GLOBALVILLAGE 78°56'N AT THE FRONTIER OF CLIMATE CHANGE

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Climate change comes first and fastest in the Arctic



The northernmost functional settlement in the world is Ny Ålesund in Svalbard, at 78 ° 56'N. It is surrounded by ice and snow; the area is populated by 100 polar bears for every human inhabitant. An unfinished church and some mining ruins show the past. Once a starting point for expeditions to the North Pole and a former mining site in the early 20th century, it is now the biggest Arctic lab in the far North. Here scientists from all over the world live and conduct research concerning climate

We will introduce several different projects, among these an international cooperation between Italy, Germany, Japan and South Korea, and we'll meet scientists and permanent residents to show work and life in this village off the beaten track. Their work is vital for prognosticating the future of the planet, because the signs of the coming change are visible in the Arctic first.

change. Often they dedicate their life to science and take considerable risks to gain new insights in their

various fields. They come from countries such as

Italy, Germany, France and the UK, but also South

Korea, India and China.

To find out more about the community and the research projects we will accompany Kim Holmén, International Director of the Norwegian Polar Institute, to the Zeppelin station at the highest point of the mountain in Ny-Ålesund.

Through our interviews with the scientists we soon understand that what happens here in the Arctic will soon be our future. The CO_2 concentration in the atmosphere is increasing, the ice is melting, the ocean is warming up. But how much of all these processes are directly related to our behaviour and what is the result of natural phenomenon? This is a crucial question for many scientific studies. One thing is certain: mankind with its modern civilisation and consumption is constantly polluting the planet. In this northern, unique place, we get a glimpse at how our future will change and how this will affect all of us.

This is a unique trip to the Arctic in 3D, to experience the sublime nature and to have a closer look at the science and the people behind it - working and living in the world's northernmost village.









We circle over a tiny village surrounded by mountains, a fjord, all covered in snow. We have to put on several layers of warm clothes as we begin to descend to Ny-Ålesund, the northernmost inhabited place in the world. Svalbard is administered by Norway, but hosts a truly global village. Scientists from all over the world come here to carry out their research and collect data used to create models on climate change. Eleven nations permanently conduct research on the Svalbard Archipelago: Germany and France merged their scientific institutes 10 years ago; Italy, UK, Norway and even India, South Korea and China send their own teams of scientists. At times, up to 20 nations are present.

The door of the plane opens and we step out-

side. It is the end of winter. It is freezing cold, the temperature gauge shows -25°C, the bright blue sky is without a cloud. We are welcomed by KIM HOLMÉN (58), the International Director of the Norwegian Polar Institute. The renowned Norwegian polar scientist sports a long beard and a haircut dating back to hippy times. He seems completely unperturbed by the cold. Kim takes us to the Norwegian Polar Institute, one of the biggest stations here. Everything is covered by a thick layer of snow, the winter up here is long and hard. In the centre of the village, we pass a bust of Roald Amundsen, the famous polar explorer. Part of a glowing, crystalclear glacier rises from the frozen ground and reflects the setting sun. We are intrigued: Why is this such a popular place to do science?

"The Polar Regions and the Arctic in particular is the key to understanding what is happening in the Arctic. Because climate change comes first and fastest in the Arctic. We see a lot of change, the glaciers at the end of the fjord here has retreated, is melting, is becoming smaller, this we know from our science studies," explains Kim.

Global warming is a complex topic to understand, not only for ordinary people but also for scientists. A lot of data from different scientific projects needs to be combined in order to get answers from scientific models for the future. We will accompany different groups that conduct research in the atmosphere, in the water, on ice and on land, to find out what is natural and what is human-induced.

What is changing and what are the consequences? And with so many nations gathered in such a small town, what does the international cooperation look like?

Kim Holmén

The nations have small programs, but if we put them together, we might be able to learn more together and actually solve some of the large environmental questions quicker and that is certainly something I devoted much of my time to.

STOP POLAR BEAR DANGER



Do not walk beyond this sign without a weapon

> We want to start exploring the town and surroundings immediately, but Kim forbids it. "You haven't had your briefing yet!" He takes us to Italian ROBERTO SPARAPANI (52), the leader of the Italian station. Soon afterwards, we find ourselves holding rifles. If you leave the village, you have to take a rifle with you as protection against polar bears. A sign reminds us about the danger. We cautiously inspect the weapons. Roberto explains how

to use them and teaches us many other safety precautions for the event that we encounter a polar bear face-to-face, such as never wandering away from the group on your own. "Polar bears are fabulous creatures, but they are not cuddly soft toys! Stay out of their way, so that they don't hurt you and you don't have to hurt them!" It is all a bit overwhelming, but it is also a reminder that we are in a hostile and isolated region of this world. Around us there are more than 4000 polar bears who are hungry after the long winter.

