CLIMATE CHANGE
AND ITS IMPACT ON ROAD CONDITIONS IN WINTER

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SUMMARY

In the Summary for Policy Makers of the IPCC WG1's contribution to its Fourth Assessment Report, the IPCC declares that warming of the climate system is unequivocal and that most of the observed increase in globally averaged temperatures since the mid-20th century is very likely due to the observed increase in anthropogenic greenhouse gas. This change is observed in most of the world and it is particularly important at high latitudes of the northern Hemisphere and over Western Europe. In France, the observed temperature has increased by almost 1°C during the last century and this rise has mainly occurred since the 1970s.

The IPCC projects that the increase in temperatures will continue during the next decades. For most greenhouse gas emission scenarios, climate models calculate a global warming of about 0.2°C per decade at the beginning of the XXIe Century. It is very likely that warming will accelerate after 2050 at a rate depending on the emission scenarios taken for hypothesis. Increase in temperature will be stronger over continental regions at mid-latitudes which concentrate a major part of the roads and of the traffic in the world. There is no doubt that climate change will have in these regions an important impact on the maintenance activities of the roads in winter. In a nutshell, the number of frost days, of cold waves and snowfalls will significantly decrease. This will probably limit the damage by frost of the road structures and the number of days when the traffic will be disturbed by snow. However, less favorable factors have to be taken into account, such as the rise of the summer temperatures or the increase in the intensity of winter precipitations in certain regions.

A sound assessment of the impact of climate change on the roads and their winter maintenance needs a solid understanding of the processes intervening between the pavement and the meteorological conditions. The use of physically-based simulation models is necessary to quantify the respective role of various factors like the air temperature and humidity, the cloudiness, the precipitation or the physical properties of the road structure. It also needs realistic climate scenarios on a regional scale which are now available. Because snow and frost conditions are common but not very frequent, France is a particularly interesting case to assess the impact of climate change on road maintenance activities in winter. Recent results will be presented to illustrate the possible impact of various climate scenarios to be expected on the number frost and snow days. Particular attention will be devoted to the number of days when snow is likely to stay on the roads.