Weather Data Environment (WxDE)

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System Overview

The Weather Data Environment (WxDE) collects and shares transportation-related weather and road condition data from across the United States for Transportation System Management and Operations (TSMO) and connected vehicle applications. Data is collected in real time from fixed environmental sensor stations and mobile vehicular sources. It checks the quality of the observed data and can infer additional road weather conditions from vehicle data such as precipitation from windshield wiper activation and radar data. The WxDE archives both collected and computed data. Real-time data can be browsed on a map, queried for a report, or subscribed to as a data feed.

The WxDE has been developed by the Federal Highway Administration's Road Weather Management Program in cooperation with the U.S. DOT Intelligent Transportation System Joint Program Office to provide weather data-related services that support the development, testing, and demonstration of applications for transportation operations and connected/autonomous vehicles. Data accessible through the WxDE is well-documented and freely available to the public. Registration and approval may be required to access some data, if the original provider of the data places restrictions on its distribution by the WxDE.

Potential Applications

The purpose of the WxDE is to serve as a transportation-related road weather observation data repository and provide services through which such data can be shared with the road weather research and development community, transportation agencies, academia, and weather service providers.
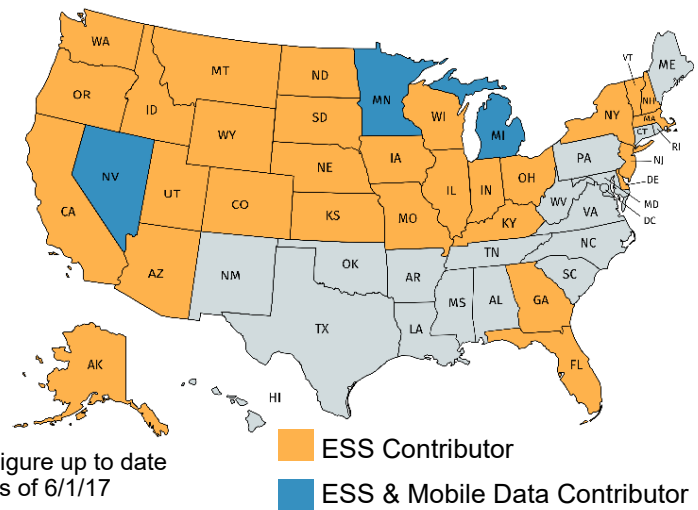
Researchers and application developers can use the WxDE to perform analyses of weather data. Users are able to subscribe to configurable sets of data and report intervals in order to download weather data based on their own specifications.

The WxDE supports many connected vehicle use cases and applications. Maintenance decision support systems (MDSS) and maintenance and fleet management systems can get current road conditions from the WxDE

for making decisions. Emergency responders may use road condition and weather data for routing support. Motorist advisory and warning systems can also provide traveler information based on data collected from the WxDE. Freight carriers and weather-responsive traffic management systems can use WxDE data to adapt operations to weather events and poor road conditions.

Data Contributors and Collection

The WxDE collects data from fixed and mobile sources from 40 state and local transportation agencies and other contributors. WxDE collectors are configured to each contributor's systems and do not require any particular data standard. An agency wanting to provide data to the WxDE provides access to their system's interface, a description of the source data format, any access restrictions on timing or data volume, and security credentials for getting data from the system (if required).

Figure up to date as of 6/1/17

🟧 ESS Contributor
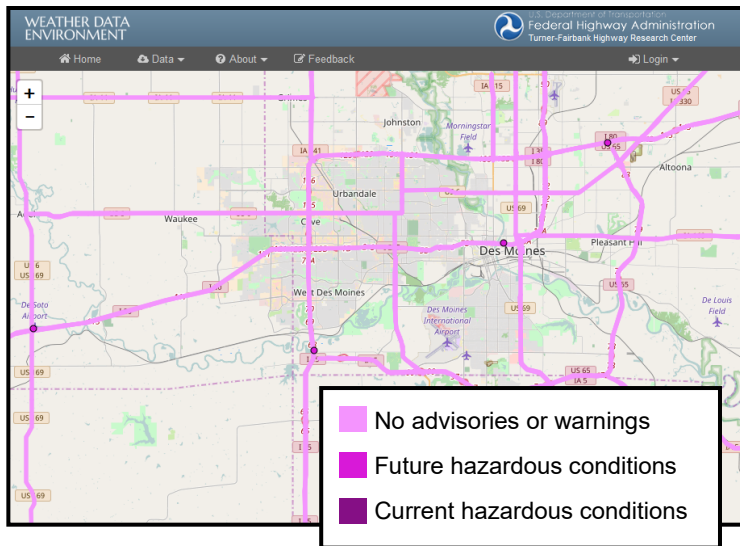🟦 ESS & Mobile Data Contributor

