MicroStep-MIS

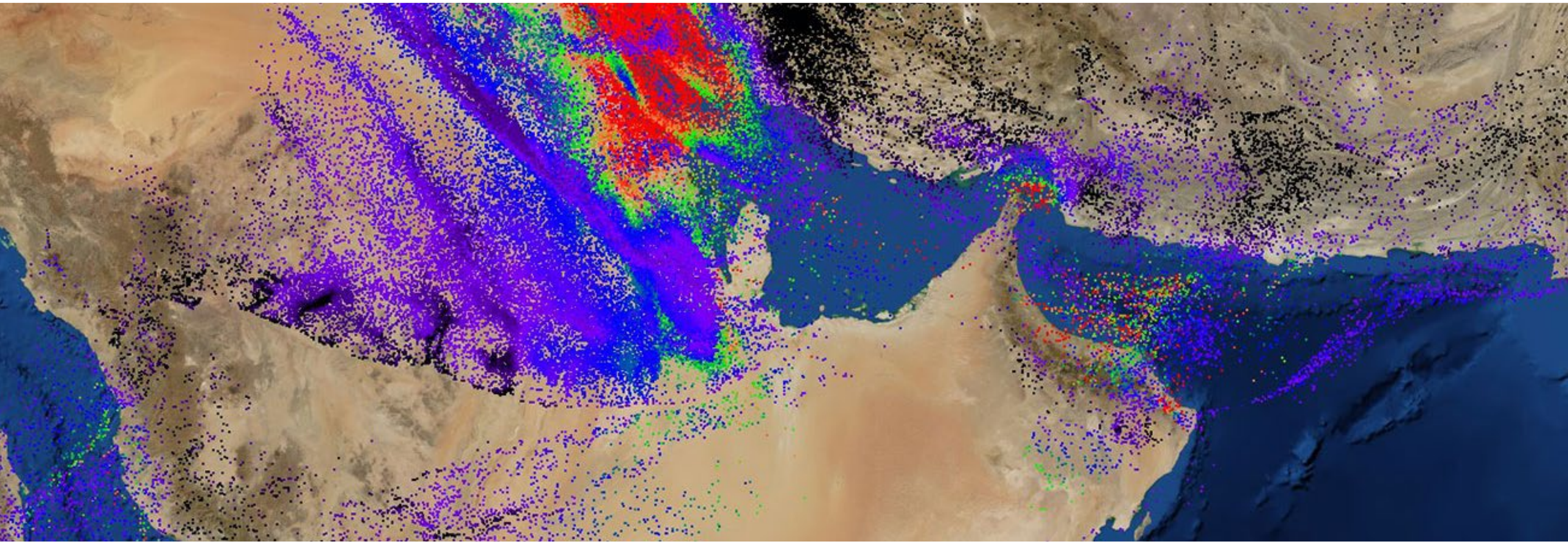
COMPLEX SOLUTIONS FOR THE REAL WORLD

Success Story

Enhancing safety on Dubai roads

SUCCESS STORY

Road Weather Information and Early Warning System, Dubai



After a serious car accident in March 2008, Dubai Municipality decided to purchase and install a fog early warning and forecasting system. MicroStep-MIS was chosen by Dubai Municipality to realize this project.

The system was installed in 2009 and it operates properly till today. IMS4 Road Weather Information System consists of meteorological stations strategically located alongside the highways. Specialized cutting-edge hardware equipment and software continuously analyze the weather and visibility and provide inputs for the forecasting models.

The system integrates 8 Automatic Road Weather Stations, 5 already existing Automatic Weather Stations and Offshore Buoy. The data center performs a continuous monitoring and analysis and provides a comprehensive, up-to-date online data available 24 hours a day.

بلدية دبي
DUBAI MUNICIPALITY

“We are very proud of the results of this project, which is not only useful to our department, but also to the whole nation and people living in the area.”

