Svalbard Environmental Protection Fund, RIS-id 11008

Decomposing textile in old whaler graves due to permafrost melt GRAVE-PERMAFROST

Recent excavations of 17th and 18th century whalers' graves on Svalbard show a disappointing amount of textile remains being preserved in the permafrost. This was completely different in 1981, when the Arctic Centre of the University of Groningen studied 50 graves at Utkiken (Ytre Norskoya) and found well-preserved wool and silk. In a recent dissertation Comis (2017) concludes that cotton and linen was already degraded when excavating in 1981. Due to climate change, the permafrost is thawing. We hypothesize that the last textile remains are disappearing and that this process is more pronounced near the eroding coast, at the sites of the most recent excavations. Therefore, we want to investigate hydrology and permafrost in the grave field of Utkiken to assess the possibility of more intact clothing in the entire cemetery. This can be done by scanning and ground-penetrating radar techniques. If possible we will use drones to minimize our footprint. If successful, this technique could also be used in other cemeteries and create a management strategy for this type of cultural heritage. In combination with this field campaign, we also plan an experimental decomposition study on different textiles material in relation to their position in the soil.

Project

In 1979-81, the Arctic Centre of the University of Groningen organised archaeological excavations near Smeerenburg. In the remains of the whaling stations hundreds of textile fragments were found. In the 50 graves that were examined of the nearby Utkiken (Ytre Norskøya) even more textile was found. Wool and silk were well preserved in the permafrost, while linnen and cotton had already rotten away (Comis 2017).
Between 1985 and 1990, 12 graves were excavated at Likneset to rescue them from falling into the ocean (Sellevold, 2000). Here they found textile remains in 8 graves (Jensen 1990).
In 2016 the Governor of Svalbard excavated several graves at Likneset that were in danger because of coastal erosion. Erosion is increasing due to disappearing permafrost in the coast Findings indicate that the conservation conditions of the graves (and thus including the textile) are changing as a result of a warmer climate (website Svalbardmuseum.no).
In the summer of 2017 the Governor of Svalbard and Svalbard museum excavated a grave from Smeerenburg. When opening the grave in October 2017, no visual remains of textile were found.

In this proposal we would like to investigate the consequences of recent warming on the possible textile remains in the old whalers graves on Svalbard. Without excavating the graves we plan to study the permafrost depth and hydrology with scanning and ground-

penetrating radar techniques, preferably using a drone to minimize our footprint. These techniques should be tested at Utkiken. At this site we can combine cryosphere data of the earlier excavated graves with the conservation status of textiles excavated in 1981. Based on our data, a map will be made an indication of the conservation status of textile. If successful, these techniques could be used for other cemeteries too.

We further plan an experiment in Ny-Ålesund, testing the decomposition speed of different textiles in relation to active layer depths and hydrology. We plan to burry four different textiles (wool, silk, cotton and linen) in nylon bags at different depths in the soil relevant for whalers graves. This technique is used as a standard for studies into plant decomposition (litterbags). We will replicate each type and depth 6 times and measure temperature at those locations with temperature loggers (i-buttons). After 3 to 6 annual cycles, we will retrieve the bag and study the amount of textile degradation both in texture (microscopically) and in weight.

Relevance

There is an urgency for this project, which is very well expressed in this text on the website of Svalbard Museum.

> *Much of the knowledge we have from the earliest whaling period in Svalbard is based on archaeological excavations of graves and settlements that were conducted in this area in the 80's. Due to good conservation conditions, very well-preserved skeletons, clothing and equipment were found in the graves. The graves from this period is therefore considered rare and unique cultural heritage because they represent a unique source of knowledge about this activity.*
>
> *However, after the excavation at Likneset in 2016, we have reason to believe that the conservation conditions of the whaling graves are changing as a result of a warmer climate. If the permafrost's freezing effect is about to change, this means that especially textiles, but also the skeletons may be gone in a few years.*
>
> *This is an all-natural process, but since these graves can contain knowledge we will not be able to gather elsewhere, we need to know more about what we stand above to better manage this material.*

This project fits very well with the priorities of the call. We are studying the impact of climate change on cultural heritage (2), support decisions on protection or excavation (3) and will further raise awareness of Svalbard's unique cultural environment (4) with our outreach activities.

Literature

Comis S.Y. (2017) Zeventiende- en achttiende-eeuwse kleding van walvisvaarders opgegraven op Spitsbergen. Ph.D. Dissertation, University of Groningen.

Jensen L.V. (1990) Whalers'clothing from a 17th-18th century cemetery at Likneset, Northwest Svalbard. A discussion of the cemetery's dating and Svalbard's role during the pelagic whaling period. Acta Borealia 7 (2): 36-55.

Sellevold B.(2000) Twelve whalers from Svalbard. Skeletal remains from Likneset on the Vasa peninsula. NIKU Scientific Report 011:1-42.

