

COMPARISON OF ROAD DATA SOURCES FOR THE REGIONAL FOREST FIRES MANAGEMENT

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We consider digital road data as a key element in the forest firefighting decision making when there a need to ensure the access to the forest fires with a minimum time spent. Accessing the forest fires by roads for the regional firefighting has some certain specifics from the data quality's point of view.

Road datasets should be maintained geometrically and attributively updated and correct

Geometry: topological correctness of road network allows to avoid any wrong path which length has to be calculated correctly to estimate the time of firefighting brigade's access;

Attributes: type of coverage, allowed speed, directions of movement, number of lanes, seasonability, etc. influence the delivery of technical means to the forest fire

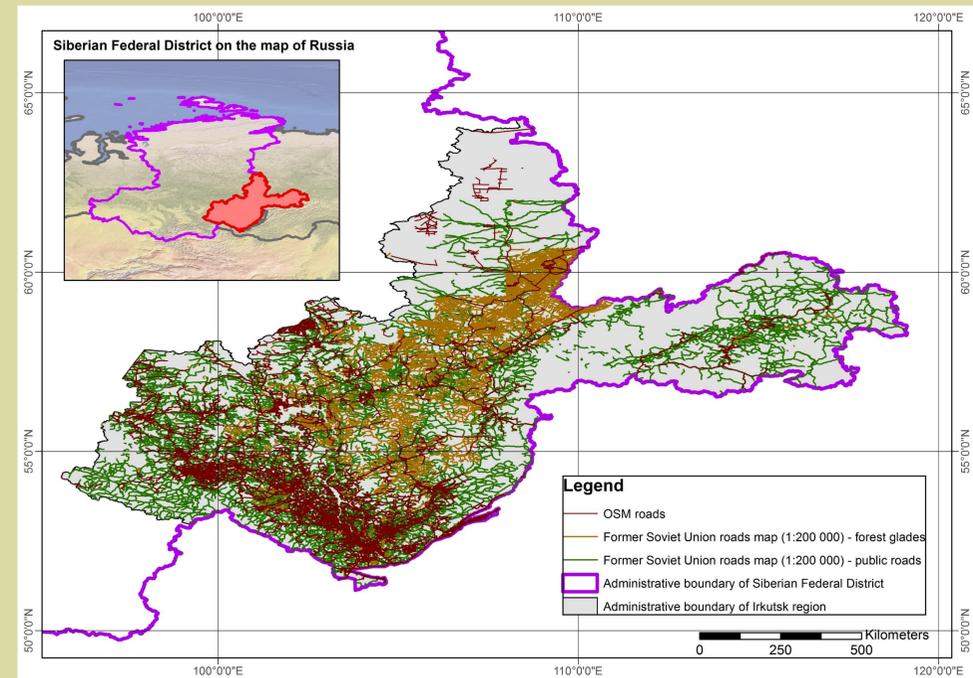
Our goal is to compare two road datasets of different source, nature and time frame for the territory of Irkutsk region in Russian Federation which has a long fire season of about more than 5 months per year.

For this goal we have considered the following tasks to undertake:

1/ to analyze the number of roads in the chosen datasets

2/ to identify existing roads in both datasets and differentiate them from the new ones

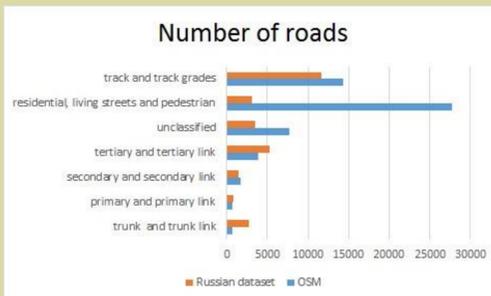
OSM (2020) vs Russian dataset (approx. 2000)



