



A GIS dataset of windthrow events in the European Russia and Ural regions for 1986-2017

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Windthrows are one of the main types of damage caused by severe convective storms and tornadoes in the boreal forest zone. The study of storm- and tornado induced forest damage allows you to found previously unknown severe weather events that were not reported by weather stations or witnesses, and significantly improve the knowledge of their climatology.

The aim of the study is to create the first GIS database of windthrow events occurred in the European Russia and Ural region between 1986 and 2017. We used Global Forest Change dataset to search and automatic delineate the windthrows for 2001-2017, and Eastern'Europe Forest Cover Change for the 1986-2000. Several windthrows were delineated manually by Landsat images or by high-resolution images.

The dates (or the ranges of dates) of windthrows events were estimated by full Landsat archive, and also with the use of weather stations observations and media reports. The type of weather phenomena, that induced forest damage (squall, tornado or snow storm) was estimated with the use of high-resolution images obtained from the free-available web services. The threshold minimum area for tornado-induced windthrows was taken equal to 5 ha, and for other windthrows – 25,0 ha, since the determining of the occurrence dates is problematic for small or fragmented windthrows.

In total, we found more than 600 windthrows in the forest zone of the European Russia and Ural between 1986 and 2017. Tornadoes, squalls and snow storms induced 312, 280 and 10 windthrows respectively. However, the total area of squall-induced windthrows is 8 times higher than the same of tornado-induced windthrows. The most significant forest damage (about 100 thous. ha) was caused by two severe squalls, which have been occurred 27 June 2010 and 29-30 July 2010.

Besides the windthrows areas and their attributes, the database contains the weather station reports for the days when the windthrows have been occurred. At present, the formation of database content continues.

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