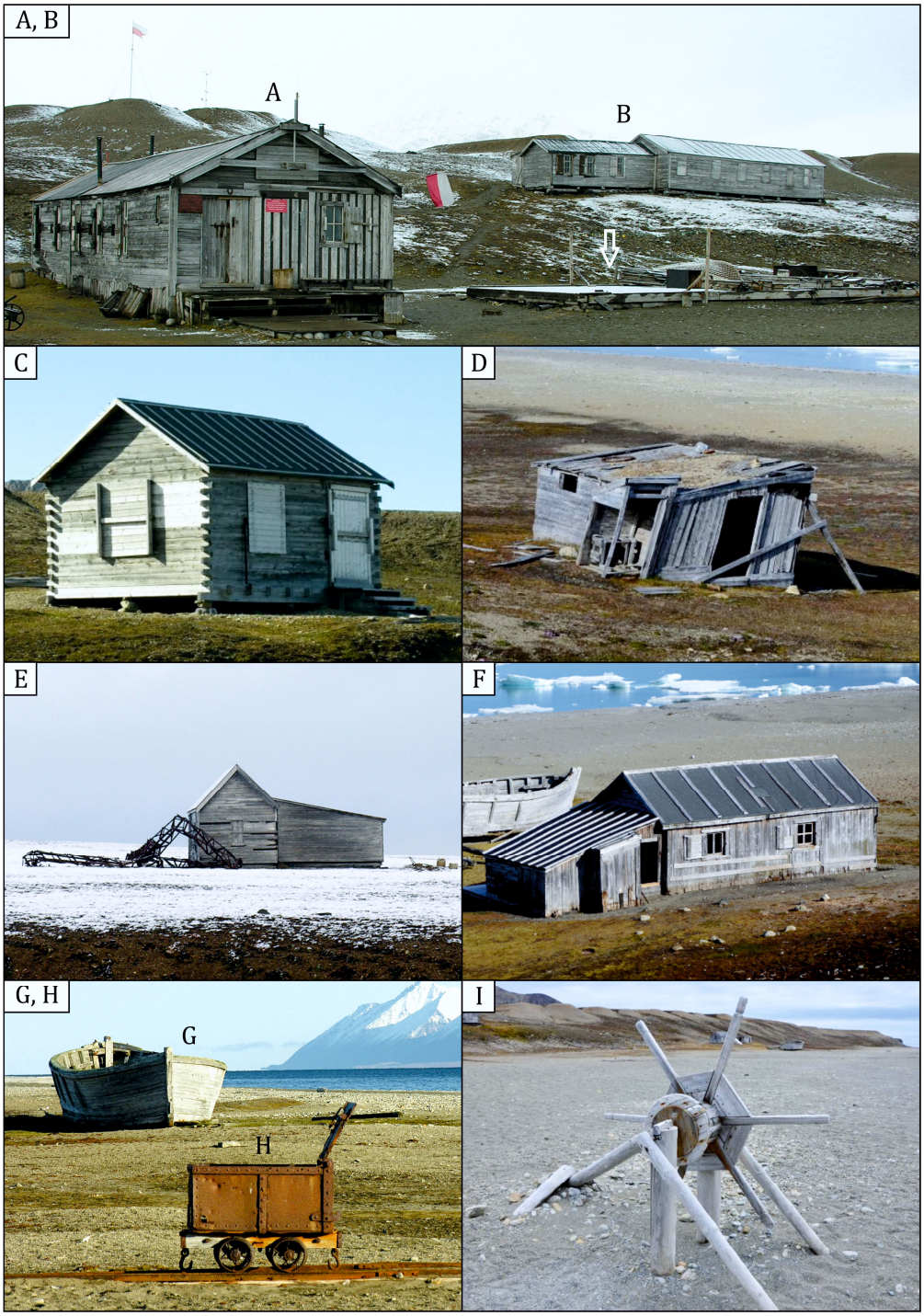

Photo 1.2. Main objects of Calypsobyen: A,B- main buildings of Polar Station and storage, on the right the remains of another object (white arrow); C- *'Camp Jacobsen'*, building near the Tyvjobekken (Wydrzyca Stream); D- farm building; E- radio building; F- *'Blomlihytta'*; G,H- transport barge (welbot) and mining truck; I- capstan. Location of objects see: Fig. 1.4 (Photos P. Zagórski).

Photo 1.3. Renovation of: A- the main building (A) (Photo K. Pękala 1986), B- storage building (B) (Photo K. Pękala 1986).

Difficult conditions related to coastal climate, logistic problems with loading and unloading of materials, as well as the unprofitability of mining operations was the reasons for abandoning the excavation site as early as in the 1920s. In the following years NEC hired trappers to spend the winter in Calypsobyen. This happened 5 times between 1922 and 1928. Independently of the NEC, in 1918 a trapper named Birger Jacobsen built one more building (F). Every winter since 1930 until the evacuation in 1941 it was occupied by another trapper – Ole Blomli. Later on the cabin was called *Blomlihytta* after his name. The last trappers to spend the winter in Calypsobyen were S. Olsen and J. Bakherud in the years 1969-1971. In the summer of 2010 the building was renovated by a Norwegian repair crew. It was raised and straightened, and the damaged floor boards were replaced inside.

Apart from these building, other historical items can be found within the borders of the camp: remnants of old mining tools (rail track sections, a trolley, boilers, wheelbarrows, numerous metal elements), a transport barge (welbot) named *'Maria Theresa'* (G) and several boatwrecks. The mineshaft is currently collapsed. One of the contemporary 'showplaces' of Calypsobyen is a wooden capstan (I). It was constructed in 1989 by Jarek 'Rabbit' Zajączkowski (Photo 1.2).

History of Polar Expeditions

The Spitsbergen Treaty of 1920, which was already mentioned above, made it possible to undertake economic activities, as well as to conduct scientific research. Poland, being one of the signatories, embraced this opportunity by organizing polar expeditions, both before and after World War II. Visiting Svalbard did not require a Norwegian visa, which reduced the amount of necessary paperwork. This was particularly important after 1945, during the so-called 'Cold War'. One notable fact was the active participation of Poland in studies related to the 3rd International Geophysical Year (1957-1958) (Machowski 1994, 1995). This led to the establishment of a permanent polar station on Spitsbergen, at Hornsund. The polar researchers were at that time accompanied by a reporter of the Polish Radio. Thanks to the regular radio broadcasts called: *'Halo Spitsbergen, halo Hornsund'* all of Poland could listen to conversations between the explorers and their families back home, learning about the highs and lows of wintering in the polar region.

The Polish Polar Station at Hornsund, currently named after its founder, prof. Stanisław Siedlecki, is owned by the Institute of Geophysics of the Polish Academy of Sciences. The station operates in yearly cycles. Its existence is very important, both due to the value of the research conducted there, as well as in terms of its logistical and representative functions.

Apart from the year-round operations of the Polar Station of Polish Academy of Sciences at Hornsund, the studies dealing with Spitsbergen are also based on the data gathered during seasonal expeditions organised by various Polish scientific institutions. The Maria Curie-Skłodowska University of Lublin joined the ranks of these institutions in 1986. A series of expeditions was organised by the Faculty of Biology and Earth Sciences of UMCS, with the purpose of conducting comprehensive studies of the environment. These were led by prof. Kazimierz Pękala, Ph.D. (Photo 1.4), who had already participated in polar expeditions organised by: the University of Wrocław (1973), the Polish Academy of Sciences (1980) and the Jagiellonian University (1983). Apart from him, another person with polar experience was Jan Rodzik, Ph.D. –member of a year-long Central Expedition of Polish Academy of Sciences in 1982-1983 to Hornsund.

The area of studies is located on the western coast of Spitsbergen in the vicinity of Bellsund (NW part of Wedel Jarlsberg Land) (Figs. 1.1 and 1.2). Many factors contributed to selecting this particular region: relatively low level of knowledge about the

Photo 1.4. Professor Kazimierz Pękala – the leader of first expeditions to Spitsbergen (Photo J. Repelewska-Pękalowa 2005).

geographic environment of the area, and the fact that it was very attractive. The settlement of Calypso (Calypsobyen), located on the south-eastern coast of Bellsund, became the base-camp for the Expeditions (Fig. 1.4). It provided the possibility to ensure proper living conditions for a dozen or so people, including equipment and food storage facilities. In order to use these structures the researchers were each time required to obtain the consent of the Svalbard Governor, and to respect the regulations resulting from the fact that the area is part of a National Park.

