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Spreading the right amount of salt in the right places at the right times: road ice prevention with the CLEAN-ROADS system

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In wintertime de-icing chemicals, such as sodium chloride, are typically used by road maintenance units to prevent ice formation on pavements. These substances, however, are known to contaminate soil, air and water, and to damage roads and vehicles. In 2012 the CLEAN-ROADS project (LIFE11 ENV/IT/000002) was launched to optimise the salt-spreading operations adopted in the Autonomous Province of Trento, a mountainous terrain in the Italian Alps [1].

A novel maintenance decision support system (MDSS) has been developed for the purpose and applied to a test route over three consecutive winter seasons. The novel MDSS gathers past and present data on road surface conditions and weather events as measured by a state-of-the-art road weather information system (RWIS) of fixed stations installed along the route [1]. It reports predictions for possible ice formation in the short (36 hours) and very short time range (6-9 hours) as probabilistic warning bulletins and automatic numerical forecasts of localised/spatialized road surface temperatures, respectively [2,3]. Furthermore, it delivers real-time alarms when conditions associated to low road friction (e.g., snow, precipitation on frozen road and ice/frost on untreated roads) are detected at RWIS stations [4]. The developed MDSS has been used through a graphical user interface to support a road maintenance unit in the timely and effective planning of salt treatments in the test route area over the considered period. It has also been exploited to provide drivers with an interactive map displaying real-time information on weather and road conditions [5].

We therefore present the CLEAN-ROADS MDSS and its contribution in reducing salt usage while guaranteeing roadway safety. We also discuss the corresponding environmental benefits achieved with the system.

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[2] Di Napoli, C. et al., Geophysical Research Abstracts 18, EGU2016-563 (2016)
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[4] Cavaliere, R. et al., 22nd ITS World Congress, ITS-2235 (2015)
[5] Pretto, I. et al., SIRWEC 2016 conference proceedings, in press (2016)