



Hand manual

Field day for wintry nature in Manamansalo

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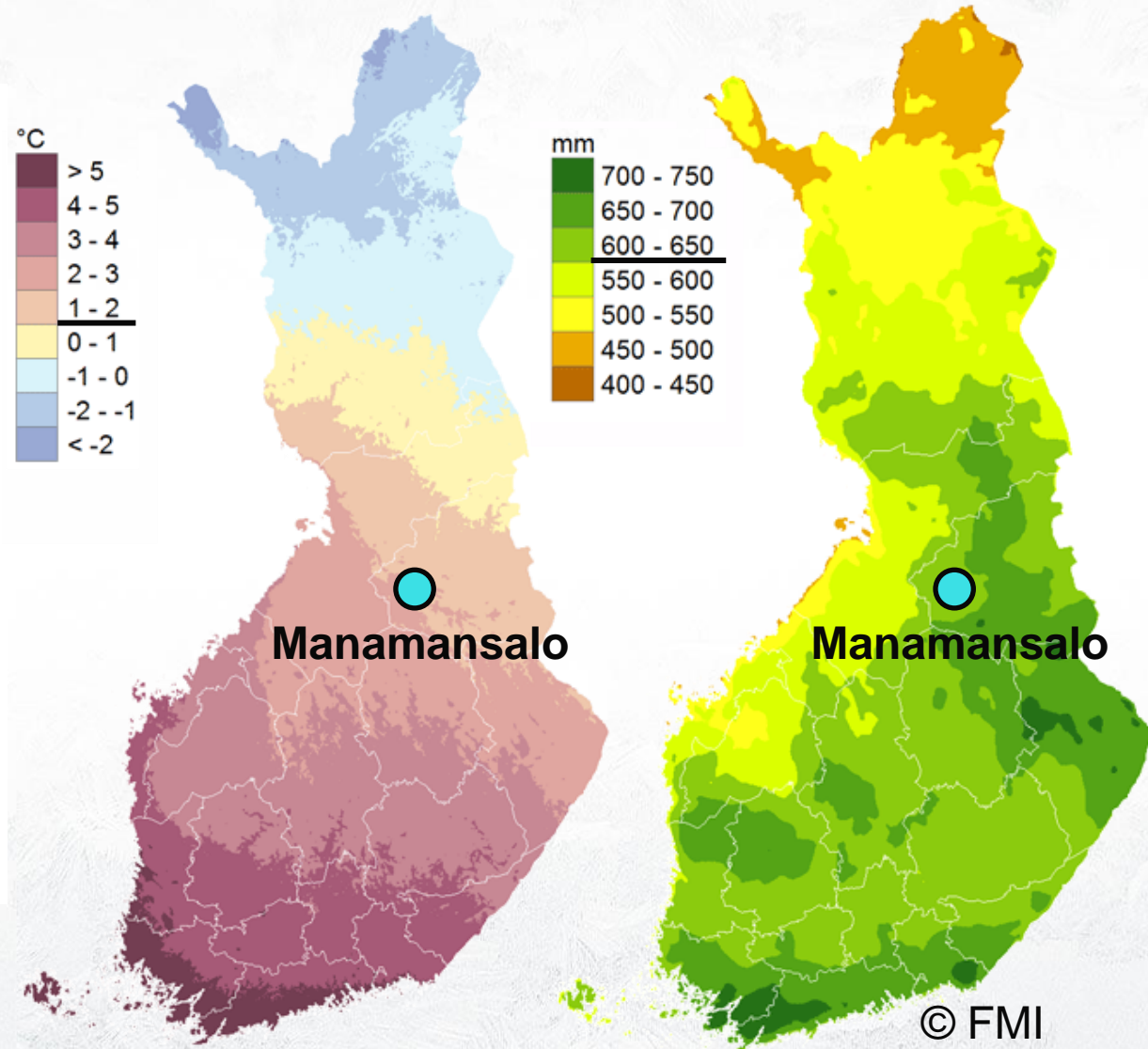
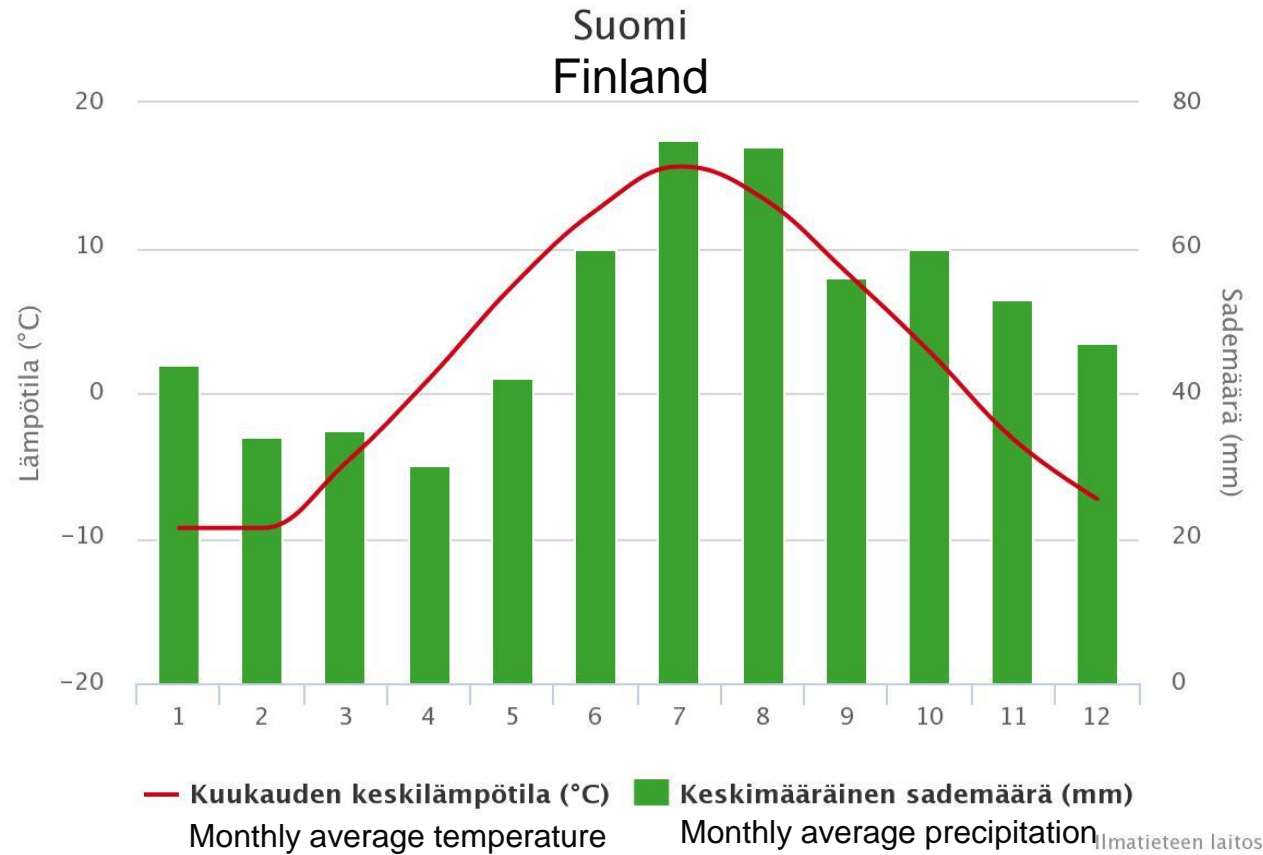
Erasmus+



