

**SOCIO-ECONOMIC BENEFITS OF
METEOROLOGICAL AND HYDROLOGICAL SERVICES**

INVENTORY OF DECISION SUPPORT TOOLS

ITEM	DESCRIPTION
Source	Bill Mahoney – NCAR, USA c/o Jeff Lazo – NCAR – lazo@ucar.edu
Sector	Surface Transportation
Sub-sector	Roadway Winter Maintenance
Tool Name	Maintenance Decision Support System (MDSS)
Tool Description	Decision support system that integrates weather and pavement condition models and observations to provide 48 hour predictions of weather and road conditions and snow and ice control treatment recommendations for user-defined roadway segments
Weather, Climate or Water inputs	Weather model and observational data are integrated and provided to pavement condition models and rules of practice logic
Specific weather, climate, water data required	Air temperature, precipitation amount and type (snow, rain, ice), insolation (direct and indirect), windspeed, wind direction, relative humidity, pavement temperature and subsurface temperature
Spatial resolution	Point forecasts are generated from numerical weather prediction models. A model grid resolution of 10-km or greater is recommended. Higher resolution (1-5 km) in complex terrain is recommended
Temporal resolution	Hourly weather and observational data are required.
Delivery methodology	Real-time input data are required.
Frequency of data requirement	Forty-eight (48) hour forecasts are updated each 3 hours
Other???	Observational data should not lag real-time by more than 15 minutes
Detailed Tool Description	<p>Output includes 48 hour predictions for user-defined road segments of:</p> <ul style="list-style-type: none"> • Air temperature • Relative humidity • Wind speed • Wind direction • Precipitation intensity • Precipitation type • Snow depth • Pavement temperature (roads) • Pavement temperature (bridges) • Blowing snow potential • Pavement frost potential • Pavement condition (wet, dry, chemical wet, ice, chemical ice, snow depth) <p>Treatment recommendations for snow and ice control covering:</p> <ul style="list-style-type: none"> • Treatment timing

	<ul style="list-style-type: none"> • Treatment amount • Treatment type <ul style="list-style-type: none"> ○ Chemical ○ Plowing ○ Abrasives <p>Provides ability for user to perform “what if” scenarios for various maintenance actions and view predicted results</p>
Spatial resolution	Output is provided for each user-defined winter maintenance (plow) route
Temporal resolution	Hourly
Delivery methodology	Products provided on personal computer (PC) using a client-server topology. PC application is JAVA code.
Frequency of provision	Observations are updated as the data arrive. Forecasts are updated every 3 hours.
Benefits of tool application	<p>The MDSS is designed to provide road maintenance practitioners with an integrated view of weather and road conditions along with recommended treatment plans. Benefits include:</p> <ul style="list-style-type: none"> • Improved efficiencies in anti-icing operations • More consistent treatment plans across the transportation operation • Increased mobility by keeping roads clear • Reduction in the amount of chemicals required to clear roads • Environmental benefits from reducing chemical use • More efficient staffing of maintenance personnel • Fewer materials required thus saving resources
Possible future advances	Weather and road condition predictions will improve as high-resolution models, additional roadside weather observations, and vehicle data are utilized and adopted. Additional research is required to understand the properties of new anti-icing chemicals, methods for utilizing vehicle data, and accuracy of road condition sensors.
Comments	MDSS technologies are being provided to the road weather community as part of a U.S. Federal Highway Administration (FHWA) technology transfer program. Information can be obtained from the web sites listed below.
URL	<p>NCAR Site: http://www.rap.ucar.edu/projects/rdwx_mdss/</p> <p>FHWA Site: http://ops.fhwa.dot.gov/weather/index.asp</p>