The sun sets in the evening and it gets dark outside until a green and yellow spectacle lights up the sky. We are lucky enough to see the Northern lights in Ny-Ålesund. With some of the international scientists we just met, we sit outside and enjoy this very special experience in the Arctic sky. It's magic. The reflections from the snow lights up the buildings; we can see the German station in front of us.

Suddenly a green laser shoots into the sky. It is part of the first research project looking at the atmosphere. ROLAND NEUBER (58), scientific coordinator of the German Alfred Wegener Institute (AWI), explains that it is the LIDAR, a laser used to measure several atmospheric parameters: pressure, temperature, humidity, but also the concentration for gases such as methane, ozone or carbon dioxide. It is part of an international project conducted by Italy, Germany and Japan which he wants to show us during the next days.

The sun wakes us up very early in the morning. As spring approaches, the nights don't last very long anymore. Roland is used to this different rhythm, and already up. With a hot cup of tea in his hands he introduces us to "Miss Piggy", a bright red balloon which is being prepared outside for its next

flight over Ny-Ålesund to perform atmospheric measurements. The results help the scientists to understand the processes in the atmosphere. The composition of the atmosphere directly affects the climate: different particles help to reflect or absorb energy and thus increase or decrease the temperature of our planet.

With Miss Piggy merrily sailing through the air above us, Roberto shows us around town a bit. It consists mainly of the various research stations, additionally there are some administrative buildings and private houses. The villagers can escape from the cold by working up a sweat at the gym or relaxing in the sauna.

what man is doing to the world.

he Arctic is key to understanding

Roberto tells us about the rich history of Ny-Ålesund. From here, Roald Amundsen and Umberto Nobile departed on their expeditions to the North Pole. The 'Amundsen-Nobile Climate Change Tower', centrepiece of one of the most important research projects here, have been named in their honour. He will take us there after lunch.

We go to the mess to warm up after our stroll around town. Three times a day meals are provided for all the people living and working here. In the winter time, this is only 30 to 35 people. The mess becomes the central location for socializing. International sound fills the air, languages from all over the world - intercultural communication at its best.

We get to talk to a few people. What does their everyday life look like? Is it hard to cope with all this ice, snow and the cold in winter and long days in summer? The Indians miss their nice curry dishes but enjoy the English sense of humour. The Italians also miss their food but like not having to worry about it. The French and Germans agree that life would be much nicer up here if only there were a proper bakery. Some things are always the same, no matter where you are.

We don our outside gear again and believe we are ready to leave to go see the tower, but Roberto laughs and tells us that warm clothing is only the start of the preparations. He diligently packs his rucksack and helps us to pack ours. So much gear just for an afternoon trip on a beautiful sunny day?

Roberto warns that the serenity is treacherous: here the weather changes really fast, from clear blue sky to heavy windstorms. The work of the scientists is not without risk - the Arctic can be merciless. Blizzards can strike any time and make it impossible to move, as everything becomes white, your tracks in the snow just disappear. Ice can break and swallow you into the icy water beneath. Every excursion has to be The nature here is spectacular in many ways. It is a very serene feeling to sit on the mountainside and listen to the quietness. prepared thoroughly. You have to take enough

such as GPS units, emergency food and shelter, a radio and a satellite phone for communication. It is important to never let the peaceful beauty trick you into a false sense of safety - even very experienced people have suffered bad accidents in the past.

After Roberto is satisfied with our preparations, we depart on snowmobiles and enjoy the journey through the snow. The landscape is breathtaking. And as if nature wants to test whether we were listening to what Roberto had said about dangers, we get stuck in the snow. The snow mobiles can only drive on a narrow strip. If you get to close to the water the ice might break and swallow you, if you are too far from the ice, the snow can be too soft and you get bogged. That's what has just happened to us.