Data Quality Checking

Data collected by the WxDE is quality checked before being shared with users. The quality checks include Complete, Manual Flag, Sensor Range, Climate Range, Step Test, Persistence, IQR, Barnes Spatial, Sea Level Pressure, Like Instrument, Precipitation Accumulation, Dew Point, Model Analysis, Neighboring Vehicle, and Vehicle Standard Deviation Tests.
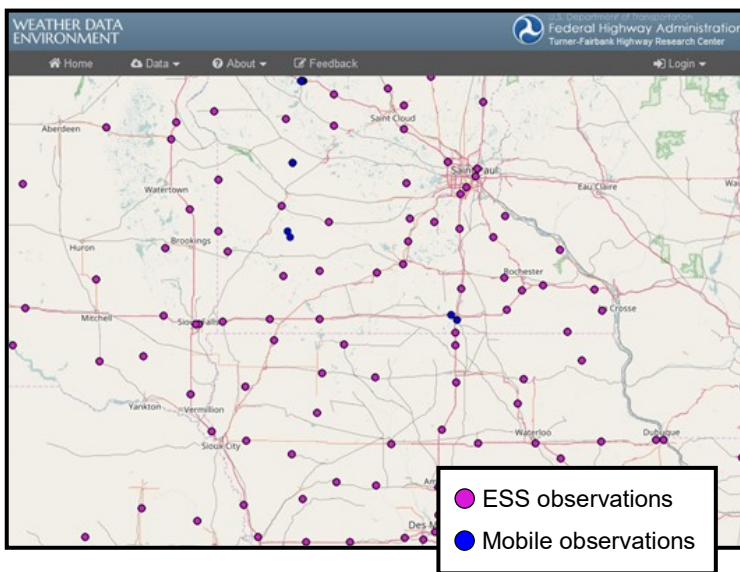
Inferred Road Weather Data

Pikalert/VDT forecasting modules have been integrated with the WxDE. Road weather forecasts out to six hours are based on NWS atmospheric forecasts and METRo analysis of untreated roadways. Forecast results and alerts are shown on the map for road segments in the forecast regions.

No advisories or warnings
Future hazardous conditions
Current hazardous conditions

Mapping Road Weather Observations

From a high-level view, users can determine the collection status of each state based on the state's color coding. After zooming in, users can view road weather observations by selecting a station on the map. All observations and their quality checking results for the selected station are displayed. To view road weather conditions of specific roads, users can zoom in another level and select a road segment on the map.

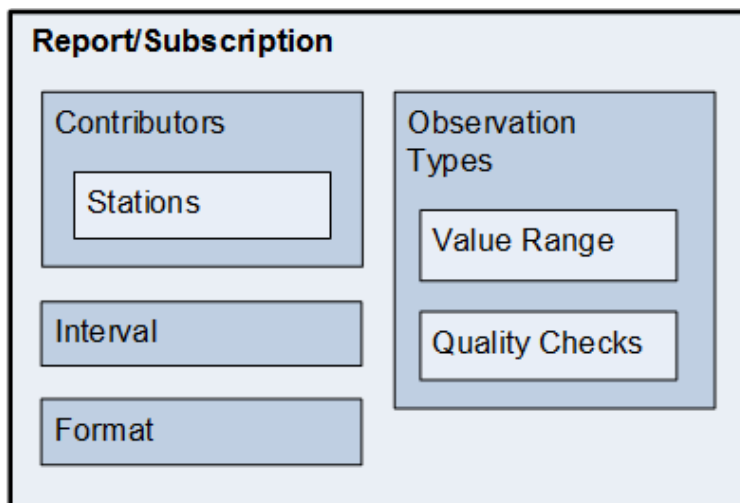

ESS observations
Mobile observations

Getting Road Weather Data

Road weather data can be obtained from the WxDE using the report/subscription query interface. The interface allows users to select contributors, stations, observation types and date/time ranges for each report. Reports can be downloaded in CSV, XML and CMML formats.

Subscribing to Road Weather Data

Users can also obtain data from the WxDE by creating subscriptions to observations on set time intervals. Users may select contributors, observations types, a time interval and formatting for each subscription. Subscribed files can be downloaded using a script for entry into other systems.

All images are courtesy of FHWA.

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Road Weather Management**

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