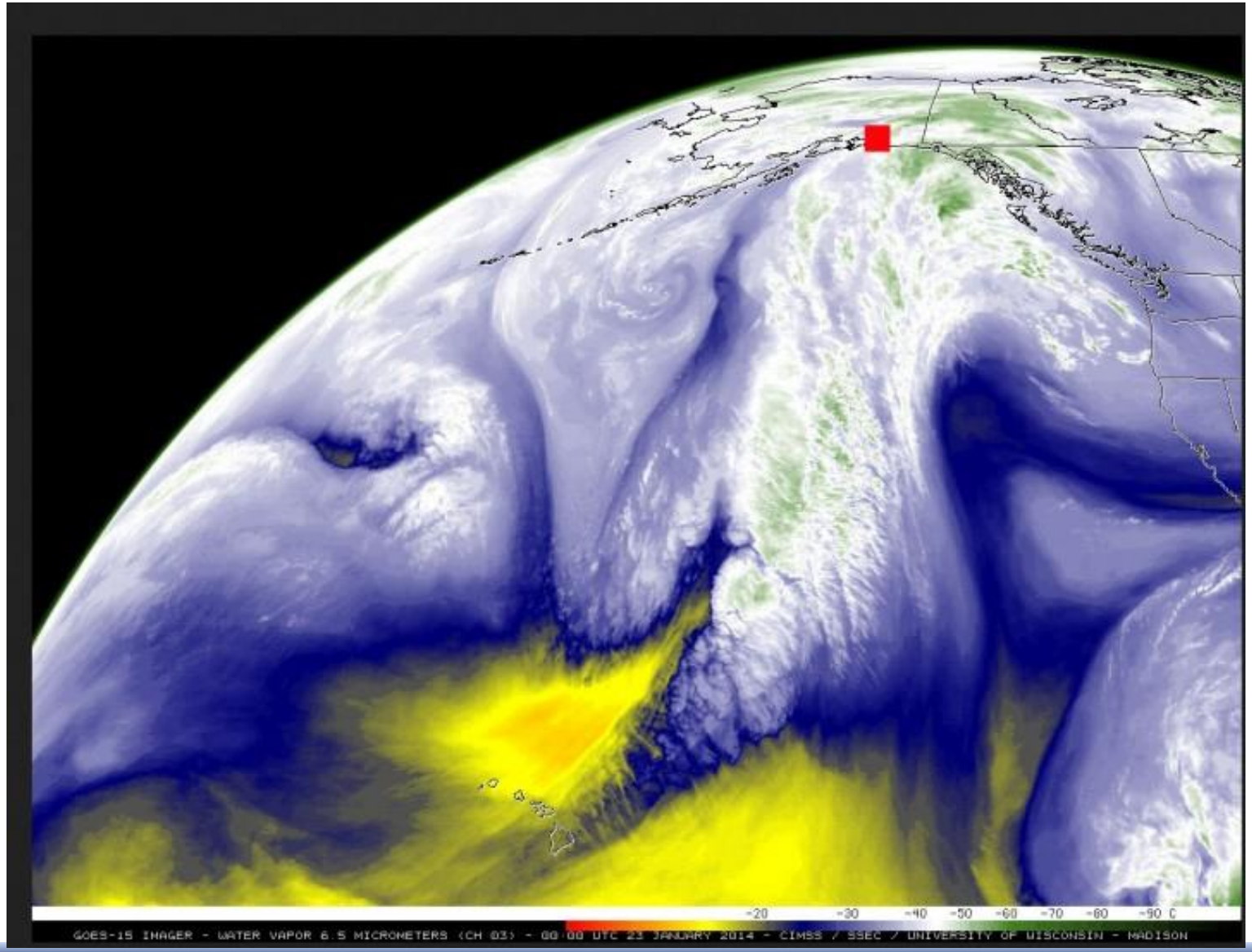
Alaska Department of Transportation & Public Facilities

ITS Alaska
Maintenance Decision Support System (MDSS)

October 20, 2015

Changing Weather Patterns



“Godzilla” El Nino?

NOAA HOME WEATHER OCEANS FISHERIES CHARTING SATELLITES CLIMATE RESEARCH COASTS CAREERS

NOAA NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
UNITED STATES DEPARTMENT OF COMMERCE

About NOAA | El Niño Home | NOAA Contacts | NOAA Staff Directory | NOAA Help | SEARCH

Weather.gov Forecast
City, ST GO

- What's Happening Today?
- Forecasts
- Observations
- Research
- Impacts
- Links, FAQs, Graphics...
- Education
- El Niño Home
- La Niña Home

