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, 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).

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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 (Calypsostranda) (Photo 1.1).

![Photo 1.1. Location of the Polar Station in Calypsobyen (Photo M.Grześ 2003).](image)

**Overview of historical, political and legal background of scientific activities**

From the scientific perspective, 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

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2 This research was supported by National Centre for Science post-doctoral fellowship under the grant: DEC-2011/04/S/HSS/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 (Repelewksa-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 \textit{et al.} 2012) (Fig 1.3.).

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{map.png}
\caption{The border of the Sør-Spitsbergen National Park (South Spitsbergen National Park) and location of Bird Sanctuary’s (after: Lier \textit{et al.} 2012).}
\end{figure}

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.

\footnote{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 \textit{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 sovereignty⁴, 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 Archipelago⁵. 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, 1925⁶.

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; Aniol 2010; Pedersen 2006; Pedersen 2009; Scother

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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 legislature 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.

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’.

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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.
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 nearby 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 & Repelewka-Pękalowa 2007b).
Photo 1.2. Main objects of Calypsoyen: 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- ‘Blomhøyhita’; G, H- transport barge (welbot) and mining truck; I- capstan. Location of objects see: Fig. 1.4 (Photos P. Zagórski).
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 buildings, 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 Calypso byen 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
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.

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.
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 Calypsoyen – 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).
A

B

C

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 1.10. Participants of the Polar Expeditions and guests: A- in Calypsobyen, from the left: V.F Starkov, M. Harasimiuk, K. Pękal, and M.E Jasinski (Photo K. Pękal 1992); B- visit of Norwegian geomorphologists, from the left: J.Y. Landvik, J. Repelewska-Pękalowa (UMCS expeditions) and O. Salvigsen (Photo K. Pękal); 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 glaciologists 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).
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).
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 study of the coast of NW part Wedel Jarlsberg Land and the Recherchefjorden bottom. The survey focused on: identify of contemporary shoreline change – GPS measurements anf laser scanning, 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.

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

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(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) NN 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 Rechehebreen, Vestervågen (Chamberlindanen) and Josephbukta.

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 compiled by Reppelewskas-Pękalowa & Pękala 1997, Zagórska 1998) in both Polish (e.g. Biuletyn Peryglacjalny, Polish Polar Research, Polish Polar Studies, Landform Analysis, Wyprawy Geograficzne na Spitsbergen⁹) and international (Catena, Geomorphology, Permafrost and Periglacial Processes, Polar Geography, Palaeoclimatic 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.

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


<table>
<thead>
<tr>
<th>EXPEDITION</th>
<th>DATE</th>
<th>LEADERS AND PROFESSIONS</th>
</tr>
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</table>
| 1st EXPEDITION | 24.06. – 13.09. 1986 | Kazimierz PĘKALA - leader, geomorphologist, UMCS  
                      Stefan BARTOSZEWSKI - hydrologist, UMCS  
                      Jan DZIERZEK - geologist, Uniw. Warsz.  
                      Krzysztof DĄBROWSKI - radio operator  
                      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  
                      Waldemar JEZIERSKI - geomorphologist, UMCS  
                      Maria ŁANCZONT - geomorphologist, UMCS  
                      Tadeusz MERTA - geologist, Uniw. Warsz.  
                      Maria ŁANCZONT - geomorphologist, UMCS  
                      Józef WOJTANOWICZ - geomorphologist, UMCS  
                      Janina REPELEWSKA-PĘKALOWA - geomorphologist, UMCS  
                      Janina REPELEWSKA-PĘKALOWA - geomorphologist, 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 LANCZONT - 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  
                      Jerry 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. Gdaki  
                      Zdzisław MICHALCZYK - hydrologist, UMCS  
                      Marek MISKIEWICZ - radio operator  
                      Jan REDER - archaeologist, geomorphologist, UMCS  
                      Janina REPELEWSKA-PĘKALOWA - geomorphologist, UMCS  
                      Kazimierz PĘKALA - leader, geomorphologist, UMCS  
                      Józef WOJTANOWICZ - geomorphologist, UMCS  
                      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. Gdaki  
                      Jerzy MELKE - pedologist, UMCS  
                      Jan REDER - archaeologist, 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 - archaeologist, 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 PEKALA- leader, geomorphologist, UMCS
Stefan BARTOSZEWSKI- hydrologist, UMCS
Paweł CZUBLA- ecologist, UMCS
Leszek GAWRYSIAK- geomorphologist, UMCS
Marek E. JASINSKI- archaeologist, Trondheim Univ.
Zbigniew JÓZWIK- biochemist, UMCS
Zbigniew KLIMOWICZ- pedologist, UMCS
Janina REPELEWSKA-PĘKALOWA- geomorphologist, UMCS
Justyna WAROWNA- geologist, UMCS
Krzysztof ZYBAŁA- student, UMCS
Piotr ZAGÓRSKI- geomorphologist, UMCS
Vladimir ZAVYALOV- archaeologist, RAS, Moscow
Eugenij ZIMIN- archaeologist, RAS, Moscow