While the crew tries to dig out the snow mobile, Roberto hands us the rifle to watch out for ice bears. After more than an hour we are still stuck and a polar bear seems to have taken notice of us. It comes closer and is quite interested. What are we supposed to do now? Shoot the bear? Nervous, we are about to alarm everyone, but fortunately the polar bear has already lost interest and strolls away. We feel quite relieved and are happy to move on when the snow mobile is finally freed. The Climate Change Tower is visible from afar, bright red dots move up and down along the scaffolding. As we get closer, we see that the red dots are the scientists in their thick red overalls.

Roberto introduces us to ANGELO VIOLA (58), who is responsible for the scientific activities of the Italian 'Amundsen-Nobile Climate Change Tower'. He describes his work to us and shows us the scientific instruments. In addition to the physical parameters of the atmosphere (wind direction, velocity, humidity etc.), the tower measures the vertical flows of the lower layers of the atmosphere. Those measurements are important, for example for calculating the deposition rate of the particles. From the top of the tower, we can see for miles across the white Arctic expanse, we have the world at our feet.

Another day dawns. We meet SEBASTIEN BAR-RAULT (35), the former leader of the French station, who is going to take us on a dog sledge ride. He takes out the huskies one by one, pets them and ties them in front of the sledge according to their position in the pack. It is easy to see that he loves those dogs.





As we travel along the shore of the bay, which is still largely covered with pack ice, we catch a short glimpse of a polar bear family in the distance, jumping over the cracks between the ice floes with surprising agility.

Our first visit to Ny-Ålesund is drawing to a close. Kim leads us to the Arctic Ice Bar, an igloo like bar completely made of ice and snow. It is only open on Saturday evenings, it is the social highlight of the week. Inside he introduces us to MASATAKA SHIOBARA (50), a scientist from Japan and JAI

PRAKASH CHAUBEY (38) from India. Most of the inhabitants we met in the mess are also gathered here. They are all joking around and telling some stories from their home countries. Clearly they are having fun, their laughter fills the room. We are welcome to join in, Roberto serves everyone a grappa. "Ice cold of course", he jokes, "there is no room to keep it warm."

We are sad to be leaving, we are starting to feel quite at home. But we will be back in summer, the time of the everlasting days.



There is no freezing of the fjord, because the water is warm and that comes from a general warming of the world...

When we come back a few months later, the place looks different. Kim welcomes us back. Although it is summer now temperatures barely reach five degrees Celsius. Cold for us, but warm enough for most of the ice to have melted. Kim takes our remark about the melted snow to introduce the next project concerning glaciers. There has been quite dramatic changes that he wants to show us the following day, but first we can move back into our rooms again. It is evening already but it is just not getting dark. At some point we have to force ourselves to go to bed. In the morning, Kim picks us up and we enter an airplane. We fly over the snow towards glaciers that have been shrinking for years now. When we arrive at one of the glaciers we can see how pieces of ice break off and fall into the sea. Kim shows us some pictures of the glaciers of 10 years ago, the

difference is significant. He explains to us that, for glaciers, the most important measure is the so-called "mass balance". Many glaciers on Svalbard have a negative mass balance. Each year more ice melts than forms. The glaciers are also an important recorder of the climate of the last thousands of years. The highest glaciers, where the mass balance is positive, are used for the collection of ice cores that are used to study the climate change. What kind of effect do melting glaciers have on our life in the rest of the world? And what does a changing climate mean for native animals?

Water A

We see the fjords completely freed of ice in the midst of the artic landscape. Birds go about their business, a fox makes its way through the snow. As climatic zones shift many animals and plants can follow their moving habitats... but what about animals in the Arctic zone? We will have to visit another project in the coming days.



A Dutch project studies migratory birds in the Polar region and the changes induced by the warmer climate. MAARTEN LOONEN (52), the Dutch station leader agrees to take the boat to get to a colony of birds. Since all animals feed on fish and plants, the accumulation of pollutants in plants as well as in the sea is transmitted to their bodies. The Dutch researchers are studying certain chemicals that deposit in the liver of birds. Another project looks at life under water. The water in the fjord has become significantly warmer; it defrosts much earlier now and influences the marine life.

CHRISTIAN LYDERSEN (57) of the Norwegian Polar Institute takes us to his project, he compares seal populations from the 80s with today and looks at climate impact on the population ecology of

ringed seals and polar bears. Our ship stops at a mooring. We can see seals jump into the water, we follow them underneath the ice.

