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GIANLUCA CASAGRANDE[1]

IN THE SILENCE OF VIRGOHAMNA. TRACES OF THE 1897 SWEDISH POLAR EXPEDITION BETWEEN GEOHISTORICAL OBSERVATION AND MEMORY

Introduction

On August 8th, 2018, about at 19.50 UTC, sailboat *Nanuq*, during her navigation in the north-western region of Svalbard archipelago[2], stopped in the space between the two islands of Danskøya (Danes Island) and Amsterdamøya (Amsterdam Island), in the small Virgohamna (Virgo Bay), approximately at coordinates Lat. 79°43'32" N, Long. 10°54'21" E (fig. 1). The yacht had a crew of ten, including sailors, researchers and communication experts[3], involved in the "Polarquest2018" expedition.

Svalbard regulation forbids access and transit through the Virgohamna historical area without specific clearence. This measure is necessary to reduce the touristic load and damage on this small spot of the Arctic, where many polar expeditions moved from, or through, between the end of the 19th century and the first decades of the 20th.

The surrounding area is virtually depopulated. The closest settlement is the Ny-Ålesund scientific base, on the southern shore of Kongsfjorden, about 90 km to the south.

Danskøya and Amsterdamøya are within the Nordvest Spitsbergen nasjonalpark, or North-West Spitsbergen National Park. The Svalbard archipelago has an overall surface of about 61,022 square kilometers, and is under Norwegian sovereignty as per the Svalbard Treaty of 1920. It has less than 3,000 inabitants,

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[2] As per the Svalbard Treaty of 1920, the archipelago is under Norway's sovereignty. All Svalbard toponyms in this paper are indicated in their Norwegian forms as published by Toposvalbard (https://toposvalbard.npolar.no/).

[3] The expedition was organized by associations "Polarquest2018" and "Acapela". It was conducted by an international crew, led by Peter Gallinelli (Australia, skipper and expedition leader), Paola Catapano (Italy, project leader) and Michael Struik (Netherlands, technical coordinator). It included three technical members for navigation and operations: Remy Andrean (France, ITC expert, boatbuilder and sailor), Mathilde Gallinelli Gonzalez (Switzerland, co-skipper and sailor), Dolores Gonzalez (Spain, architect and sailor), three scientific operators: Safiria Buono (Italy, technical operator), Gianluca Casagrande (Italy, geographer), Ombretta Pinazza (Italy, physicist), and one photographer/cameraman: Alwin Courcy (France).

mostly concentrated in two small towns – Longyearbyen, with a prevailingly Norwegian population, and Barentsburg, with a Russian majority.

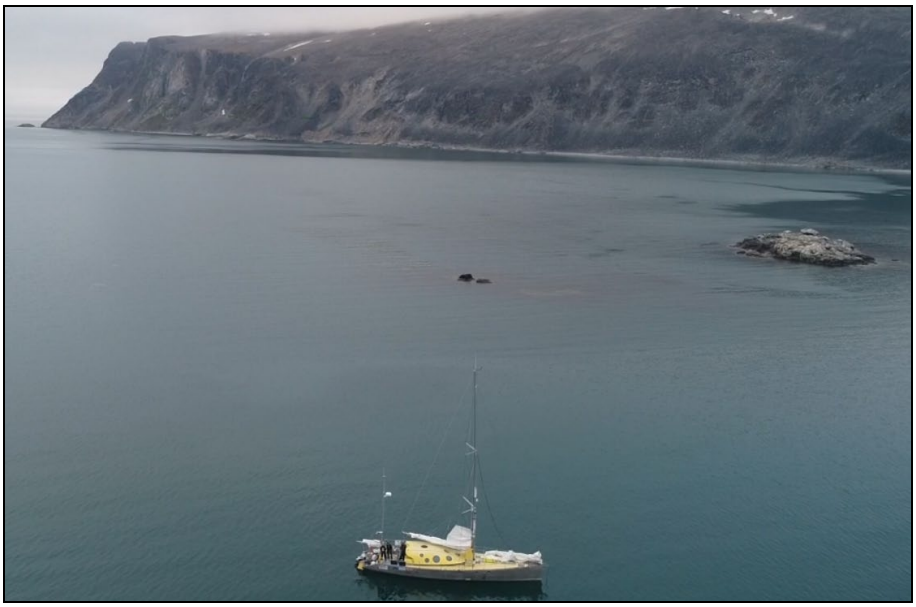

Figure 1. *Nanuq* at her anchorage with Amsterdamøya in the background, as seen from the drone (image by the author)

In spite of environmental concerns, an increasingly massive tourism developed in the region over the past decades, often consisting in cruises and guided tours, mostly along the western coast of the largest island.

The stop-over of Polarquest2018 at Virgohamna had the primary purpose of conducting an expeditive survey of the historical site, testing an innovative methodology by the use of small drones for aerial imagery. The intended result was to recognize and map some known traces of expeditions which had used the place between the end of the 1800s and the beginning of 1900s. It was also considered possible, though planned as a secondary goal, to acquire "raw data" useful to study other geo-historical or archaeological phases, along with the general environmental status of the site.

In this paper the author aims to present part of the primary activity, as well as to highlight some humanities-related geo-historical aspects of this research experience.

The landscape of Virgohamna (fig. 2) has high cultural and symbolical values. This is particularly clear if the surviving material elements are associated to other documentary sources and to socio-cultural perception about the historical events.

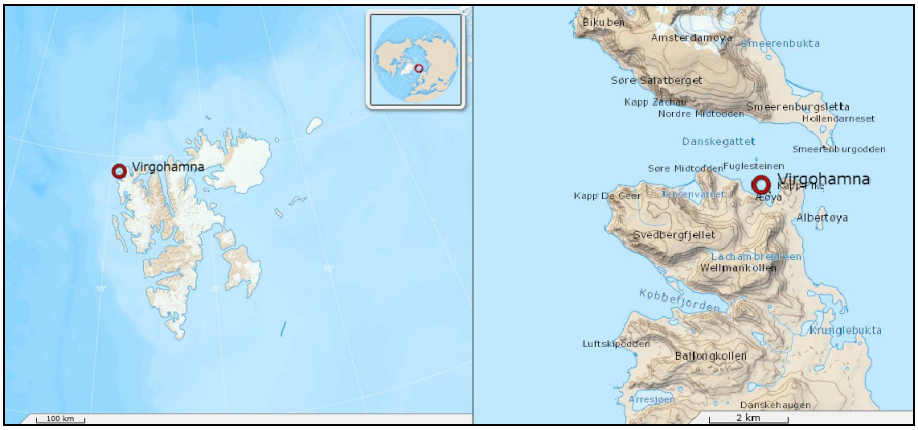

Figure 2. Virgohamna in a general map of Svalbard and in a detail map from Toposvalbard (https://toposvalbard.npolar.no/), modified by the author

A present-day visitor to the place is struck by the feeling of solitude and solemnity that dominates it. Traces of century-old human activity are easy to recognize. Nevertheless, they require attention and a thorough study in order to be correctly interpreted and understood.

Once awareness about the historical evidence is risen, the limitation of access (which is not absolute prohibition) as specified by the Norwegian authorities can be considered to have a twofold meaning.

