Windthrows in the pine forests of the Tsagan-Daban ridge (central part of the Selenginsky middle mountains)

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Relevance of the study

Siberian pine (Pinus sibirica), or cedar, refers to especially valuable wood species. It is widely spread in Transbaikalia. Pinus sibirica is a significant part of the forest stands of the mountain dark coniferous taiga on the territory of Buryatia and Zabaikalsky Krai, forming areas with a continuous distribution - cedar forests. Despite the vast geographical spread of cedars in Transbaikalia, their total area in forest stands is limited. According to the Republican Forestry Agency, on the territory of Buryatia the share of cedar trees in the forest range is only 8.9%. In recent years the qualitative transformation of cedars as a result of natural and anthropogenic factors has been fixed. There are facts of felling, damage of forest stands by Siberian silkworm and not typical for the region phenomenon of climatic nature - squalls and hurricanes.

The objective of the study is to determine the scale of damage caused by the squall wind to the forest stands of especially valuable cedar forests in the mountain taiga of the Tsagan-Daban ridge.

Tasks:

- to identify localization centers of windfalls in the taiga of the Tsagan-Daban ridge;
- to calculate the area of damaged stands;
- to establish the root causes of windfalls in the Tsagan-Daban cedar forests.

There were no signs of windfalls in the territory mentioned before, as well as no traces of their existence in the historical past.

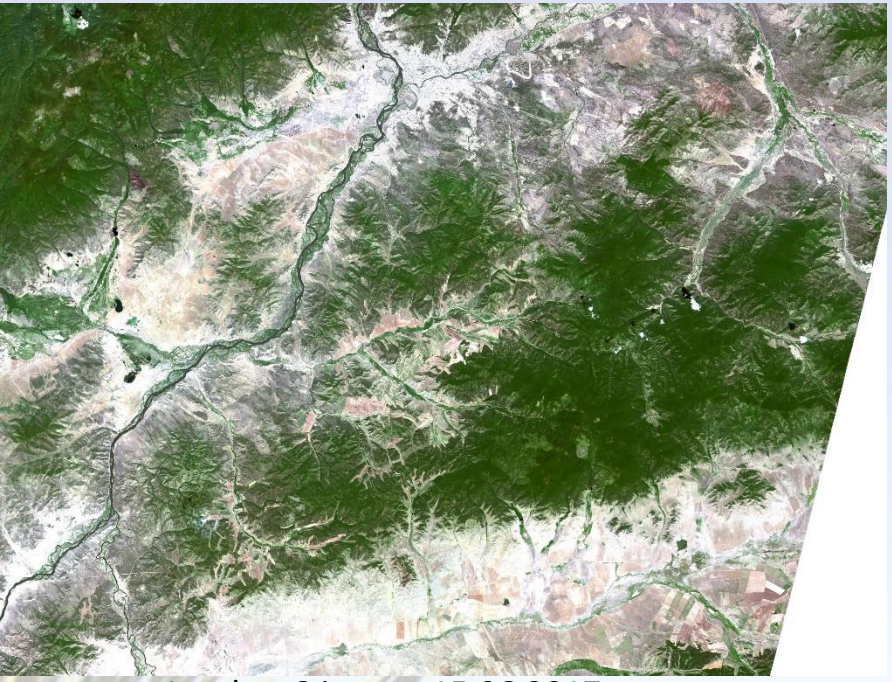
Study area

The Tsagan-Daban ridge is a medium-altitude mountain chain 200 km long located in central part of the Selenginsky middle mountains. The main watershed of the ridge extends to the north-east from the Selenga River to the Kizhinga Basin.