Budget

GRAVE	**NOK per unit**	**units**	**SEPF**	**OUR**
Travel to Longyearbyen	5000	4	20000	
Travel to Ny-Ålesund	6550	1	6550	
Stay in LYR	1200	4	4800	
Board in NA	470	7	3290	
Lodging in NA	595	7		4165
Sailing boat local transport and stay	25000	9	225000	
Drone	34000	1	34000	
Ground penetrating radar	25000	1	25000	
Scanner on drone	30000	1	30000	
Theodolite	10000	1		10000
Litterbags and i-buttons	2000	1	2000	
Our contribution in work	**NOK/hr**	**hr**	**SEPF**	**OUR**
Preparation	1280	40		51200
Travel	1280	32		40960
Field work	1280	288		368640
Reporting	1280	80		102400
Transport of material	10000	1		10000
Total NOK			350640	587365

For the field work we will rent a boat with room for 4 researchers. Including travel we expect a 9 day field campaign at the cemetery in NW Spitsbergen. The costs for radar and scanning devices are estimates and depend on the optimal solution based on drone or ground-based devices..

People involved

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Figure 1
Picture from the excavation of a whaler grave with intact woolen hat and two other clothes which were conserved very well from the 17th century to 1981 in frozen soil.

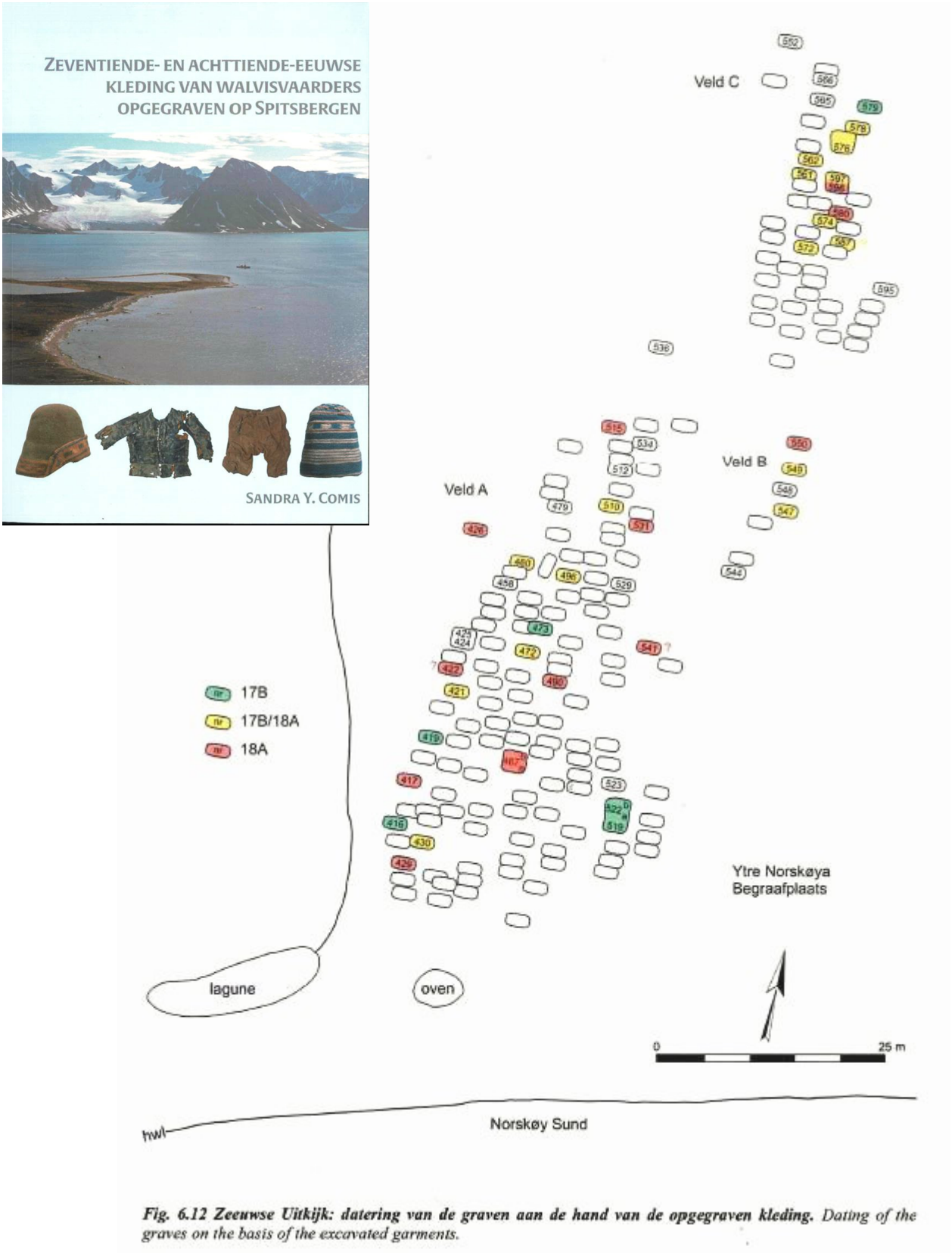

Fig. 6.12 Zeeuwse Uitkijk: datering van de graven aan de hand van de opgegraven kleding. *Dating of the graves on the basis of the excavated garments.*

Figure 2

Map of the cemetery at Utkiken. The coloured graves have been excavated in 1981 and dated based on the garments (from Comis 2017).