A serene winter scene at sunset. A person is crouched on a snow-covered beach, building a fire. A plume of white smoke rises from the fire. The sun is a bright, glowing orb on the horizon, casting a golden light across the water and snow. The sky is a mix of orange and blue. In the foreground, there are snow-covered dunes and the dark silhouettes of trees. The word "Theory" is written in a large, white, sans-serif font across the middle of the image.

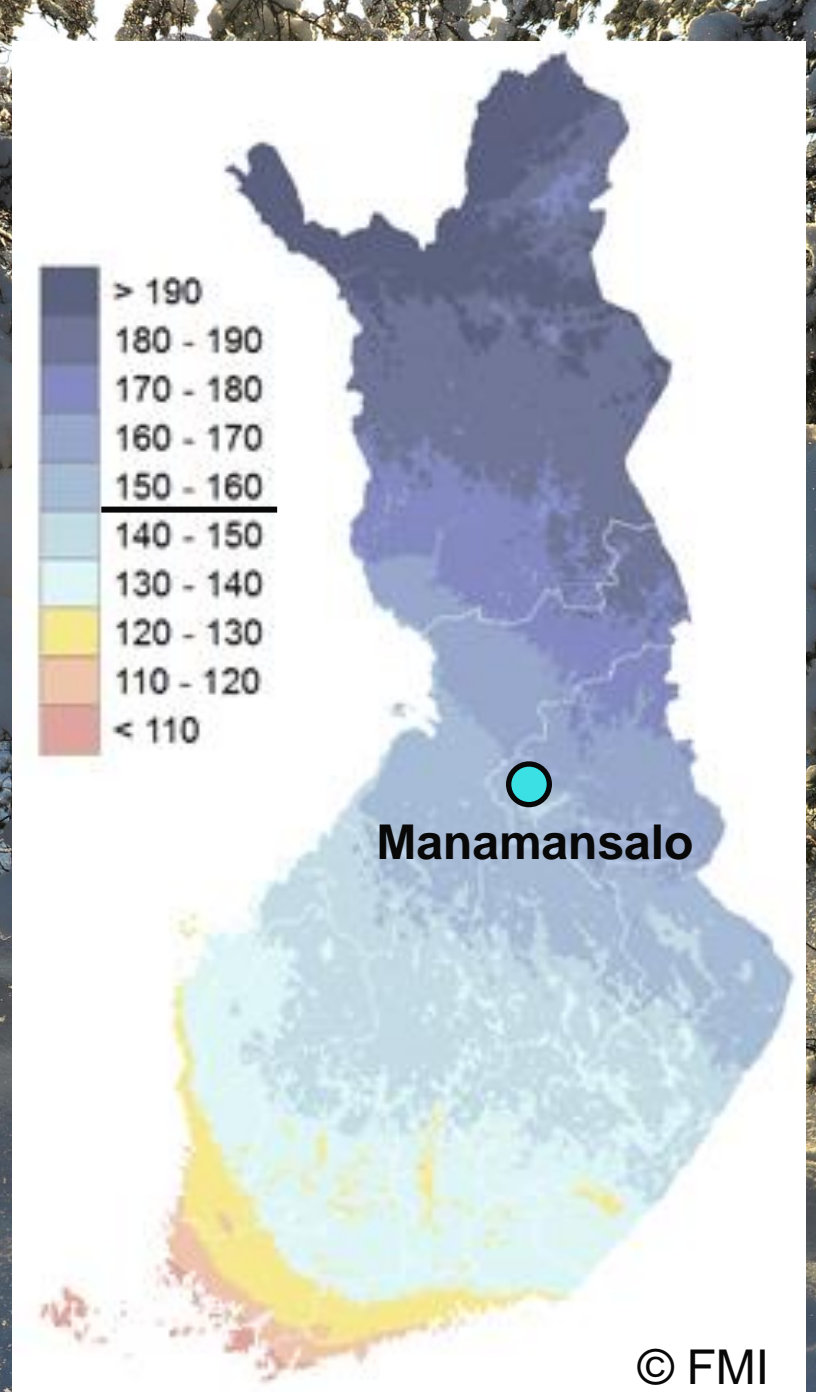
Theory

Average climate in Finland 1981-2010



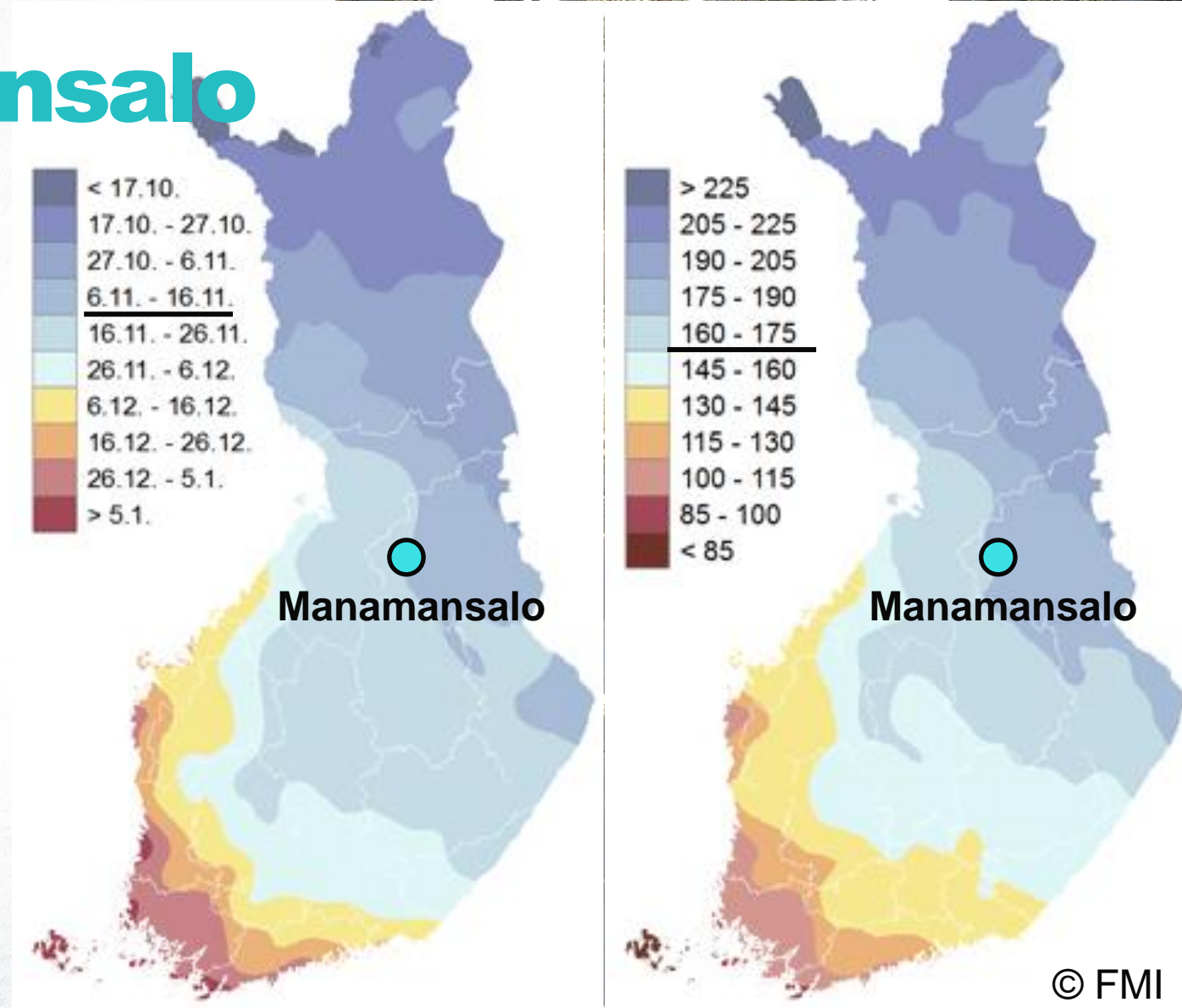
Winter in Manamansalo

- Meteorologically winter is determined by average temperature values.
 - Thermic winter = average temperature stays below 0 degree Celsius.
- The length of thermic winter in Manamansalo is ca. 160 days.
