

Press Release

Tree rings reveal how wind is killing European trees?

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In European forests, windthrow (wind blowing down trees) is the cause of around 50% of disturbance-induced forest mortality. These numbers are gleaned from reports of forest mortality coming from country specific forest inventories. However, knowing exactly which or what type of storm caused the windthrow is a difficult task because it is rarely the case that a forest inventory is scheduled just after a storm. Thus, researcher at the Czech University of Life Sciences in Prague have taken to tree rings to discern what types of storms are most likely causing forest disturbance.

Through tree rings, researchers can tell when a disturbance happened. “You will either see a sudden increase in growth, called a release event, or you will see lots of seedlings growing into the canopy really quickly because there is no shading by other trees after a large disturbance event,” says Pettit main author of a recent publication in the *Journal of Geophysical Research Atmospheres*. “Once we have a disturbance timeline, we can compare forest disturbances to wind patterns happening during the winter and summer to see which is responsible for killing the canopy and ‘releasing’ other nearby trees.”

The storms that are causing wind and windthrow differ between winter in summer with large windstorms common during winter and thunderstorms with the chance of tornadoes being common during summer. Though many people don’t associate tornadoes and Europe, there are a surprising number of tornado events compiled in the European Severe Weather Database. Pettit and other researchers in the department of Forest Ecology at the Czech University of Life Sciences found evidence that both large winter and small summer storms are causing windthrow in the Carpathian Mountains.

Though windthrow from large winter storms was more prevalent in the Carpathian Mountains, the fact that there is evidence of summer storms is unique. Summer storms are not usually the culprit in studies of windthrow except in the United States. The fact that smaller summer storms were impacting European forests and that that impact could be seen by examining tree rings makes this project all the more interesting.

This study may be cause for a bit of alarm. “According to our best atmospheric records and reconstructions, the prevalence and strength of large winter storms is increasing” says Pettit. The outcome of this increase is uncertain but recent storms like Kyrill in 2007 or Lothar and Martin of 1999 took down millions of cubic meters of wood in multiple countries. Beyond just windthrow, these storms damaged houses and even killed people. These facts stand testament to the possible impacts of increasing winter storm intensity and prevalence.

One possible ray of hope is that natural, old-growth stands showed some resistance to windthrow. “In our study, there were some stands that we saw had a very consistent record of low disturbance” says Pettit. “Something about these stands was the key to reducing catastrophic impacts of wind. They were just more resistant.” Pettit went on. This resistance could be due to the fact that multiple

ages of trees are present to effectively buffer impacts of wind. When not all of the trees are the same age, not all of the trees experience the brunt of the wind and not all fall in the same storm.