On the one hand, it directly acts to reduce degradation of the historical site (i.e. the geohistorical "space") by preventing indiscriminate access and pressure on the archaeological remainings. On the other hand, it helps to foster preservation of the geohistorical "place" by ensuring its continuity in terms of physical nature as well as perceptual and symbolical values. The relatively untouched environment and the persistent, predominant silence at Virgohamna, both associated to prevention of massive access by large and invasive tourist services, are important in keeping the true and profound memorial value of the location. Indeed, this perpetuates, through the ages, the physical, sensorial dimension of how the place not only *looked* like, but also *felt* like, and *sounded* like when explorers elected it as their gate into the Arctic mystery. In this sense, the nature of Virgohamna acquires a specific "performative potential" as a geohistorical landmark for the socially-shared memory of specific episodes in the history of Polar exploration (Winter, 2006, p. 12).

This paper is specifically focused on what could be identified, during the survey, in relation to the Swedish Andrée Polar Expedition of 1896-1897, probably the most famous attempt of reaching the North Pole which ever started from Virgohamna. Considerations about the memorial meaning of this important piece of cultural heritage are also outlined.

Virgohamna and Andrée's Polar Expedition (1896-1897)

Traces of human presence and activity at Virgohamna date back to the age of the European "discovery" of the archipelago.

In the 17th century, when whale hunting was thriving in the area, the village of Smeerenburg was established by Dutch whalers on the south-eastern shore of Amsterdamøya, hosting a small community (Umbreit, 1991, pp. 57-58). Almost opposite – only slightly westward – on Danskøya, beyond the strait, there was a small protected bay known as Houcker Bay. A tiny whale-hunter station was settled there, with a few buildings and a basic infrastructure. Smeerenburg and the other station were abandoned in the second half of the century, when whale-hunting moved elsewhere. The islands remained well known to seagoers, but virtually deserted to this day.

In 1888, a wealthy British citizen, Arnold Pike, charmed by those remote places, wanted a house to be built for himself on the very spot of Houcker Bay where remnants of the whale-hunting station were still recognizable (Capelotti, 1997, p. 28). It was a time when an increasing part of European society – especially in the upper class – was impressed by the competition for the conquer of the Poles. Those places were indeed perceived as beyond human reach in spite of the industrial and technological achievements of the *Belle Époque*. From this cultural *milieu*, in which political, national, scientific and social elements used to combine, a strong push towards exploration developed. The "discovery" of the North Pole seemed to be a most attractive goal to many explorers.

The rush for the Arctic caused an obvious increase in interest for the Svalbard archipelago, which was more and more considered as a natural base-camp for penetrating further in those yet unknown regions.

In 1896, a Swedish ship called *Virgo* was visiting the northwestern area of Svalbard in search for an appropriate location to establish a base: Houcker Bay was chosen. From that moment on, the place would have been named "Virgo Bay" (Capelotti, 1997, p. 28). The change also caused a sort of semantic turning-point in how the site was perceived. From a landmark of rather vague historical memories of whale-hunters, Virgohamna became associated to expeditions which were to start, end or to have crucial moments there[4].

The Virgo was a support vessel to the Andrée Polar Expedition, planned to leave the bay in summer 1896 heading for the North Pole. Swedish engineer Salomon August Andrée was known to be completely devoted to his project (Svenska Sällskapet, 1931, pp. 7-11).

Today he would have certainly be considered a "visionary", in all meanings of the term. The basic idea was to overcome the obvious difficulties of a long crossing on or through the Arctic pack by simply flying towards the

[4] Andrée 1896, 1897; Wellman 1906, 1907, 1909; airship *Italia* Polar Expedition search and rescue operations (1928). In the latter, the bay was used by a Swedish rescue expedition. After being airlifted from the pack by Lt. Einar Lundborg, *Italia*'s commander, Gen. Umberto Nobile, was taken to Virgohamna to meet Italian Navy's support ship *Città di Milano*.

North Pole (McCormack, 2008, p. 417). Andrée decided to rely on a hydrogen balloon, if it would have been possible to fly it into appropriate wind-streams. One crucial element, naturally, was to find a way to actually guide the aerostat, at least partially. A balloon is normally dragged by the wind and quickly tends to travel at the same speed and in the same direction of the air current. It is therefore only possible to climb, descend or maintain a certain altitude. Andrée, however, believed to have successfully invented a system to actually *guide* the aircraft. He would have used three guideropes, hanging from the balloon to the ground. If sufficiently long and appropriately heavy, they could have given a certain degree of vertical stability while at the same time causing a certain amount of friction during their slide on the ground, seawater or iceshelf. This action would have slowed down the balloon and it would have therefore opposed a persistent drag to the air current. A group of sails, installed on board the aerostat, would have then allowed to obtain some divergence from the predominant wind direction.

Andrée had conducted some limited testing of this concept in 1894 on balloon *Svea*, concluding – quite optimistically – that it would have been possible to obtain up to 27° divergence from the wind direction (Nobile, 1975, p. 26). Relying on this idea, he made an agreement with French balloon manufacturer H. Lachambre. The firm prepared an aerostat for the Polar expedition, the *Örnen* ("*Eagle*" in Swedish), featuring a larger gasbag than the *Svea*. Andrée's fundraising campaign was successful essentially due to both the man's ability of showing the project as feasible, and to the limited knowledge of his time about the meteorology of the inner Arctic region.

A matter of national prestige was also at stake, given that Sweden was witnessing, in those very years, the polar endeavors of other countries. Norway, in particular, was at the same time a politically subordinated nation but also a primary competitor in the race for the North Pole with, among others, explorer Fridtjof Nansen and his ship *Fram*. Swedish scientific expertise in the exploration had been supported for decades by Norwegian technical skill (Drivenes, Jølle, 2006, p. 40), but could have been also effectively counteracted, and this obviously fueled national pride, especially between two countries standing under one monarchy, but often living separate identities (Drivenes, Jølle, 2006, pp. 107-117).

In settling at Virgohamna, Andrée decided to place his balloon-house very close to the old Pike's House. The building, entirely made in wood, was meant to host the aerostat during inflating operations and before departure.

After being built in Paris, balloon *Örnen* was shipped directly to Virgohamna without any flight test by Andrée. Meanwhile, he had selected the other crewmembers. They were senior meteorologist and explorer Nils Eckholm and young physicist and photographer Nils Strindberg.

Andrée and his men reached Virgohamna in June 1896 to establish their base. When everything was ready for departure, however, wind conditions remained constantly unfavourable. On August 17th, the party had to conclude

that it was too late in the season for a safe attempt, and the mission was postponed. The *Örnen,* along with other equipment, was loaded back on support ship *Virgo* and the workgroup left the island, planning to return in 1897. Shortly after their return to Sweden, Eckholm resigned from the expedition due to disagreements with Andrée about safety issues. Eckholm was soon replaced by engineer Knut Fraenkel. A fourth aeronaut, Vilhelm Swedenborg, was also selected as a back-up (fig. 3).

