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Early warning system for railbound transportation lines (EWS Transport)

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EWS Transport assesses new risk-minimization strategies for railbound transportation systems based on recent improvements in early detection methods for earthquakes and advances in information and communication technologies.

Apart from the Japanese earthquake early warning system for Shinkansen bullet trains (UrEDAS), there are no early warning systems focussing on the special requirements of transport lines.

The feasibility study EWS Transport uses new methods and investigates early warning possibilities beyond UrEDAS. It is comprised of the following points:

(a) Early warning will not be based exclusively on the single-station method employed by UrEDAS. EWS Transport will utilize the entire observation system, extracting information via artificial neural net technology.

(b) An alert and shake-map allowing assessment of the safety situation along the track system will be developed. Furthermore, EWS Transport will produce an early estimate of damage to the network. Subsequently, risk minimization will take place by implementing emergency plans based on hazard and damage catalogues prepared in advance.

(c) Rapid acquisition of more detailed information concerning the propagation direction and amplitude of seismic waves in the three spatial dimensions could be essential for railbound systems with their narrow tolerance for track-alignment parameters. We

will determine if this information can be used to assess more accurately the impact of an earthquake on train operation as well as on various infrastructure elements and to select the most suitable emergency measures.

(d) The option of integrating sensors in the standard railway sensor train control system will be studied. Measuring the signal-to-noise ratio along tracks, choosing appropriate sensors and evaluating deployment possibilities thus constitute components of the project.

(e) We will analyze the feasibility of using the network of sensors for extended application. The data exchanged constantly between various stationary track sensors and the train control center provide a promising base for continuous structural health monitoring, even when there is no imminent danger.