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Quantification of Road Network Vulnerability and Traffic Impacts to Regional Landslide Hazards.

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Slope instability represents a prevalent hazard to transport networks. In the UK regional road networks are frequently disrupted by multiple slope failures triggered during intense precipitation events; primarily due to a degree of regional homogeneity of slope materials, geomorphology and weather conditions. It is of interest to examine how different locations and combinations of slope failure impact road networks, particularly in the context of projected climate change and a 40% increase in UK road demand by 2040. In this study an extensive number (>50 000) of multiple failure event scenarios are simulated within a dynamic micro simulation to assess traffic impacts during peak flow (7 – 10 AM). Possible failure locations are selected within the county of Gloucestershire (3150 km2) using historic failure sites and British Geological Survey GeoSure data. Initial investigations employ a multiple linear regression analyses to consider the severity of traffic impacts, as measured by time, in respect of spatial and topographical network characteristics including connectivity, density and capacity in proximity to failure sites; the network distance between disruptions in multiple failure scenarios is used to consider the effects of spatial clustering. The UK Department of Transport road travel demand and UKCP09 weather projection data to 2080 provide a suitable basis for traffic simulations and probabilistic slope stability assessments. Future work will thus focus on the development of a catastrophe risk model to simulate traffic impacts under various narratives of future travel demand and slope instability under climatic change. The results of this investigation shall contribute to the understanding of road network vulnerabilities and traffic impacts from climate driven slope hazards.