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# Current and future flood risk to railway infrastructure in Europe

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Railway infrastructure plays an important role in the transportation of freight and passengers across the European Union. According to Eurostat, more than four billion passenger-kilometres were travelled on national and international railway lines of the EU28 in 2014. To further strengthen transport infrastructure in Europe, the European Commission will invest another € 24.05 billion in the transnational transport network until 2020 as part of its new transport infrastructure policy (TEN-T), including railway infrastructure.
Floods pose a significant risk to infrastructure elements. Damage data of recent flood events in Europe show that infrastructure losses can make up a considerable share of overall losses. For example, damage to state and municipal infrastructure in the federal state of Saxony (Germany) accounted for nearly 60% of overall losses during the large-scale event in June 2013. Especially in mountainous areas with little usable space available, roads and railway lines often follow floodplains or are located along steep and unsteady slopes. In Austria, for instance, the flood of 2013 caused € 75 million of direct damage to railway infrastructure.
Despite the importance of railway infrastructure and its exposure to flooding, assessments of potential damage and risk (i.e. probability * damage) are still in its infancy compared with other sectors, such as the residential or industrial sector. Infrastructure-specific assessments at the regional scale are largely lacking. Regional assessment of potential damage to railway infrastructure has been hampered by a lack of infrastructure-specific damage models and data availability. The few available regional approaches have used damage models that assess damage to various infrastructure elements (e.g. roads, railway, airports and harbours) using one aggregated damage function and cost estimate. Moreover, infrastructure elements are often considerably underrepresented in regional land cover data, such as CORINE, due to their line shapes.
To assess current and future damage and risk to railway infrastructure in Europe, we apply the damage model RAIL –‘ RAilway Infrastructure Loss’ that was specifically developed for railway infrastructure using empirical damage data. To adequately and comprehensively capture the line-shaped features of railway infrastructure, the assessment makes use of the open-access data set of openrailway.org. Current and future flood hazard in Europe is obtained with the LISFLOOD-based pan-European flood hazard mapping procedure combined with ensemble projections of extreme streamflow for the current century based on EURO-CORDEX RCP 8.5 climate scenarios. The presentation shows first results of the combination of the hazard data and the model RAIL for Europe.