The first UMCS Polar Expedition, organised jointly with the Institute of Geology of the University of Warsaw, set out from Lublin on 24th June, 1986. It had been preceded by a long period of preparations, which took place during a decade that was quite difficult for the country's economy. Purchasing the necessary equipment, clothing and provisions for a dozen or so people was not an easy task. The expedition members also had to account for the possibility of having to make small or comprehensive repairs to the buildings. Thus they needed to have the necessary construction materials.

In the beginning (in the years between 1986 and 1990), the expedition participants would for the most part arrive to Spitsbergen by plane: from Warsaw to Moscow, and on the next day from Moscow *via* Murmansk to Longyearbyen on Spitsbergen. Such a trip took at least two days and nights. The last stage (from the airport at Longyearbuen to the base-camp at Calypsobyen) involved renting out a helicopter from *Trust Arktiugol*, which was often possible only after a few days have passed (Photo 1.5AB). By virtue of agreements with the Institute of Geophysics of Polish Academy of Sciences, the equipment and provisions were transported by ship, chartered especially for the Central Expedition of Polish Academy of Sciences (this was also the case during successive expeditions) (Photo 1.6.AB). Similar difficulties awaited you on the return journey. Direct communication with Poland was only possible if one of the expedition members had been authorised to use a two-way radio.

The year 1991 brought about significant changes, also in terms of logistics. From that moment on the researchers would travel by plane from Warsaw *via* Oslo to Longyear, which was considerably shorter, and allowed them to extend the period of field studies. Other options were also possible e.g. travelling by ship from Gdynia to Spitsbergen (in 1999, r/v Professor Shtokman). In the case of transport people and things from Longyearbyen – Calypsobyen were used among other the services of the

Norwegian Aviation Company Airlift AS (helicopter), russian ship 'Pomor', research vessel s/y 'Oceania' (captain Marek Marzec) and the yacht s/y 'Eltanin' (captain Jerzy Różański) (Photo 1.7ABC). After 1999 the expedition participants could communicate with the world using a satellite phone (Irydium), and later on – cellular phones. This was particularly important from the point of view of safety issues.

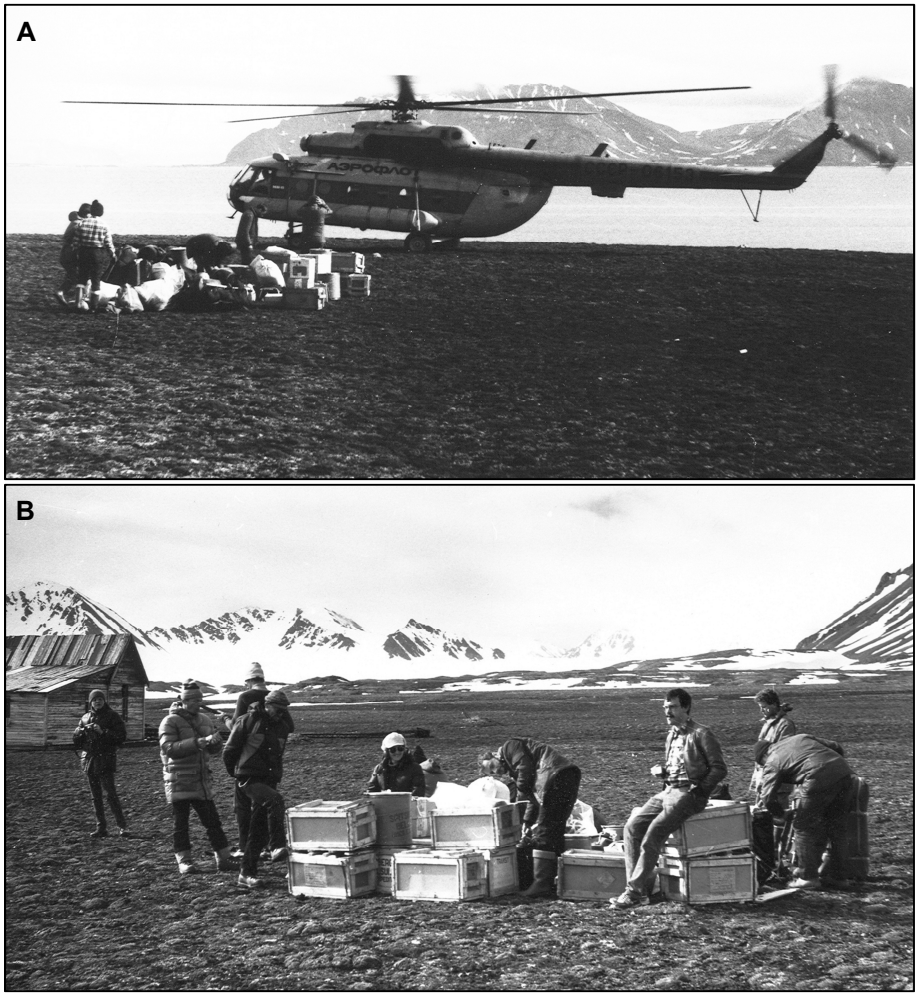

Photo 1.5. A- first landing on Calypsostranda in 2nd July, 1986 (Photo A. Gluza), B- after landing (Photo K. Pękala).

Also, acquiring provisions for these expeditions became incomparably easier, especially after the year 2000, as ever since then the MS 'Horyzont II' – a training vessel of the Polish Naval Academy in Gdynia, makes regular trips between Gdynia and Spitsbergen (Photo 1.8ABC). Twice in 1999 and 2000, the return route from Calypsobyen (Svalbard) to Gdynia (Poland) run over of two stages: the Tromsø – ships (a/s Nordbjørn) and next: Tromsø-Stockholm-Gdynia-Lublin – by car.

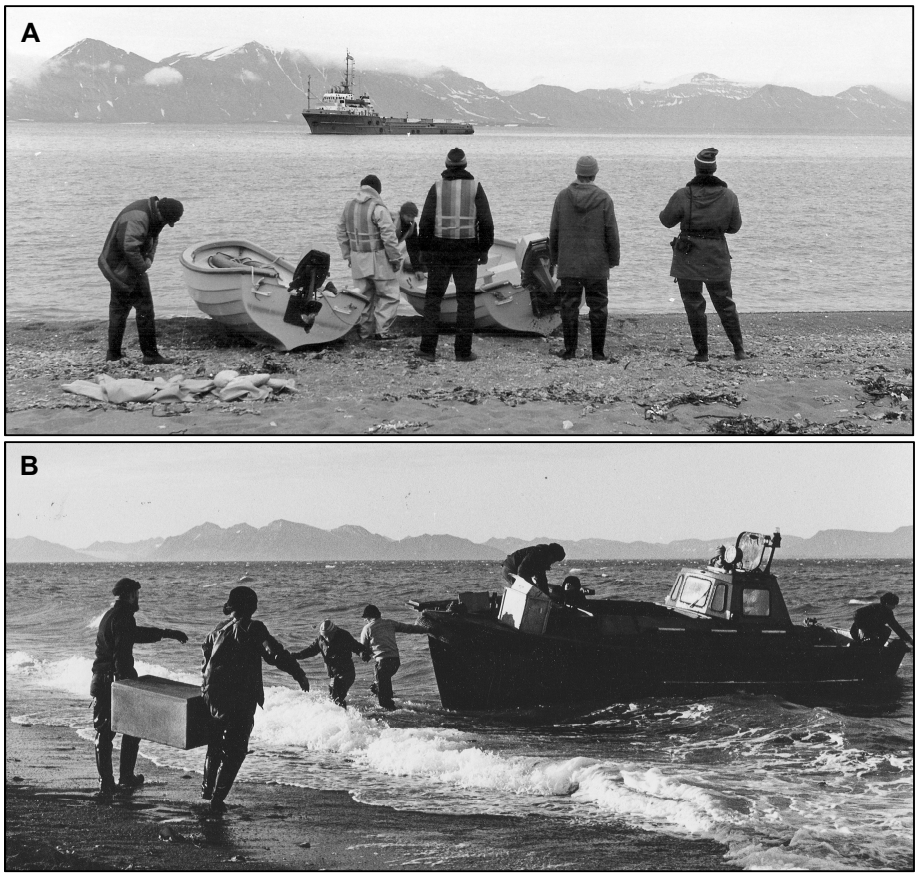

Photo 1.6. The transport and unloading of expedition equipment – Calypsobyen: A- in 1987 (Photo F. Święs), B- in 1990 (Photo K. Pękala).