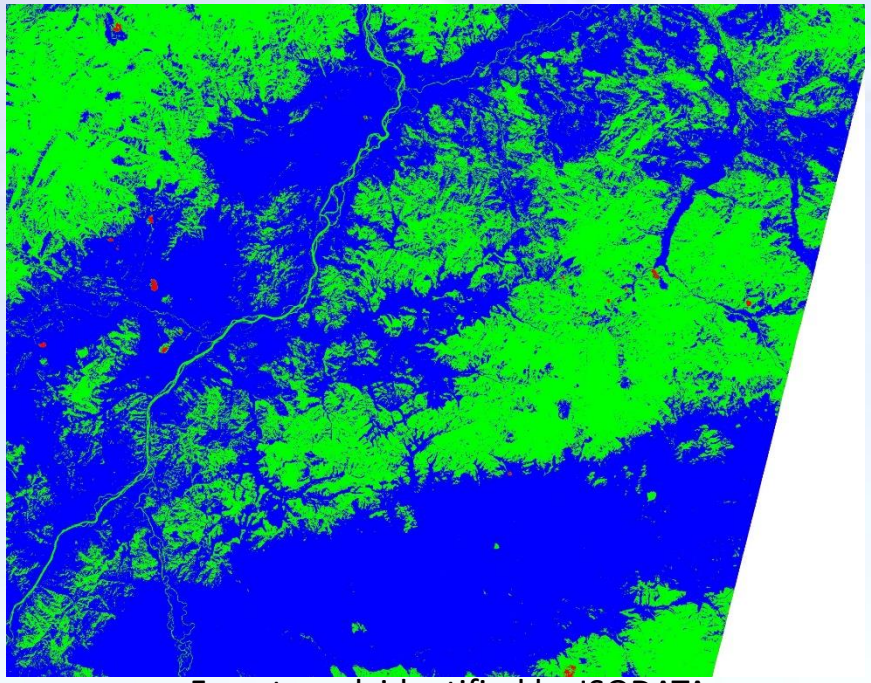
The southern macroslope of the ridge faces the Tugnui hollow; the northern slope has no distinct orientation, as this part is characterized by numerous spurs, which extend in the direction from the main watershed to the Uda river valley. Maximum height of the ridge is 1434 m.

The main type of landscape of the territory is mountain taiga. Slopes and peaks of the ridge are covered with forest vegetation. Coniferous and coniferous small-leaved forests with common pine, larch, birch, aspen prevail in the lower part of the slopes. The light coniferous trees are mostly replaced by dark coniferous, spruce, fir and cedar trees above 800 - 900 meters in Tsagan-Daban. This part of the territory is characterized by the prevalence of cedar in the forest stand.

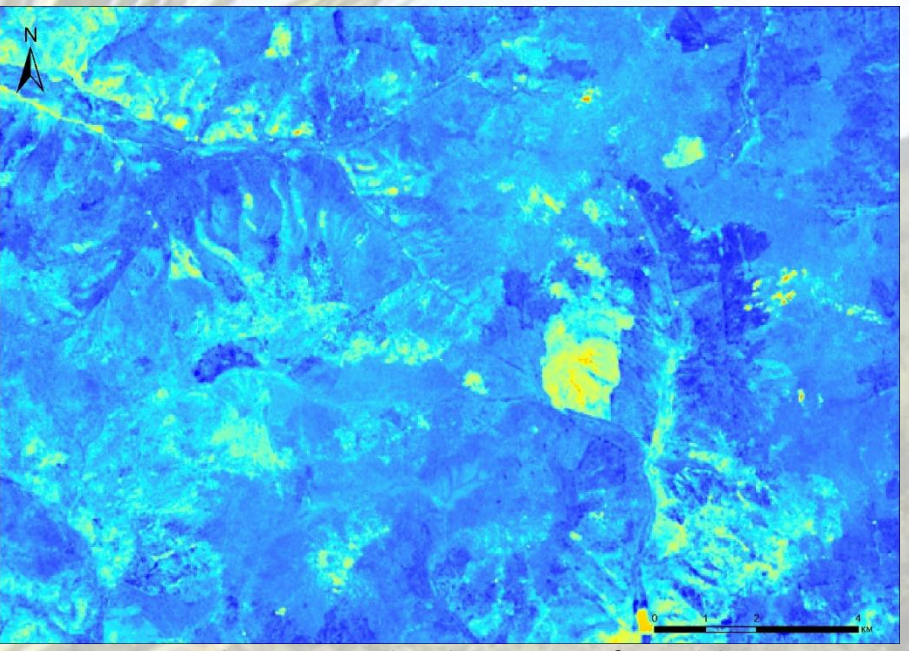
Район исследования (1)



