



Smart Information for a Sustainable World

Integrating *Clarus* Data with the 511 New York Traveler Information System

Road Weather Management Stakeholder Meeting
September 8th, 2011

Agenda

- Project Background & Goals
- Inputs into Road Segment Alerting
 - Why is *Clarus* Data Important?
- About 511NY
- Demonstration Scenarios
- Observations and Results
- Next Steps
- Questions?

Project Background

- Project part of the Federal Highway Administration (FHWA) Broad Agency Announcement
 - **Research on *Clarus* System Data**
 - Winter/Spring 2010
 - Solicitation Number DTFH61-10-R-00015

- “...develop new or improved road weather management/operations procedures, create innovative user interfaces, and develop new applications including weather-responsive traffic management tools.”

Additional Uses of *Clarus* Data continued

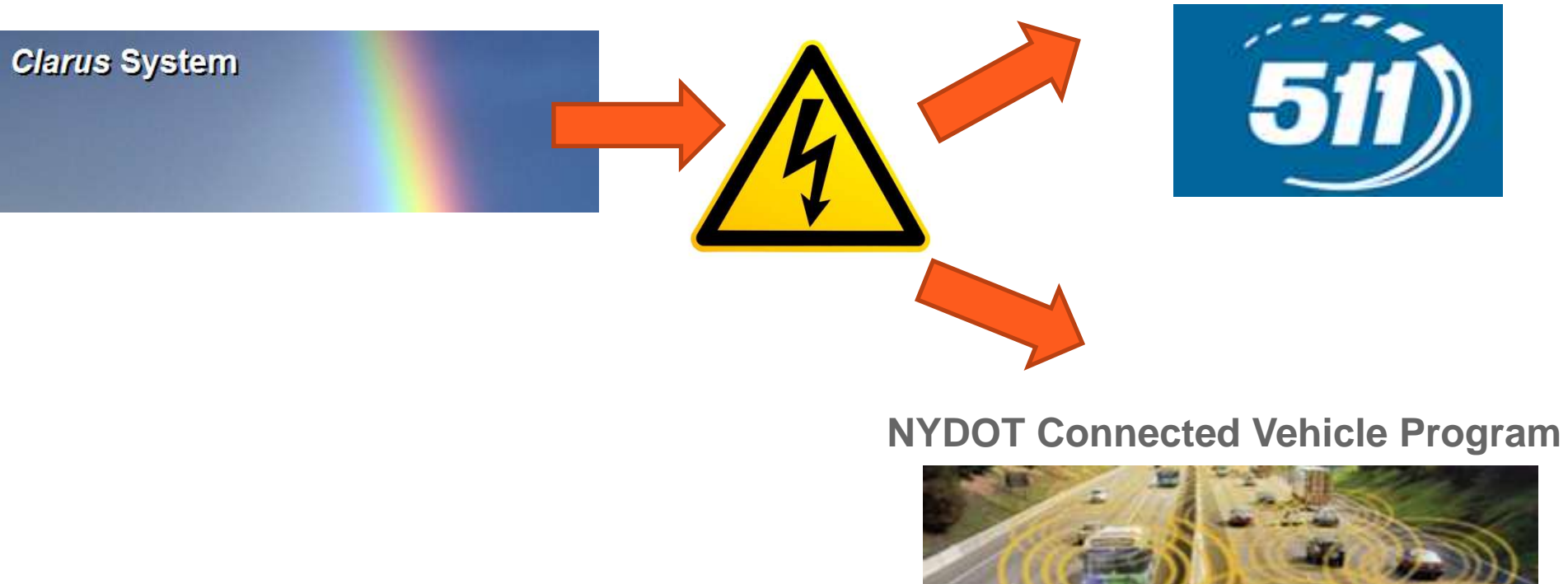
- Received 15 proposals, made 8 awards (5 academic, 3 private)
- Period of performance: 12 months, thru Sept. 2011

AMEC Americas Ltd.....	Add Nova Scotia & New Brunswick to <i>Clarus</i>
University of Idaho.....	Integrate <i>Clarus</i> data into Traffic Signal Sys. Ops.
GST Inc.....	Fuse <i>Clarus</i> data & MoPED Data for alerting & DST
University of Maryland.....	Integrate <i>Clarus</i> data into Regional Integrated Transportation Information System (RITIS)
Univ. of North Dakota.....	Validate quality of mobile wx data from state fleets: MN, ND & SD DOTs
Montana State Univ.....	Integrate <i>Clarus</i> data into Rural Travel Wx DST
Michigan Tech. Univ.....	Integrate <i>Clarus</i> data & Crash Data for travel DST
Telvent-NY Inc.....	Road Segment Alerts with <i>Clarus</i> data; NY 511



Project Goals

- Collect and integrate *Clarus* observations and disseminate road-segment alerts for use in the New York 511 system and Connected Vehicle Program

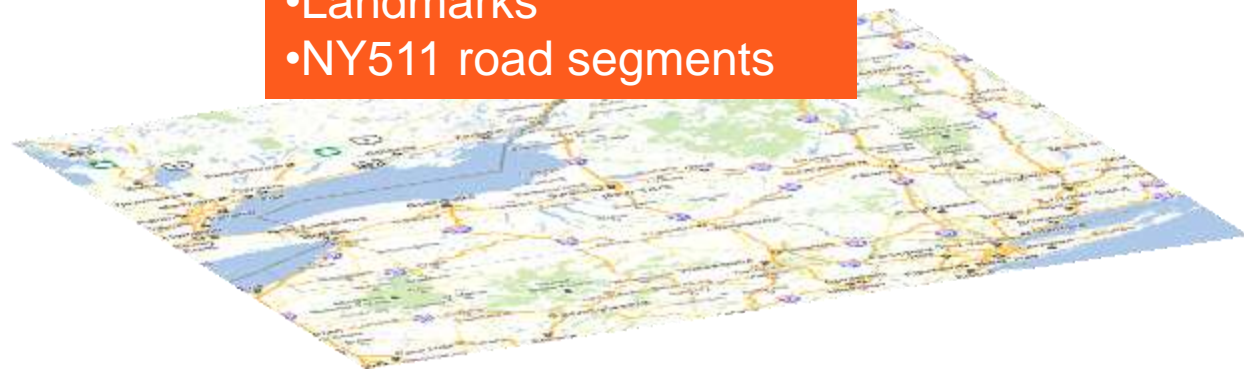


Road Segment Alerting Inputs



Defined by:

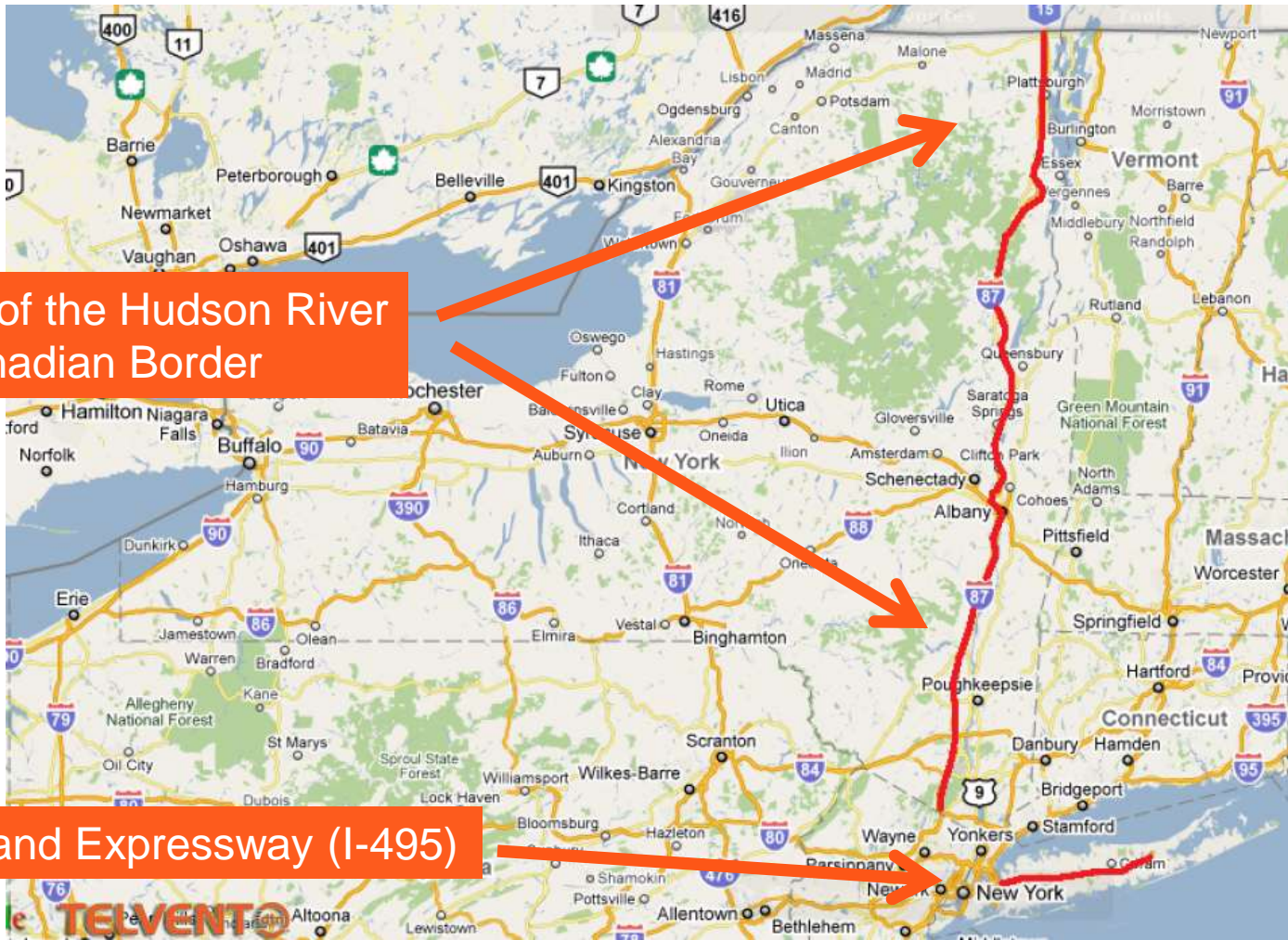
- Highway segments
- Landmarks
- NY511 road segments