At first, the plan was to conduct studies in the course of three summer seasons (1986-1988). However, reality exceeded these expectations by far. Until 2012 as many as 24 summer expeditions were organised. The number of participants during each expedition and their time of stay on Spitsbergen were different, depending on the studies being conducted and the logistical possibilities (Repelewska-Pękalowa & Bartoszewski 2006). In total, the number of people that took part in these expeditions was 69, and they represented both the UMCS in Lublin as well as other institutions from Poland and abroad (Photos 1.9 – 1.13; Tables 1.1 and 1.2).

In spring seasons 2005-2009 – on the basis of Calypsobyen – five fieldwork took place on the glaciers of Wedel Jarlsberg Land. This research was carried out in the framework of an international research project 'GLACIODYN' (4th International Polar Year – 'The dynamic response of Arctic glaciers to global warming'), together with representatives of the University of Silesia, Institute of Geophysics Polish Academy of Sciences and colleagues from the Polish Polar Station in Hornsund. The research tasks of the project was carried out also in summer 2008. (Photo 1.11ABC).

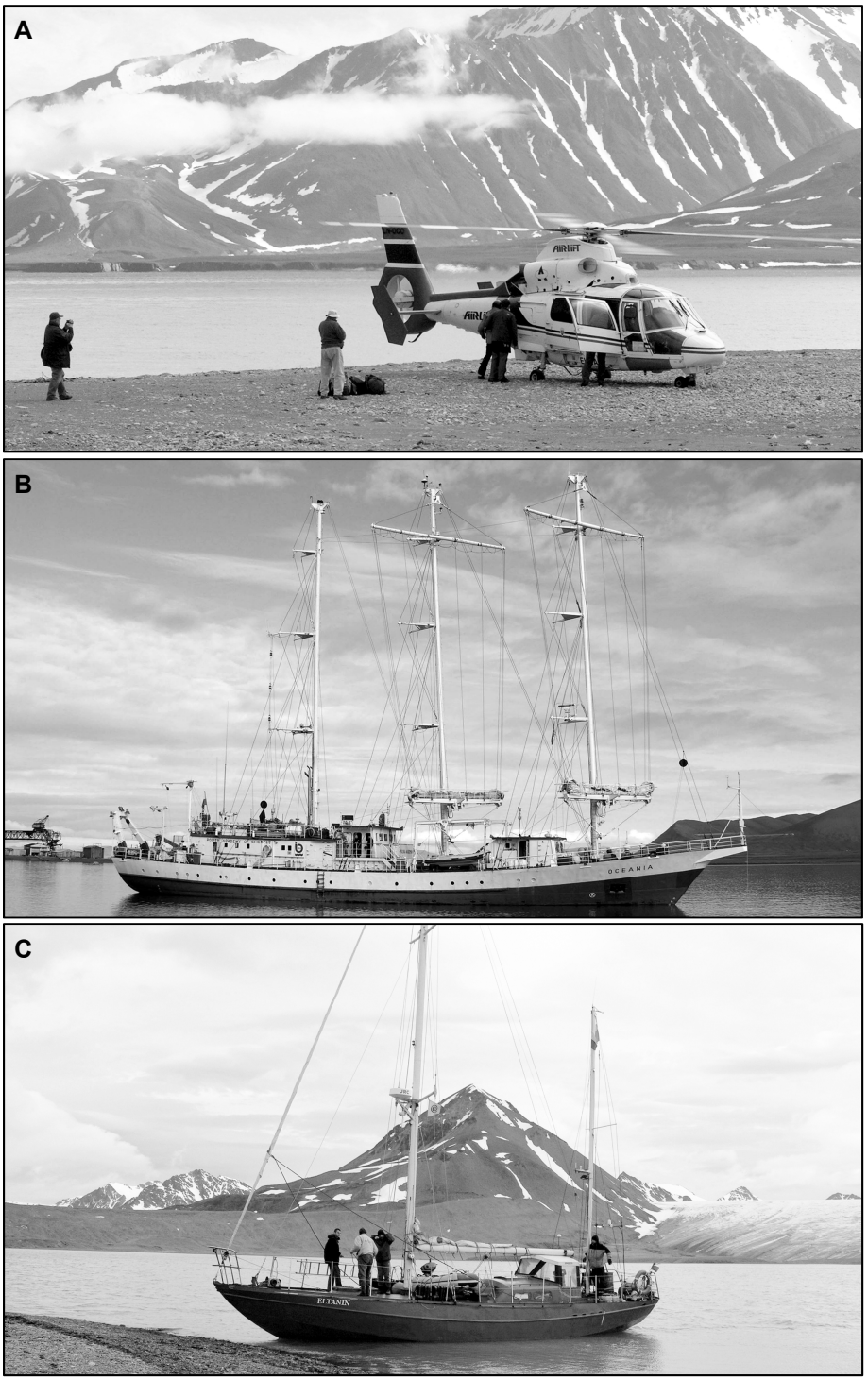

Photo 1.7. The means of transport: A- helicopter of Airlift AS (Photo P. Zagórski 2008), B- s/y 'Oceania' (Photo P. Zagórski 2010), C- s/y Eltanin (Photo P. Zagórski 2009).

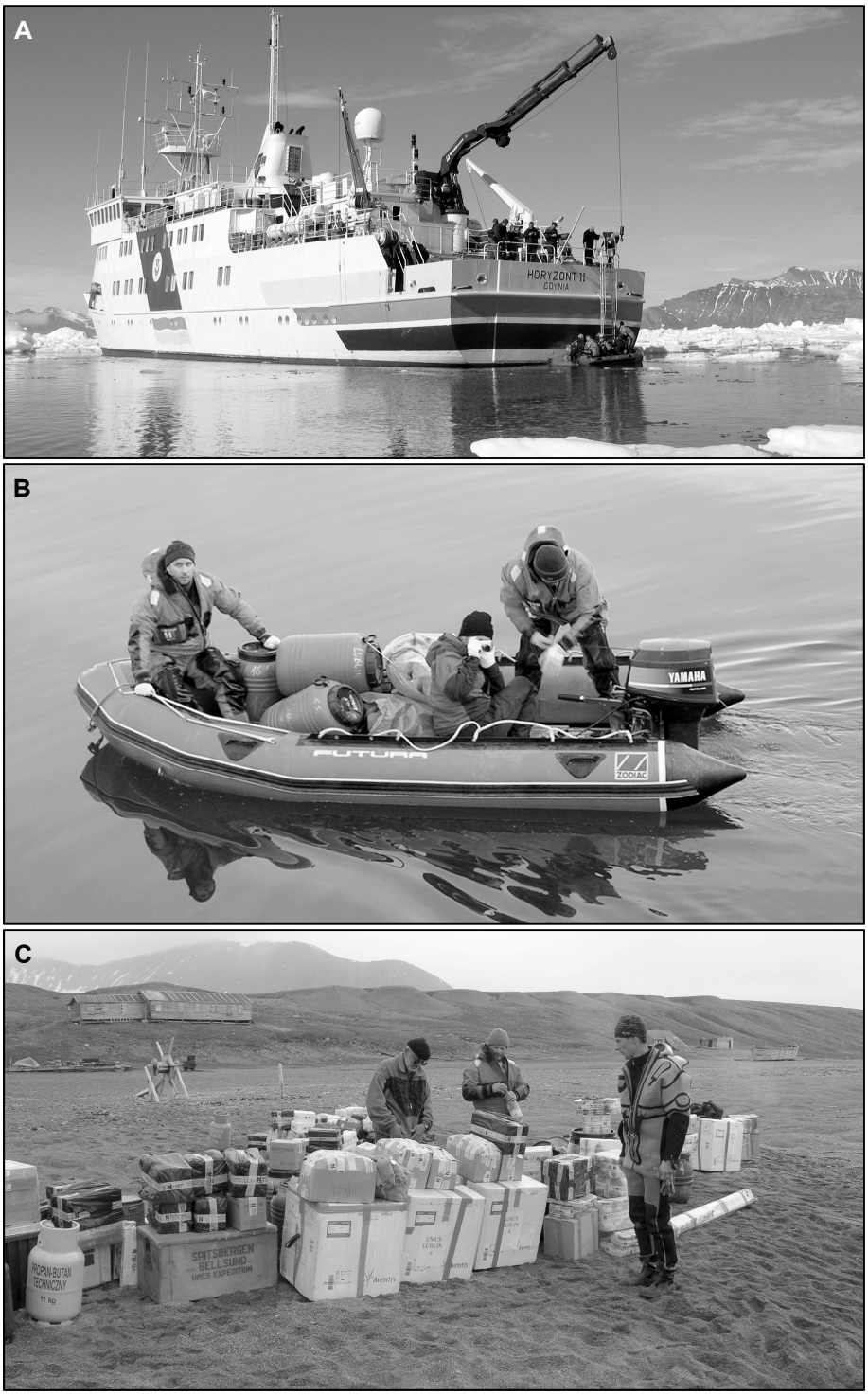

Photo 1.8. A- transport of equipment by ship m/s Horyzont II (Photo M. Grześ 2003), B- unloading (Photo P. Zagórski 2006), C- after unloading (Photo P. Zagórski 2005).

