

Topic 2e - Using field observations and GPS to validate ice sheet dynamics

Swiss camp was actually a training ground. I put it up to make measurements for the local climate in 1990. And we were here-- eight people. Seven of them were students and then usually an adviser. And that's where they learned-- a lot of them actually are physical scientists. That means they are modellers or physicists to understand processes.

I wanted them to do hands-on measurements-- how difficult this is actually to make a snow pit to understand the change on site. Because if you model something, does not even mean the model is correct. I wanted them to understand how accurate is it when they say we can measure surface temperature by 0.1 degrees. It's not true. We cannot do that. We hardly have any instruments that are that accurate over large scales. So it is important to understand what can we do and what is feasible for the modelling.

It's an ideal experimental site. And it's ideal because you can come back and as you can see, you find an infrastructure that's worth maintaining. It is still extreme. What you see today is not what we have every day. We are having open jackets, no gloves. The last two days we had blowing snow here. You could not even see the boxes next to us, it was so bad. So this is an exception. It needs dedication. If you do the measurements here-- these are outdoor people. Usually mountaineering people. So it is a combination of skills.

Since I have been here 25 years, I have seen a lot of changes of these glaciers that are moving out. They accelerate-- most glaciers along the west coast of Greenland have doubled its velocity, or even tripled. Jakobshavn isbrae is moving now by 18 kilometers every year into the ocean. It is the fastest moving ice stream on this earth. It will never be a substitute, even with all the technology we have from space or unmanned vehicle. You need to have point measurements. Not so just for the measurements but for understanding a process. If you sit in a plane or you make measurements from space, you don't really see the microstructure of snow. You have to record it. And that's how you understand the process.

A good example is actually our GPS units we installed here. GPS is a instrument that measures velocity by the centimetre accuracy and height change. And through these measurements we understood that during the summer the Greenland ice sheet-- which advances every day 33 centimetres-- in the summer time, it advanced 60 centimetres. Or in the last few years, up to 90 centimetres. And that acceleration in the summer was due to the melt water that had actually penetrated through the ice, lubricate the underside of the ice for short periods, and then made it move faster towards the coast.

And this is not something you understand from space. You only see the result. You see the fast motion. You have to know why is it and that's why you make these measurements-- to understand processes.