Mohammad Mashroom, Dubai Municipality

SUCCESS STORY

Road Weather Information and Early Warning System, Dubai

Real-time weather and forecast information

The actual values of temperature, relative humidity, rainfall, water level, as well as wind speed and direction in different parts of the Municipality are provided every two minutes, ensuring up-to-date data for the traffic safety. Road stations improve timeliness of maintenance actions, increase winter maintenance efficiency, and minimize the traveling public's exposure to hazardous weather-related roadway conditions.

Modeling and forecasting

The fog forecasting models provide a local visibility forecast and prediction of fog development in the traffic areas. It further provides an early warning of possible formation of water fog. The system provides excellent results. In a one year test, the forecasts creation, supported by all components of the system, achieved success in fog forecasting at 95 % (the probability of detection score) with only 18 % of false alarms.

Real-time camera views: Decreased visibility due to the sand and dust in the air at Al Mamzar station on 16.03.2014 (on the left); normal visibility at Al Mamzar station on 17.03.2014 (on the right)

> ***"The information is used by the government (Dubai Police and Coastal Guards) and it helps them to take appropriate action in case of low visibility and fog. They are able to warn drivers about fog conditions in order to prevent road accidents."***
>
> *Mohammad Mashroom, Dubai Municipality*

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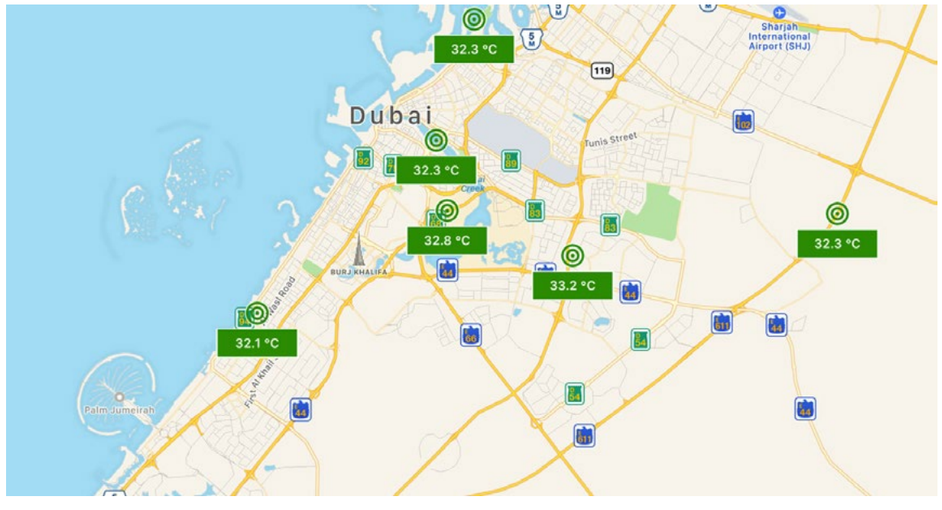
Road Weather Information and Early Warning System, Dubai

Sandstorm forecasting

In spite of the fact that sandstorms occur naturally, they can represent a great health hazard to human societies living near the desert regions. A sandstorm is a situation occurring when the horizontal visibility is reduced due to the sand and dust in the air below 1000 m. Our challenge was to predict the dust event which reduces visibility below 3000 m at least 2 hours in advance. Sand and dust in the air during such situations can cause inconvenience to people with respiratory health problems. The problem is the most significant in the Arabian Peninsula, as it experiences frequent sandstorms.

Automatic Road Weather Stations



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Road Weather Information and Early Warning System, Dubai

This was the main reason behind Dubai Municipality starting the sandstorm prediction project. It was an extension to the existing Fog Monitoring and Forecasting System. The system is based on a 3D weather prediction model. It is further integrated with a model for sand source areas that were transported by wind and settled. Sandstorm modeling is part of the web based Dubai Municipality visibility monitoring system, which consists of:

- 10 Automatic Road Weather Stations, 6 Tide-met Stations, 2 Offshore Buoys, 3 Groundwater Monitoring Stations
- Unified Data Collection System and Climatological Database
- Weather prediction model
- Fog prediction model
- Sandstorm prediction model