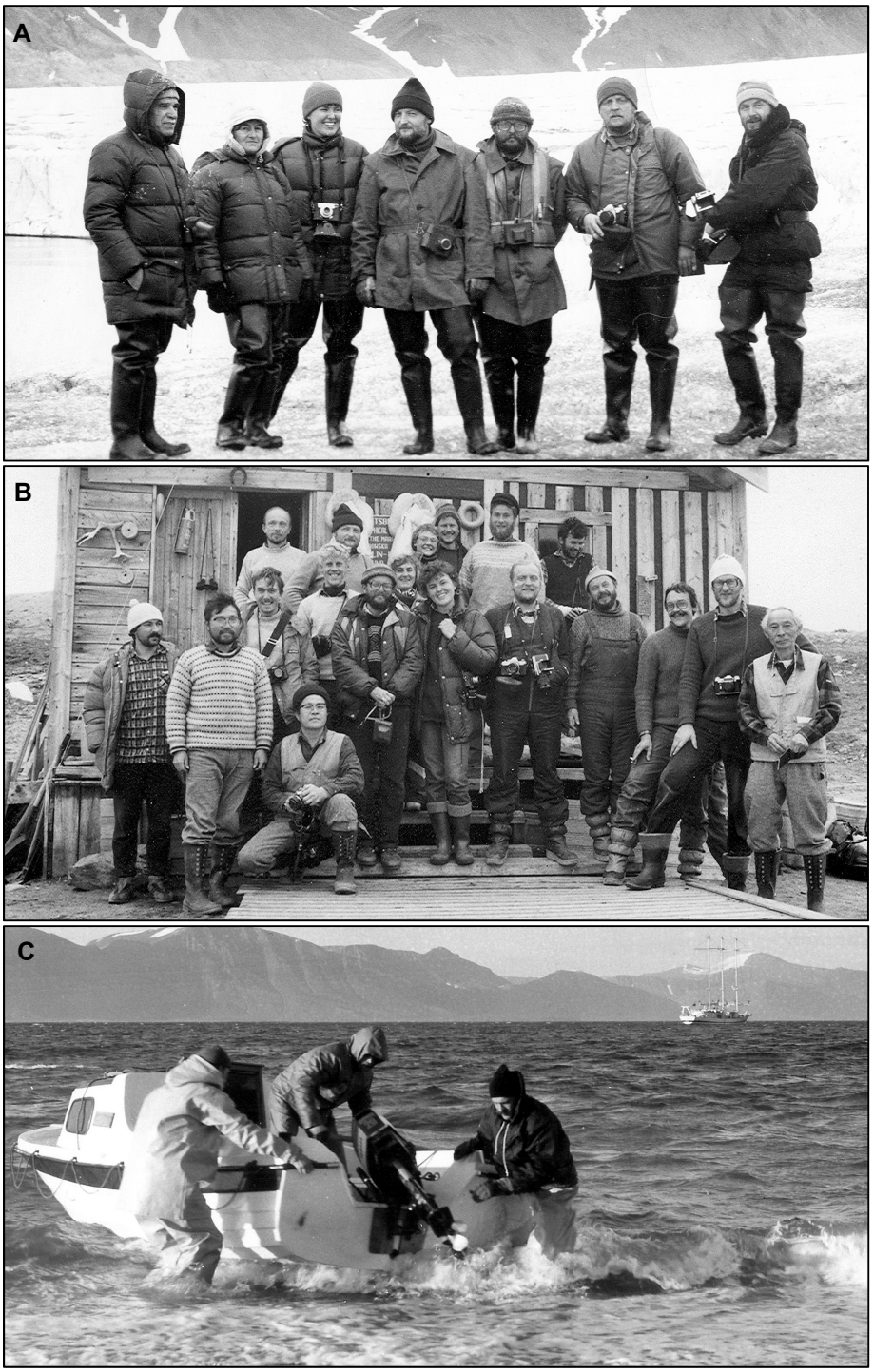

Photo 1.9. Participants of the Polar Expeditions and guests: A- in the front of Recherchebreen, from the left: S. Uziak, J. Repelewska-Pękalowa, A. Rzętkowska, J. Rodzik, S. Bartoszewski, M. Harasimiuk and K. Pękala (Photo K. Pękala 1986); B- American-Japanese group of guests in Calypsobyen (Photo K. Pękala 1986); C- visit of the s/y 'Oceania' crew (Photo F. Święs 1989).

Photo 1.10. Participants of the Polar Expeditions and guests: A- in Calypsobyen, from the left: V.F Starkov, M. Harasimiuk, K. Pękala and M.E Jasinski (Photo K. Pękala 1992); B- visit of Norwegian geomorphologists, from the left: J.Y. Landvik, J. Repelewska-Pękalowa (UMCS expeditions) and O. Salvigsen (Photo K. Pękala); C- visit of Dutch archaeologists, third from the right: L. Hacquebord (Photo P. Zagórski 1998).

Photo 1.11. The participants of the 'GLACIODYN' project: A- in Calypsobyen (Photo G. Gajek 2008); B- fieldwork on the Recherchebreen forefield, from the left: M. Świtoniak, J. Jania, J. Fedorowski and M. Harasimiuk (Photo J. Jania 2008); C- Czech-Polish group of glaciospeleologists on the Scottbreen, from the left: S. Kostak, J. Řehák, S. Řehák, A. Haczek (Photo P. Zagórski 2007).

Photo 1.12. Geologists residing in the Calypsobyen with participants of UMCS Expeditions (*): A- from the left: J.Majka (Sweden), J. Melke (*), E. Thiem (USA) and M.B. Bjørnerud (USA) (Photo P. Zagórski 2007), B- from the left: J. Melke (*); B. Luks (Warsaw), K. Birkenmajer (Krakow) and J. Chodorowski (*) (Photo S. Bartoszewski 2002); C- from the left: M. Dwornik, J. Czerny, P. Budzewski, P. Hoffmann and M. Fajarewicz - AGH Krakow (Photo M. Łodziński 2009).

Photo 1.13. Visit of the representatives the Governor's Office of Svalbard, second from left: K. Dahle – Adviser Cultural Heritage (Photo S. Bartoszewski 2001).

Scope of research

The scientific aim of UMCS Polar Expeditions was to improve our understanding of processes controlling the functioning of natural environment in the surroundings of Bellsund in NW Spitsbergen. Research programmes that were carried out over the years had an interdisciplinary character. Research focused on issues important from the point of view of the following disciplines: geology, geomorphology, climatology and meteorology, hydrography, pedology, botany, biochemistry, radiochemistry, environmental protection and archaeology.

The diversity of scientific interests required application of various methods and techniques. In the course of year the applied methodology has improved. It was clearly visible in case of meteorological observations which evolved from the analogous measurements carried out until 1998 towards fully-automated weather stations that started to run in 1999 (see: Photos 3.1 and 3.2). The hydrological measurements were equipped with automated devices in 2001. One of the most important 'technological' advances of geodetic and geomorphological studies was an introduction of Global Position Systems – GPS (Leica System 500, Ashtech) in 2000 (Photos 1.14AB and 1.15). In 2005, on a raised marine terrace within the limits of weather station a GPS reference station was established (CALY Point), with the following coordinates: 77° 33' 30.14' N, 14° 30' 49.17' E, ellipsoidal height – 52.24 m, orthometric height 18.78 m a.s.l., adjusted to the permanent station IGS (International GPS Service) on Spitsbergen (ITRF 2000 unit). The application of GPS surveys enabled to run photogrammetric analyses of aerial images taken by Norwegian Polar Institute in 1990 and construction of digital elevation model DEM's and orthophotomaps of the study area (Zagórski 2002, 2005; Orthophotomap; Appendix 1).

