

THE PERMAFROST IS THAWING. BUT HOW FAST?

The permafrost is thawing, but the implications are unclear, says the IPCC report that came out last week. The thawing process is complex, as ecologist Monique Heijmans knows.

No ecosystem stands to suffer more from the warming of the earth than tundra and taiga regions with permafrost. This is clear from the latest report of the Intergovernmental Panel on Climate Change (IPCC). Even if the warming remains below two degrees, by the end of the century one quarter of the permafrost's top layer (up to four metres deep) will have thawed. It melts and rots away, with huge emissions of greenhouse gases as a consequence.

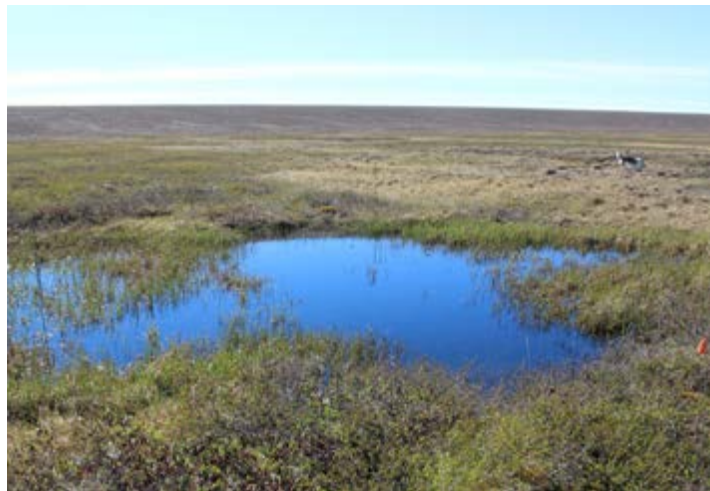
But there is plenty of uncertainty in the climate models. That is because numerous factors influence the thawing process, says Heijmans. She has been doing research in Yakutsk in the far northeast of Russia since 2007. She was there again this summer to help her PhD student Rúna

Magnússon. Magnússon is doing research in the delta of the River Chokurdah on the link between the vegetation, climate change and the state of the permafrost. 'The ground is thawing because of the warming,' explains Monique Heijmans is 'That is the direct impact of climate change. Precipitation plays an important role in the thawing process too. The first evidence of that was provided by the wet summer of 2011.

'Besides warming, precipitation plays an important role in the thawing process'

In that year, the thaw was more severe than usual: 30 centimetres as opposed to the normal 20-25 centimetres. So last year we started a trial in which we water the permafrost to imitate a wet summer.'

The additional water caused additional thawing now too. Not only last year when the permafrost was



▲ In the tundra region in Yakutsk, Russia, WUR ecologist is doing research on the thawing of the permafrost.

watered, but this year as well. 'The thaw lingers on,' concludes Heijmans. 'It's possible that the additional thawing causes the ground to subside, because the ice layers in the permafrost melt away. Satellite photos confirm this idea: we are seeing more water in our research area.' Due to the thaw, the vegetation that used to grow there drowns in the pools that form. This finding contradicts the idea

that the warming of Arctic regions will increase vegetation. Although that could still be true, Heijmans thinks. In the pools that form, the normal succession of species gets under way, from water plants through peat moss to shrub vegetation. 'So recovery seems possible. The only question is which process goes faster: the thaw caused by warming or the growth of vegetation in the pools.' **✎ RK**