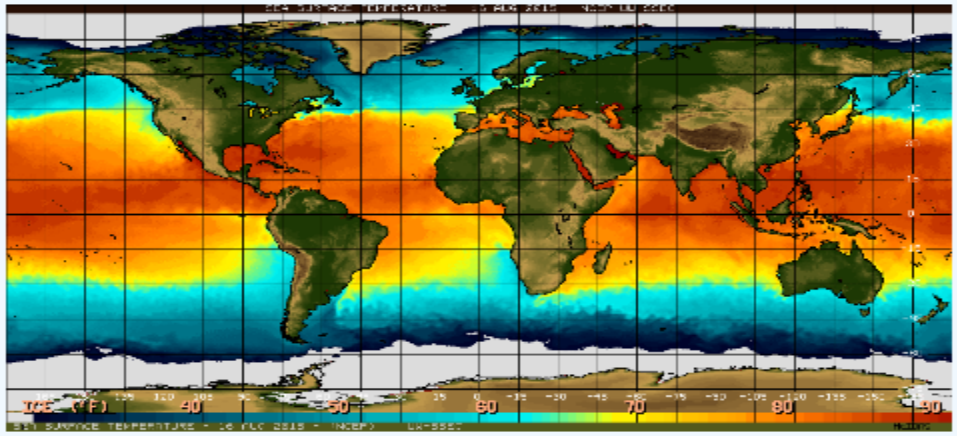
Media Contacts

Chris Vaccaro
NOAA Weather Service
301-427-9000

Monica Allen
NOAA Research
301-734-1123

NOAA's El Niño Portal

For more information on the ongoing El Niño event, check the ENSO Diagnostic Discussion, which is updated on the second Thursday of each month. Be sure to follow our ENSO blog and connect with us on social media.



Sea surface temperature in the equatorial Pacific Ocean (above). El Niño is characterized by unusually warm temperatures and La Niña by unusually cool temperatures in the equatorial Pacific. Anomalies (below) represent deviations from normal temperature values, with unusually warm temperatures shown in red and unusually cold anomalies shown in blue.

- El Niño is a disruption of the ocean-atmosphere system in the Tropical Pacific having important consequences for weather and climate around the globe.
- NOAA has primary responsibilities for providing forecasts to the Nation, and a leadership role in sponsoring El Niño observations and research.
- El Niño status & discussion
- What is El Niño?
- What is La Niña?
- YouTube video: Understanding El Niño
- YouTube video: Developing an El Niño Observing System
- New Look at 1918/1919 Niño Suggests Link to Flu Pandemic
- El Niño FAQs & definitions

Our Mission

Keep Alaska moving through service and infrastructure

- **Provide for the safe and efficient movement of people and goods**
- **Provide access to state services**
- **Provide access to resources**

To accomplish our mission, we build, maintain, and operate Transportation Infrastructure (Assets)

Recurring Ice Storms

Standard Method: Weather Guessing

RWIS Technology

Info available

DOT&PF > Iways > RWIS >State Map >Area Map [Login]

RWIS Site Summary

Airport Way @ MP . 11

For definitions, click on the name field.

Date / Time	
08/12/2015 1:33 PM	
Atmospheric Data	
Air Temperature	55 °F
Dew Point	47 °F
Relative Humidity	75 %
Wind Speed	1 mph
Wind Direction	E
Wind Speed Maximum	6 mph
Wind Direction of Maximum Speed	E

Pavement Surface and Subsurface Data			
Pavement Sensor Location	Date/Time	Surface Temperature (°F)	Subsurface Temperature (°F)
EB Lane @ RPU - Infrared	08/12/2015 1:33 PM	59	-

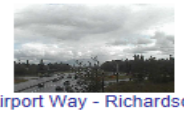
Camera Data


Airport Way West View
08/12/2015 1:53 PM


Airport Way West View
08/12/2015 1:53 PM


Gaffney Road North View
08/12/2015 1:54 PM


Airport Way East View
08/12/2015 1:54 PM


Airport Way - Richardson EB Ramp
08/12/2015 1:54 PM


Airport Way - Steese/Richardson Intersection
08/12/2015 1:54 PM


Pavement Closeup View
08/12/2015 1:54 PM

Road Weather

- » RWIS Home
- » RWIS - Camera - TDP
- » myRWIS
- » About RWIS
- » About TDP
- » RWIS Glossary
- » RWIS Website FAQs
- » Alaska Weather Links
- » Contact RWIS Manager

- » RWIS Site Data
  - » Site Summary
  - » Extremes Summary
  - » Atmospherics Summary
  - » Pavement Summary
- » RWIS Site MetaData

- » 511 - Traveler Information

RWIS HELP

Please note: You must have Acrobat Reader to open any documents on this page. If you do not have Acrobat Reader, click to download the FREE software.

Pavement Friction

State of Alaska | myAlaska | My Government | Resident | Business in Alaska

Alaska Department of Transportation & Public Facilities

Road Weather Information System

DOT&PF > Iways > RWIS >State Map >Area Map

RWIS Site Summary

Airport Way @ MP . 11

For definitions, click on the name field.

Date / Time	
08/12/2015 1:33 PM	
Atmospheric Data	
Air Temperature	55 °F
Dew Point	47 °F
Relative Humidity	75 %
Wind Speed	1 mph
Wind Direction	E
Wind Speed Maximum	6 mph
Wind Direction of Maximum Speed	E

Pavement Surface and Subsurface Data

Pavement Sensor Location	Date/Time	Surface Temperature (°F)	Subsurface Temperature (°F)	Pavement Surface Grip	Pavement Surface State	Pavement Contaminant Depth (mm)
EB Lane @ RPU - Infrared	08/12/2015 1:33 PM	59	-	0.76 - GOOD	Wet	-

RWIS Hardware

Non-Invasive Pavement Sensors

- **There are two separate sensors…**

- **DSC111 (The 'C' stands for condition)**
- **Measures Road State** – 4 eye safe lasers at differing frequencies are transmitted by top lens & received by bottom lens

- **DST111 (The 'T' stands for temperature)**
- **Measures Road Surface Temperature** - based on long-wave infrared radiation.