Saturday evening brings a surprise: an Arctic party! NICK COX (60), the UK Station Leader, came here for the first time in 1978 and has been a regular guest ever since. He took part in the last dog sledge expedition in Antarctica and shares his passion for ice and snow with many scientists that have dedicated most of their professional life to the frozen land. He takes us out while telling us stories of his 35 years of experience. We enjoy his company and that of the Ny-Ålesund inhabitants. The population has grown, in the summer months more scientists come to Ny Ålesund to gather data. The population now numbers approx. 140.

There is an ethical problem with our relationship with nature.

All dressed up, we hang out with them at the bar in the mess building, from where we can watch the glacier through the panoramic windows. We chat and talk about music. As we all sit together, we have a chance of asking everyone to sing a song for us, a song that reminds them of home. What we wish to understand is: where do people feel at home? Where do they live and work? Where do they fell comfortable? What is the international cooperation like in the practice? The sound echoes back from the glaciers in the fjord as the evening takes its course.

The following morning we see the unique beauty and serenity of the Arctic landscape. We didn't even sleep, only our watch tells us that it is morning, it is still confusing. This place is special, that's what a lot of those people working here say. And it is true, a feeling of peace and quietness makes this place magical.

We accompany a French-German team of the AWITEV into the field. They study permafrost soil, which is defrosting more and more every summer. The frozen ground stores huge amounts of carbon dioxide and methane gases and scientists are afraid that this could be released into the atmosphere and speed up the warming process even more. For this reason it is important to study the plants that grow on the ground. We want to know more: where does the carbon dioxide come from originally, why is it stored in the ground and how much is there? This field of research is the new goldfield for scientists.

As temperatures are above zero degrees now, snow mobiles and skis are no longer required in the village, the inhabitants get their bikes out of the storage. But we notice quite fast that people don't use ordinary bikes here, they have e-bikes. E-bikes at the North Pole? King's Bay is responsible for all infrastructures and services here, so we ask them where the electricity comes from and how it is generated, how all the logistics work up here. They are a nonprofit organisation; they run the shop, the post office, and the hotel which is not for tourists but for guest researchers only. It is quite a task. "People who work here for the King's Bay Organisation live like in a bubble," explains BIRGI LINDIVIK HÅRKLAU (32) years old, one of the accountants of King's Bay, "You don't have to cook or to think about going to the supermarket after work, no traffic jams, no stress. Everything is organised and quiet, you don't need money because you can't spend it anyway."

We visit the tiny store that supplies the community with everything necessary for the life up north. The mail arrives once a week, nobody seems to be in a rush, there is time for a little chat. We take a break and enjoy a cup of hot tea outside, we gaze at the sea, the lifeline of the village.

It is quiet on the fjord, the water is calm. We see a few birds in a peaceful atmosphere. Out of a sudden a huge cruise ship enters the bay and drops anchor. Hundreds of tourists invade the small village, enter the store and buy souvenirs. This is in huge contrast with usual quietness of the place. For just a short time, Ny-Ålesund becomes chaotic. While the tourists bring money into the village and make all supplies for the scientists and permanent residents a little more affordable, there is also a negative side to the visits of tourist boats.

The dark smoke of the cruise ship takes us to the next scientific topic. Particles in the atmosphere and how global pollution has an impact on global warming and climate change. Why do particles contribute to a warmer climate? What are the consequences for the North Pole?

Kim decides to take us up the hill in a gondola to a station 474 meters above the sea. The surrounding landscape is spectacular. It is a beautiful day and Kim is smiling at us. Arriving on top of the mountain, Ny Ålesund shows all its beauty. Kim is briefing us about the Zeppelin Station's instruments and projects. He takes us to the platform outside, then inside





the building. Here all sorts of particles present in the air are being measured, he explains. As we leave the building, we have to sign a logbook. The instruments are so sensitive that our breath may influence the data. "Even someone smoking over one kilometre away will be registered," Kim tells us. So cruise ships constitute a serious problem to the experiments. Apart from the pollution itself, the impact of the ships falsifies the results of measurements and makes them useless. The advantages of being in the middle of nowhere are the pure results of measurements. Additionally, tourists might not be aware of ongoing experiments. More than once loads of people just walked over areas where research was being conducted and destroyed the setup. Therefore not everyone is entirely happy with the visitors. As we look at all this machinery Kim explains: "In order to understand what is happening, we must look at what is natural, what is man doing to greenhouse gases, to aerosols and particles. We are hopefully able to separate the natural from the human-induced, and then we can make better statements about how much is our responsibility and how much is just natural variation." Does that then allow us a look into the future? In the evening it is time to draw some conclusions and combine research results from the international cooperation. The teams get together, and discuss their data. There might be some communication problems at times, but different nations working together will bring huge advantages. Know-how is shared and scientists improve and learn much faster. After all, climate change is global and doesn't stop at borders.