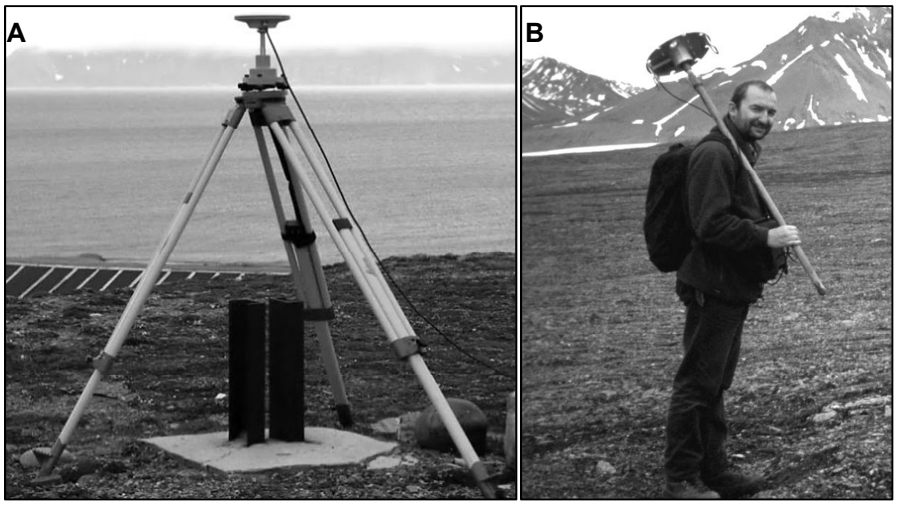

Photo 1.14. A- GPS reference station in Calypsobyen – CALY Point (Photo P. Zagórski 2005), B- field work on the Calypsostranda – M. Sękowski, IGiK Warsaw (Photo K. Pękala 2000).

Photo 1.15. GPS-Leica system 500 measurements on the Renardbreen forefield (Photo K. Pękala 2005).

Another progress in research was achieved during the summer expeditions in 2010 and 2011 thanks to the application of a terrestrial laser scanning Leica ScanStation C10 and GLS 1500 TOPCON (Kociuba *et al.* 2013) (Photo 1.16BC).

In recent years, developed and complemented the the study of the coast of NW part Wedel Jarlsberg Land and the Recherchefjorden bottom[8]. The survey focused on: identify of contemporary shoreline change – GPS measurements anf laser scaning, identify the factors influencing to coast, determination of the state and the transformation of old coastal area (late Weichselian raised marine terraces), identify the morphology

[8] (1) Special grant of the Ministry of Science and Higher Education, Republic of Poland, No. IPY/ 296/2006 –'GLACIODYN' – 'The dynamic response of Arctic glaciers to global warming'; (2) Prorector for Scientific Researches and International Cooperation of Maria Curie-Skłodowska University in Lublin (No. BW-01-1100-15-09), project leader Ph.D. Piotr Zagórski; (3) N N 306 703840 'Morphogenetic and morphodynamics conditions of development of the coast of the NW part of Wedel Jarlsberg Land (Spitsbergen) in the late Vistulian and Holocene' (MORCOAST), project leader Ph.D. Piotr Zagórski.

and topography of the bottom of the fjord (multibeam echosounder scanning – cooperation with Institute of Geophysics PAS in Warsaw and the University of Gdańsk) and determine the variation of the sediments deposition (different origins) in the following regions: forefield of Rechechebreen, Vestervågen (Chamberlindanen) and Josephbukta.

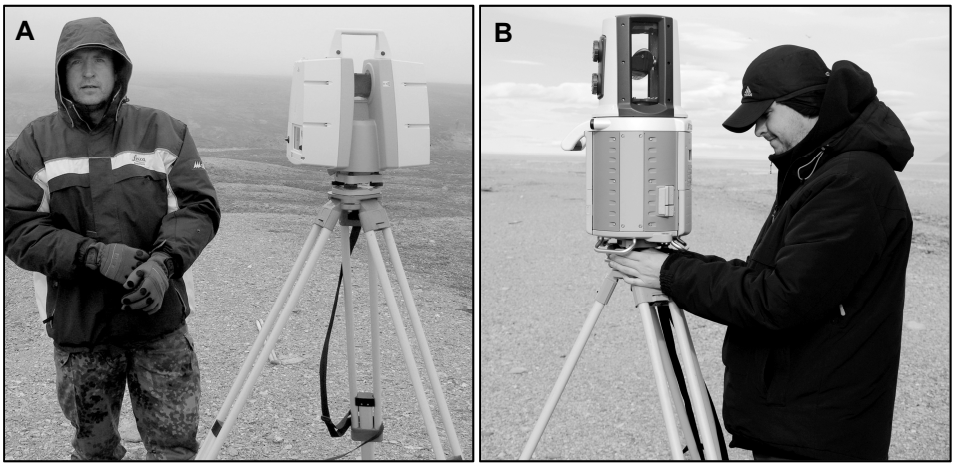

Photo 1.16. B- laser skaning using ScanStation C10 scanner – W. Kubisz, Leica-Geosystems Polska (Photo P. Zagórski 2010), C- laser skaning using GLS 1500 TOPCON scanner – A. Malczewski, TPI Poland, (Photo P. Zagórski 2011).

Undoubtedly the application of those sophisticated methods and devices improved the quality and number of collected data. The results of the UMCS Polar Expeditions were presented in hundreds of papers (see: bibliography complied by Repelewska-Pękalowa & Pękala 1997, Zagórski 1998) in both Polish (e.g. Biuletyn Peryglacjalny, Polish Polar Research, Polish Polar Studies, Landform Analysis, Wyprawy Geograficzne na Spitsbergen[9]) and international (Catena, Geomorphology, Permafrost and Periglacial Processes, Polar Geography, Palaeoclimate Research, Zeitschrift für Geomorphologie) academic journals. The outcomes of research projects were also presented during numerous national meetings including the Polar Symposia and Polar Sessions in Lublin, Wrocław, Poznań, Toruń, Sosnowiec, Warsaw, Kraków, Szczecin, Łódź and Gdańsk, the assemblies of Polish Geographical Society and international conferences (International and European Conferences on Permafrost: Trondheim (1988), Beijing (1993), Zurich (2003) and Potsdam (2005).

Since 1993, reports on the activities of Polish Expeditions have been presented in the 'Biuletyn Polarny' magazine published by the Committee on Polar Research of Polish Academy of Sciences and the Polar Club of the Polish Geographical Society. The documentation is collected and stored at the Department of Polar Research and Documentation of the Jagiellonian University.

[9] Bibliographic data: http://geografia.umcs.lublin.pl/wyprawy/

Table 1.1. Participants of Maria Curie-Skłodowska University Polar Expeditions (1986-2012). Part 1.

1st EXPEDITION: 24.06. – 13.09. 1986
Kazimierz PĘKALA- leader, geomorphologist, UMCS
Stefan BARTOSZEWSKI- hydrologist, UMCS
Jan DZIERŻEK- geologist, Uniw. Warsz.
Krzysztof DĄBROWSKI- radio operator
Andrzej GLUZA- meteorologist, UMCS
Marian HARASIMIUK- geomorphologist, UMCS
Zbigniew KLIMOWICZ- pedologist, UMCS
Jerzy NITYCHORUK- geologist, Uniw. Warsz.
Janina REPELEWSKA-PĘKALOWA- geomorphologist, UMCS
Jan RODZIK- geomorphologist, UMCS
Anna RZĘTKOWSKA- botanist, Uniw. Warsz.
Eugeniusz RYŻYK- meteorologist, UMCS
Ryszard SZCZĘSNY- geologist, Uniw. Warsz.
Stanisław UZIAK- pedologist, UMCS