Road Network

NYSDOT Road Network

- Project coverage – Two New York transportation corridors



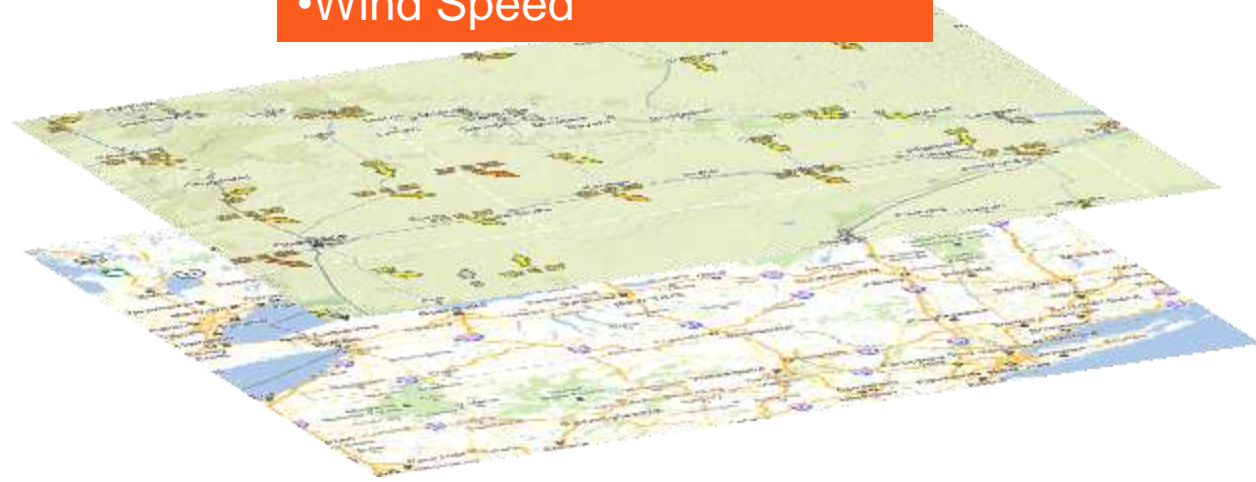
I-87 west of the Hudson River to the Canadian Border

Long Island Expressway (I-495)

Road Segment Alerting Inputs



Atmospheric Observations
• Wind Speed



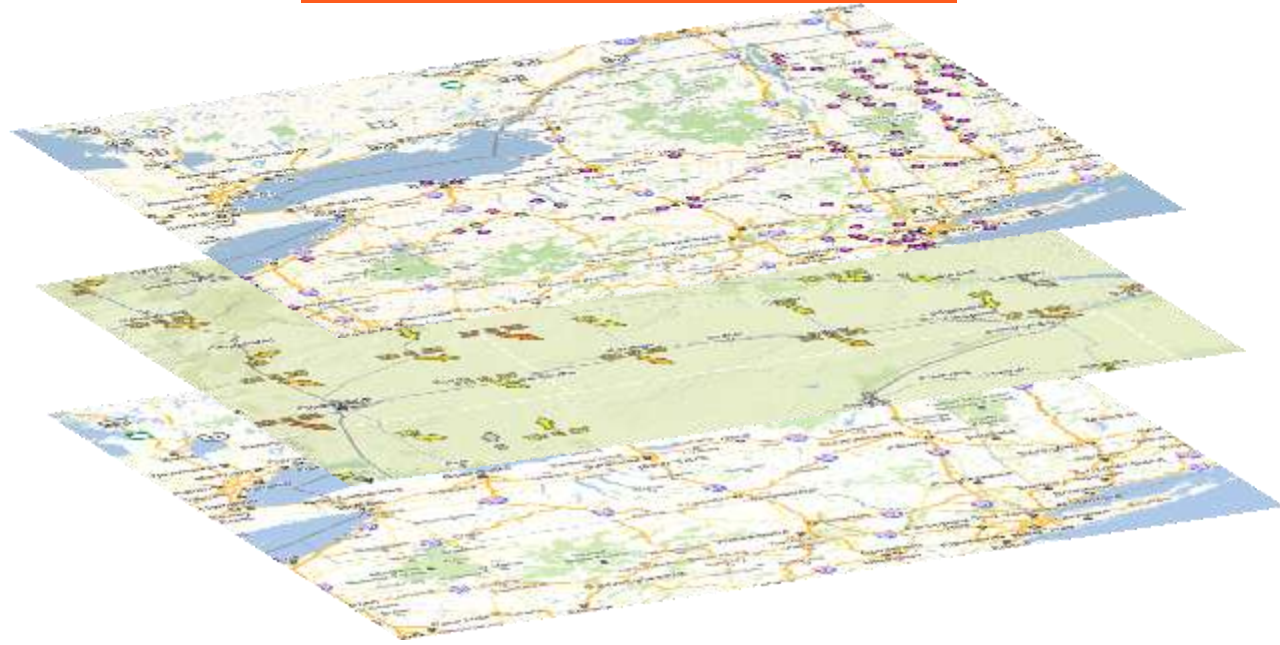
Observations

Road Network

Road Segment Alerting Inputs



NYSDOT RWIS from Clarus



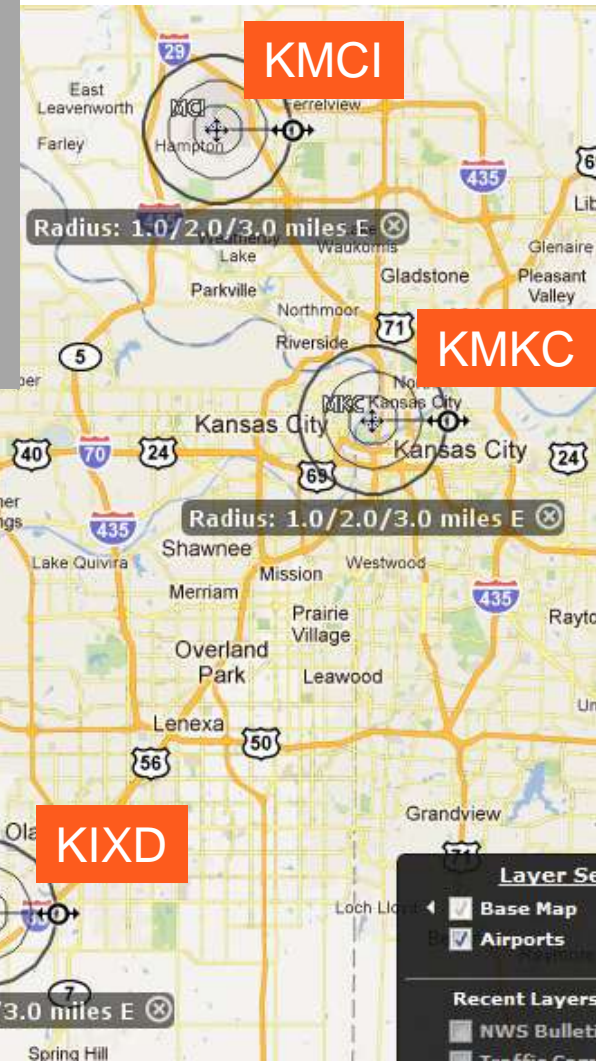
Clarus System

Observations

Road Network

Why is *Clarus* data valuable for Road Segment Alerting?