 - Locally, Lake Oulujärvi decreases the length of thermic winter couple of weeks.



Winter in Manamansalo

- Stable snow cover usually falls in mid-November.
 - Length of stable snow = the longest period of time when ground is covered by at least 1 cm snow cover.
- Snow cover time in Manamansalo is in average ca. 170 days.

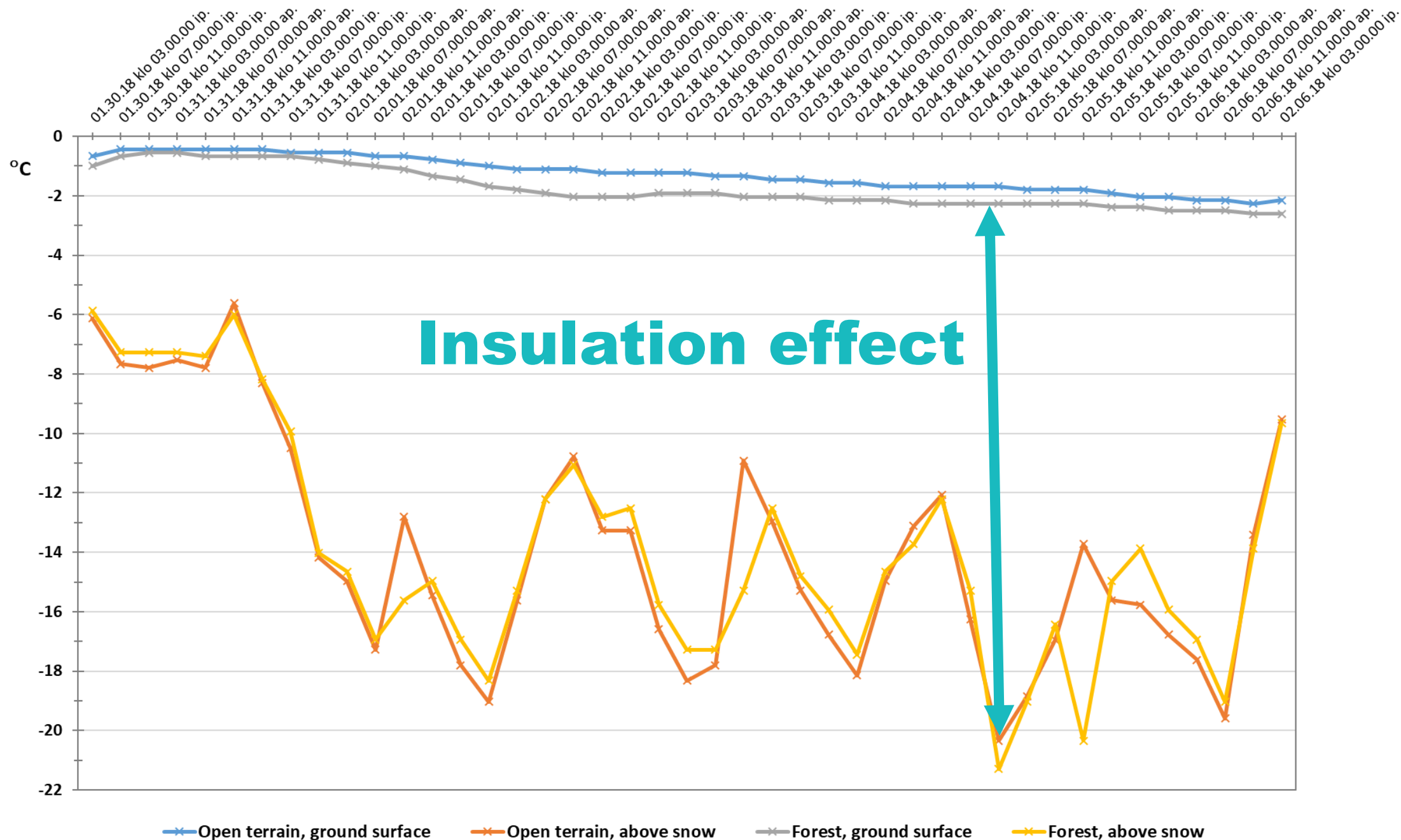


Snow

- Two main elements:
 - Water (ice crystals, liquid water).
 - Air (pores).
- Density = Weight per volume (kg/m^3).
 - Fresh snow ca. 100 kg/m^3 , or $0,1 \text{ kg/l}$.
 - Compacted snow ca. $500\text{-}600 \text{ kg/m}^3$.
 - In windy places even 800 kg/m^3 .
 - Strong wind, warm temperature (>0 degrees) and gravity increase density.
 - Density affect to rate of insulation.
 - Insulate = not conducting heat
 - Compare: winter clothes