Landsat 8 image, 15.06.2017



Forest mask identified by ISODATA



SWVI application in the detection of windthrows

Site survey of windthrows

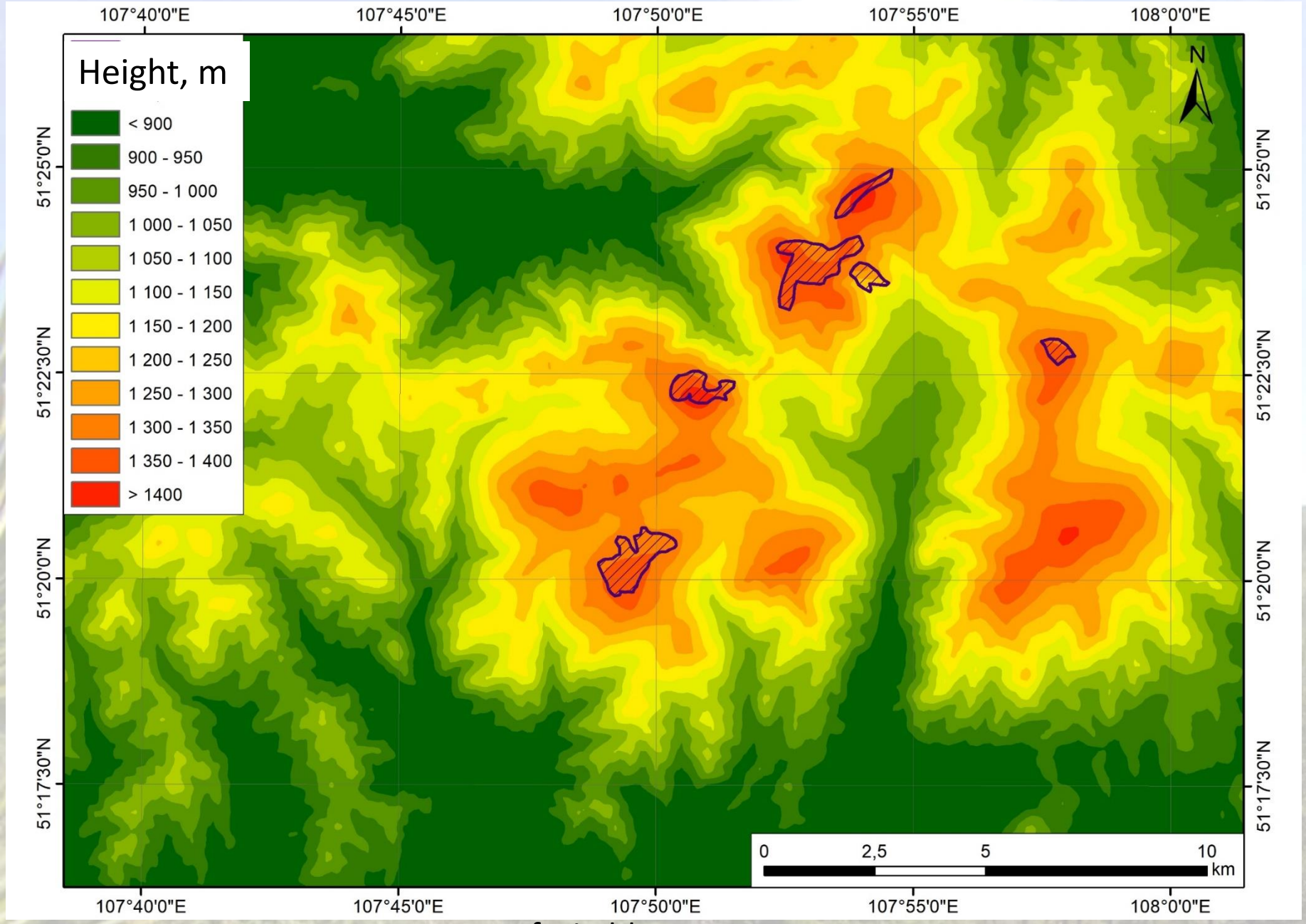
Materials and methods

Detection of the windthrows was made with use of Landsat 8 data, UAV imagery and field route descriptions.

The forest mask was created using the IsoData method of uncontrolled classification. Contours of windthrows were distinguished based on 2019 images using the SWVI index. For more accurate estimation space imagery interpretation data were combined with orthophoto from UAV cameras.

Verification of the results with assessment of the extent of stand damage was carried out during field survey near the Omulevaya mountain.

Results and discussion



Map of windthrows areas

General view of the windthrows

Forest stand damage pattern

During the study of windthrows in the mountain taiga of the Tsagan-Daban ridge, it was established the following:

1. The damage to the forest stands in the taiga in 2018 occurred as a result of the wind impact. In the historical period, such an event was not observed in this area;
2. The damage is discrete in nature, only cedar trees were damaged;
3. There are 6 centers of windthrows in the study area, which are confined to the highest axial parts of the Tsagan-Daban ridge and have a total area of 402 hectares;
4. The damage to the stand in the Tsagan-Daban cedar forests occurred due to a number of factors. Along with the storm wind, a prolonged drought and anthropogenic impact on pine trees during nut harvesting played their role.
5. In cedar forests of other similar surveyed territories (mountain taiga of the Ulan-Burgasi ridge) no similar extent of stand damage was found.

Thank you for attention!

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