- Alerting on observations from Airports...
 - Typically 1-3 miles (or more) from a major roadway
 - Report atmospheric (non-roadway) variables only
 - Air Temperature, Wind Speed & Direction...



Why is *Clarus* data valuable for Road Segment Alerting?

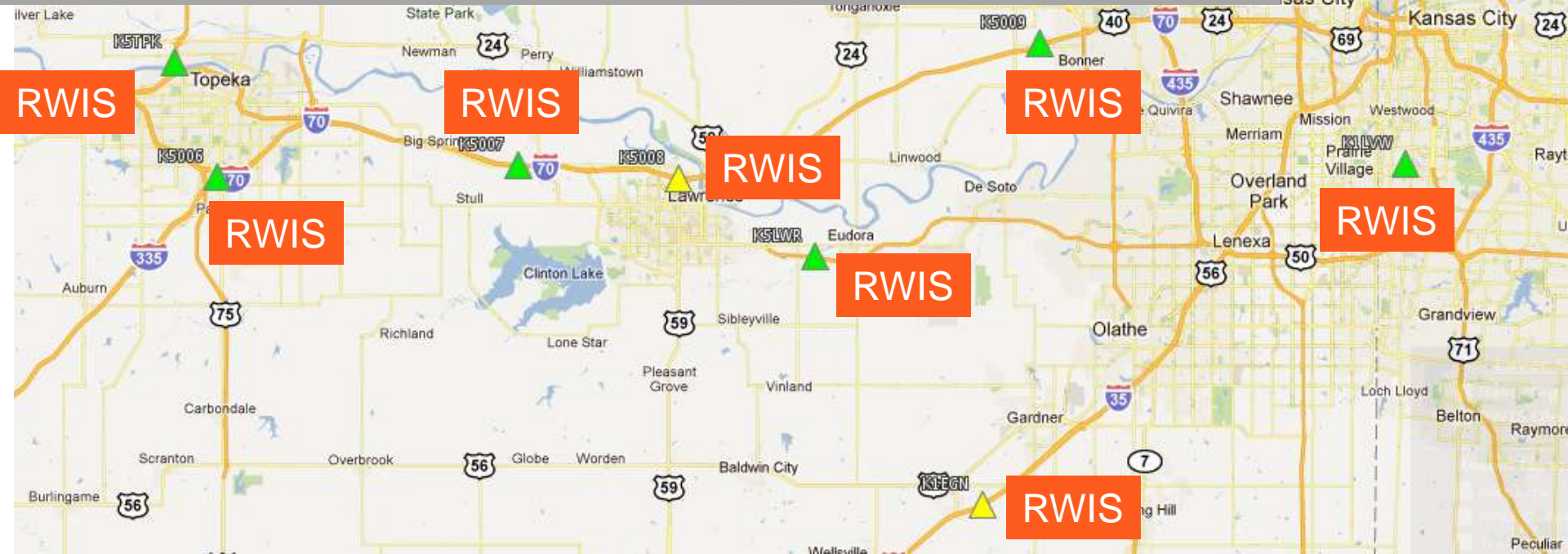
Alerting on observations from RWIS...

- Located *on* the roadway

- Report atmospheric and surface (roadway) variables

- Air Temperature, Wind Speed & Direction...

- Road Temperature, Road Condition...