How to Use

Maintenance Manager Use of Friction Measurement Readings

Grip (Co-efficient of Friction) Reading Rule of Thumb:

Level of Grip	*Description**
0.6 and above	*Grip good*
0.4 to 0.59	*Grip poor*
0.39 and below	*Pavement slippery – Very poor grip*

**These descriptions are intended only as indicators, as the real friction values depend on many variables, such as vehicle type and speed, tire type, road surface structure, etc.*

Why Improve On This?
(Why MDSS?)

- Customer demand for higher **level of service** and **reliable, current information**
- **Budget/staff constraints** in the face of high cost of labor, equipment and materials used for maintenance
- Difficulty in **forecasting** certain types of **weather and complex pavement response** to conditions and maintenance efforts
- **Environmental concerns** with anti-icing and de-icing

Alaska Enhanced MDSS

- **Decision support tool** →recommends course of action based on conditions/forecast
- Integrates fixed **RWIS** sites and **mobile operations**
- Algorithms customized for **Alaska**

Partners in MDSS

NCAR
NATIONAL CENTER FOR ATMOSPHERIC RESEARCH

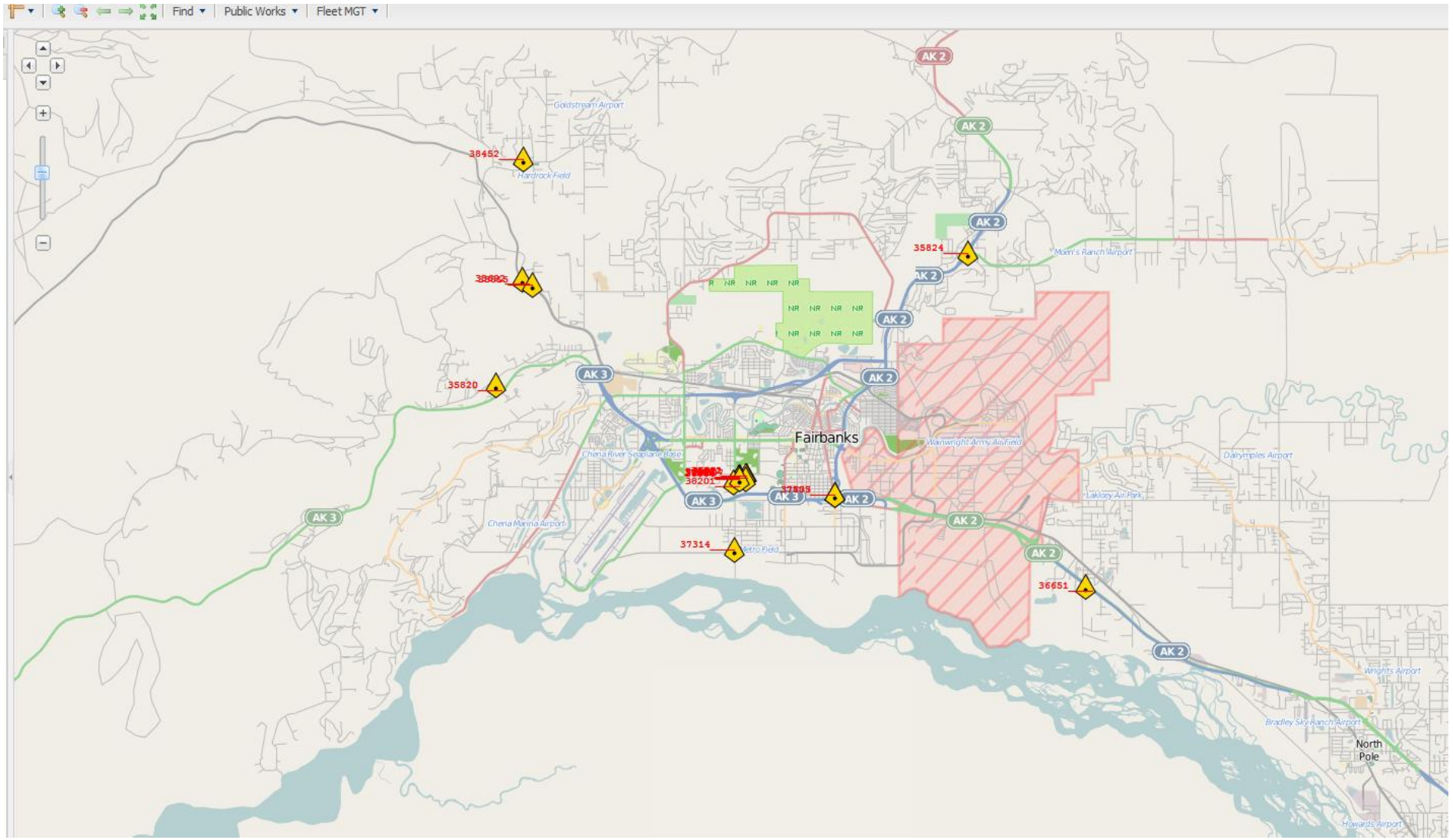
NOAA
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
U.S. DEPARTMENT OF COMMERCE