2nd EXPEDITION: 7. 06. – 28.08. 1987
Kazimierz PĘKALA- leader, geomorphologist, UMCS
Stefan BARTOSZEWSKI- hydrologist, UMCS
Krzysztof DĄBROWSKI- radio operator
Andrzej GLUZA- meteorologist, UMCS
Waldemar JEZIERSKI- geomorphologist, UMCS
Zbigniew JÓŹWIK- biochemist, UMCS
Jerzy MELKE- pedologist, UMCS
Tadeusz MERTA- geologist, Uniw. Warsz.
Maria ŁANCZONT- geomorphologist, UMCS
Wojciech OZIMKOWSKI- geologist, Uniw. Warsz.
Jacek PIASECKI- climatologist, Uniw. Wroc.
Janina REPELEWSKA- PĘKALOWA- geomorphologist, UMCS
Jan RODZIK- geomorphologist, UMCS
Florian ŚWIĘS- botanist, UMCS

3rd EXPEDITION: 28.06. – 20.10. 1988
Kazimierz PĘKALA- leader, geomorphologist, UMCS
Stefan BARTOSZEWSKI- hydrologist, UMCS
Roman CHLEBOWSKI- geologist, Uniw. Warsz.
Jacek CHODOROWSKI- pedologist, UMCS
Andrzej GLUZA- meteorologist, UMCS
Waldemar JEZIERSKI- geomorphologist, UMCS
Jacek KUBIAK- radio operator
Jan MAGIERSKI- hydrochemist, AR, Lublin
Jerzy MELKE- pedologist, UMCS
Jan REDER- archaeologist, UMCS
Jan RODZIK- geomorphologist, UMCS
Florian ŚWIĘS, botanist, UMCS

4th EXPEDITION: 28.06. – 15.09. 1989
Kazimierz PĘKALA- leader, geomorphologist, UMCS
Piotr CZABAN- meteorologist, UMCS
Zbigniew JÓŹWIK- biochemist, UMCS
Jan MAGIERSKI- hydrochemist, AR, Lublin
Mariusz MARZEC- student, Uniw. Gdański
Zdzisław MICHALCZYK- hydrologist,UMCS
Marek MIŚKIEWICZ- radio operator
Jan REDER- archaeologist, geomorphologist, UMCS
Janina REPELEWSKA-PĘKALOWA- geomorphologist, UMCS
Krzysztof SIWEK- climatologist, UMCS
Józef WOJTANOWICZ- geomorphologist, UMCS
Guests:
Jarosław ZAJĄCZKOWSKI ('Rabbit'), Gdynia
Marek ZAJĄCZKOWSKI ('Trapper'), oceanologist IO PAN Sopot

5th EXPEDITION: 12.06. – 17.08. 1990
Kazimierz PĘKALA- leader, geomorphologist, UMCS
Stefan BARTOSZEWSKI- hydrologist, UMCS
Jan CHOCHOROWSKI- archaeologist, UJ, Kraków
Marek E. JASINSKI - archaeologist, Trondheim Univ.
Zbigniew KLIMOWICZ- pedologist, UMCS
Jan MAGIERSKI- hydrochemist, AR, Lublin
Mariusz MARZEC- student, Uniw. Gdański
Jerzy MELKE- pedologist, UMCS
Jan REDER- geomorphologist, UMCS
Marek RESZKA- radiochemist, UMCS
Krzysztof SIWEK- climatologist, UMCS

6th EXPEDITION: 30.06. – 30.08. 1991
Kazimierz PĘKALA- leader, geomorphologist, UMCS
Marek E. JASINSKI - archaeologist, Trondheim Univ.
Waldemar JEZIERSKI- geomorphologist, UMCS
Zbigniew JÓŹWIK- biochemist, UMCS
Tadeusz KRÓL- geomorphologist, UMCS
Janina REPELEWSKA-PĘKALOWA- geomorphologist, UMCS
Vadim STARKOV- archaeologist, RAS, Moscow
Vladimir ZAVYALOV- archaeologist, RAS, Moscow
Eugenij ZIMIN- archaeologist, RAS, Moscow

7th EXPEDITION: 3.07. – 24.08. 1992
Kazimierz PĘKALA- leader, geomorphologist, UMCS
Marian HARASIMIUK- geomorphologist, UMCS
Marek E. JASINSKI- archaeologist, Trondheim Univ.
Waldemar JEZIERSKI- geomorphologist, UMCS
Tadeusz KRÓL-geomorphologist, UMCS
Jan REDER- geomorphologist, UMCS
Florian ŚWIĘS- botanist, UMCS
Vadim STARKOV- archaeologist, RAS, Moscow
Vladimir ZAVYALOV - archaeologist, RAS, Moscow
Eugenij ZIMIN- archaeologist, RAS, Moscow

Table 1.1. Part 2.

8th EXPEDITION: 01.07. – 30.08. 1993
Kazimierz PĘKALA- leader, geomorphologist, UMCS
Stefan BARTOSZEWSKI- hydrologist, UMCS
Paweł CZUBLA- ecologist, UMCS
Leszek GAWRYSIAK- geomorphologist, UMCS
Marek E. JASINSKI- archaeologist, Trondheim Univ.
Zbigniew JÓŹWIK- biochemist, UMCS
Zbigniew KLIMOWICZ- pedologist, UMCS
Janina REPELEWSKA-PĘKALOWA- geomorphologist, UMCS
Justyna WAROWNA- geologist, UMCS
Krzysztof ZYBAŁA- student, UMCS

9th EXPEDITION: 05.07. – 25.08. 1994
Zbigniew KLIMOWICZ- leader, pedologist, UMCS
Jerzy BANAŚ- pedologist, UMCS
Anna BILIK- meteorologist, UMCS
Jan REDER- geomorphologist, UMCS
Wladimir ZAWIALOV- archaeologist, RAS, Moscow
Ewgenij ZIMIN- archaeologist, RAS, Moscow

10th EXPEDITION: 28.06. – 23.08. 1995
Kazimierz PĘKALA- leader, geomorphologist, UMCS
Viktor DERZHAVIN- archaeologist, RAN, Moscow
Marek E.JASINSKI- archaeologist, Trondheim Univ.
Zbigniew JÓŹWIK- biochemist, UMCS
Janina REPELEWSKA-PĘKALOWA- geomorphologist, UMCS
Florian ŚWIĘS- botanist, UMCS
Piotr ZAGÓRSKI- geomorphologist, UMCS
Vladimir ZAVYALOV - archaeologist, RAS, Moscow

11th EXPEDITION: 30.06. – 10.08. 1996
Kazimierz PĘKALA- leader, geomorphologist, UMCS
Marek E.JASINSKI- archaeologist, Trondheim Univ.
Janina REPELEWSKA-PĘKALOWA- geomorphologist, UMCS
Vadim STARKOV- archaeologist, RAS, Moscow
Eugenij ZIMIN- archaeologist, RAS, Moscow

12th EXPEDITION: 03.07. – 21.08. 1998 r.
Jerzy MELKE- leader, pedologist, UMCS
Piotr ZAGÓRSKI- geomorphologist, UMCS

13th EXPEDITION: 01.07. – 27.08. 1999
Piotr ZAGÓRSKI- leader, geomorphologist, UMCS
Marcin KOZIEŁ- student, UMCS
Jerzy MELKE- pedologist, UMCS
Krzysztof SIWEK- meteorologist, UMCS

14th EXPEDITION: 27.06. – 24.08. 2000
Kazimierz PĘKALA- leader, geomorphologist- UMCS
Zbigniew JÓŹWIK- biochemist, UMCS
Janina REPELEWSKA-PĘKALOWA- geomorphologist, UMCS
Marcin SĘKOWSKI- geodesist, IGiK, Warszawa
Piotr ZAGÓRSKI- geomorphologist, UMCS

15th EXPEDITION: 22.06. – 01.09. 2001
Stefan BARTOSZEWSKI- leader, hydrologist, UMCS
Andrzej GLUZA- meteorologist, UMCS
Jan MAGIERSKI- hydro-chemist, AR, Lublin
Krzysztof SIWEK- meteorologist, UMCS

16th EXPEDITION: 04.07. – 15.09. 2002
Stefan BARTOSZEWSKI- leader, hydrologist, UMCS
Jacek CHODOROWSKI- pedologist, UMCS
Jerzy MELKE- pedologist, UMCS
Krzysztof SIWEK- meteorologist, UMCS
guests
Krzysztof BIRKENMAJER - geologist, ING PAN, Kraków
Krzysztof KRAJEWSKI - geologist, ING PAN, Warszawa
Bartłomiej LUKS - student, Warszawa