Automatic Road Weather and Tide-met Stations

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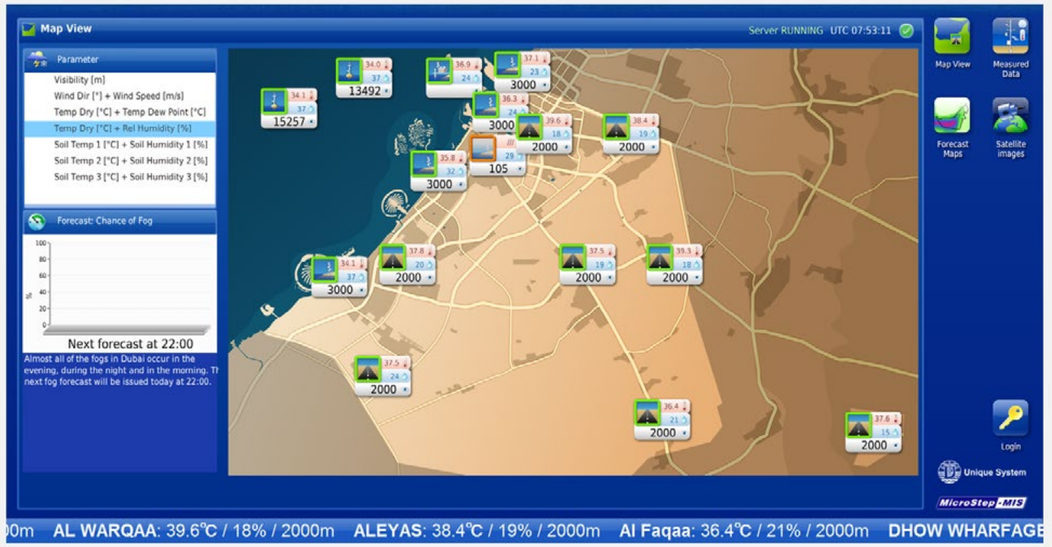
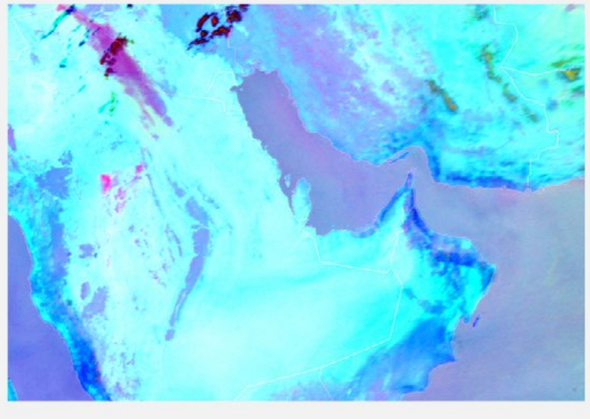
Road Weather Information and Early Warning System, Dubai





Comparison of predicted sandstorm (above) with satellite image (on the right) 02.10.2013 10:00 UTC

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Road Weather Information and Early Warning System, Dubai

Smartphone application

Najm Sohail, is the name of the Weather Early-Warning application that visualizes sandstorm forecast in Dubai with an advance of up to two days. Thanks to this mobile application, people can now anticipate dust / sand storm conditions in Dubai, 48 hours in advance with just a click on their smart phones. The mobile application aims at helping residents to pre-plan their outdoor activities, inform allergy and asthma sufferers about potential health risks, and also warn motorists about the visibility conditions on the roads.

Tsunami early warning system

Tsunami is a series of waves in a water body caused by the displacement of a large volume of water. Earthquakes, volcanic eruptions, landslides, and other disturbances above or below water level all have the potential to generate a tsunami.