Figure 3. The crew for Andrée's Polar Expedition of 1897. Left to right: Swedenborg (back-up aeronaut), Strindberg, Fraenkel, Andrée (seated) (image source: http://s41.photobucket.com/user/Forsete/media/aee.jpg.html)

After some technical upgrades, in late May 1897 the expedition was back at Virgohamna with support ships *Virgo* and *Svensksund*. On July 11th, conditions appeared to be sufficiently favourable for the attempt. The top structures of the balloon house were dismantled in order to allow for the ascent. Such procedure, though planned from the beginning, implied that once the removal of the structure had begun, it was impossible to abort the mission without cancelling it completely.

The *Örnen* took off at 13.46 GMT (Svenska Sällskapet, 1931, p. 68). It immediately began to drift towards the north-east, flying low over the waters of the bay. As expected, the three large guideropes began to exert friction on the water and on the stones of the beach and the shallow sea-bottom (fig. 4). The balloon suddenly descended (Nobile, 1975, p. 30) and the nacelle with the aeronauts dipped into the water. The three men released 9 bags of ballast, for a total of 207 kgs, in a struggle to regain climb. Almost at the same time, the main, longer sections of the three guideropes detached from the balloon because of a design flaw of their emergency release devices: another 530 kgs were so abandoned (Svenska Sällskapet, 1931, p. 69).

Figure 4. The initial phase of the flight. The balloon moves at low altitude in a north-easterly direction. The guideropes are largely immersed in the sea and they leave a clear trace on the water (image source: Svenska Sällskapet, 1931, f.p. 53)

Right after take-off, then, the *Örnen* had already lost considerable weight. The flight endurance of a balloon depends heavily on the amount of available ballast. As the aerostat loses lifting force (in the case of the *Örnen*, mostly due to leakage through the gasbag seams), it becomes "heavier" than air and tends to sink. In that condition, if weight is released by discharging ballast, the aerostat

becomes "lighter" and may then stabilize its descent or even climb, until a corresponding amount of lifting force is lost[5]. If an excess in lift causes the balloon to climb beyond expectation, the aircraft may only level off or descend by releasing gas or by reaching a condition of more or less temporary static equilibrium at a certain altitude. It is therefore necessary to properly manage the release of weight on the one hand, and of gas on the other, in order to maximize available flight time.

After suffering such a massive loss in weight, the balloon was way too light and – at least for the moment – completely uncontrollable direction-wise. Both circumstances were against Andrée's plan and should have suggested to abort the mission (McCormack, 2008, p. 420). The crew, however, chose to continue. About 18 minutes into its flight, the *Örnen* was navigating at an altitude of about 600 meters and was drifting fast with the wind. It remained visible to the observers' sight up until about an hour (Smithsonian Report, 1898, p. 407).

German reporter Gerard Lerner, among the observers in Virgohamna on the day of Andrée's departure, was three days later on a small ship coasting the northern shores of Svalbard. In the early hours of July 14th he would spot, briefly, at a great distance, Andrée's balloon, 35 km north-east of Sjuøyane (the "Seven Islands"). This would be the very last moment in which the *Örnen* was actually seen in flight (Barr, 2006, p. 99).

Four days after the expedition had departed Virgohamna, boat *Alken* (then in proximity of Phippsøya, north Svalbard) received a message from the *Örnen*. It had been brought by a carrier pidgeon and had been released by the balloon at 12.30 on July 13th. (Smithsonian Report, 1898, p. 411; Nobile, 1975, pp. 30-31). The message reported that the balloon was flying without any significant difficulty[6]. Between 1899 and 1900, in different moments and different places of Svalbard, Iceland and Norway five messaging-buoys from the Andrée expedition were found, washed ashore from the sea. Two of them contained brief messages reporting – just like the one delivered to *Alken* – data about the initial phase of the flight. The remaining three buoys did not deliver

[5] The flight of an aerostat is quite a complex phenomenon. The expansion or contraction of gas in the envelope, caused by variations in pressure and temperature, along with changes in the balloon weight due to moisture and ice formation are all factors which influence the behavior of the system. Several causes hampered Andrée's flight. First of all, the initial excessive climb determined a remarkable expansion of the hydrogen and a faster leakage through the seams of the gasbag due to higher internal pressure. Second, the insisted attempt to use draglines and sails (with shorter ropes, obtained by the use of remaining sections of the initial draglines, spliced and prolonged by adding sections of ballast ropes), forced the decision to remain at low altitude. This made it so that the balloon had to frequently stay immersed in the summer fogs which developed just above the surface of the pack. Two negative effects resulted: fabric of the gasbag would collect moisture (i.e. additional weight) while at the same time the hydrogen in the envelope was contracting in the lower temperature, as the sun could not warm up the balloon. The overall buoyancy of the *Örnen* was therefore reduced and the aeronauts had to waste ballast in order to keep the aerostat aloft.

[6] Reported position was Lat. 82°2' N, Long. 15°5' E. The balloon was navigating towards the east at 250 m of height (Svenska Sällskapet, 1931, p. 89).

any message; one of them was the larger buoy that Andrée had previously announced to be meant for release over the North Pole. It had just been abandoned as ballast at a certain moment. All received messages did not provide any conclusive information. For decades, the fate of the Andrée's expedition was to remain a mystery.

On August 6th, 1930, vessel *Bratvaag*, equipped both for scientific research and sealing, made a stop in small Kvitøya (White Island), on the eastern edge of Svalbard. Scouts from her crew found the remnants of Andrée's last camp. Diaries, specimens, photographic rolls and many pieces of equipment were found. The *Bratvaag* recovered two corpses. They were identified as Andrée's and Strindberg's. The remainings of Fraenkel, along with other materials, were later discovered and collected by the crew of another ship, the *Isbjörn*.

The fallen of the *Örnen* were taken back to Sweden and later honored with solemn state funerals in October 1930. Meanwhile, it had been possible to examine the documents and develop 93 photographs, allowing to clarify several aspects of the tragic expedition.

An explorers' ordeal

Andrée's, Strindberg's and Fraenkel's had flown for three days, until July 14th, 1897. Most of that time had been spent in low-altitude flight over the pack, as the aeronauts had arranged a provisional guideropes by splicing and connecting part of a main dragline that had remained onboard with other ballast ropes they had. The attempt of achieving guided flight proved a failure, and led to an excessive waste of gas and ballast. Frequent impacts of the balloon's car on the pack surface resulted in substantial stress on the crew, causing sickness and overfatigue.

In a rare moment of calm in the late evening of the stressful second day, the balloon had been held still by a rope lying on the ice, in a thick layer of fog. Andrée had made the following entry in his logbook:

> «Although we could have thrown out ballast, and although the wind might, perhaps, carry us to Greenland, we determined to be content with standing still. We have been obliged to throw out very much ballast to-day and have not had any sleep nor been allowed any rest from the repeated bumpings [of the nacelle on the pack], and we probably could not have stood it much longer. All three of us must have a rest, and I sent Strindb.[erg] And Fr.[aenkel] to bed at 11.20…, and I mean to let them sleep until 6 or 7 o' cl. if I can manage to keep watch until then. Then I shall try to get some rest myself. If either of them should succumb it might be because I had tired them out.
> It is not a little strange to be floating here above the Polar Sea. To be the first that have floated here in a balloon. How soon, I wonder, shall we have ["we" substitutes the erased word "I"] successors? Shall we thought mad or will our example be followed? I cannot deny but that all three of us are dominated by a

> feeling of pride. We think we can well face death, having done what we have done. Is not the whole, perhaps, the expression of an extremely strong sense of individuality which cannot bear the thought of living and dying like a man in the ranks, forgotten by coming generations? Is this ambition?» (Andrée, 1931, p. 352. Text between square brackets is mine, cross-checked with the corresponding section in Andrée, 1930, pp. 359-360).