17th EXPEDITION: 11.07. – 05.09. 2005
Stefan BARTOSZEWSKI- leader, hydrologist, UMCS
Andrzej GLUZA- meteorologist, UMCS
Stanisław CHMIEL- hydro-chemist, UMCS
Kazimierz PĘKALA- geomorphologist, UMCS
Janina REPELEWSKA-PĘKALOWA- geomorphologist, UMCS
Krzysztof SIWEK- meteorologist, UMCS
Piotr ZAGÓRSKI- geomorphologist, UMCS

18th EXPEDITION: 28.06. – 06.09.2006
Józef SUPERSON- leader, geomorphologist, UMCS
Andrzej GLUZA- meteorologist, UMCS
Krzysztof SIWEK- meteorologist, UMCS
Piotr ZAGÓRSKI- geomorphologist, UMCS

19th EXPEDITION: 02.06 – 17.09. 2007
Jerzy MELKE- leader, pedologist, UMCS
Piotr BARTMIŃSKI- pedologist, UMCS
Jan DZIERŻEK- geologist, Uniw. Warsz.
Andrzej GLUZA- meteorologist, UMCS
Jerzy NITYCHORUK- geologist, Uniw. Warsz.
Krzysztof SIWEK- meteorologist, UMCS
Marcin ŚWITONIAK- pedologist, UMK, Toruń
Piotr ZAGÓRSKI- geomorphologist, UMCS

20th EXPEDITION: 29.05 – 16.09. 2008
Andrzej GLUZA- leader, meteorologist, UMCS
Jerzy FEDOROWSKI- paleontologist. UAM, Poznań
Grzegorz GAJEK- geomorphologist, UMCS
Marian HARASIMIUK- geomorphologist, UMCS
Jacek JANIA- glaciologist, Uniw. Śląski, Sosnowiec
Jerzy MELKE- pedologist, UMCS
Krzysztof SIWEK- meteorologist, UMCS
Marcin ŚWITONIAK- pedologist, UMK, Toruń
Piotr ZAGÓRSKI- geomorphologist, UMCS

Table 1.1. Part 3.

21st EXPEDITION: 28.05 – 14.09. 2009
Krzysztof SIWEK- leader, meteorologist, UMCS
Piotr DEMCZUK- geomorphologist, UMCS
Grzegorz JANICKI- geomorphologist, UMCS
Waldemar KOCIUBA- geomorphologist, UMCS
Jerzy MELKE- pedologist, UMCS
Marcin ŚWITONIAK- pedologist, UMK, Toruń
Piotr ZAGÓRSKI- geomorphologist, UMCS

22nd EXPEDITION: 18.06 – 14.08. 2010
Andrzej GLUZA- leader, meteorologist, UMCS
Waldemar KOCIUBA- geomorphologist, UMCS
Waldemar KUBISZ- geodesist, Leica-Geosystems, Warszawa
Krzysztof SIWEK- meteorologist, UMCS
Piotr ZAGÓRSKI- geomorphologist, UMCS

23th EXPEDITION: 16.06 – 08.09. 2011
Andrzej GLUZA- leader, meteorologist, UMCS
Łukasz FRANCZAK- geomorphologist, UMCS
Grzegorz GAJEK- geomorphologist, UMCS
Grzegorz JANICKI- geomorphologist, UMCS
Waldemar KOCIUBA- geomorphologist, UMCS
Leszek ŁĘCZYŃSKI- oceanographer, Uniw. Gdański
Artur MALCZEWSKI- geodesist, TPI Polska, Warszawa
Cyprian SEUL- sedimentologist, ZUT, Szczecin
Krzysztof SIWEK- meteorologist, UMCS
Beata STERNAL- geomorphologist, UAM, Poznań
Piotr ZAGÓRSKI- geomorphologist, UMCS

24th EXPEDITION: 06.07 – 27.08. 2012
Piotr ZAGÓRSKI- leader, geomorphologist, UMCS
Łukasz FRANCZAK- geomorphologist, UMCS
Grzegorz GAJEK- geomorphologist, UMCS
Michał GOŁOTA- student, UMCS
Waldemar KOCIUBA- geomorphologist, UMCS
Paweł KRZĄSTEK- student, UMCS
Leszek ŁĘCZYŃSKI- oceanographer, Uniw. Gdański
Cyprian SEUL- sedimentologist, ZUT
Mateusz C. STRZELECKI- geomorphologist, Durham University, UK/UNIS

Explanations of abbreviations:

UMCS – Maria Curie-Skłodowska University, Lublin
AR – Agricultural Academy (since 2008 the University of Life Sciences), Lublin
IGiK – Institute of Geodesy and Cartography, Warsaw
ING PAN – Instutute of Geological Sciences, Polish Academy of Sciences, Kraków, Warsaw
IO PAN Sopot - Institute of Oceanology, Polish Academy of Sciences, Sopot
UAM – Adam Mickiewicz University, Poznan
UJ – Jagiellonian University, Krakow
UMK – Nicolaus Copernicus University, Torun
Uniw. Gdański – University of Gdansk
Uniw. Warsz. – University of Warsaw
Uniw. Wroc. – University of Wroclaw
Uniw. Śląski – University of Silesia, Sosnowiec
ZUT – West Pomeranian University of Technology, Szczecin
TPI Polska, Warsaw
Leica-Geosystems, Warsaw
RAS – Russian Academy of Sciences, Moscow
Trondheim University, Norway
Durhan University UK
UNIS – The University Centre in Svalbard

In addition to those listed in the table, the following teams were led research based on the Polar Station UMCS in Calypsobyen:

- 1991 – the team biologists and divers of Czechoslovak International Ecological Expedition 'Spitsbergen 91': Z. Ďuriš, Z. Prymus, A. Šimčik;
- 2002 – geological group of Institute of Geological Sciences, Polish Academy of Sciences, Kraków/Warsaw: K.Birkenmajer, K.Krajewski, B. Luks;
- 2005-2009 – international research project 'GLACIODYN' (4th International Polar Year – 'The dynamic response of Arctic glaciers to global warming'):
  - 21.03-09.05.2005 – M. Grabiec, D. Puczko, G. Gajek and 2 guests from Polish Polar Station (PPS) in Hornsund;
  - 20.03-09.05.2006 – M. Grabiec, D. Puczko, G. Gajek and 2 guests from PPS in Hornsund;
  - 15.03-27.04.2007 – G. Gajek and two guests from PPS in Hornsund;
  - 13.03-18.04.2008 – D. Puczko, G. Gajek and two guests from PPS in Hornsund;
  - 23.07-11.08.2008 – J. Jania, J. Fedorowski, M. Harasimiuk and G Gajek;
  - 08.03-24.04.2009 – M. Grabiec, D. Puczko, G. Gajek and four guests from PPS in Hornsund;

- 2007 – international goup of geologists: J. Czerny (AGH, Poland), M.B. Bjørnerud (USA), J. Majka (Poland/Sweden), A. Kawalec-Majka (Poland), N. Kuznetsov (Russia), M. Manecki (Poland), M. Michalik (Poland) and E. Thiem (USA);
- 2007 – Czech-Polish group of speleologists: J. Řehák, S. Řehák, S. Kostka, A. Haczek;
- 2009 – international group of geologists: J. Czerny (AGH, Poland), P. Budzewski (Poland), M. Dwornik (Poland), M. Fajarewicz (Poland), D.G. Gee (Sweden), P. Hoffmann (Poland), A. Larionov (Russia), M. Łodziński (Poland);
- 2012 – Polish group of ornitologists and geomorphologists: L. Keslinka-Nawrot (University of Gdansk), A. Nawrot, J. Renkas and K. Herman.

Table 1.2. Basic data about the Spitsbergen Expedition of Maria Curie-Skłodowska University in Lublin.

