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Chilling workshop

Hannu Mourujärvi | CSC

The Elmer/Ice workshop at CSC in November brought together scientists specialising in glacial modelling. Some dozen scientists around the world participated. The participants came with their own case study that was tackled with the help of CSC's Elmer specialists. The three-day event was a combination of workshops and lectures.

ELMER uses the finite element method (FEM) it is excellently suited to cover both aspects, fluid- and solid mechanics. The increased resolution of these models bring along that Full-Stokes ice sheet models have to utilise high performance computing (HPC) facilities. The parallel version of Elmer performs well in runs utilising several hundred processors simultaneously, opening the possibility for high resolution simulations of continental size ice-bodies, such as the Greenland ice sheet.

The workshop was aimed at advanced users of Elmer/Ice and for solving glaciological conundrums. The workshop was a good chance to meet the Elmer specialists and new features were covered.

Simulating Midtre Lovénbreen

Ilona Välisuo gained a Master's degree in geophysics researching the physics of snow and ice. She then moved onto meteorology and is now a post-graduate student at the Finnish Meteorological Institute.

"The main focus of my studies is in investigating the connections between weather and climate conditions and the surface energy and mass balance of glaciated areas. My current research activities consist of simulating the effects of temperature and precipitation forcing on Midtre Lovénbreen, Svalbard, using the Elmer glacier model and weather observations."

For her the workshop is a good chance to meet other Elmer users as the community is quite small in Finland.

"This workshop gather the Elmer/Ice community. There are lots of young scientists like me and this workshop is a great opportunity to update my Elmer-skills. A lot of new features of Elmer have been introduced here and it's good to keep up ▸

with them in order to get the most out of Elmer/Ice." She adds.

Like other participants she has her own computer and Elmer/Ice installed with her, but she is planning to run Elmer on CSC's computers: "CSC's computers do not run out of storage space and I don't need to maintain and update it myself."

At the source of glacial floods

Tómas Jóhannesson is studying outburst floods from subglacial water bodies below the Vatnajökull ice cap in Iceland. There is a large subglacial lake that releases floods every three years. The lake is formed by a geothermal area in the crust below the ice cap. Glacial outburst floods are called jökulhlaups and they can cause severe damage to roads and bridges. These floods are not exclusive to Iceland, but occur also from glaciers in Norway and Greenland.

"With Elmer/Ice I'm modelling the flow of ice towards the geothermal area where it melts. We get to carry out hands-on experiment with the help of Elmer specialists. In this workshop, we come with our own problems that we have worked on at home and leave with solutions."

For him, Elmer/Ice is necessary in order to understand the dynamics of the ice flow. Hi says that the effect of water between the ice and the bedrock on glacier flow is the hardest nut to crack in glaciology. The water pressure and the overburden pressure of the ice are important as is the moving boundary between ice and water and the point where the ice loses contact with the bedrock. Glacial hydrology becomes more and more important as people learn how ice moves. Simulations are needed to understand better what's going on, but the scientists do not rely on simulations alone:

"There are instruments on land and on the ice to measure when the flood starts and how it develops."