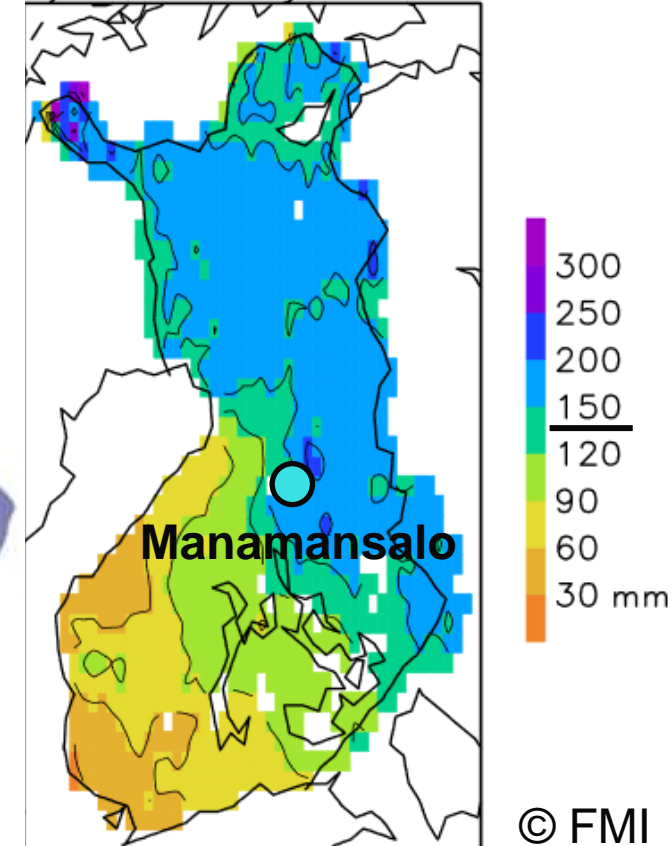
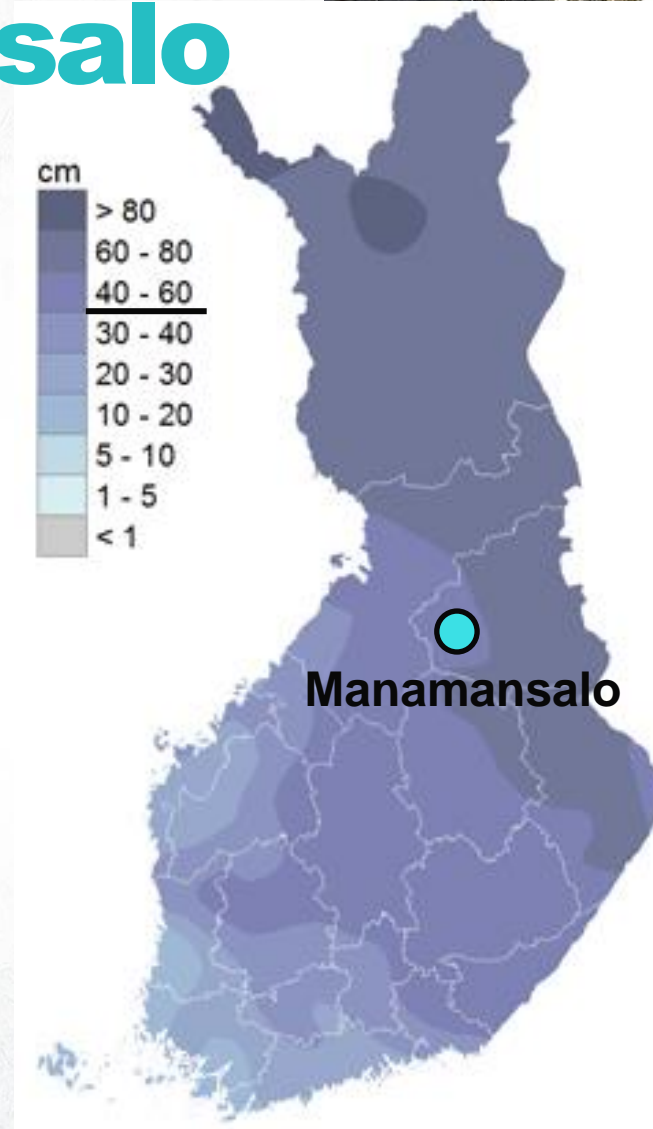