UAF
UNIVERSITY OF ALASKA
FAIRBANKS

WeatherCloud™

MDSS Hardware

Mobile Observations



MDSS Home Page

Pikalert EMDSS

http://www.ral.ucar.edu/projects/rdwx_mdss/emdss/?state=alaska

Apple Yahoo! Google Maps YouTube Wikipedia News (35) Popular

Obs | Next 6 Hrs | 6 - 24 Hrs | 24 to 72 Hrs

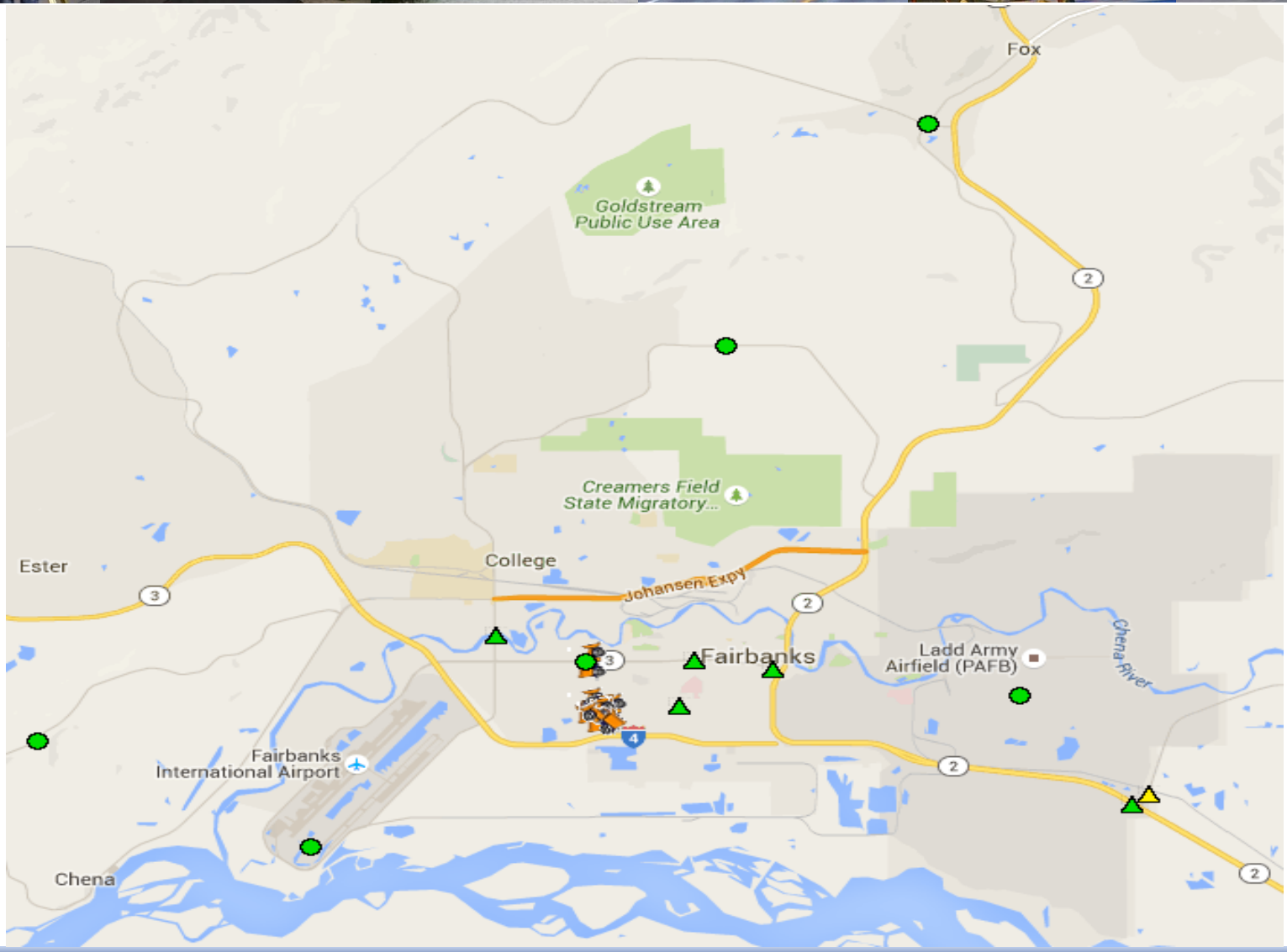
Pikalert Map

Map Satellite

Chukchi Sea
Alaska
Yukon
Northwest Territories
Nunavut
Hudson Bay
Gulf of Alaska
Bering Sea
Sea of Okhotsk
Canada
Alberta
Manitoba
British Columbia
Edmonton
Saskatchewan
Ontario
Calgary
Winnipeg
Vancouver
Washington
Montana
North Dakota
Minnesota
South Dakota
Wisconsin
Oregon
Sapporo

Map data ©2013 Basarsoft, Google, INEGI, ORION-ME Terms of Use Report a map error

Site List | Map | Vehicle List


Fox
Goldstream
Public Use Area
Creamers Field
State Migratory...
College
Ester
Johansen Expy
Fairbanks
Ladd Army
Airfield (PAFB)
Chena River
Fairbanks
International Airport
Chena
2
3
4

Weather Reporting Site Pick List

Pikalert EMDSS

http://www.ral.ucar.edu/projects/rdwx_mdss/emdss/?state=alaska

Apple Yahoo! Google Maps YouTube Wikipedia News (35) Popular

Pikalert Site List

Fairbanks [zoom...]