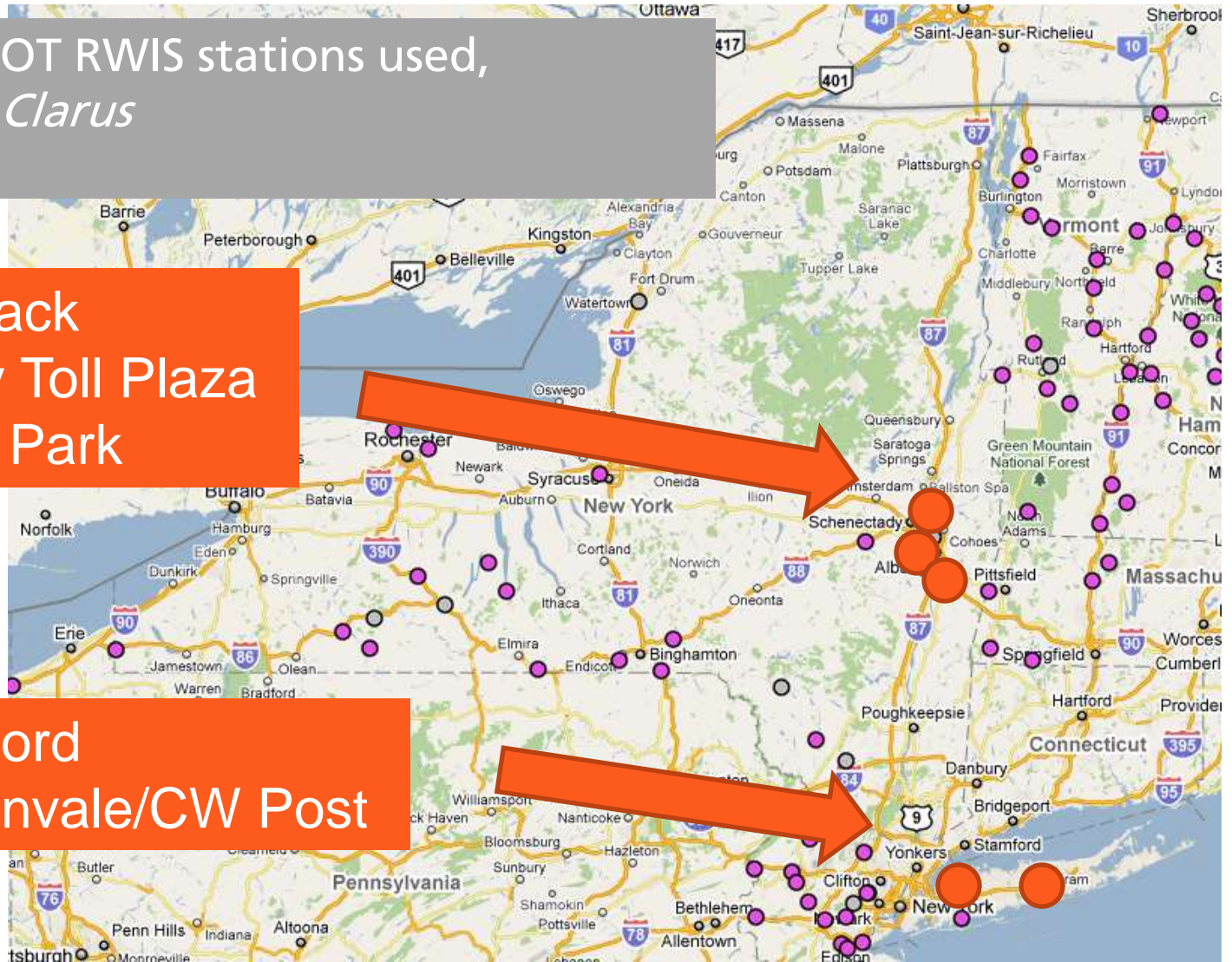


Clarus Stations Used

Five (5) NYSDOT RWIS stations used, delivered via *Clarus*

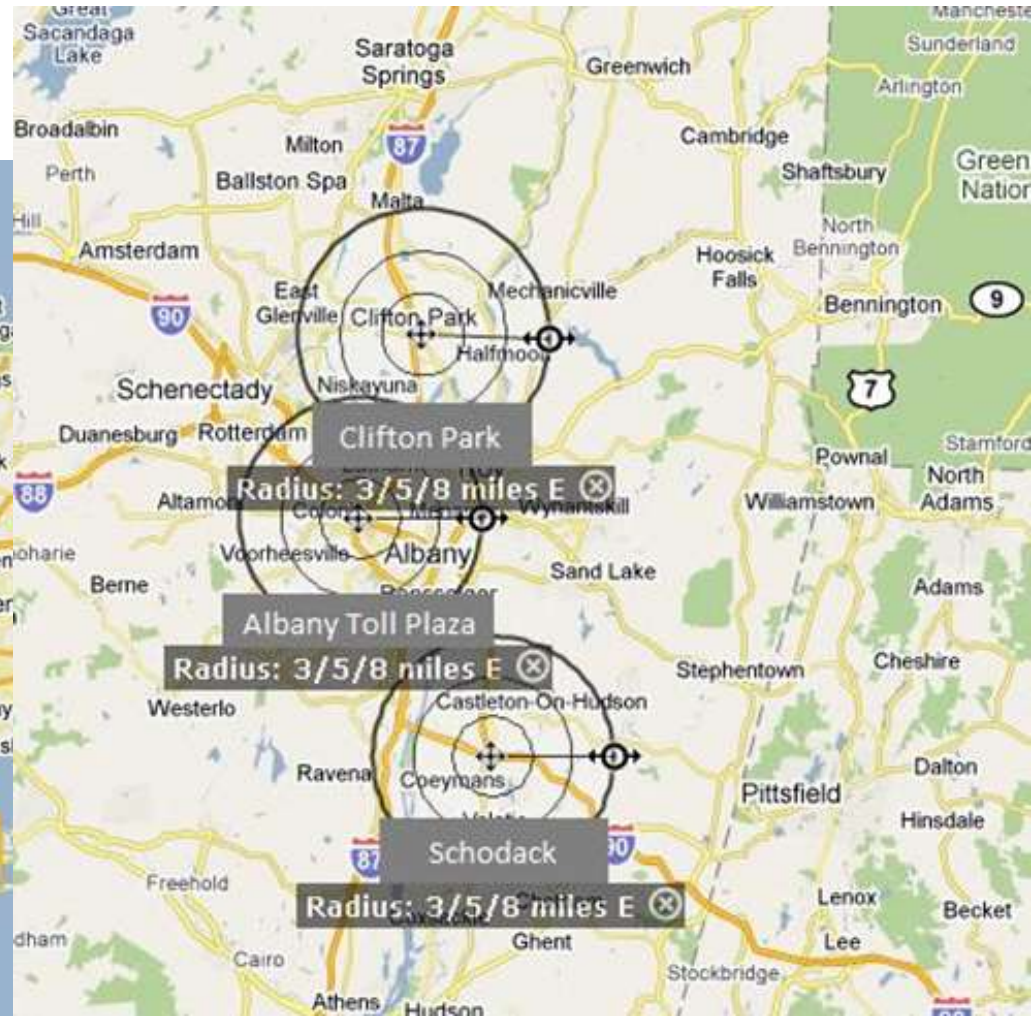
- Schodack
- Albany Toll Plaza
- Clifton Park

- Medford
- Greenvale/CW Post



Clarus RWIS versus Roadway

- Radius of influence around the RWIS selected from *Clarus*
 - 8 miles



Road Segment Alerting Inputs

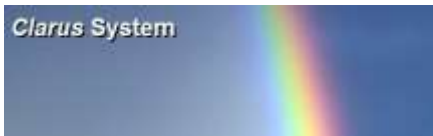


- Intensity (Light, Moderate, Heavy)
- Type (Rain, Snow, Mix)