Comparison of classification types

OSM name	OSM description (*, **)	Number of records	Russian dataset	Number of records
trunk and trunk link	the most important roads in a country's system that aren't motorways	656	motorways	2748
primary and primary link	the next most important roads in a country's system	716	roads with improved surface (improved highways)	770
secondary and secondary link	the next most important roads in a country's system	1656	paved roads (highways)	1414
tertiary and tertiary link	the next most important roads in a country's system	3907	unpaved roads (improved)	5250
unclassified	the least important through roads in a country's system – i.e. minor roads of a lower classification than tertiary, but which serve a purpose other than access to properties	7700	dirt country roads	3495
residential	roads which serve as an access to housing, without function of connecting settlements	27679	roads in the settlement	3153
living street	residential streets where pedestrians have legal priority over cars, speeds are kept very low and where children are allowed to play on the street			
pedestrian	roads used mainly/exclusively for pedestrians in shopping and some residential areas which may allow access by motorized vehicles only for very limited periods of the day			

Quantitative analysis by road type



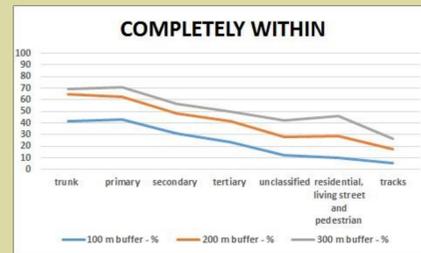
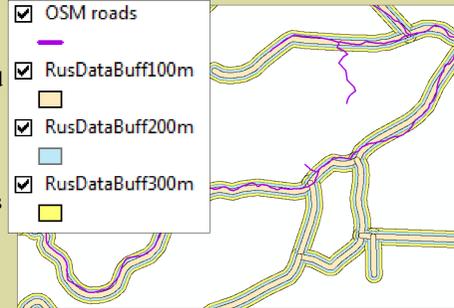
Experiments with the buffers for OSM-Russian datasets spatial relationship

RULES TO BE CHECKED:

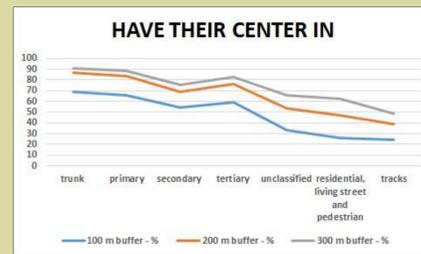
COMPLETELY_WITHIN: The features in the input layer will be selected if they are completely within or contained by a selecting feature

HAVE_THEIR_CENTER_IN: The features in the input layer will be selected if their center falls within a selecting feature. The center of the feature is calculated as follows: for line input, the geometry's midpoint is used

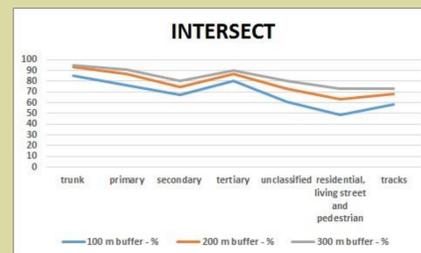
INTERSECT: The features in the input layer will be selected if they intersect a selecting feature



Road exists and has some geometry changes (within the buffer)



Road exists and didn't change geometrically (within the buffer)



Road exists (in and out of buffer)

- Interpretation of “Intersect” in the relation “OSM-Russian dataset” was the most interesting one to understand the road's presence
- Number of roads within the buffer 300 m (maximum size for our experiments)

OSM name	Number of records	Russian dataset	Number of records
trunk	91	motorways	2748
primary	89	roads with improved surface (improved highways)	770
secondary	76	paved roads (highways)	1414
tertiary	83	unpaved roads (improved)	5250
unclassified	66	dirt country roads	3495
residential, living street and pedestrian	63	roads in the settlement	3153
tracks	49		

New roads in OSM (in %)

- Unclassified roads and tracks have changed the most (almost twice), main roads like trunks have changed the least (depending on the buffer's size)
- More buffers like 10-50 m can be used

CONCLUSIONS AND FUTURE RESEARCH

Comparison results have (1) confirmed that having an updated road data source is important and (2) shown that OSM data should be used in combination to the available regional data, especially for the roads of “low” classes. For the further transport modeling we have used the dataset of 1:200 000 to create a road model and then to construct the ground access routes, tests done for Irkutsk region and Siberian Federal District. Road datasets assessment can be useful for the annual preparation of fire season in the forestry departments and for the development of regional programs such as “Forestry Development” and Forest Plans

ACKNOWLEDGEMENTS

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