Obs: Next 6 Hrs: 6 - 24 Hrs: 24 - 72 Hrs:

(All alerts generated at: 17:00 on 10/5)

FAIRBANKS, FAIRBANKS INTERNATIONAL AIRPORT
Obs: Next 6 Hrs: 6 - 24 Hrs: 24 - 72 Hrs:

WAINWRIGHT U. S. ARMY AIRFIELD
Obs: Next 6 Hrs: 6 - 24 Hrs: 24 - 72 Hrs:

District North-Side Hills. Farmers Loop @ Summit Dr
Obs: Next 6 Hrs: 6 - 24 Hrs: 24 - 72 Hrs:

FAIRBANKS / EIELSON AIR FORCE BASE
Obs: Next 6 Hrs: 6 - 24 Hrs: 24 - 72 Hrs:

District Town. Airport Way @ Peger Rd
Obs: Next 6 Hrs: 6 - 24 Hrs: 24 - 72 Hrs:

District North-Side Hills. China Ridge Rd @ Ridgepoint Dr
Obs: Next 6 Hrs: 6 - 24 Hrs: 24 - 72 Hrs:

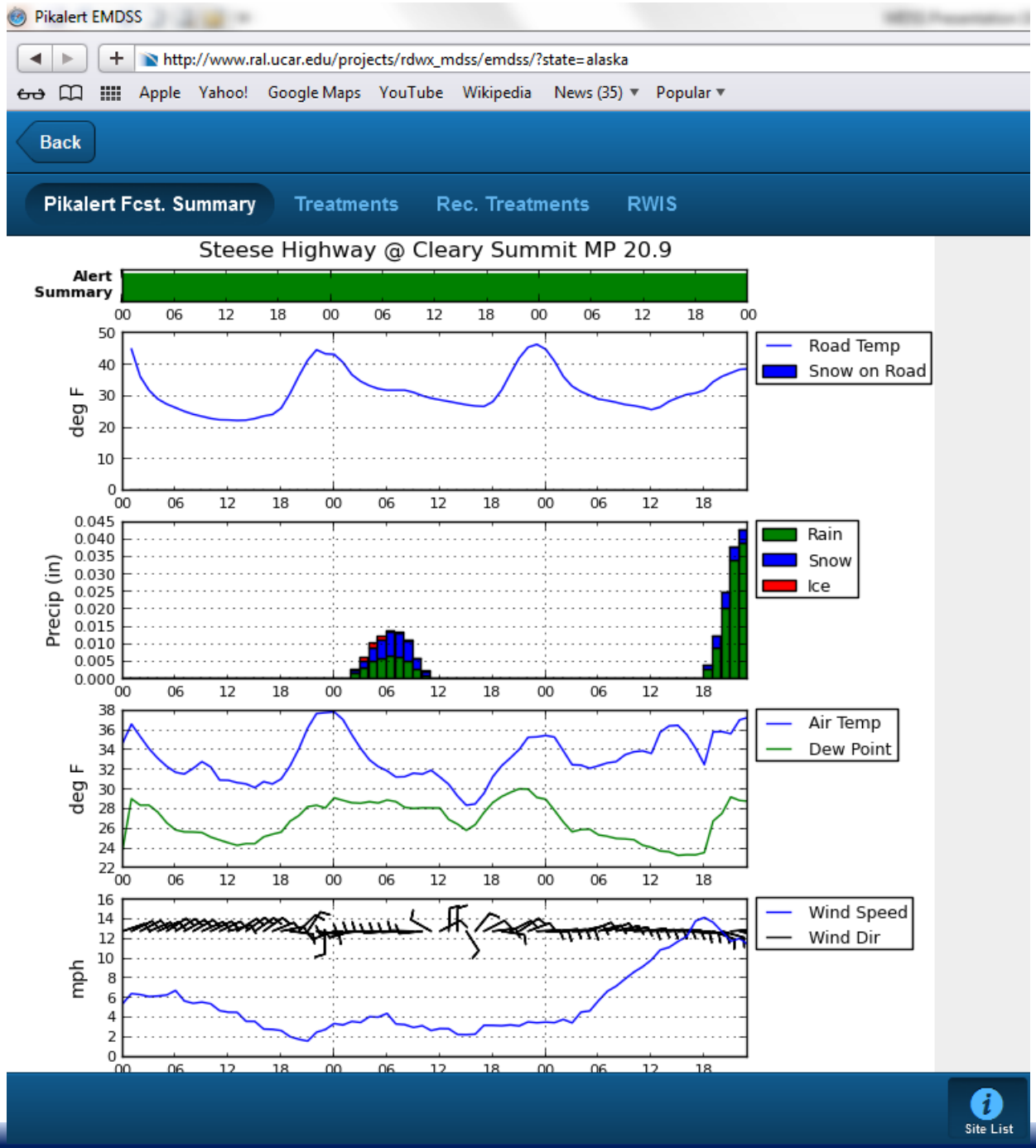
District North-Side Valleys. Gold Stream Rd @ Old Steese Hwy
Obs: Next 6 Hrs: 6 - 24 Hrs: 24 - 72 Hrs:

Steese Highway @ Cleary Summit MP 20.9
Obs: Next 6 Hrs: 6 - 24 Hrs: 24 - 72 Hrs:

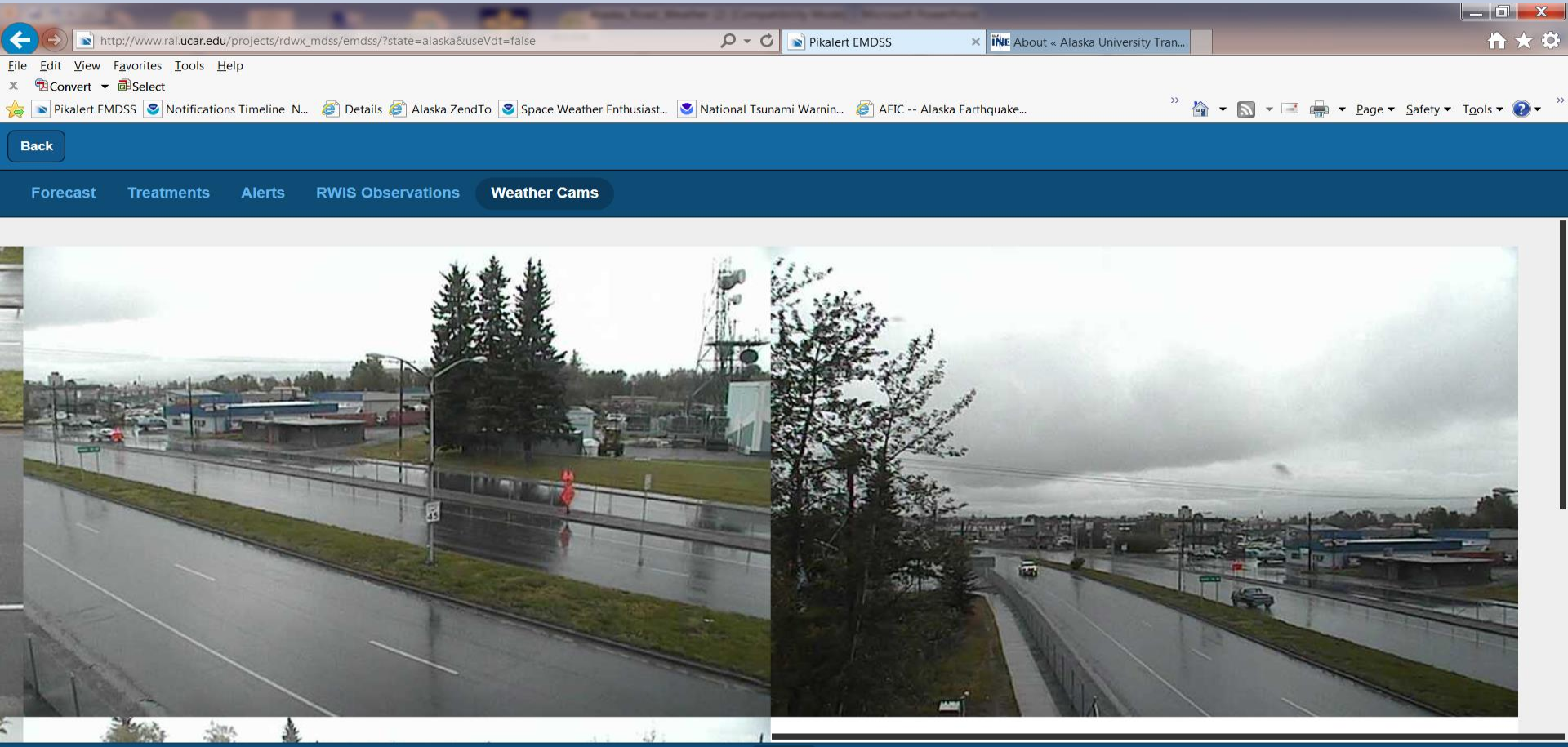
Richardson Highway @ Badger Interchang
Obs: Next 6 Hrs: 6 - 24 Hrs: 24 - 72 Hrs:

University Avenue Fairbanks @ Chena Ri
Obs: Next 6 Hrs: 6 - 24 Hrs: 24 - 72 Hrs:

Site List Map Vehicle List


Pikalert EMDSS
http://www.ral.ucar.edu/projects/rdwx_mdss/emdss/?state=alaska
Apple
Yahoo!
Google Maps
YouTube
Wikipedia
News (35)
Popular
Back
Pikalert Fcst. Summary
Treatments
Rec. Treatments
RWIS
Steese Highway @ Cleary Summit MP 20.9
Alert Summary
deg F
Road Temp
Snow on Road
Precip (in)
Rain
Snow
Ice
deg F
Air Temp
Dew Point
mph
Wind Speed
Wind Dir
Site List