Temperature curves in two different places under and above the snow cover

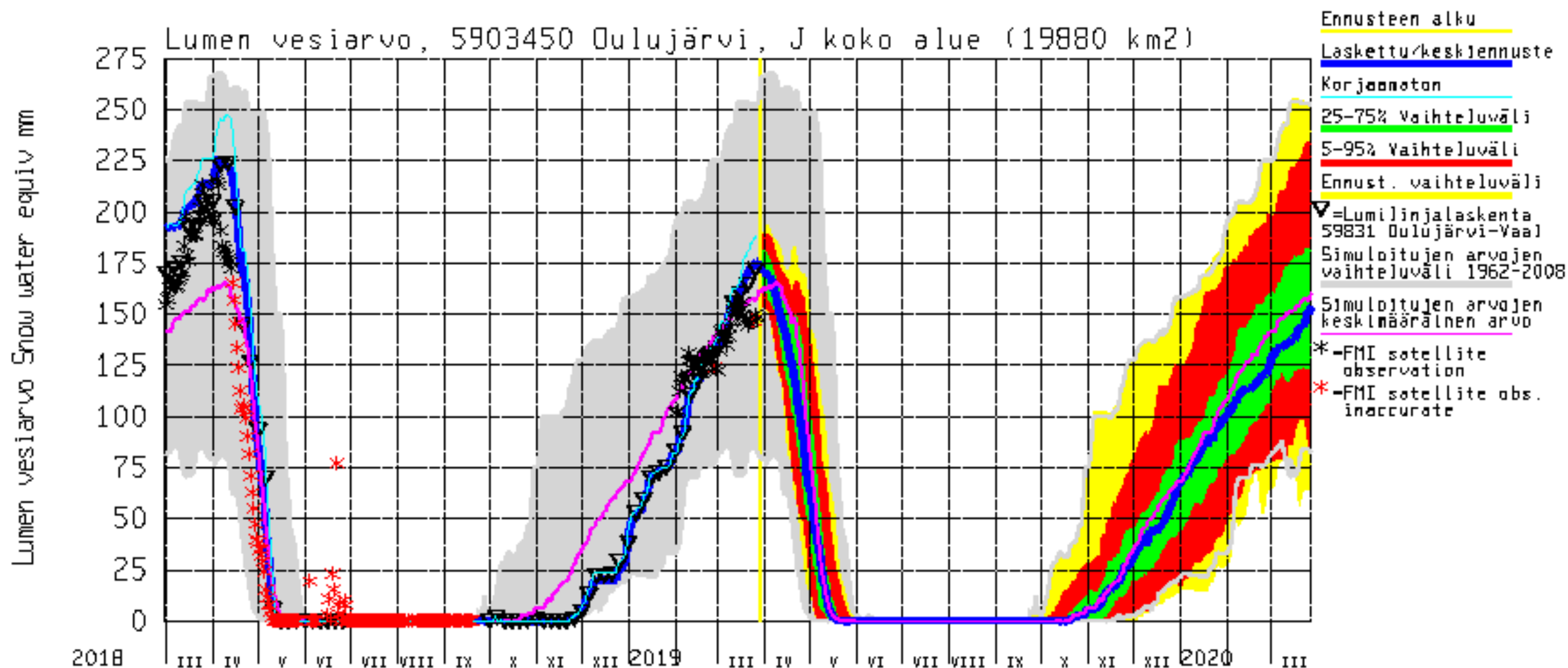


Winter in Manamansalo

- The average maximum snow depth is ca. 60 cm.
- The average maximum SWE is ca. 150-200 kg/m³.
 - SWE = Snow Water Equivalent
 - **SWE = water content in snow** (in millimetres or in kilograms).
 - Usually: kg/m³



Variation in snow water equivalent

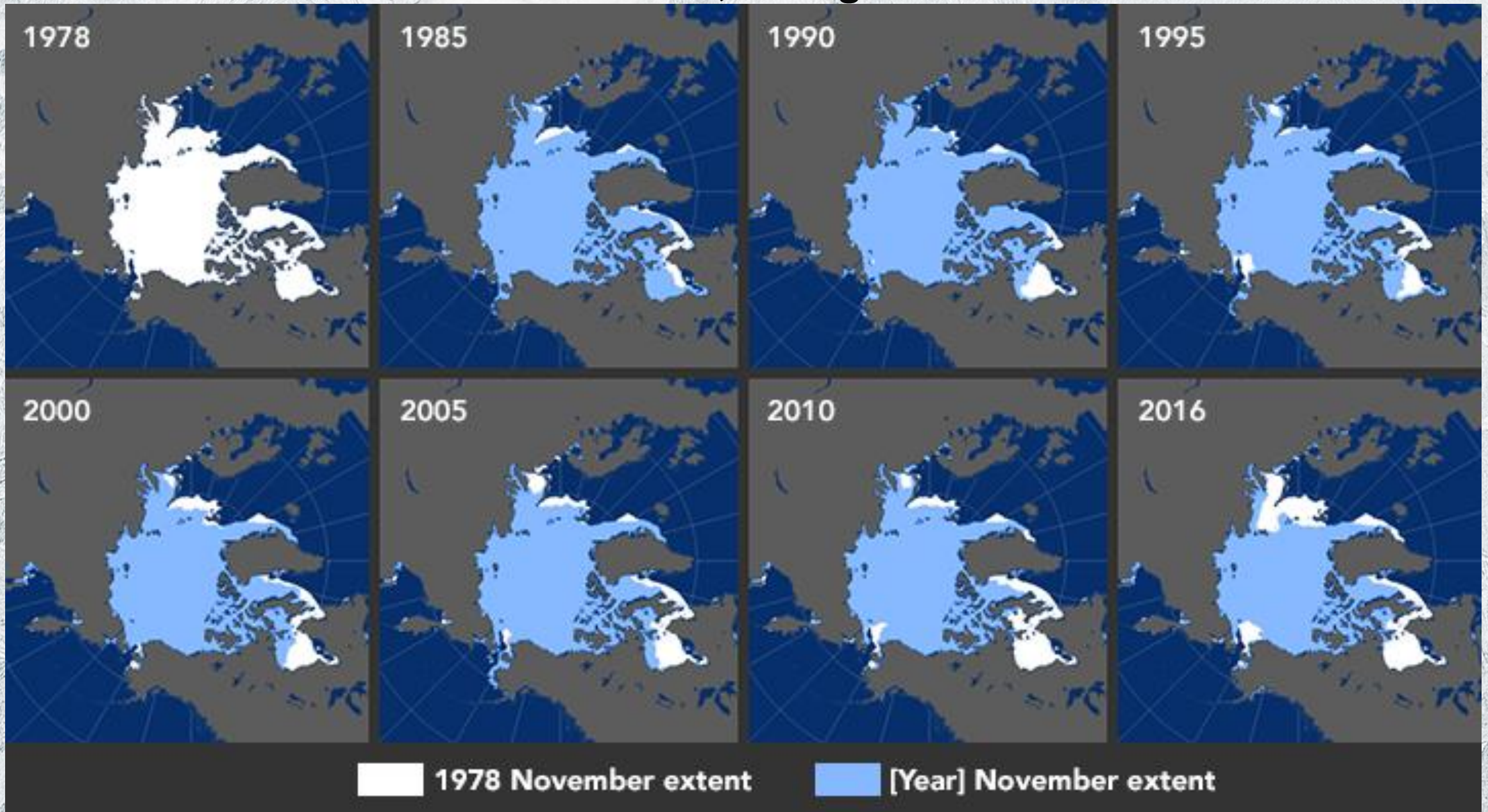


Ice cap

- **No ice** = No visible ice on water.
- **Partially frozen** = The visible part of lake, river or sea is partially frozen.
- **Continuous icecap** = The whole visible part of the waterbody is frozen.
- **Thickness of ice** (unit: centimetres):
 - **Ice** = Thickness of the whole icecap.
 - **Water** = Depth of free water below the icecap.
 - **Porous ice** = Thickness of porous ice layer (weak ice layer with lots of air bubbles).
 - **Bright ice** = Thickness of hard, transparent ice layer.
 - **Snow** = Depth of snow above the porous ice.
- **Constant icecap** = Exact date, when waterbody got continuous ice cap.
- **Ice run** = Exact date, when the icecap cracks and began to move.
- **Iceless period** - Exact dates, when there is no ice visible anymore.