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

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

11th EXPEDITION: 30.06. – 10.08. 1996
Kazimierz PEKALA- 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 KÖZIEŁ- student, UMCS
Jerzy MELKE- pedologist, UMCS
Krzysztof SIWEK- meteorologist, UMCS

14th EXPEDITION: 27.06. – 24.08. 2000
Kazimierz PEKALA- leader, geomorphologist- UMCS
Zbigniew JÓZWIK- 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

17th EXPEDITION: 11.07. – 05.09. 2005
Stefan BARTOSZEWSKI- leader, hydrologist, UMCS
Andrzej GLUZA- meteorologist, UMCS
Stanisław CHMIEL- hydro-chemist, UMCS
Kazimierz PEKALA- 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, UMCS
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- geodesist, UMCS
Jacek JANIA- glaciologist, Uniw. Śląski, Sosnowiec
Jerzy MELKE- pedologist, UMCS
Krzysztof SIWEK- meteorologist, UMCS
Marcin ŚWITONIAK- pedologist, UMCS
Piotr ZAGÓRSKI- geomorphologist, UMCS
In addition to those listed in the table, the following teams were led research based on the Polar Station UMCS in Calypsobyen:

- **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;
  - 08.03-24.04.2009 – M. Grabiec, D. Puczko, G. Gajek and four guests from PPS in Hornsund;
• 2007 – international group 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 ornithologists 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.

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

| 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 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 pokopalniach, z których, pierwotnie siedmigłowych, zachowały się cztery. W okresie funkcjonowania kopalni budynki (A) pełniły 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 niedaleko wysokiej terasy, 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.


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. 1.2. Obszar badań (Orthophotomap, Zagórski 2005).
Ryc. 1.4. Główne obiekty Calypsobyen: A- 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 kopalny, 7- barka transportowa (welbot), 8- wózek kopalny.
Ryc. 1.5. Plan głównych budynków Calypsobyen – objaśnienia w tekście (Krawczyk, Reder 1989).

Fotografie
Fot. 1.2. Główne obiekty Calypsobyen: A-B- budynek główny Stacji Polarnej i magazyn, po prawej pozostałości innego budynku (strzałka); C- „Camp Jacobsen” przy Tywjobekken (Potok Wyrzyniki); D- budynek gospodarczy; E- radiostacja; F- „Blomlihytta”; G-H- barka transportowa i wózek kopalny, 1- kabestan. Lokalizacja obiektów, patrz: Ryc. 1.3 (fot. P. Zagórski).
Fot. 1.15. Pomiary GPS (Leica system 500) na przedpolu Renardbreen (fot. K. Pękala 2005).

Tabele
Tabela 1.2. Dane o Wyprawach Spitsbergeneskich UMCS w Lublinie.