Number and Year	Period	Days	Number of participants
1st – 1986	24th June – 13th September	81	14
2nd – 1987	9th June – 28th August	81	14
3rd – 1988	28th June – 20th October	115	12
4th – 1989	28th June – 15th September	80	11
5th – 1990	12th June – 17th August	67	11
6th – 1991	30 th June – 30th August	62	9
7th – 1992	3rd July – 24th August	53	10
8th – 1993	1st July – 30th August	61	10
9th – 1994	5th July – 25th August	52	6
10th – 1995	28th June – 23rd August	57	8
11th – 1996	30th June – 10th August	42	5
12th – 1998	3rd June – 21st August	45	2
13th – 1999	1st July – 27th August	58	4
14th – 2000	27th June – 24th August	59	5
15th – 2001	22nd June – 1st September	71	4
16th – 2002	4th July – 15th September	73	4
17th – 2005	11th July – 5th September	56	7
18th – 2006	28th June – 6th September	71	4
19th – 2007	2nd June – 17th September	107	8
20th – 2008	29th May – 16th September	110	9
21st – 2009	28th May – 14th September	109	7
22nd – 2010	18th June – 14th August	57	5
23rd – 2011	16th June – 8th September	84	11
24th – 2012	6th June – 27th August	52	9
	Total	1703	

Streszczenie

Wyprawy Uniwersytetu Marii Curie-Skłodowskiej na Spitsbergen

Spitsbergen jest największą wyspą archipelagu Svalbard, administrowanego przez Królestwo Norwegii. Obszar ten stanowi doskonały poligon interdyscyplinarnych badań naukowych, ze względu na unikalną przyrodę, jak i status prawny archipelagu, określony przez Traktat Spitsbergeński (*The Svalbard Treaty*) z 1920 roku. Walory środowiskowe oraz dostępność tego terenu zadecydowały o rozpoczęciu w 1986 roku badań polarnych przez wyprawy Uniwersytetu Marii Curie-Skłodowskiej w Lublinie. Na miejsce badań wybrano północno-zachodnią część Wedel Jarlsberg Land w obrębie zachodniego wybrzeża Spitsbergenu, ograniczoną od zachodu i północy brzegiem Morza Grenlandzkiego i Bellsundu, od wschodu Recherchefjorden i Recherchebreen oraz Dunderdalen od strony południowo-zachodniej (ryc. 1.1, 1.2). Teren ten objęty jest ochroną w ramach Parku Narodowego Południowego Spitsbergenu. Bazę wypraw zało-

żono na południowo-wschodnim brzegu Bellsundu w Calypsobyen, na mocy pozwolenia Gubernatora Svalbardu.

Osada składa się z kilku, zachowanych w różnym stanie, drewnianych zabudowań i stanowi skansen budownictwa przemysłowego (fot. 1.1). Najstarszym obiektem jest, położony na uboczu od strony południowo-wschodniej, pierwotnie pokryty korą brzozową i darnią budynek (C), zbudowany w 1901 roku przez uczestników ekspedycji, wysłanej przez biznesmena i polityka Christiana Michelsena, późniejszego premiera Norwegii (ryc. 1.3, 1.4, fot. 1.2). Większość budynków Calypsobyen została wzniesiona w latach 1918-1919 przez *Northern Exploration Company (NEC)*, która podejmowała tu próby wydobycia węgla kamiennego, nieopłacalne ze względu na jego słabą jakość oraz cienkie pokłady. W kolejnych latach NEC zlecał zimowanie w Calypsobyen traperom, polującym na pieśce (lisy polarne), foki i niedźwiedzie. W latach 1922-28 miało miejsce pięć zimowań traperów w budynkach pokopalnianych, z których, pierwotnie siedmiu, zachowały się cztery. W okresie funkcjonowania kopalni budynek (A) pełnił funkcję gospodarczą, ale później, po dobudowaniu wewnątrz 2 pomieszczeń zmienił charakter na mieszkalny (ryc. 1.3, 1.4, fot 1.2). Po gruntownym remoncie i adaptacji przez uczestników pierwszych wypraw lubelskich w latach 1986-1987, stanowi ich główne lokum. Zimą zatrzymują się tu mieszkańcy Longyearbyen podczas wycieczek skuterami śnieżnymi. Budynek (B), pierwotnie mieszkalny, obecnie spełnia funkcję magazynową. Posiada jedno duże pomieszczenie i dwa mniejsze oraz przybudówkę (agregatornia). Do zabudowy związanej z NEC należą także: niewielki budynek (D), w którym zachowały się resztki kuźni oraz położony nieopodal na wysokiej terasie, budynek telegrafu (E) z przewróconym masztem radiowym, w czasie II wojny światowej wykorzystywany przez Niemców, jako radiostacja. Obok zabudowań, na terenie osady znajdują się resztki urządzeń górniczych (odcinki torów kolejki, wagonik, kotły, taczki, wiele różnych elementów metalowych) oraz barka transportowa (G) o nazwie *„Maria Theresia"* i kilka zniszczonych łodzi, zaś szyb kopalni jest obecnie zawalony.

Niezależnie od NEC w 1918 roku traper Birger Jacobsen wybudował jeszcze jeden budynek (F). Od 1930 roku aż do ewakuacji w 1941 roku zimował w nim corocznie traper Ole Blomli, stąd nazwa *„Blomlihytta"*. Ostatni traperzy zimowali tu w latach 1969-1971. Przez uczestników wypraw lubelskich był wykorzystywany jako laboratorium hydrochemiczne. W 2010 roku budynek został poddany renowacji przez Norwegów. Norweska administracja wyspy zajęła się w ostatnich latach gruntowną renowacją osady. Wcześniej uczestnicy wypraw lubelskich przeprowadzili szereg, koniecznych do zamieszkania i pracy, różnorodnych prac remontowych, wykonanych z troską o zachowanie pierwotnego wyglądu obiektów.

Do roku 2012 UMCS zorganizował dwadzieścia cztery naukowe wyprawy, których uczestnicy badali poszczególne elementy środowiska przyrodniczego, zarówno abiotyczne, jak i biotyczne. Liczba uczestników oraz czas ich pobytu na Spitsbergenie były zróżnicowane w poszczególnych wyprawach. Łącznie uczestniczyło w nich 69 osób, reprezentujących zarówno UMCS, jak również inne instytucje z kraju i zagranicy (fot. 1.9ABC, tabele 1.1, 1.2).

Objaśnienia

Ryciny

Ryc. 1.1. A- położenie Svalbardu (UNEP/GRID-Arendal), B- położenie obszaru badań a prądy morskie: 1- ciepły (WSC – Zachodniospitsbergeński), 2- zimne (ESC – Wschodniospitsbergeński, S.C. – Sørkapski, BC – Bjørnøyi); WJL –Wedel Jarlsberg Land, TL – Torell Land.

Ryc. 1.2. Obszar badań (Orthophotomap, Zagórski 2005).

Ryc. 1.3. Granice Południowo-Spitsbergeńskiego Parku Narodowego oraz lokalizacja sanktuariów ptasich (Lier i in. 2012).
Ryc. 1.4. Główne obiekty Calypsobyen: I- widok ogólny (fot. P. Zagórski 2005); B- lokalizacja obiektów: 1- budynki używane, 2- inne budynki w dobrym stanie, 3- ślady budynków obecnie nieistniejących, 4- kabestan, 5- stacja meteorologiczna, 6- szyb kopalniany, 7- barka transportowa (welbot), 8- wózek kopalniany.
Ryc. 1.5. Plan głównych budynków Calypsobyen – objaśnienia w tekście (Krawczyk, Reder 1989).

Fotografie

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Fot. 1.2. Główne obiekty Calypsobyen: A,B- budynek główny Stacji Polarnej i magazyn, po prawej pozostałości innego budynku (strzałka); C- *„Camp Jacobsen"* przy Tyvjobekken (Potok Wydrzycy); D- budynek gospodarczy; E- radiostacja; F- *„Blomlihytta"*; G,H- barka transportowa i wózek kopalniany, I- kabestan. Lokalizacja obiektów, patrz: Ryc. 1.3 (fot. P. Zagórski).
Fot. 1.3. Remonty budynków w Calypsobyen: A- głównego (A) (fot. K. Pękala 1986), B- magazynu (B) (fot. K. Pękala 1986).
Fot. 1.4. Prof. Kazimierz Pękala – kierownik pierwszych wypraw polarnych (fot. J. Repelewska-Pękalowa 2005).
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Fot. 1.8. A- transport wyposażenia statkiem m/s Horyzont II (fot. P. Zagórski 2000), B- wyładunek (fot. P. Zagórski 2006), C- tuż po wyładunku (fot. P. Zagórski 2005).
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Fot. 1.13. Wizyta przedstawicieli biura gubernatora Svalbardu (fot. S. Bartoszewski 2001).
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Tabele

Tabela 1.1. Uczestnicy Wypraw Polarnych Uniwersytetu Marii Curie-Skłodowskiej (1986-2012).
Tabela 1.2. Dane o Wyprawach Spitsbergeńskich UMCS w Lublinie.