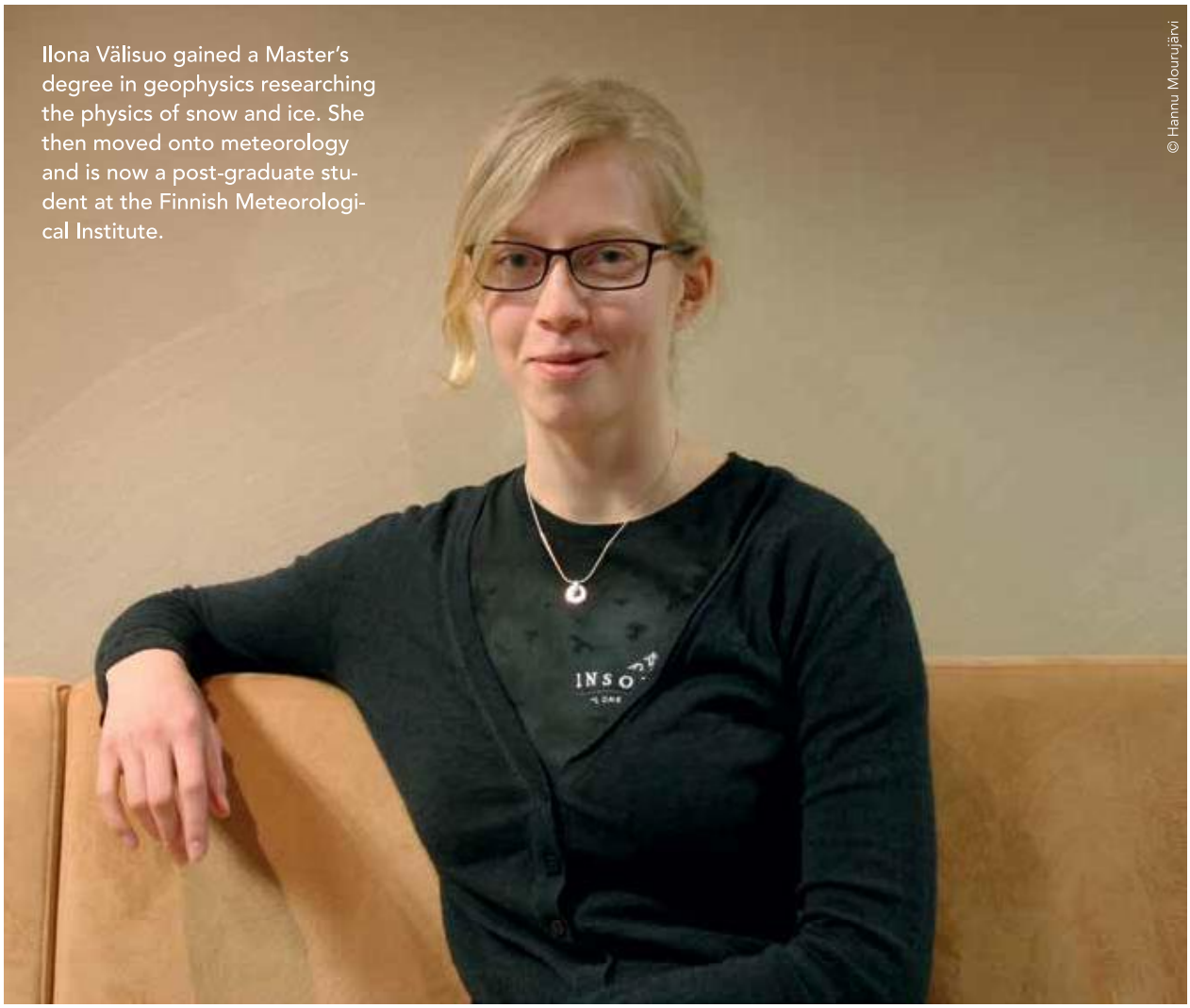
According to Jóhannesson, the face-time with Elmer specialists is the key to the workshop: "It is very fortunate to get direct access to Elmer specialists like **Thomas Zwinger** and **Peter Råback**."

"Although this is a three-day seminar, some people are staying longer. I am a starter amongst these more advanced Elmer/Ice users." He adds.

According to him, the seminar is well organized and the facilities are excellent. "The participants come here with Elmer on their personal computers or they can use it on computers provided by CSC. We also have Elmer accessible on a CSC supercomputer. Everything we need is available."

"Most Elmer users are impressed by the level of support that Elmer is given by CSC, considering that it's open software."

"The ongoing development effort is impressive. Many software packages that are developed at this high level are proprietary and you have to belong to a group or pay for a licence." Jóhannesson adds.



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