



An overview of natural hazard impacts to railways and urban transportation systems

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We present an overview and two case studies of natural hazard impacts on rail transportation systems in the Czech Republic. Flooding, landsliding, heavy snowfall, windstorms and glaze (black ice) are the most common natural processes which occur in this region. Whereas flooding and landsliding usually cause direct damage to the transportation infrastructure, other hazards predominantly cause indirect losses.

Railway and urban tramline networks are almost fully dependent on electricity which is provided by a system of overhead lines (electric lines above the tracks). These lines are extremely susceptible to formation of glaze which blocks conduction of electric current. A December 2014 glaze event caused significant indirect losses in the largest Czech cities and railways due to the above-mentioned process. Details of this event will be provided during the presentation.

Windstorms usually cause tree falls which can affect overhead lines and physically block railway tracks. Approximately 30 % of the Czech railway network is closer than 50 m from the nearest forest. This presents significant potential for transport interruption due to falling trees. Complicated legal relations among the owners of the plots of land along railways, the environment (full-grown trees and related habitat), and the railway administrator are behind many traffic interruptions due to falling trees. We have registered 2040 tree falls between 2012 and 2015 on the railway network. A model of the fallen tree hazard was created for the entire Czech railway network.

Both above-mentioned case studies provide illustrative examples of the increased fragility of the modern transportation systems which fully rely on electricity. Natural processes with a low destructive power are thereby able to cause network wide service cut-offs.