We have made ourselves responsible for the loss of habitat for many specialized animals and plants.

After so many impressions of the village, we almost feel like home! But we will have to leave soon. Back in the village, we wonder what happens in winter when the tourists and most scientist have left? What is it like to live in the dark and only see the same 35 other people for several months? Who has to stay and why? What do you do when there is no natural light? Time for our last interviews before leaving.

We see the sun going up and down without drop-

ping below the horizon, the tourists go back to their ship and leave. Most of the scientists pack up, only a few people are staying. The last ship arrives with all the winter supplies before the ice cuts off the island from the rest of the world. For three months the villagers will have to live off the supplies that are brought over from the mainland. Everything has to be planned in advance: how many people are going to stay, for how long, what do they need? Meat, fruit, pasta, drinks, toilet paper and soap... Climate has always changed, will always change, but the question is: Are the changes we are making so large that we are influencing our ability to grow food, have houses?

> This is a vulnerable place, a place to protect. How can we realistically contribute to saving the planet and slowing down global warming? In Kim's opinion we have to reconsider our general relationship with nature:

> "We have made ourselves responsible for the loss of habitat for many specialized animals and plants. In other parts of the world they can maybe move as climate changes but these very special species that live here that are dependent on the sea ice, have nowhere to go, and it is our responsibility that they are losing habitat, so there

is an ethical problem with our relationship with nature."

Cooperation seems easy here. People help each other, work together and solve problems together. Climate change is a global concern and unity is the only way of facing the challenges of the future. If international cooperation works so well in small habitats, why not reproduce this system at broader levels? Can't we transfer the concept onto politics and act as one?

The sun sets for the first time in months. The next winter is approaching fast...



VISUAL CONCEPT

On our way towards Ny Ålesund we come across icebergs, glaciers, pack ice and finally arrive in the small colourful village. Aerial shots introduce us to the rich nature and wildlife of the Arctic.

We want the 3 D shots of fjords, glaciers, arctic animals such as birds, polar foxes and polar bears to interact with the different research projects and the interviews. The projects we will accompany will take us under water, onto the ice and into the atmosphere. All three elements (air, ice/ soil and water) will be visually told in 3 D, always in connection with the respective research group. We will be face to face with the incredible nature in 3D, as if the viewer is part of the group of scientists. We want to work with calm and smooth camera movements, interweave the shots rhythmically with pictures of the village, the interviews and the scenes where the viewers can observe the day-to-day life in the village and the research being conducted.

The Arctic is a world in decline. It might seem far away but it affects everyone. We want to show its beauty and raise awareness before it is too late.



After having seen the northern lights for the first time in Iceland I've been magically drawn to the far North. Even in my childhood, I was fascinated by the story of Umberto Nobile's journey to the North Pole in 1928. He started his flights from Ny-Ålesund, back when the place was still inhabited by coal miners. When the CNR offered me the chance to visit Ny-Ålesund as a filmmaker and conduct research and interviews with scientists, I did not have to think about it twice: I packed all my warmest clothes straight away. Ny-Ålesund is not only a magic place, it is also unique. It is one of the most important labs for climate scientists from all over the world. The international character of the village, in the midst of ice and snow, makes it visually amazing. Far away from our "civilized" world it truly represents wild nature, with 100 polar bears per inhabitant.

The Arctic plays a major role in all climate models. It is the first place to be affected by global warming and has a direct effect on the rest of the world. One climate summit after another passes, but still we need to find out what exactly is happening to our climate. I am investigating this question and collecting more and more information. Soon it be-

comes very clear to me that Climate Change isn't just an abstract thing up here in the north: it unfolds right in front of your eyes, and affects so many lives all over the world.

It is a journey into the beauty of the Arctic, into a part of this world that has remained largely untouched by humans. Now this region is threatened by climate change, a change for which we are partially responsible. What will the future of our planet be like, what are possible scientific scenarios? What can we do to save the Arctic? Those are the central questions of our journey.



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