Less than two days later, however, the aeronauts had decided to land on the ice, ready to commence a long return march on foot. In Andrée's plan there were, undoubtedly, random elements. Nevertheless, the expedition had an extraordinary technical flexibility; the attitude and strength of the three men enhanced this potential.

After having brought the *Örnen* to a landing, the aeronauts had camped for a few days next to the deflated balloon, in order to appropriately select materials and supplies.

Andrée, who was the expedition leader, kept a main diary about scientific data and the explorers' actions. Fraenkel was in charge of the meteorological log. Strindberg took pictures with ad-hoc designed and built equipment and also served as cartographer, recording the party's position. In spare time, though, he wrote letters in shorthand for his fiancé, Anna Charlier, with whom he had been engaged since the fall 1896, after returning from the first expedition attempt. Strindberg's letters, which only cover the first phase of the march and cease as the explorers' conditions were becoming more and more critical, are a profoundly human testimony.

As per to Andrée's instructions, supply depots had been created: one of them was on Franz Josef Land, south-east from the *Örnen*'s landing spot; and one on Sjuøyane (Seven Islands), at the northern edge of Svalbard archipelago, to the south-west from their position. The men had therefore tried to move towards Franz Josef Land – also a more interesting target for explorers at the time.

Unfortunately, they had to face an overwhelming icedrift and on August 4th they had decided to try to reach the Seven Islands. On September 12th-13th, Andrée had surrendered to the fact that there was no way to prevail on icedrift, and that their only option was to winter on pack. Finally, the three explorers had found themselves drifting along the eastern coast of Kvitøya. The place was depopulated and almost entirely covered with glaciers. Although the three men had had no previous chance to put foot on land since their departure from Virgohamna, Andrée's notes show little enthusiasm about the possibility of wintering on Kvitøya, that he referred to as "New Iceland" (Svenska Sällskapet, 1931, p. 189). The island was clearly inhospitable even in the perspective of a wintering camp (Andrée, 1931, p. 402).

In those days, next to their tent, the three had striven to build a shelter, using ice blocks glued together by the use of water that was then left to refreeze. It was a sort of well-designed igloo. After a few days of use, though, the ice platform it was built on had suddenly failed, and the explorers had, albeit with reluctance, abandoned their shelter (Andrée, 1931, pp. 404-405, 412). This was

possibly one of the reasons for which they finally resolved to move on land before the icedrift would have had taken them too far. They established a first camp on the rocky southern corner of Kvitøya. It was, by then, October 5th; the Arctic winter was closing in, as it was darkness. On October 7th, after a snowstorm, they had moved their tent and part of the equipment to a small rocky cliff in the vicinity of the landing spot. They had begun to collect and stack driftwood as fuel and probably as material to build a small hut.

It was speculated, based on some rather unreadable notes found among the remainings of the camp, that Andrée might have hoped, in those days, to give their settlment area his mother's name (Svenska Sällskapet, 1931, p. 203). She had been probably the closest relationship Andrée had ever had in his life, and she had died shortly before the expedition departure in 1897. In Kvitøya, the three men were soon to die (Broadbent, Olofsson, 2000, p. 23).

The notes they had kept so much in detail during the expedition faded quickly after the arrival on the White Island. Strindberg, who was probably the first to die, had made on October 7th a brief entry in his log: "moving". For ten days he had written nothing else; finally, on October 17th, one last, rather unclear line; it might have marked the time of return to the tent, possibly after a reconnoitering trip. That is the last message left by the three Swedish explorers. The exact circumstances of their death remain unknown. It is quite probable it was not caused by starvation, since they had relatively rich supplies at the time and they were very well equipped and capable of hunting. Maybe they were more or less debilitated by some infection caused by the raw meat they used to eat, or by botulism; perhaps they had been attacked by polar bears. It is probable, however, that they were finally overcome by the increasing cold – their clothes were not optimal for the environment (Lithberg, 1931, pp. 215-216) – and by exhaustion.

Bratvaag's and *Isbjörn*'s crews concluded that the three explorers had not even began the construction of the hut which might have better protected them against the harsh winter conditions.

The discovery of Andrée's expedition, along with the exceptional value of the documents which allowed to fully reconstruct their epic ordeal, had wide international resonance. Diaries and pictures from both the expedition and its discovery were quickly compiled in a publication which was – especially for the time – an *instant book*.

After the main Swedish publication, translations were published in other European countries as a wide general public had obvious interest in reading the texts which could solve a 30 year-old mystery. Readers in each country had national, geocultural and social reasons for welcoming such "best-seller".

In Italy, for instance, the book was published by Mondadori (one of the chief publishing houses in the country) and was circulating in November 1930, just three months after the discovery at Kvitøya and a month after the solemn funerals in Stockholm (*Con l'"Aquila" verso il Polo*, 1930). Such rapidity is easy to explain: Andrée story had been publicly renown since the time of the

mysterious disappearance of the expedition; as early as 1898, famous poet Giovanni Pascoli dedicated one of his creations[7] to the Swedish explorer. In the small poem, Pascoli imagines that Andrée had caught the dignity of a solitary triumph in actually reaching the Pole, only for dying in total, almost super-human solitude. There seems to be a clear reference to Ulysses' legendary death as depicted in Dante's Divine Comedy. Furthermore, in 1928 – just two years before the discovery at Kvitøya – Italy, Norway and Sweden had witnessed the tragedy of airship *Italia*, lost in the Arctic after actually reaching the North Pole. Each of the three countries mourned in that case as well the loss of national heroes in the everlasting challenge to the Great North: several similarities could have therefore been perceived in this more recent story; ideals, heroism, mystery, all from the same geographical region (north-east Svalbard) with one generation re-living the hopes, suspense and pains of the previous one. In quite an impressive continuity of themes and symbols.

Historical views on Andrée's expedition are divergent. A *tranchant* yet plausible synthesis is given by Capelotti: «Andrée had attempted (…) only to vanish, his fate a mystery, his method ignored» (Capelotti, 1994, p. 275). The Swedish explorers' attempt was indeed to be a controversial model, which nevertheless impressed many, even among the following generation of polar aeronauts (Nobile, 1975, pp. 45 and 111; Trojani, 1968, p. 177). The man who turned Andrée's dream into reality and flew over the North Pole in an airship, Italian engineer Umberto Nobile, acknowledged the predecessor's valor as follows:

> «Had Andrée, giving up his guidance system, relied only on free flight above the fog, undoubtedly, with the strong wind that on the day of departure was blowing from SW (9 to 20 meters per second), he would have reached far beyond Latitude 83°…
> The *Örnen* was quite a large balloon, and well built; its impermeability to hydrogen was fairly high… The decrease in lifting force in five or six day of flight would have not presumably exceeded 500 kgs, easy to compensate by [discharging] the available ballast. In any case, even if the *Örnen* would have not reached the Pole, it was likely to beat any previous record in northern Latitude and also to explore a vast region of the Polar Sea. Sooner or later the wind would have changed direction, beginning to blow from the northern quadrants and the *Örnen* would have flown back and maybe it could have reached land… What a great triumph would have it been for Andrée, Strindberg and Fraenkel, and how well deserved for the courage, the endurance and the incomparable bravery they showed in their odyssey. What a pity it did not happen» (Nobile, 1975, pp. 44-45, translation and text in square brackets is mine).