Arctic ice sheet extent; change from 1978-2016.

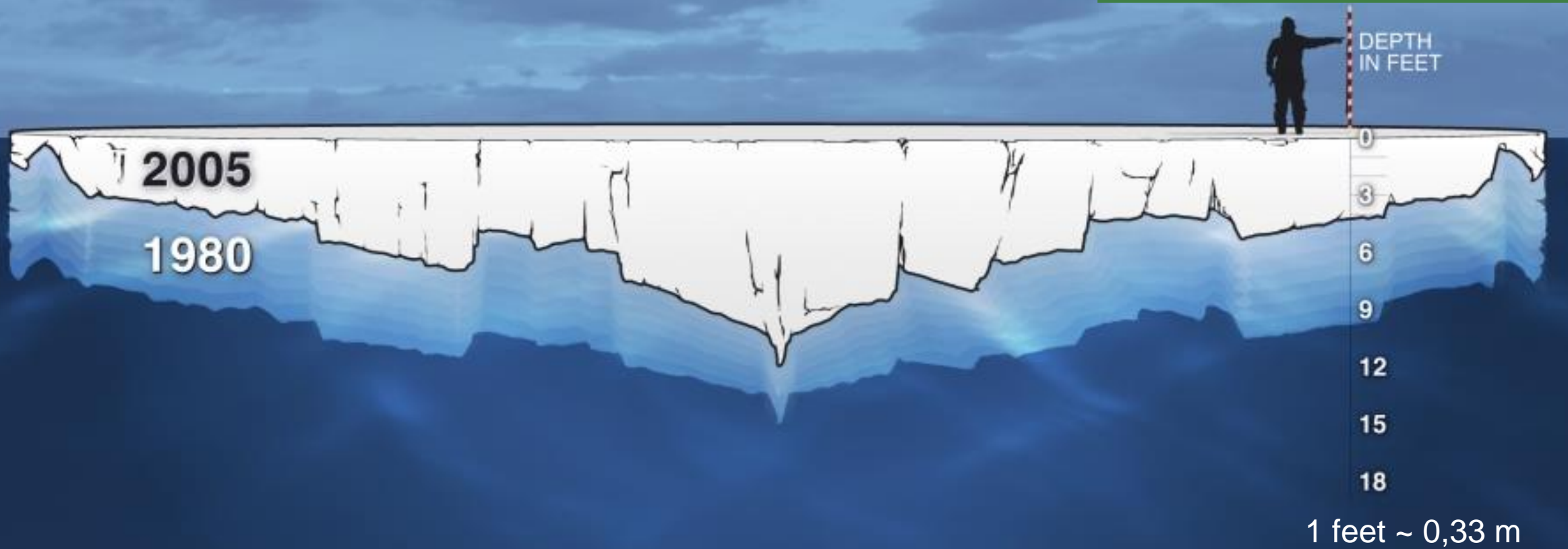


Arctic Sea Ice Is Thinning

Ice depth levels in autumn

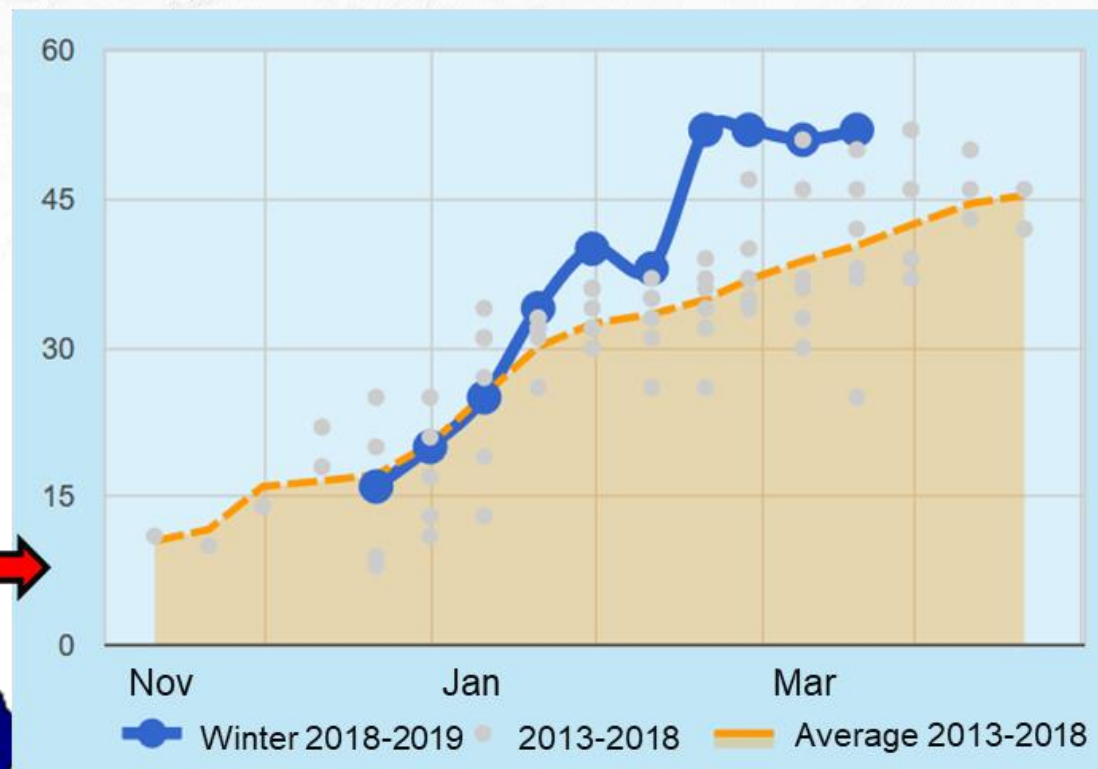
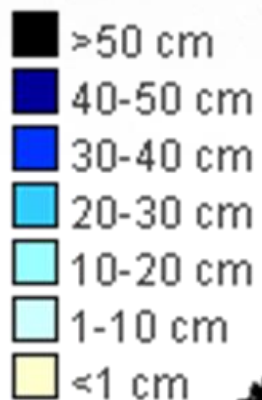
-1.07 million km²

The Arctic's sea ice extent has shrunk in every decade since 1979, with 1.07 million km² of ice loss every decade.
- *United Nations Development Program*