Radar

Clarus System



Observations

Road Network

Road Segment Alerting Inputs



- Winter Storm Warning
- Blizzard Warning
- Tornado Warning

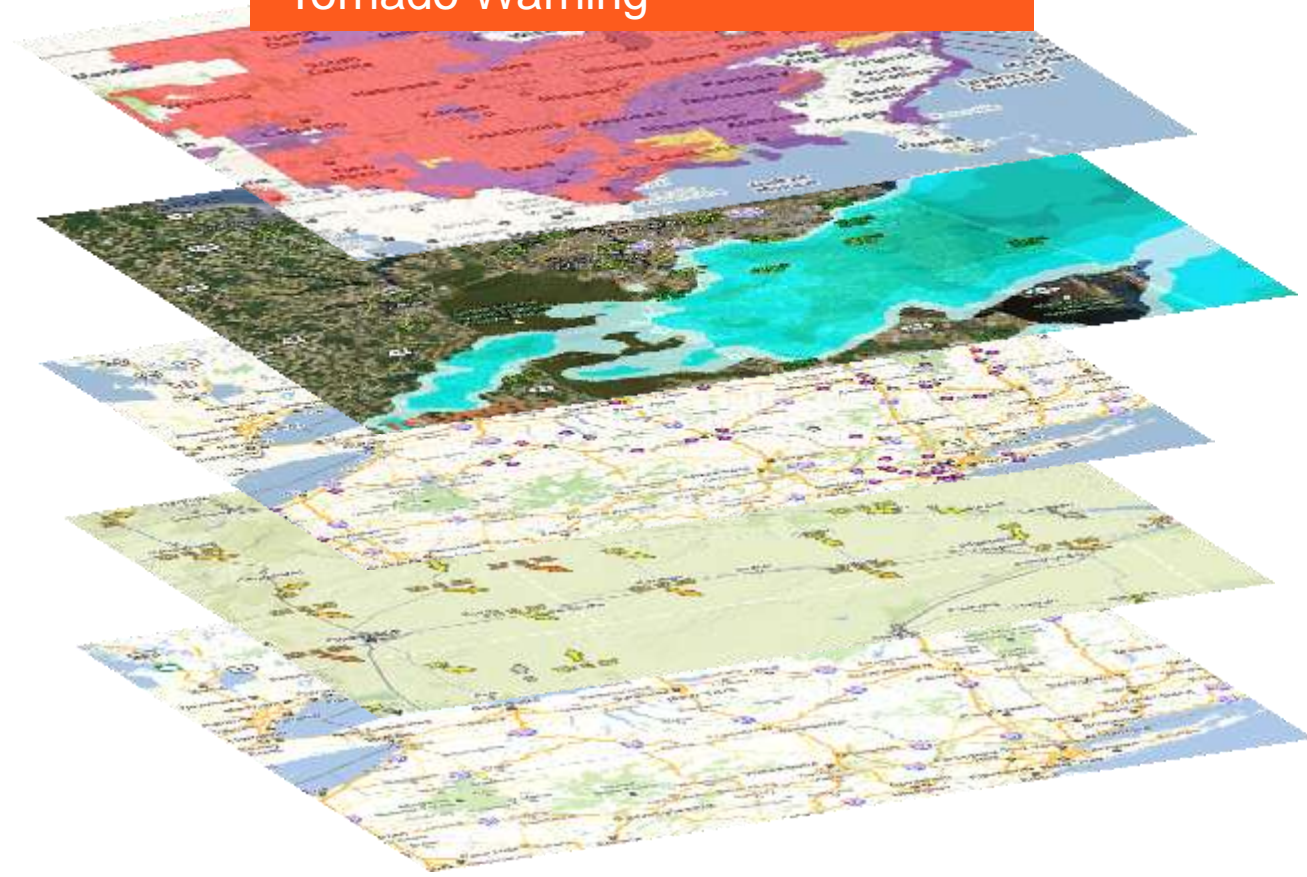
NWS Warnings

Radar

Clarus System

Observations

Road Network



Road Segment Alerting Inputs



- Storm “cat-scan”
 - Rotation (tornados)
 - Hail potential

Storm Corridors

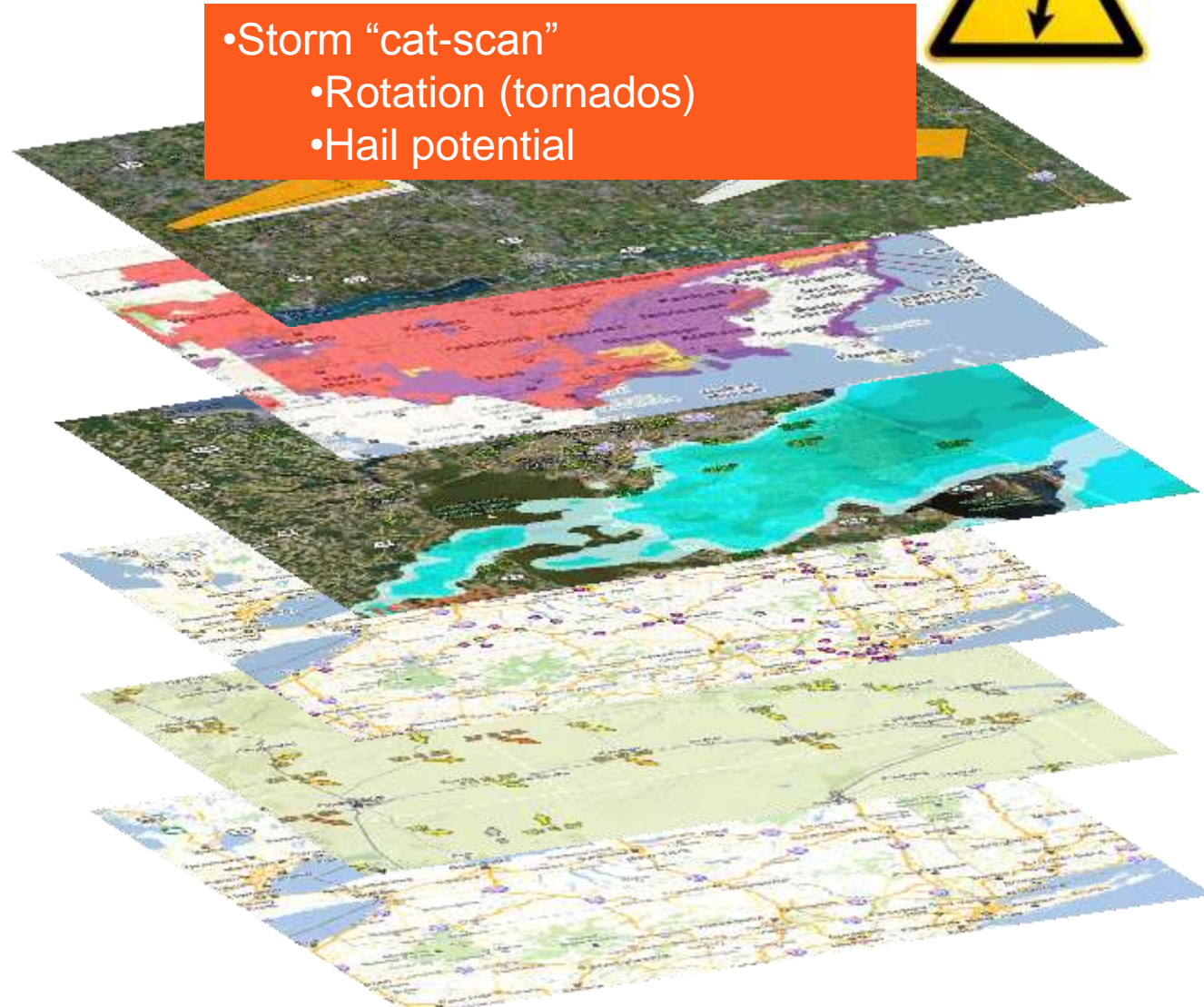
NWS Warnings

Radar

Clarus System

Observations

Road Network



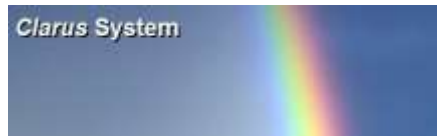
Road Segment Alerting Inputs



Storm Corridors Which storms have a potential tornado? Where is it moving?

NWS Warnings Where are Blizzard Warnings posted?

Radar Where is heavy snow falling?



Where are pavements observed to be wet? Below freezing?

Observations Where is it extremely windy right now?

Road Network Which specific road segment is having issues?

Road Segment Alerting Inputs



Storm Corridors

What is forecast to happen?

Areas

NWS Warnings

Radar

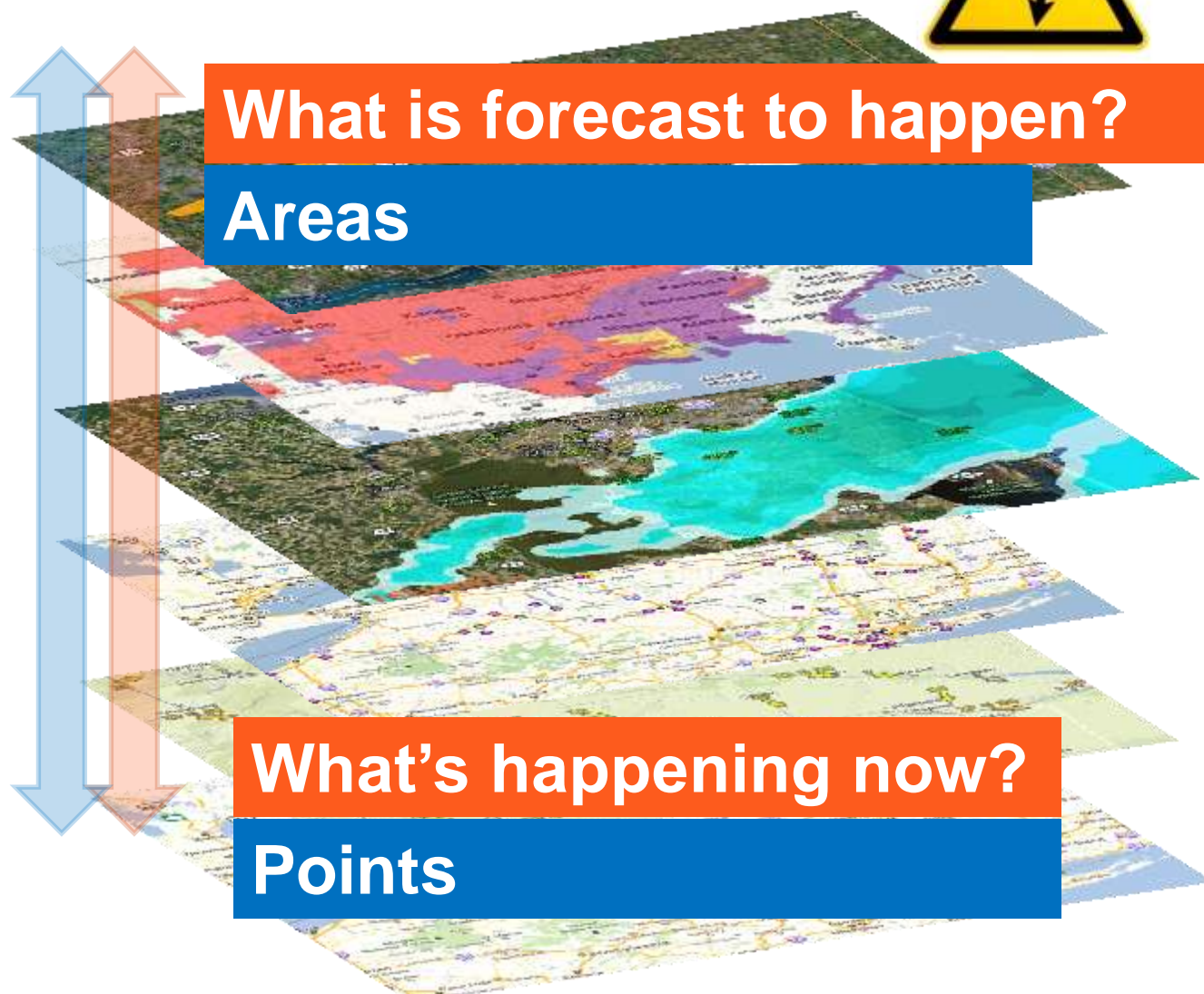
Clarus System

Observations

Road Network

What's happening now?

Points



Architecture & End Users



About 511NY

The screenshot shows the 511NY website homepage. At the top right, there are navigation links: HOME | ABOUT | CONTACT | FAQ. The main header features the 511 logo with the text "Traffic, Travel and Transit" and a large orange banner with the URL "www.511ny.org". Below the banner, there are sections for "ALERTS" (stating "There are no service alerts at this time.") and "MY CUSTOMIZED ALERTS". The main content area is divided into three columns: a large image of a city skyline at night, a "WELCOME TO 511NY" section with introductory text, and a "511NY MOBILE APP" section. Below this are five circular icons representing "TRAFFIC CONDITIONS", "TRANSIT CONDITIONS", "TRANSIT TRIP PLANNER", "RIDE SHARE", and "TRAVEL LINKS". At the bottom left, there are logos for "Clean Air NY" and "DRIVE GREEN, SAVE GREEN". At the bottom right, there are social media icons for Facebook, YouTube, and Twitter. The footer contains the navigation links "HOME | ABOUT | CONTACT" and the text "A free service of the New York State Department of Transportation".

HOME | ABOUT | CONTACT | FAQ

511 Traffic, Travel and Transit

www.511ny.org

ALERTS | There are no service alerts at this time.

MY CUSTOMIZED ALERTS

WELCOME TO 511NY

511NY is New York State's official traffic and travel info source. Whether you drive or take public transit, click below for precisely what you need, or simply dial 511 on your phone. Wherever you're going, 511NY is here to get you there.

To learn more about 511NY, see our [Frequently Asked Questions \(FAQs\)](#).

INTRODUCING 511NY MOBILE APP

Download to your mobile device to get statewide traffic, transit and travel info. [Click here for details.](#)

TRAFFIC CONDITIONS

TRANSIT CONDITIONS

TRANSIT TRIP PLANNER

RIDE SHARE

TRAVEL LINKS

Clean Air NY
Breathe it in.