[7] It was included in the book *Odi e Inni*, and was entitled simply: *Andrée*. The short poem was first published in «Nuova Antologia» on December 1st, 1897, only a few months after the expedition disappearance.

Andrée's, Strindberg's and Fraenkel's adventure lives on, after over a century, as quite an attractive story of exploration, both in terms of a technical endeavor and as a human journey towards the unknown (Capelotti, 1999, Popat, 2016; McCormack, 2008).

A most touching testimony about Andrée's and his companions' legacy remains in the lines of what was supposed to be a well-wishing letter, written by great explorer and scientist Fridtjof Nansen, who was record-man in the race for the North Pole at the time when the *Örnen* left Virgohamna:

> «And so, farewell! In the time that is coming many friendly thoughts will be sent to you from a friend who believes that he is able, whatever fortune may bring, to judge a man according to his merits and not according to his succes0073» (excerpt from a Letter by Fridtjof Nansen, May 20th, 1897, cited in Svenska Sällskapet, 1931, f.p. 37).

The expeditive documentation of Virgohamna by Polarquest2018

Once s/y *Nanuq* was positively anchored and safe, the expedition leader and Arctic skipper Peter Gallinelli and the author evaluated the presence of adequate conditions for performing the planned observation of Virgohamna historical shoreline. The site of former Andrée's and Wellman's bases[8] was about 500 meters south-west of the boat.

At the moment of arrival, the sea was almost perfectly calm and there was virtually no wind. The sky was overcast with cloud base at a few hundred meters, but below the clouds visibility was about 5 nautical miles.

The situation was therefore assessed to be appropriate for the activity.

Nanuq was equipped with 4 flying drones for aerial documentation. One of them, a DJI Phantom 4 Pro™ quadcopter, was prepared for take-off towards the beach. The purpose of the flight was to take a series of pictures to be used for processing a 3D model and an ortophoto. The author would be in charge of this survey, with assistance by technical coordinator Michael Struik and by the skipper. Cameraman Alwin Courcy was to take footage of the operation so as to later include it in a documentary.

The drone was launched at 20.48 UTC and flown towards the beach climbing initially to 120 m above sea level. As somewhat predicted based on previous experiences, a series of malfunctions affected the UAV's flight control system, due to environmental conditions. Most of the problems involved the internal compass of the drone, probably because of the relative proximity of the survey area to the magnetic North Pole; a few seconds into the flight, the issue

[8] American journalist and explorer Walter Wellman (1878-1935) organized the first attempt to reach the North Pole by the use of an airship in 1906. He established a base in the western side of Virgohamna beach featuring a hangar, workshops, and an accomodation building.

escalated to hampering the normal operation of other onboard systems. No automatic flight procedure could be considered at that point, so most of the mission was flown manually and it was often necessary to cope with unexpected erratic behaviors of the drone in flight. Given the importance of the survey, anyhow, it was decided to continue.

The UAV was flown over Virgohamna at an altitude of 131 meters. The onboard camera was activated in 20 Mpx, JPEG format, 3-second time-lapse and the drone was slowly (up to 5 m/s horizontal speed) directed along several concurrent directions, in order to completely cover the survey area.

After a 20 minutes flight, the drone was safely recovered onboard *Nanuq*; however, the return and landing procedures were more challenging than expected due to the aforementioned flight control system malfunctions.

Given the need of soon departing from the site for the scheduled navigation, there was not sufficient time to completely process the acquired data into a final 3D model or ortophoto. However, it was paramount to verify that the photographic coverage had been positively achieved. If this had not been the case, a second mission was to be conducted.

A laptop workstation was available for expeditive processing, with appropriate software (specifically, Agisoft Photoscan 1.4). A "provisional" processing was done in order to assess whether a sufficient degree of "area coverage" had been achieved in the flight. The test required several minutes and gave a positive result.

Based on this assessment, *Nanuq* left Virgohamna at 22.10 UTC.

After the expedition, the acquired images were submitted for extensive processing at the Geographic Research and Application Laboratory (GREAL) of the European University of Rome. A 3D model and an ortophoto were obtained (fig. 8). Based on these documents, between October 2018 and February 2019, an analysis was developed to understand the status of the place at the moment of the expeditive survey. The analysis called for reference to the available archaeological and geo-historical literature and to many historical images (figg. 5 and 6). The latter are easily available in the public domain, but in several cases they are not accompanied by specific documentation. The results and considerations developed in the aforementioned analysis, associated to humanities-related themes traditionally connected to the story-telling of Andrée's expedition are summarized in the following paragraph.

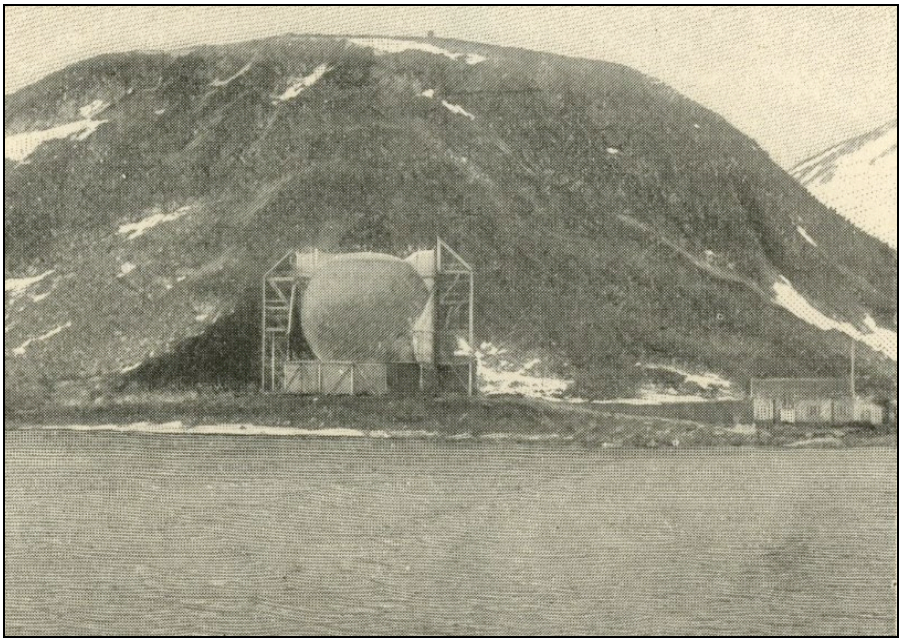

Figure 5. The *Örnen* inside the balloon house just before departure, pictured from one of the ships anchored at Virgohamna. The Pike's House can be seen on the right (image source: Smithsonian, 1898, p. 12)