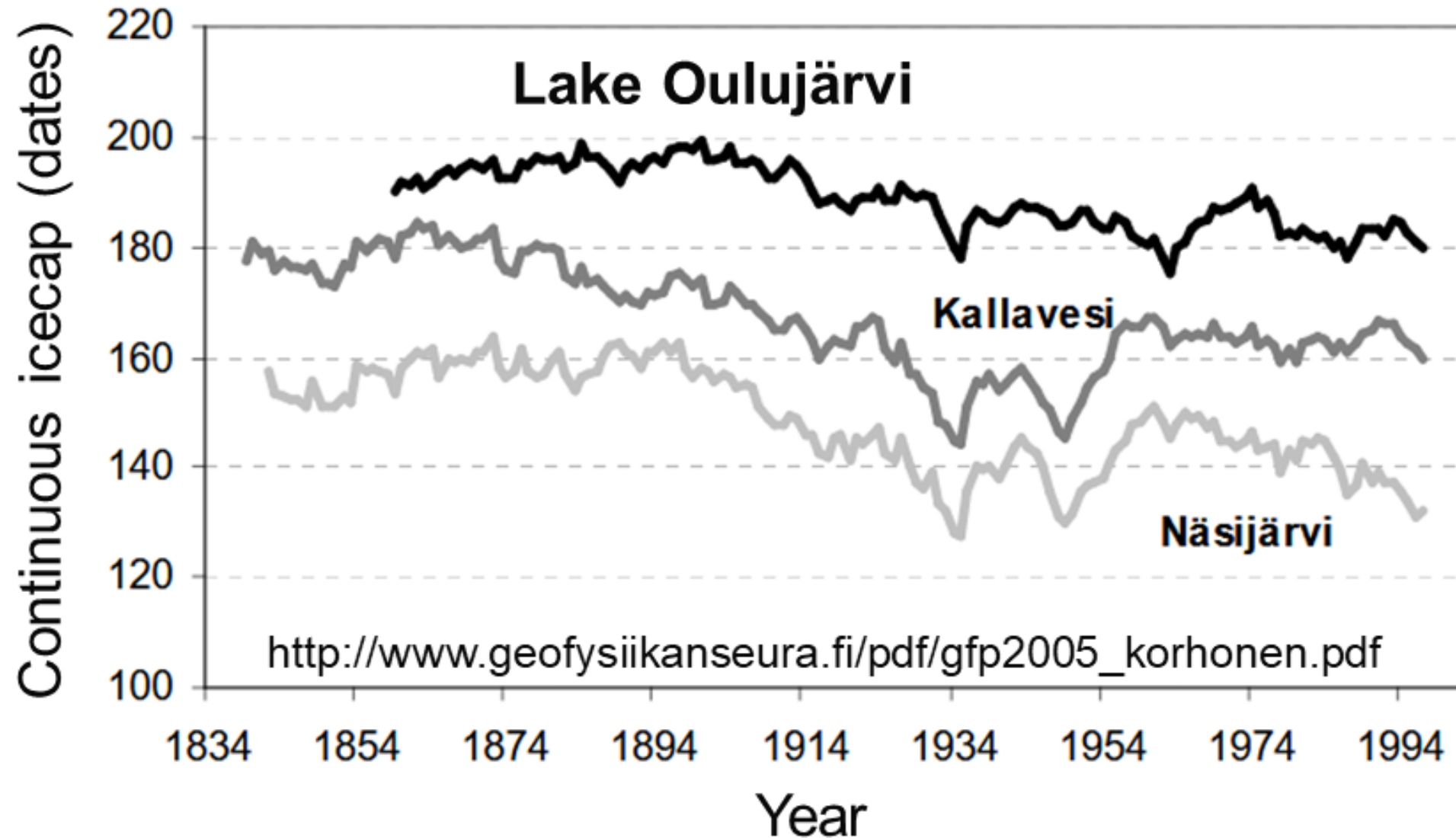
Ice thickness in Lake Oulujärvi in winter 2018-2019 compared to longer term average.

27.3.2019



[https://www.jarviwiki.fi/wiki/Ouluj%C3%A4rvi_\(yhd.\)/Ymp%C3%A4rist%C3%B6hal
linnon_havaintopaikka_\(Manamansalo,_j%C3%A4%C3%A4tilanne\)](https://www.jarviwiki.fi/wiki/Ouluj%C3%A4rvi_(yhd.)/Ymp%C3%A4rist%C3%B6hal
linnon_havaintopaikka_(Manamansalo,_j%C3%A4%C3%A4tilanne))

Average duration of continuous icecap in some Finnish lakes.

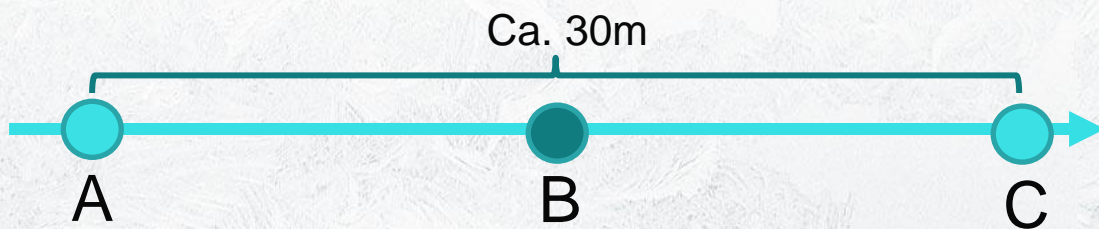


A photograph of two children standing in a snowy landscape. The child on the left is wearing a dark hooded jacket and pants, holding a smartphone up to take a picture. The child on the right is wearing a dark jacket with a fur-lined hood and blue pants. They are standing on a snow-covered ground with footprints. In the background, there is a dense forest of snow-covered trees under a blue sky with light clouds. The text "Working instructions" is overlaid in the center in a large, white, bold font.

