



Dynamic risk simulation to assess risk along roads

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Risk generated through natural hazards on roads is usually calculated with an equation which integrates various parameters of hazard and traffic. These are static variables as hazard frequency and number of vehicles crossing the dangerous section. This traditional methodology cannot take into account the dynamic variations of traffic and interactions between vehicles such as speeds modifications due to the section sinuosity, slowdowns resulting saturated traffic or creation of vehicles columns in front of traffic lights.

The influence of traffic dynamics on the risk estimation is not addressed with the standard methodologies. Here we show, with the help of a dynamic traffic simulator specially developed for this project, that the variations of traffic greatly influence the risk results. Several sections of an alpine road in Switzerland were analyzed with the method of dynamic risk and compared with the results of the conventional method of risk calculation. It was possible to demonstrate that risk significantly increases on sinuous sections with the decreasing of vehicles speed. It has been highlighted that well positioned traffic lights, outside the risk area, can prevent a risk increase during a construction site, while a column of vehicles located within the danger zone greatly increases the risk.

These results demonstrate the importance to consider the traffic in a dynamic way to assess risk to the closest field reality. Thus, recommendations to reduce risk on the roads can be given using a dynamic traffic simulator, modeling interactions between vehicles. Eventually, dynamic risk assessment can also be integrated into existing methodologies that consider only static parameters.