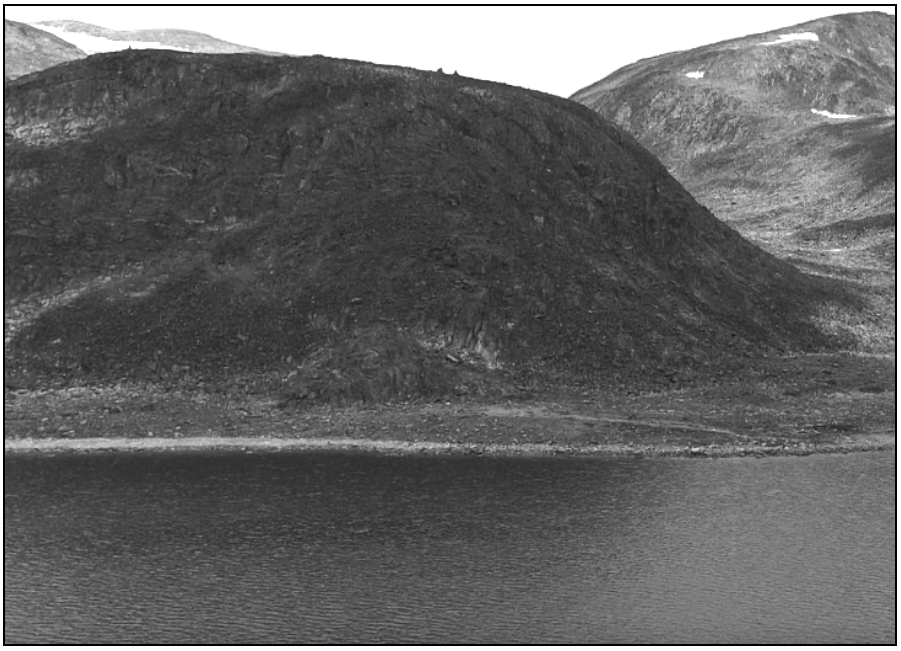

Figure 6. The same site in an image taken by the drone on August 8th, 2018, from a similar position. View direction is towards SSW (image by the author)

Traces of Andrée's expedition

In Andrée's, Strindberg's and Fraenkel's story there is an instant which strikes one's imagination. It is the very moment of departure, which is depicted in figure 7.

Figure 7. Andrée, Strindberg and Fraenkel standing on the *Örnen* nacelle a few instants before take off. Sailors from support ship *Svensksund* are about to cut the ropes holding the balloon to the ground (image source: Svenska Sällskapet, 1931, f.p. 65)

The scene is fully described, at the first person, by Strindberg, in one of his shorthand letters to Anna, written on July 22nd, when the three men were marching on the pack.

> «I wrote my last letter to you the same day we started; you must have received it, of course. Of what happened since you have learned from the accounts in the papers, etc., but quite naturally I shall describe my persional impressions too. It was grand when it was at last determined that we should start. Andrée, Fraenkel and I and Machuron [representative of the balloon manufacturer] went on shore and looked at the balloon from the roof of the balloon house. After we had discussed the possibilities of starting for a while Andrée asked us what we th(hought): "Shall we try or not?" Fraenkel at first answered evasively, but then said that (we?) should go on. [unreadable text] I answered, "I consider that we ought to try attempt it", and Swedenborg [the back-up aeronaut] was of the same opinion. Andrée was serious and said nothing. We all went on board [of support ship *Svensksund*] again. We did not yet know what was to be done, but

> when we had come on board Andrée at once said to Ehrensvärd [the captain of *Svensksund*]: "Well, now we have been considering whether the start should be made or not; my comrades insist on starting, and as I have no fully valid reasons against it, I shall agree to it, although with some reluctance. Will you, then, send all hands on shore to begin the work of dismantling the balloon house". And then everyone woke up. The sailors had never worked so willingly before nor had the carpenters… The harbor now presented a lively picture. Two sealers had just come in and one had been lying there before. The latter had to shift anchorage so as not to be in the way of the balloon. The weather was gloriously beautiful and the wind a fresh S.S.W. I went ashore and packed a few articles in the car of the balloon and arranged some things here and there. The work of removing the front side of the house went on briskly, and one planck after the other was thrown down. The balloon stood there steady and secure, protected against the winds by the canvas on the fourth and fifth floors… The time had come to say good bye. This was done heartily and touchingly but without any sign of weakness. Then Andrée cries: "Strindberg and Fraenkel, are you ready to get into the car?" Yes! And so we got in. Now my thoughts turned for a moment to you and my dear ones at home. How would the journey succeed? And how fast my thoughts came, but I had to restrain them. I asked Machuron, who stood nearest and whom I found most congenial, to give my love to you. I wonder if a tear did not tremble on my cheek at that moment. But I had to see that the camera was in order and to be ready to throw out ballast etc. And now all three of us stand there on the top of the car. There is a moment's solemn silence. Machuron says: "Attendez un moment! Calme". The right moment comes. "Cut away everywhere" comes Andrée's voice. Three knives cut the three lines holding fast the carrying-ring and the balloon rises amid the hurras of those below; we answer with a: "Hurrah for old Sweden!" and then we rose from out the balloon-house. A peculiar sensation, wonderful, indescribable!» (Strindberg, 1931, pp. 445-448, text in square brackets is mine).

That point in time is the pivotal moment of the story. It is when three men, alive among the living, crossed what in 19th century was actually an example of "Hercules's Columns". From their remote, advanced base at Virgohamna, they were stepping over spaces which had been seldom reached at their time, and were moving towards the unknown. They were doing that with completely new means, at the end of a century which was envisioning the hope of a human redemption to be achieved by technological progress.

From that moment on, their contemporaries could only watch them fly away and record the very little they could actually see. From Virgohamna the *Örnen* ventured, for the first time in history, into the skies of the Arctic towards the North Pole.

Humankind could later know the rest of the story; but in the static form of reports, photographs and annotations. Andrée, Strindberg and Fraenkel, however, did succeed, beyond their own lives, to complete the cycle of exploration: they came back to report on what they had seen and lived in a world still pretty much unknown to their fellow citizens.

Seen in this perspective, the points of geographical space that can still be associated with this story keep, like it happens with all minor landmarks, a symbolical value of their own: this is what motivated Polarquest2018 to include Virgohamna in its expedition plan, despite the fact that the place per se had been documented and studied already in the past. It was also the occasion to try a different, and innovative, form of documentation, testing a new possible procedure for easily monitoring the status of geo-historically and archaeologically relevant sites.

The surviving material elements of Andrée's expedition at Virgohamna are now rare, quite sparse and in various – often terminal – states of decay. However, they can still give us valuable information about what the men of the 1896-1897 expedition could see and live; they can also give us insight on how the crews were operating.

Andrée, Strindberg and Fraenkel, with the crews of the support ships and other personnel stationed at Virgohamna, spent their time between the beach, the ships and the surrounding depopulated highlands and valleys. Obviously, most of the activity was in the few hundred meters between the anchorages and the installations on the shore. In that overall small area, preparations for the flight as well as social moments took place: such was the case, for instance, of the traditional Scandinavian banquet to celebrate the Summer solstice.

Support ships *Svensksund*[9] and *Virgo* were anchored in front of the shore, and other boats and vessels periodically visited the base. Andrée's expedition, compared with Wellman's, which was to settle at Virgohamna nine years later, was less complex and required less equipment, so it ended up occupying a smaller area on the ground.

