Did **ancient polar forests** drop their leaves?

Melise Harland says knowing whether polar forests were deciduous or evergreen could help predict climate change.

One hundred million years ago, the polar regions were covered with dark dense forests, rather than the ice and snow we think of today. If our future climate continues to warm up, forests may once more spread back towards the poles. But until now, forests in high latitudes have been missing from the computer models used to predict climate change, making the polar regions too cold.

We know the forests were there, because they left behind fossilised wood. I've been using this wood to investigate whether the trees were deciduous or evergreen, and even the length of time they held their leaves. This would have affected how the forests themselves influenced the climate of the day. While white ice reflects heat and light back into the atmosphere (high albedo), dark forests would have absorbed most of the sunlight (low albedo), keeping the poles warmer.

By measuring the size of the cells within the growth rings of trees we can see how much of the wood grew late or early in the year, and how quickly the trees started to slow down their growth in autumn and increase growth again in the spring. Deciduous trees begin to slow down their growth earlier in the year than evergreen trees, producing smaller cells for a longer period of time. Deciduous trees also produce smaller cells very late in the year compared to evergreen trees.

My studies show that both evergreen and deciduous trees grew near the North Pole, including some evergreens similar to modern spruce and pine and deciduous trees like modern larch and swamp cypress. Near the South Pole the trees were mainly evergreen types similar to modern Monkey Puzzle trees, with only a few deciduous trees of cypress type.

A computer model, developed at Sheffield University, is able to 'grow' polar forests for past time periods. The model produces forests with evergreen and deciduous compositions similar to my results from the fossil wood. Now that the fossils have shown that the conifer model works well, this model will be added to global climate models to help more accurately predict our future climate.

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