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Meteorological tools in support to the railway security system on the Calabria region

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RAMSES (RAilway Meteorological SEcurity System) is a pilot project co-funded by the Italian Railway Company - RFI S.p.A. and conceived for the mitigation of the hydrological risk along the Calabria railways. RAMSES aims at improving the forecast of very short life-cycle convection systems, responsible of intense and localized rainfalls affecting small catchment areas, which are often underestimated by the numerical weather models and even non-adequately detected by the network of sparse raingauges. The RAMSES operational design is based on a synergistic and integrated architecture, providing a series of information able to identify the most active convective cells and monitoring their evolution in terms of vertical structure, rain intensity and geo-hydrological effects at ground (debris flow, landslides, collapses of bridges, erosion of the ballast).
The RAMSES meteorological component is designed to identify and track the short-term evolution (15-60 min) of convective cells, by means of imaging techniques based on dual-polarization weather radar and Meteosat data. In support of this quasi-real time analysis, the numerical model WRF provides the weather forecast at 3-6 hours range by ingesting, through the assimilation system LAPS, the observational data (rain gauges, ground weather stations, radar, satellites) in order to improve the initial condition.
Finally, the hydraulic flow modeling is used to assess the ground effects in terms of landslide susceptibility, rainfall-runoff intensity, debris impact on the drainage network and evaluate of risk along the railway track.