A 100 year historical database indicates that on average 6 tsunamis occur per year and are able to carry their destructive power across large coastal areas. The Tsunami Monitoring System consists of:

- Seismic monitoring stations
- Coastal tide and wave monitoring stations
- Offshore tsunami monitoring stations
- Central station for integrated Tsunami Monitoring and Early Warning System with central data collection and a database established at the Dubai Municipality
- Development of tsunami monitoring and tidal model for tides and surface current

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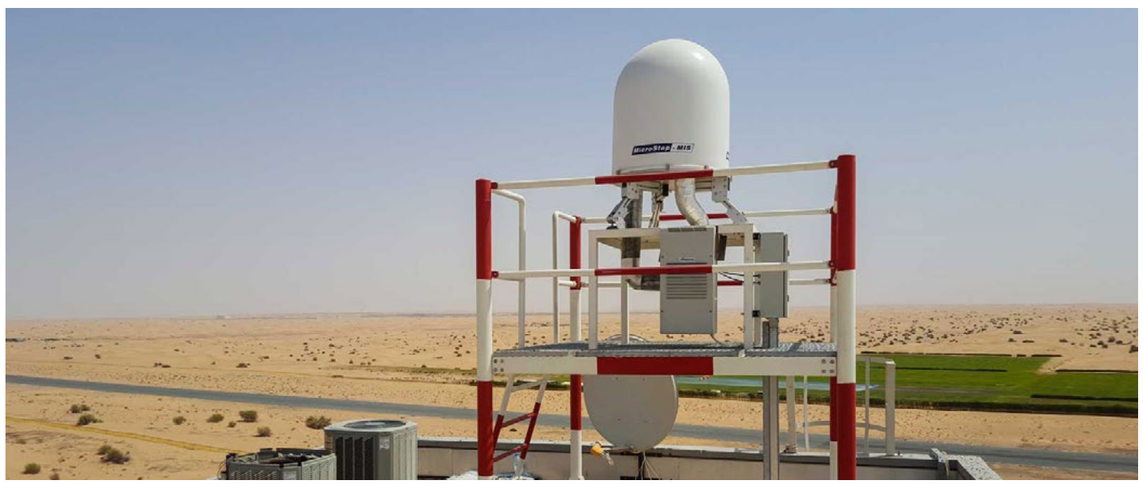
Road Weather Information and Early Warning System, Dubai

Radar installation

Mini Meteorological Radar is unique portable X-band weather radar, which provides real time insight into a weather situation for a range up to 200 km. The radar by MicroStep-MIS more than satisfies the needs of Dubai Municipality for rain monitoring. It can be further used for watersheds management, global warming adaptation strategies, flood protection, operative weather forecast, and aviation safety. Thanks to the radar, it is possible to measure cyclones and nowcast the local storms that cannot be predicted by the modeling system.



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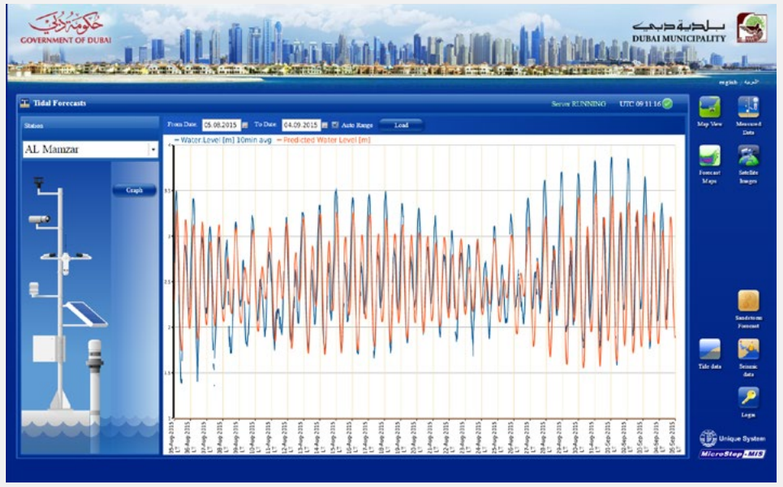
Road Weather Information and Early Warning System, Dubai

Tidal modeling

The model used by the Dubai Municipality is a numerical model (hydrodynamic model), which is associated with a numerical grid covering a specific spatial domain to predict the motion of the water. Output includes water surface elevation, position information, and current velocity. The model output file format is in a form known as 'NetCDF'.

Seismological modeling

Seismological monitoring system is a package of products for data acquisition, archival, and management of seismic networks. The system provides a comfortable access to regular tasks in seismic network operation.



100+

talented and dedicated professionals working together

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