DRIVE GREEN, SAVE GREEN
create a lean, green, money-saving machine

f f YouTube t

HOME | ABOUT | CONTACT

A free service of the New York State Department of Transportation

About 511NY

The screenshot displays the 511NY website interface. At the top right, there are navigation links: HOME | ABOUT | CONTACT | FAQ. The main header features the 511 logo and the slogan "GET CONNECTED TO GO". Below this is a navigation bar with categories: Traffic, Travel and Transit Info; TRAFFIC CONDITIONS; TRANSIT CONDITIONS; TRANSIT TRIP PLANNER; RIDE SHARE; TRAVEL LINKS; and MY511NY. A blue banner below the navigation bar contains an alert: "AIR QUALITY ACTION DAY is posted for Monday July 11, 2011 for the DOWNSTATE METROPOLITAN area. Hig" and a link to "MY CUSTOMIZED ALERTS".

The main content area is titled "Traffic Conditions" and includes a "Map Legend" section on the left. The legend lists several categories with checkboxes: "Weather/Alerts", "Tunnels", and "Show Speeds". Below the legend, there are three buttons: "Save My Map View", "View My Saved Map", and "Clear My Map View".

The central part of the page is a map of New York State and surrounding regions. The map is titled "Zoom to: Select a Region" and includes a "Map Legend" section with three options: "Map", "Satellite", and "Hybrid". The map shows major highways (Interstates 190, 90, 81, 87, 88, 380) and cities such as Rochester, Syracuse, Albany, and New York. A large orange arrow points from the "Cameras" text block to a specific location on the map near I-190 and I-19.

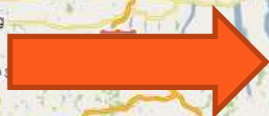
At the bottom of the page, there are navigation links: HOME | ABOUT | CONTACT. On the right side, there is a footer: "A free service of the New York State Department of Transportation" with the NYS logo.

Incidents & Closures

Special Events

Cameras

Traffic Speed



About 511NY

Road segment shading...

Road Segment Alerts

Winter Travel Advisory

The screenshot shows the 511NY website interface. At the top, there is a 'Traffic Conditions' tab and a 'Zoom to: Select a Region' dropdown menu. Below this, there are several sections: 'Special Events' with an 'Active' dropdown, 'Bridges and...', 'Show Speeds', and 'Winter Travel Advisory'. The 'Winter Travel Advisory' section includes a legend with the following items: 'No Report', 'Generally Clear and Dry Conditions', 'Wet Conditions', 'Snow / Ice Conditions', 'Severe Snow / Ice Conditions', 'Closed', and 'Closed Portions'. The background shows a map of the Buffalo, NY area with various road segments highlighted in different colors corresponding to the legend.

The screenshot shows the Clarus Weather legend. It features a checked checkbox next to a weather icon (cloud with rain) and the text 'Clarus Weather'. Below this, there is a legend with the following items: 'Wet' (green line), 'Snow / Ice' (light blue line), 'Severe Snow / Ice' (dark blue line), 'High Winds' (pink line), 'Severe Weather Alert' (dark red line), and 'Severe Weather Detected' (red line). The background shows a map of the Buffalo, NY area with various road segments highlighted in different colors corresponding to the legend.

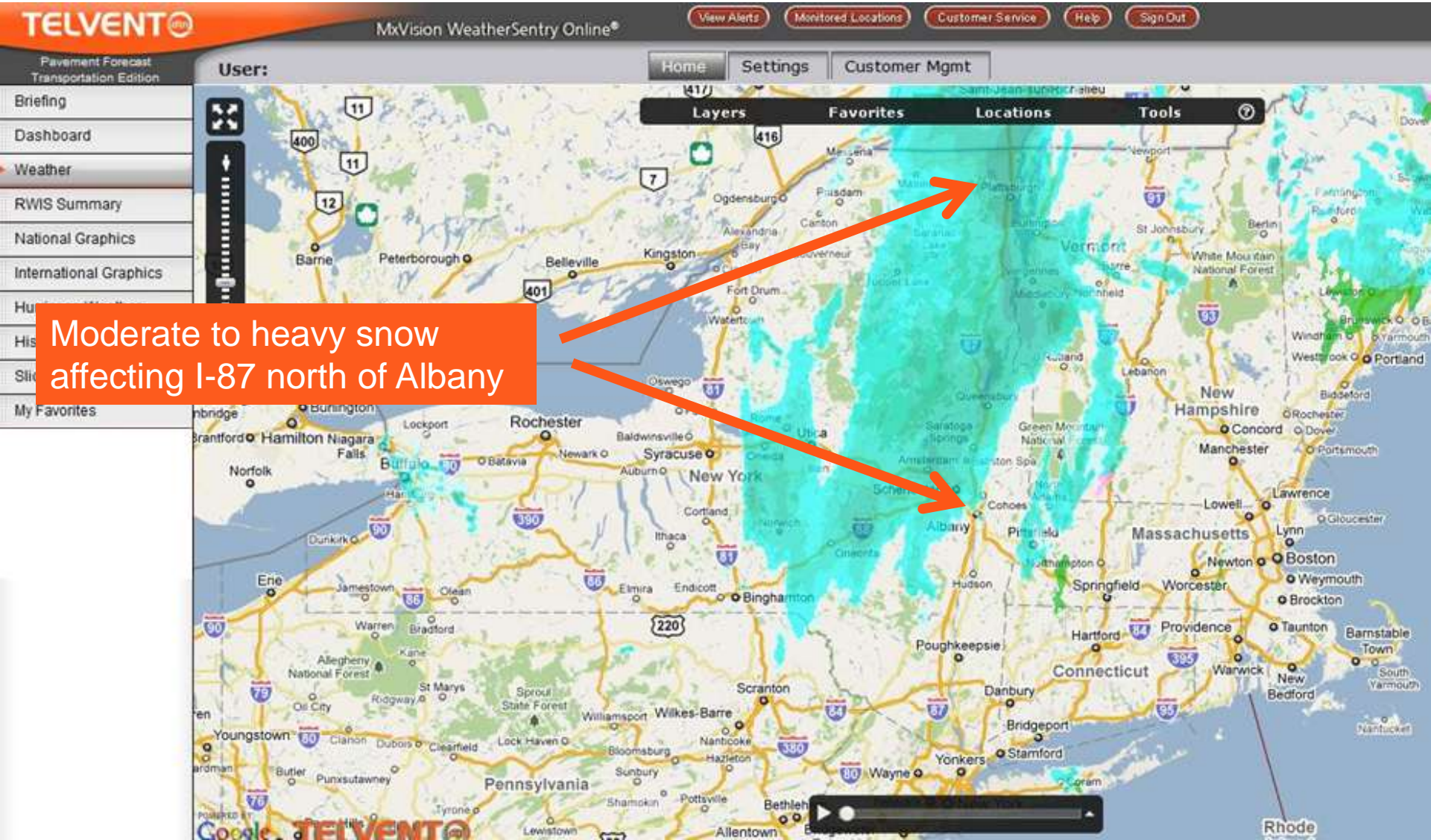
A pre-production version of 511NY was used for the *Clarus* project