By observing the pictures taken by the drone, it is easy to understand the general arrangement of the former installations site. In the south-east zone, there is a residual trace of the balloon house. The octagonal building had an external diameter of about 40 metres and it was built on top of an artificial flat surface. The structure was made in wood for the most part and it was abandoned after the departure of *Örnen*.

When the first working groups of Wellman's polar expedition arrived at Virgohamna in 1906, they found much of Andrée's balloon house still in place, though in an evident state of decay. They therefore removed a fairly large quantity of materials, in order to reuse them for building the floor of Wellman's airship hangar.

A few years before, a relatively small memorial for Andrée, Strindberg and Fraenkel had been built in the immediate proximity of the balloon house remnants. Such memorial was ceremonially visited by Wellman as he arrived at Virgohamna in order to prepare his own expedition. The visit was shot in a brief film, which shows some remainings of Andrée's expedition still present on

[9] Ship *Svensksund* was still in service when the remainings of the Andrée's expedition were found at Kvitøya. The three explorers' coffins were solemnly transported onboard their past support-ship from Tromsø to Stockholm before the funeral ceremonies.

the scene, but no significant element of the former balloon house, which must have been already demolished at that time[10]. However, not all the wooden elements from the balloon house ended up re-used in Wellman's hangar: many small parts remain to this day in proximity of the memorial. The small monument remains to this day as a place marker well known to elite tourist expeditions and it is also very easy to spot on the images taken by the drone. The ortophoto reveals the presence of thin elements and suggests that the overall structure of the balloon house must have been relatively light. Upon returning to Virgohamna in 1897, almost a year after his first expedition attempt, Andrée had concerns that the balloon house might have collapsed in the harsh winter weather. The structure did present some minor damage, but it had remained largely intact. According to Overrein (2015), in the area of the balloon house it is possible to recognize, along with wooden structural elements, several metal fragments.

It is no longer possible – at least in the available images from the drone flight – to define with certainty the perimetral shape of the building, but it is possible to approximately identify its general location and area. From there, two small and short trails appear to be partly clear of stones and gravel; similar trails were easy to recognize on historical pictures of Andrée's installations, so that some continuity can be considered in those trails after 121 years. Approximately 30 meters to the north-west, the two trails converge towards the surviving foundations of the Pike's House. That fairly small area was then the center of activity for men who were coming and going – often literally walking on the sea ice – from and to the ships and the shore.

Arnold Pike had granted Andrée permission for using his house at Virgohamna (Svenska Sällskapet, 1931, p. 55). It was a small rectangular building with a sloping roof. The Swedish workgroup used it (Capelotti, 1997, p. 73) also for hosting some equipment and provisions. In early October 1897, while he watched the shores of Kvitøya drifting slowly along the pack in the Arctic dusk, Andrée's thought returned to the small house at Virgohamna. A much-needed spare part for their cooking apparatus was still in the Pike's House, and they regretted having left it there (Svenska Sällskapet, 1931, pp. 195-196). Very little is left of the Pike's House today. The small building stood for slightly more than fourty years, during which it had been periodically used or just visited by anyone who – for whatever reason – landed in the bay.

In 1925 the house was dismantled and its materials were moved to Barentsburg, in Isfjord, southern Spitsbergen. They were later destroyed (Capelotti, 1994, pp. 266 and 272; 1997, p. 30). At Virgohamna there are only some structures of the foundation, with part of the wooden beams which kept the house base separate from the ground, as it is common in most Arctic buildings. Wooden joists and elements are clearly visible both in many tourists'

[10] The footage can be seen at the following URL: https://www.youtube.com/watch?v=7vKEfkpV1es (last accessed April 12th, 2019).

pictures available on the Internet and also, obviously, in the drone's aerial imagery. It is possible that some item associated to Andrée's expedition is still present in the foundation or in its immediate surroundings.

In the immediate vicinity of the house, there was another object relevant to the 1896-1897 expedition.

Operational efficiency considerations had led Andrée to give up the idea of bringing the hydrogen he needed for the balloon in bottles; rather, he had decided to produce the gas in situ, by assembling a hydrogen generator right at Virgohamna. The generator was to be built next to the Pike's House, taking advantage of the fact that the area selected for the balloon house was altimetrically a bit higher, thus making gas flow towards the balloon easier (Svenska Sällskapet, 1931, p. 56). The plant was designed and built in order to use a then common technique for producing gas – it would have been a technological standard for a while[11]. The hydrogen was generated by the plant and sent into the balloon hosted inside the nearby structure. In passing, though, the gas had to be purified. Between the generating plant and the balloon, then, there was a filtering device, filled with calcium carbonate. 121 years later, the generator has now disappeared but the large filter is still in place and its condition appears to be surprisingly good. It is a wooden box with a rusty metal frame on top. In 1993 the element had been seen and documented by Pete J. Capelotti, who had even found residues of the filtering powder (Capelotti, 1997, p. 33). Images acquired by the drone allows to think that relatively little had changed since that not recent survey.

Very close to the filter, on the ground, it is possible to see an evident and relatively large stain of rust on the ground, which is almost all that remains of the hydrogen generating plant. This old piece of industrial archaeology was still present, with some of its large components in 1928 when Virgohamna hosted the Swedish rescue mission which was supporting the international search and rescue effort for airship *Italia*. In 2018 there was no relevant clearly recognizable element in the same spot, except from the large rusty trace, very easy to identify in all aerial images.

[11] See Capelotti, 1997, p. 73. Andrée had two chemists as consultants, Ernst Ek and Axel Stake. They were in charge of defining the best technical solutions for producing the gas and ensure an efficient and durable storage of the hydrogen the balloon gasbag. The gas was produced by using water, sulphuric acid and iron shavings. As it was output from the generator, the gas had to be cleared of water and sulfuric acid through the filter which is still in situ. Then the hydrogen was conveyed towards the balloon. The hydrogen generator was also used, however, to keep the balloon inflated while it was naturally and slowly leaking gas, in the wait for departure.

