

## sDiv working group meeting summary

### sTreelines

#### Spatial pattern emergence from ecological processes at alpine treelines: model-supported hypothesis tests against globally-distributed field data

The overall aim of the sTreeline workshops is to synthesize process knowledge on treeline ecology and biodiversity in a spatially-explicit model and to compare emerging patterns with data collected at treelines globally.

As the main output of the **first sTreelines workshop** we developed a conceptual model, the core of which was ready to be translated into computer code and tested.

**Between the first and the second workshop**, we obtained DFG funding to appoint a researcher to work on the implementation of the model. In September 2019, Lukas Flinspach started his PhD and already managed to improve the implementation of the model in NetLogo to a level that it could be used as a basis for our discussions in the second workshop in November.

In the **second sTreelines workshop**, we explored the processes implemented in the model, improving them at a conceptual level and starting to implement them in the NetLogo model. This process is still ongoing, but it got an enormous boost through the shared thought processes at the sTreeline workshop.

Inspiring presentations were provided by two new group members, Frank Hagendorn ("The dark side of treeline ecosystems: how the belowground shapes treeline dynamics") and Pavel Moiseev ("Treeline advances in untouched areas of the Ural mountains" and "Climate-induced dynamics of woody vegetation in mountains of the Russian Subarctic"). The rest of the workshop was dominated by joint brainstorming and brainpicking to adjust the model processes and to discuss the patterns that we would like to define in the model output and the different levels of field and remote-sensing data holding different types of pattern information that could be used to calibrate the model with for different regions. We decided that staying together with the group was most conducive to this process and cancelled the planned group breakouts.

The main output of the workshop is an improved conceptual and implemented model, which will form the basis for further development and cooperation. The workshop also provided a new impulse for the revision of a manuscript providing a general descriptive framework of global treeline patterns, which is foundational to our modelling work. A first manuscript about the model itself is planned for 2020.

So far (Feb 2020), the modelling ideas have been included, and the synthesis group presented, in several conference contributions:

- Bader, M.Y., H.L. Buckley, B.S. Case, *et al.* Poster: How to model the emergence of spatial patterns in alpine treeline ecotones? *Annual meeting of the Arbeitskreis Hochgebirge (DGfG special-interest group on High-mountain research)* (Feb 2019, Augsburg, Germany)
- Bader, M.Y., F. Döweler, B.S. Case, *et al.* Symposium talk: Understanding global variation in treeline spatial patterns: a community database and spatial process model. *15<sup>th</sup> annual Conference of the International Biogeography Society* (Jan 2019, Malaga, Spain)
- Bader, M.Y., H.L. Buckley, B.S. Case, *et al.* Talk: Modelling treeline spatial pattern emergence to understand global variation in treeline dynamics. *Annual meeting of the Arbeitskreis Biogeographie (DGfG special-interest group on biogeography)* (May 2019, Frankfurt, Germany)
- Bader, M.Y. Workshop talk & poster: Effects of climate change on treeline elevation: how to use spatial signals to predict temporal changes? *4<sup>th</sup> International Mountain Conference* (Sept 2019, Innsbruck, Austria)

All in all we had a very constructive workshop atmosphere. We very much appreciated not having to worry about logistics, which were wonderfully taken care of by the sDiv staff. We are looking forward to keep working together to further develop and use the model!

In case of questions, please contact Marten Winter [marten.winter@idiv.de](mailto:marten.winter@idiv.de) or tel. +49 (0)341 97 33129.