Two Demonstration Scenarios

- March 7th, 2011
 - Snow storm
- April 28th, 2011
 - Severe weather outbreak



Scenario #1 – March 7th, 2011



Scenario #1 – March 7th, 2011

Albany Toll Plaza

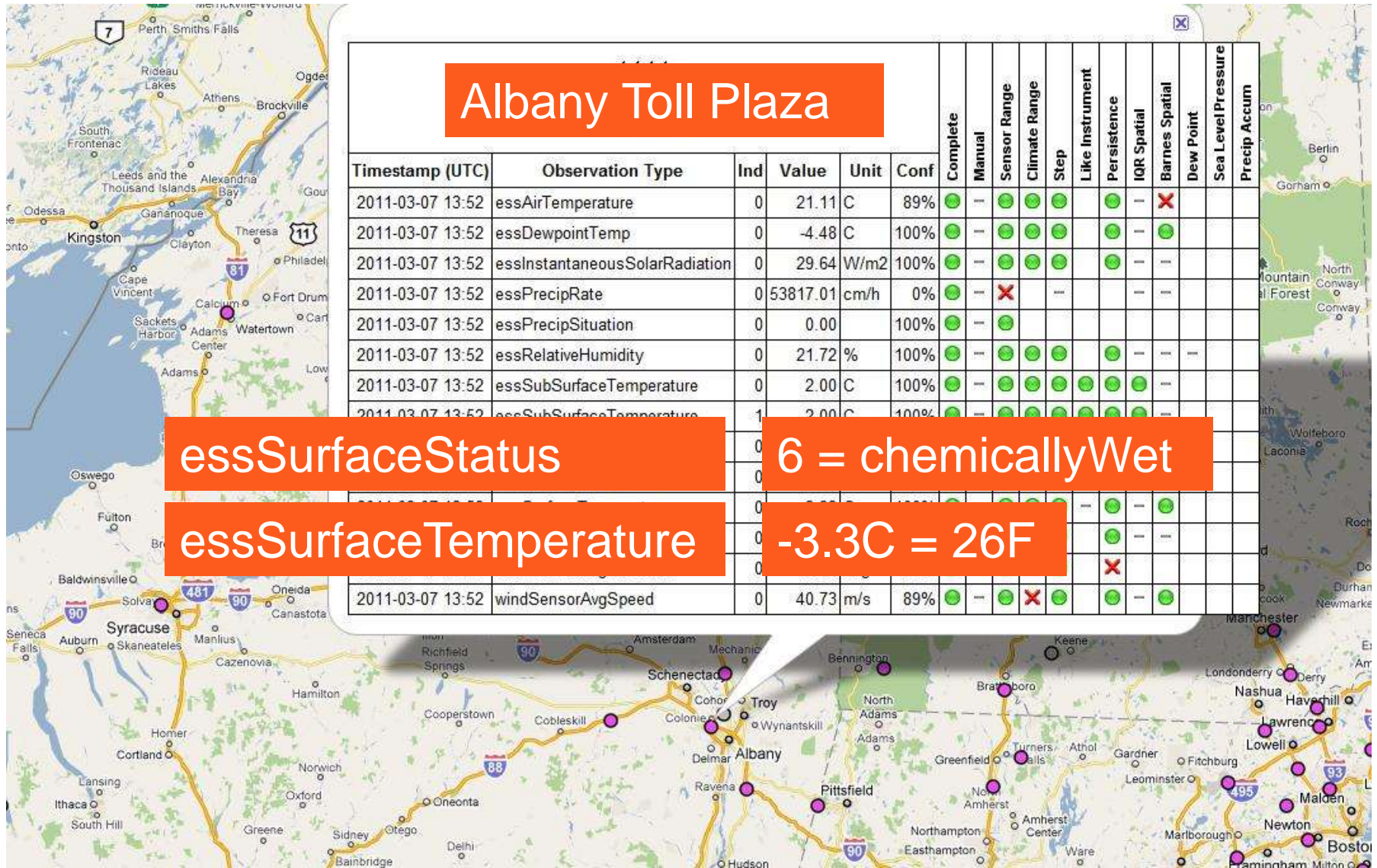
Timestamp (UTC)	Observation Type	Ind	Value	Unit	Conf	Complete	Manual	Sensor Range	Climate Range	Step	Like Instrument	Persistence	IQR Spatial	Barnes Spatial	Dew Point	Sea Level Pressure	Precip Accum
2011-03-07 13:52	essAirTemperature	0	21.11	C	89%	●	-	●	●	●	●	●	-	✗			
2011-03-07 13:52	essDewpointTemp	0	-4.48	C	100%	●	-	●	●	●	●	●	-	●			
2011-03-07 13:52	essInstantaneousSolarRadiation	0	29.64	W/m2	100%	●	-	●	●	●	●	●	-	-			
2011-03-07 13:52	essPrecipRate	0	53817.01	cm/h	0%	●	-	✗	-	-	-	-	-	-			
2011-03-07 13:52	essPrecipSituation	0	0.00		100%	●	-	●	●	●	●	●	-	-			
2011-03-07 13:52	essRelativeHumidity	0	21.72	%	100%	●	-	●	●	●	●	●	-	-			
2011-03-07 13:52	essSubSurfaceTemperature	0	2.00	C	100%	●	-	●	●	●	●	●	-	-			
2011-03-07 13:52	essSubSurfaceTemperature	1	2.00	C	100%	●	-	●	●	●	●	●	-	-			
2011-03-07 13:52	essSurfaceStatus	0	6			●	-	●	●	●	●	●	-	-			
2011-03-07 13:52	essSurfaceTemperature	0	-3.3	C		●	-	●	●	●	●	●	-	-			
2011-03-07 13:52	windSensorAvgSpeed	0	40.73	m/s	89%	●	-	●	✗	●	●	●	-	●			

essSurfaceStatus

6 = chemicallyWet

essSurfaceTemperature

-3.3C = 26F



Scenario #1 – March 7th, 2011

511
Traffic, Travel and Transit Info

511NY
GET CONNECTED TO GO

HOME | ABOUT | CONTACT | FAQ

TRAFFIC CONDITIONS | TRANSIT CONDITIONS | TRANSIT TRIP PLANNER | RIDE SHARE | TRAVEL LINKS | MY511NY

ALERTS | MY CUSTOMIZED ALERTS

Zoom to: Select a Region

Map Legend

- Incidents / Closures
- Weather/Alerts

Cameras

- Show Speeds
- Winter Travel Advisory
- Clarus Weather

Wet

Snow / Ice

Severe Snow / Ice

High Winds

Severe Weather Alert

Severe Weather Detected

Map | Satellite | Hybrid

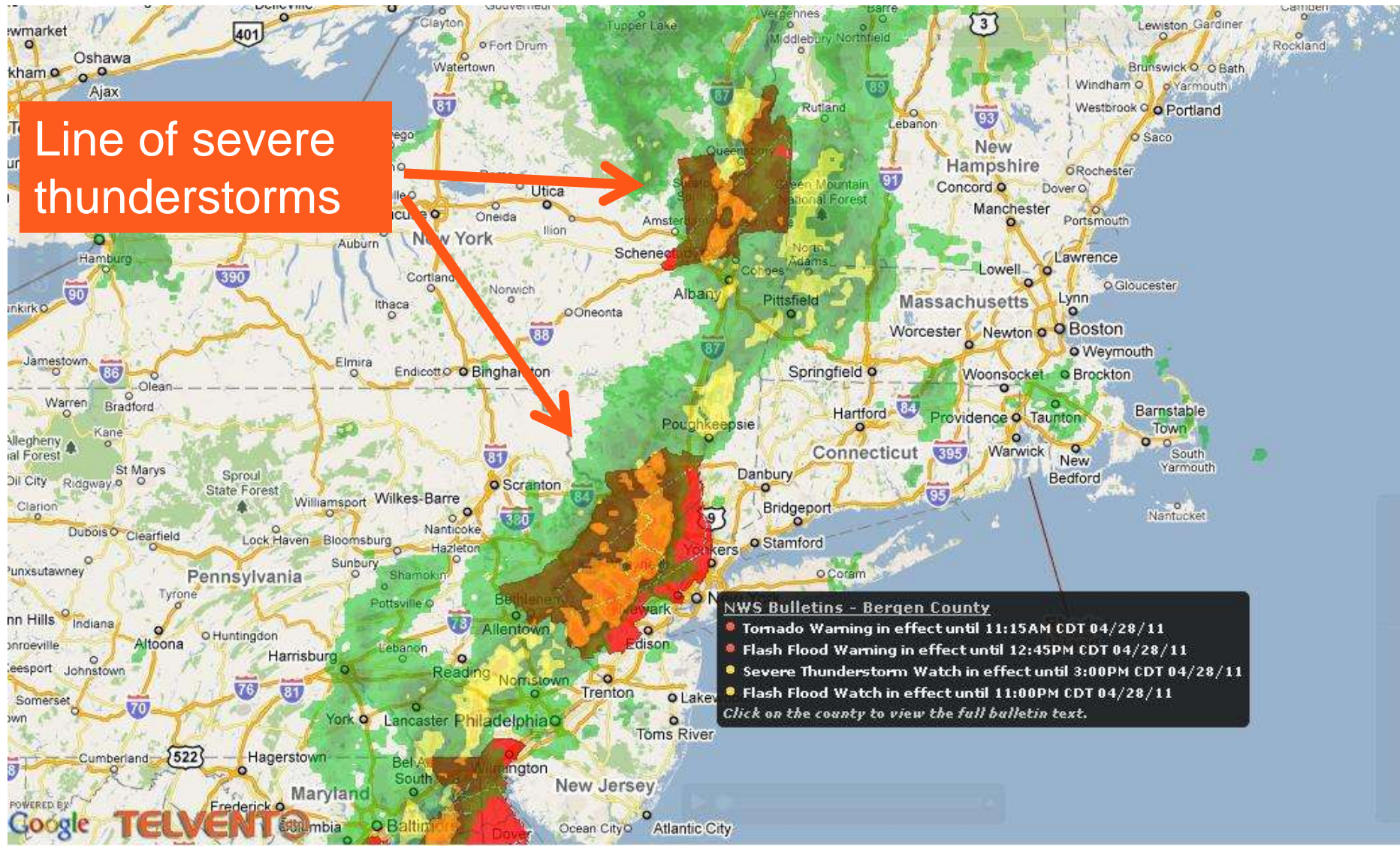
Last Update: 3/07/2011 10:10AM
Pavement Temperature: 29 F (or lower)
Pavement Condition: Wet
Precipitation Type: Light Snow