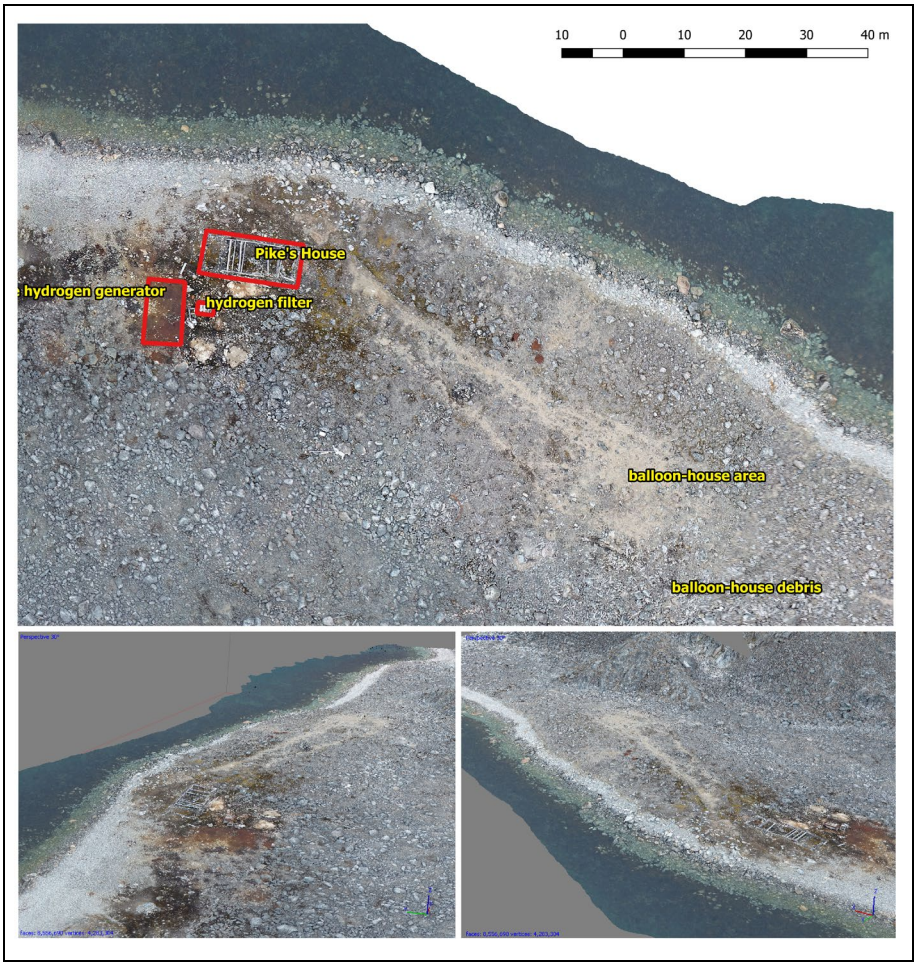

Figure 8. Remnants of Andrée's 1896 and 1897 base. Aerial images from the drone were used to produce a high-resolution ortophoto which was then input in a GIS for analysis and annotation (above). Source images also allowed to produce a descriptive 3D model, two views of which are shown (below)

Conclusions

The place from which the Andrée expedition departed remains, to this day, an important element in the cultural heritage of Arctic exploration. Virgohamna is a relevant geo-historical and archaeological site and the Svalbard authorities had quite appropriately decided to issue specific regulations in order to preserve it. That remote beach in the Arctic has symbolical value, recalling a paradigmatic human experience. Andrée's Strindberg's and Fraenkel's polar journey, albeit an apax from the technical point of view, was successful in

influencing – or, at least, in giving some inspiration to – some of the explorers in the following generation.

A few relics of that scientific, technological and human story are still present in the place, even though they remain in the form of progressively decaying remnants. However, if observed in their specific context, those traces may still strike the observer, as they effectively echo human presence and actions. They are valuable material for a kind of "tangible storytelling", beyond historical texts and sources; the vivid story-telling of past events in a world which is currently lived and perceived on totally different basis.

In this sense, over a century after its first use as an advanced base towards the exploration of the Arctic, Virgohamna retains a physical status which – unlike other locations in the surroundings, currently under considerable tourist pressure – may provide some performative memory value as a historical place (Winter, 2010). As such, it can be considered as a physical and sensorial source for collective feeling and narration of the past of polar exploration. The overall, striking impression of solemnity dominating the place as it is kept to this day bears a potential – to the benefit of present and future visitors – for vividly perceiving the past and more effectively sharing not just historical knowledge but also a deeper understanding of the subjective dimensions of past events. As long as the old material traces remain sufficiently untouched, the echo of old human endeavors somewhat lives on, in the majestic silence of Virgohamna.

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IN THE SILENCE OF VIRGOHAMNA: TRACES OF THE 1897 SWEDISH POLAR EXPEDITION BETWEEN GEOHISTORICAL OBSERVATION AND MEMORY – At the north-western edge of Svalbard archipelago there are two small islands, Danskøya (Danes Island) and Amsterdamøya (Amsterdam Island), currently depopulated. In 1896 and 1897, Swedish engineer and explorer Salomon August Andrée chose small Virgohamna (Virgo Bay) on the northern shore of Danes Island, as starting point to reach the North Pole by a hydrogen balloon. Andrée's expedition was quite ahead of his time, as well as reckless to some degree: it was to tragically fail and to disappear in mystery until the unexpected discovery of its remnants over thirty years later. Yet, the endeavor remarkably impressed the public of its time and inspired the following generation of explorers. In 2018, more than a century after Andrée's flight, the Polarquest2018 expedition made a brief stop-over in the area and an expeditive survey with drones was conducted. The survey allowed to effectively acquire a view of the current conditions of the historical site, recognizing -among many other things - some minor remainings of the 1897 structures. The fading traces of Andrée's base retain some archaeological value, but the main asset of the place is indeed its capability of impressing the visitor's imagination. This is due to the fact that it is possible to identify dimensions, shapes and a few remnants of the once-existing Andrée's infrastructure, and this occurs in an environmental and geographic context which underwent minimal change in more than a century. This allows to perceive, to some degree, its past nature as a place where the members of the expedition lived and operated, in such a way so as to be a relevant memorial in the history of Arctic exploration.

NEL SILENZIO DI VIRGOHAMNA. LE TRACCE DELLA SPEDIZIONE POLARE SVEDESE DEL 1897 FRA OSSERVAZIONE GEOSTORICA E MEMORIA – All'estremità nord-occidentale dell'arcipelago delle Svalbard si trovano le piccole Danskøya (Isola Danese) e Amsterdamøya (Isola Amsterdam), oggi completamente disabitate. Nel 1896 e 1897 l'ingegnere svedese Salomon August Andrée elesse la piccola insenatura di Virgohamna, sulla riva settentrionale di Danskøya, a base di partenza per il suo tentativo di raggiungere il Polo Nord con un pallone a idrogeno. Il viaggio di Andrée era allo stesso tempo avveniristico e avventato, ma pur fallendo tragicamente con la scomparsa della spedizione fino al casuale ritrovamento dei suoi resti più di trent'anni dopo, avrebbe colpito

fortemente la suggestione dei contemporanei e della successiva generazione di esploratori. Nel 2018, ormai ad oltre un secolo da quella vicenda, la spedizione artica Polarquest2018 è transitata nell'area e ha effettuato una documentazione speditiva della zona mediante droni. La ricognizione ha permesso di acquisire un'efficace "istantanea" delle condizioni attuali del sito, riconoscendo – fra l'altro - alcuni elementi delle installazioni del 1897. Le tracce ormai tenui del campo base da cui partì l'aerostato hanno oggi qualche valenza archeologica, ma il principale potenziale del luogo è di riuscire tuttora a colpire l'immaginazione del visitatore. La possibilità di individuare dimensioni e forme di quello che fu l'avamposto della spedizione Andrée, in un contesto ambientale e geografico scarsamente alterato, può aiutare a percepire con grande efficacia anche la sua dimensione di spazio vissuto dagli uomini che parteciparono a quell'impresa. In forza di questo, Virgohamna è ancora oggi un landmark capace di costituire un forte richiamo percettivo e simbolico a una pagina rimasta emblematica nella storia delle esplorazioni artiche.

Keywords: Virgohamna; History of Arctic exploration; Andrée expedition; Polarquest2018.

Parole chiave: Virgohamna; Storia delle esplorazioni artiche; Spedizione Andrée, Polarquest2018.