Working instructions

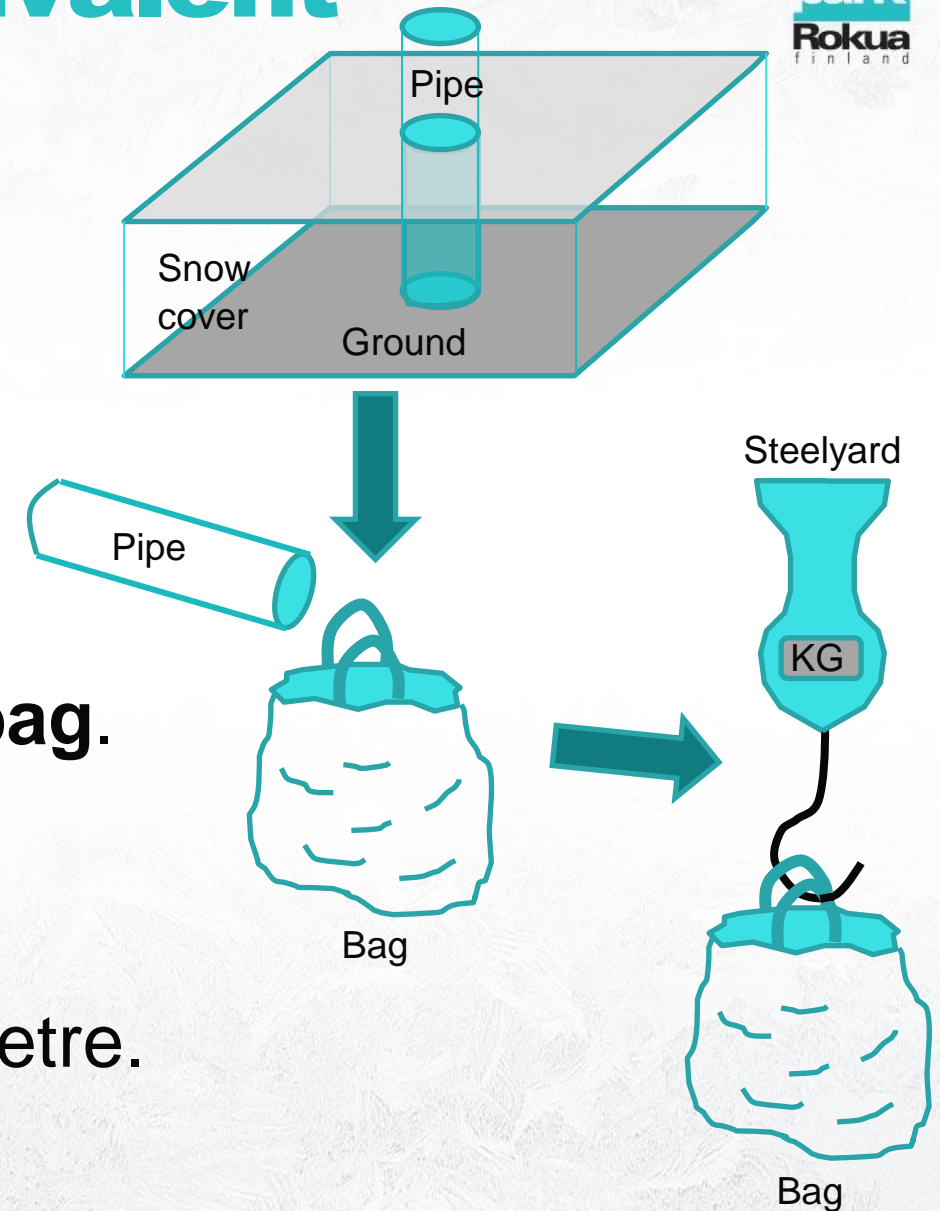
Measuring snow depth

1. **Select ca. 30 metres line.**
 - Snow cover should be untouched.
2. **Measure the depth in 3 points (A-C).**
 - In the beginning, in the middle and in the end of the line.
3. **Push the wooden liner until it hits ground.**
4. **Read value in the stick.**
5. **Write the value in the worksheet.**



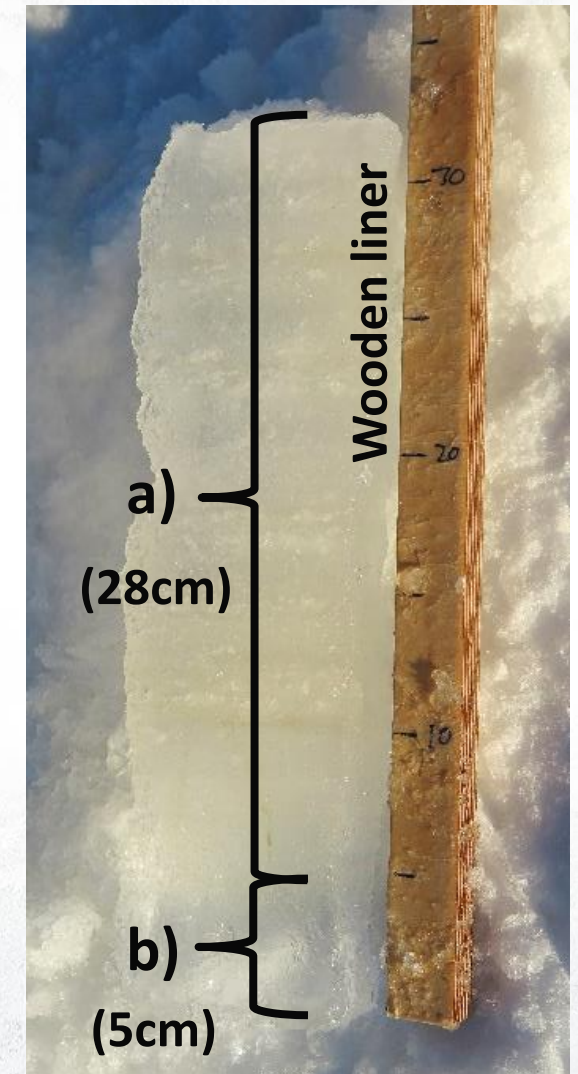
Measuring snow water equivalent

1. Use the same line as for snow depth.
 - Measure SWE in the middle of the line.
2. Push the pipe until it hits ground.
3. Polish one side off snow with shovel.
4. Push a shovel under the pipe.
5. Rise and empty the pipe to a plastic bag.
6. Weight the bag with a steelyard.
7. Write the value in the worksheet.
8. Calculate snow load per one square metre.



Measuring ice cap

1. **Select two measurement points.**
 - Near shore and long distance from the shore.
 - **NOTICE: Make sure it is safety to go on ice!!!**
2. **Drill a hole** through ice cap. If possible, take a sample of ice using an ice saw.
3. **Measure total thickness** of ice cap. Mark the value in your worksheet.
4. **Measure the thicknesses of** (look the picture):
 - a) *Porous ice* (in picture: 28 cm),
 - b) *Bright ice* (in the picture: 5 cm).
5. **Mark the values** in your worksheet.



Observing animals' foot prints



Squirrel



Fox



Willow grouse and hare

Observing animals' foot prints



Wulf



Lynx



Ermine and Marten

Notes