Map data ©2011 Google - Terms of Use

Road segments shaded with "Snow/Ice" color north of Albany

Scenario #2 – April 28th, 2011

Line of severe thunderstorms



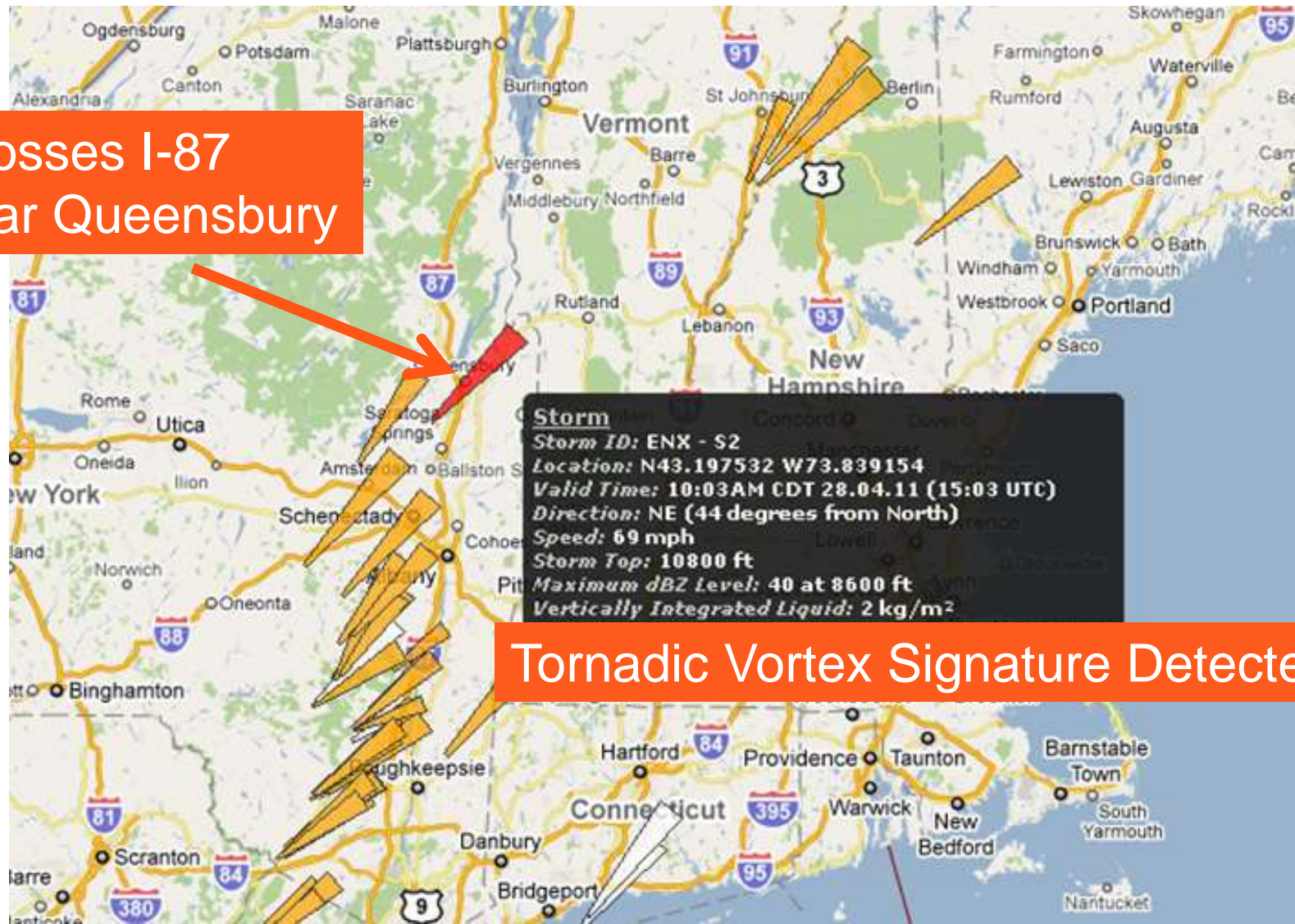
NWS Bulletins - Bergen County

- Tornado Warning in effect until 11:15AM CDT 04/28/11
- Flash Flood Warning in effect until 12:45PM CDT 04/28/11
- Severe Thunderstorm Watch in effect until 3:00PM CDT 04/28/11
- Flash Flood Watch in effect until 11:00PM CDT 04/28/11

Click on the county to view the full bulletin text.

Scenario #2 – April 28th, 2011

Crosses I-87
near Queensbury



Tornadic Vortex Signature Detected

Scenario #2 – April 28th, 2011

511
GETCONNECTEDTOGO

HOME | ABOUT | CONTACT | FAQ

TRAFFIC CONDITIONS TRANSIT CONDITIONS TRANSIT TRIP PLANNER RIDE SHARE TRAVEL LINKS MY511NY

at this time.

MY CUSTOMIZED ALERTS

Region to: Select a Region

Map Satellite Hybrid

Last Update: 4/28/2011 11:03AM
Severe Weather Detected: Tornado Possible
Precipitation Type: Light Rain

Map Legend

- Incidents/Closures
- Weather/Alerts
- Special Events
- Active
- Bridges and Tunnels
- Construction
- Active
- Cameras
- Show Speeds
- Winter Travel Advisory
- Clarus Weather
- Wet
- Snow / Ice
- Severe Snow / Ice
- High Winds
- Severe Weather Alert
- Severe Weather Detected

POWERED BY Google

Map data ©2011 Google

I-87 near
Queensbury

From the Traveler's Perspective



- End user = **Travelling Public**
 - Brings information down to the roadway level (*Clarus* & RWIS)
 - Insight into weather in-between sensors
 - Insight into developing weather situations that will affect the region

From the Traveler's Perspective



"I see nothing falling from the sky but is the road slick?"

"Which portion of my route is or will be affected by high winds?"

"It is sunny now. Am I about to drive into a developing blizzard?"



"I see where the severe weather is now. Which roads will it affect in the next 15-30 minutes?"

Observations & Results

- Both NYSDOT and FHWA evaluated the pre-production 511NY system over a 3-month time period.
 - Alert Prioritization
 - ▶ Standardize order of alerts to display (radar versus warnings, etc.)
 - Data Quality
 - ▶ RWIS data quality is key to ensure data can be utilized for alerting
 - Information Clarity
 - ▶ Keep public perception/interpretation in mind...keep it simple
 - ▶ Provide additional information on alert types
 - ▶ Standardize the colorization and terminology
 - ▶ Cease use of Flood Warnings...keep Flash Flood Warnings
 - **Thank you NYSDOT & FHWA!**

Next Steps

- Simplify and clarify the alert results



Next Steps

- Simplify and clarify the alert results
- Explore integration of road segment alerts into 511NY production system

The screenshot displays the 511NY website interface. At the top, there is a navigation bar with links for HOME, ABOUT, CONTACT, and FAQ. Below this is a header with the 511NY logo and the slogan "GET CONNECTED TO GO". A secondary navigation bar lists various services: TRAFFIC CONDITIONS, TRANSIT CONDITIONS, TRANSIT TRIP PLANNER, RIDE SHARE, TRAVEL LINKS, and MY511NY. The main content area is titled "ALERTS" and indicates "There are no service alerts at this time." Below this, there is a "MY CUSTOMIZED ALERTS" section. The primary focus is the "Traffic Conditions" section, which includes a "Map Legend" on the left and a map on the right. The map legend lists various alert types such as Incidents/Closures, Weather/Alerts, Special Events, Bridges and Tunnels, Construction, Cameras, Show Speeds, Winter Travel Advisory, and Clarus Weather. The map shows a red line indicating a "Severe Weather Alert" along the I-190 corridor near Albany, NY. A pop-up box on the map provides details: "Last Update: 4/28/2011 11:03AM", "Severe Weather Detected: Tornado Possible", and "Precipitation Type: Light Rain". The map also shows other road conditions like wet roads (green) and snow/ice (blue).

Next Steps

- Simplify and clarify the alert results
- Explore integration of road segment alerts into 511NY production system
- Integrate road segment alerts into the NY Connected Vehicle program



“Heavy
snow
ahead”

Other Uses for Road Segment Alerting

- XML feed can be integrated into many different applications
 - Connected vehicle initiatives
 - 511 programs
 - Traffic Management Centers
 - Traffic modeling input
 - Signal timing





Questions?

- Final Report

- www.its.dot.gov/index.htm
- Integrating *Clarus* Data with the 511 New York Traveler Information System
- FHWA Publication Number: FHWA-JPO-11-112



Thank You