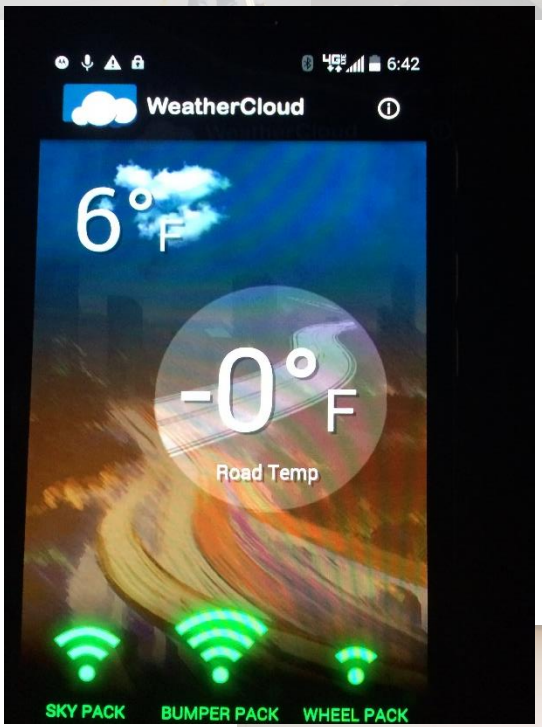
MDSS RWIS Weather Cameras



EMDSS Benefits

- **Proactive** approach
- **Efficient** allocation of resources
- Mobile operations yield **real-time data** and offer flexibility

Future Build Out



- Connected vehicle display on MDSS Site - **1 hour historical**
- Treatment recommendations for **all weather sites Statewide**
- Expand **mobile observations**
- **Tablet** and **iPhone** access (w/App)

National Weather Service Resources

Web:

- http://pafg.arh.noaa.gov
- www.weather.gov
- www.arh.noaa.gov

Get Mobile Alerts:

- http://inws.wrh.noaa.gov

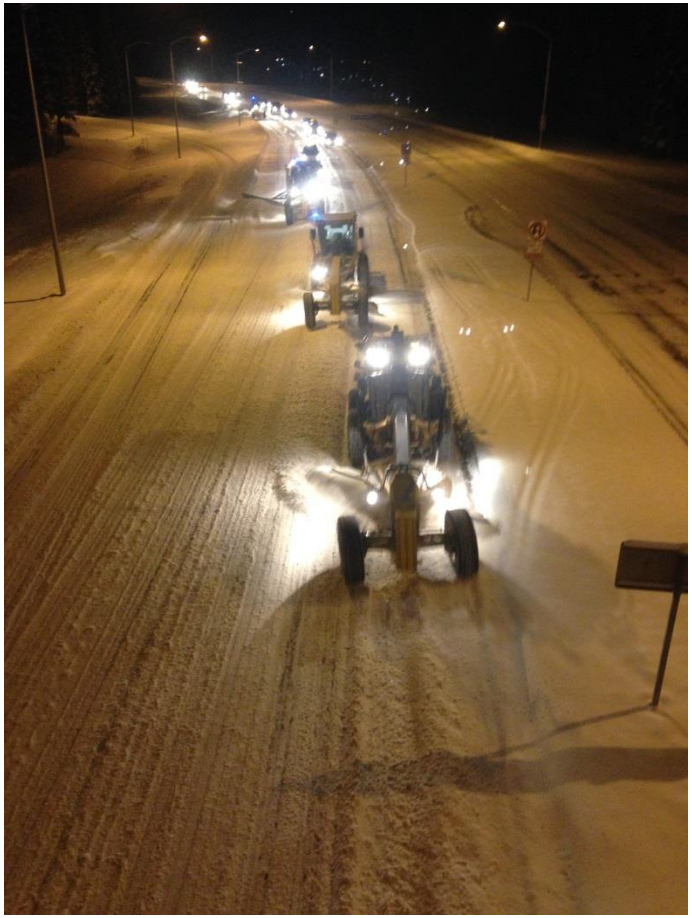
Radio: 162.55 MHz

Social Media:

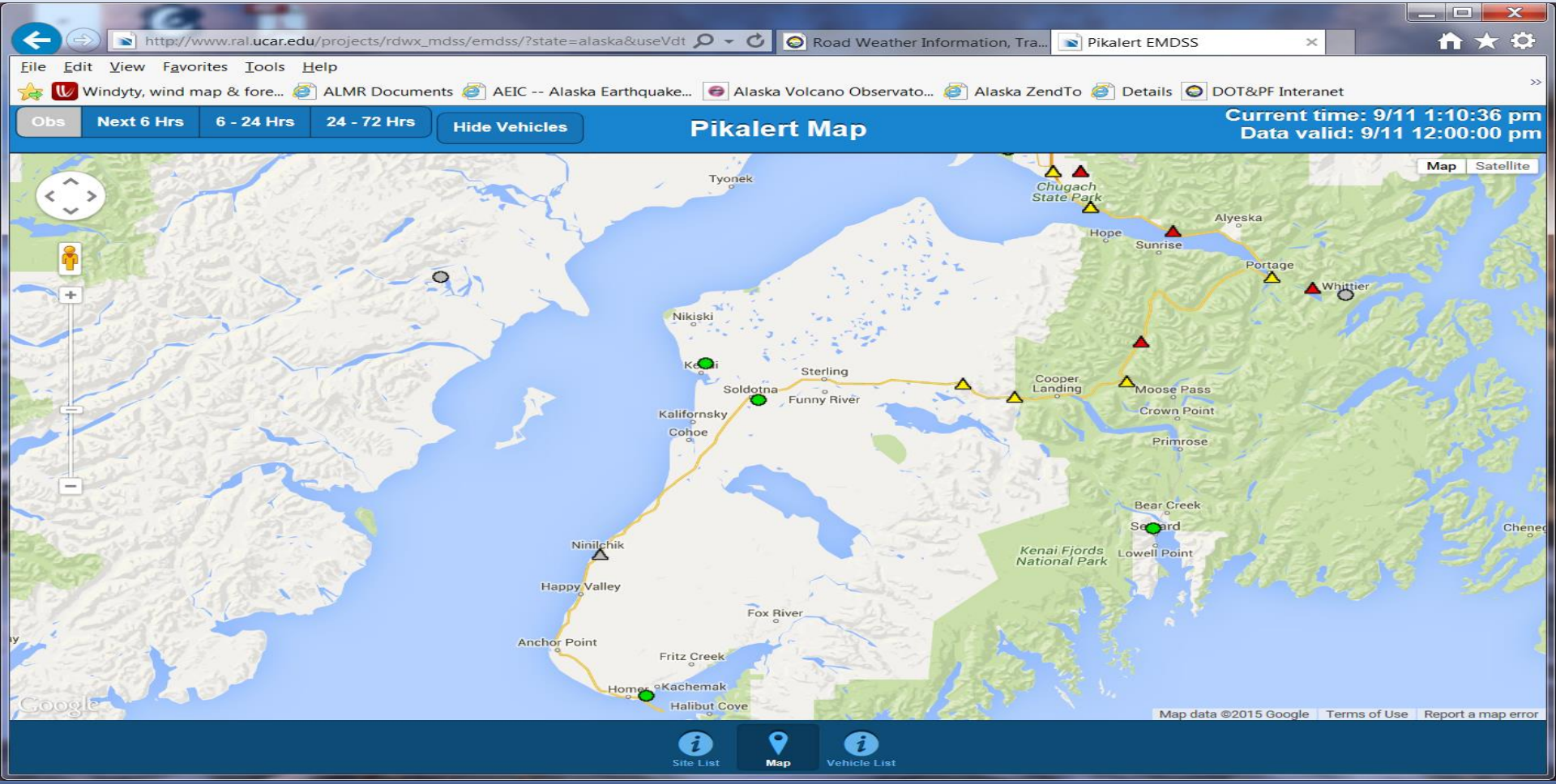
Twitter:
@NWSFairbanks
http://twitter.com/NWSFairbanks

Facebook:
www.facebook.com/NationalWeatherService.Alaska.gov

Questions?



PHASE 1 - KENAI PENINSULA PROJECT



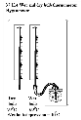
KENAI PENINSULA RESEARCH

- WEATHER MODELING
  - Collaboration UAF Weather Department, National Center for Atmospheric Research Bolder, CO and DOT&PF M&O
- PAVEMENT RESEARCH (Specific to Alaska)
  - Solar radiation pavement model – to look for bias
  - Variable terrain elevation pavement condition model
  - Micro climate pavement condition model
- USER RESEARCH FOR ALASKA
  - Needs assessment
  - Rural, urban and airport ice control
- MDSS/MWDS development specific to Peninsula District

NATIONAL WEATHER SERVICE

Current and Forecast Weather

- Ambient air temperature
- Wind speed/direction
- Dew point temperature
- Relative humidity
- Cloud cover
- Precipitation rate
- Precipitation type
- Precipitation accumulation
- Precipitation intensity
- Surface pressure
- Probability of fog
- Visibility

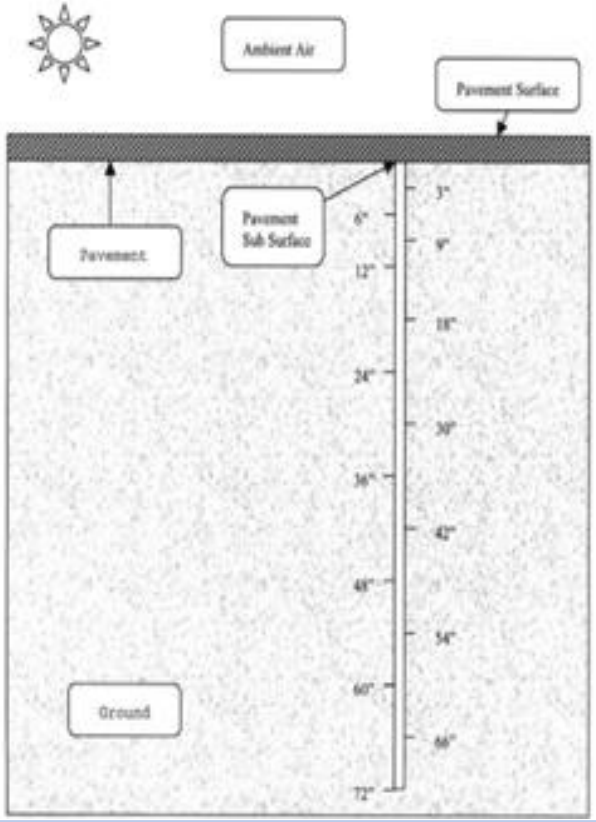


ROAD WEATHER INFORMATION SYSTEM

- Station identifier
- Latitude
- Longitude
- Elevation
- Observation time
- Wind speed/direction
- Ambient air temperature
- Precipitation rate
- Precipitation type
- Precipitation accumulation
- Precipitation intensity
- Station pressure
- Surface/pavement temperature
- Dew point temperature
- Camera images

TEMPERATURE DATA PROBES

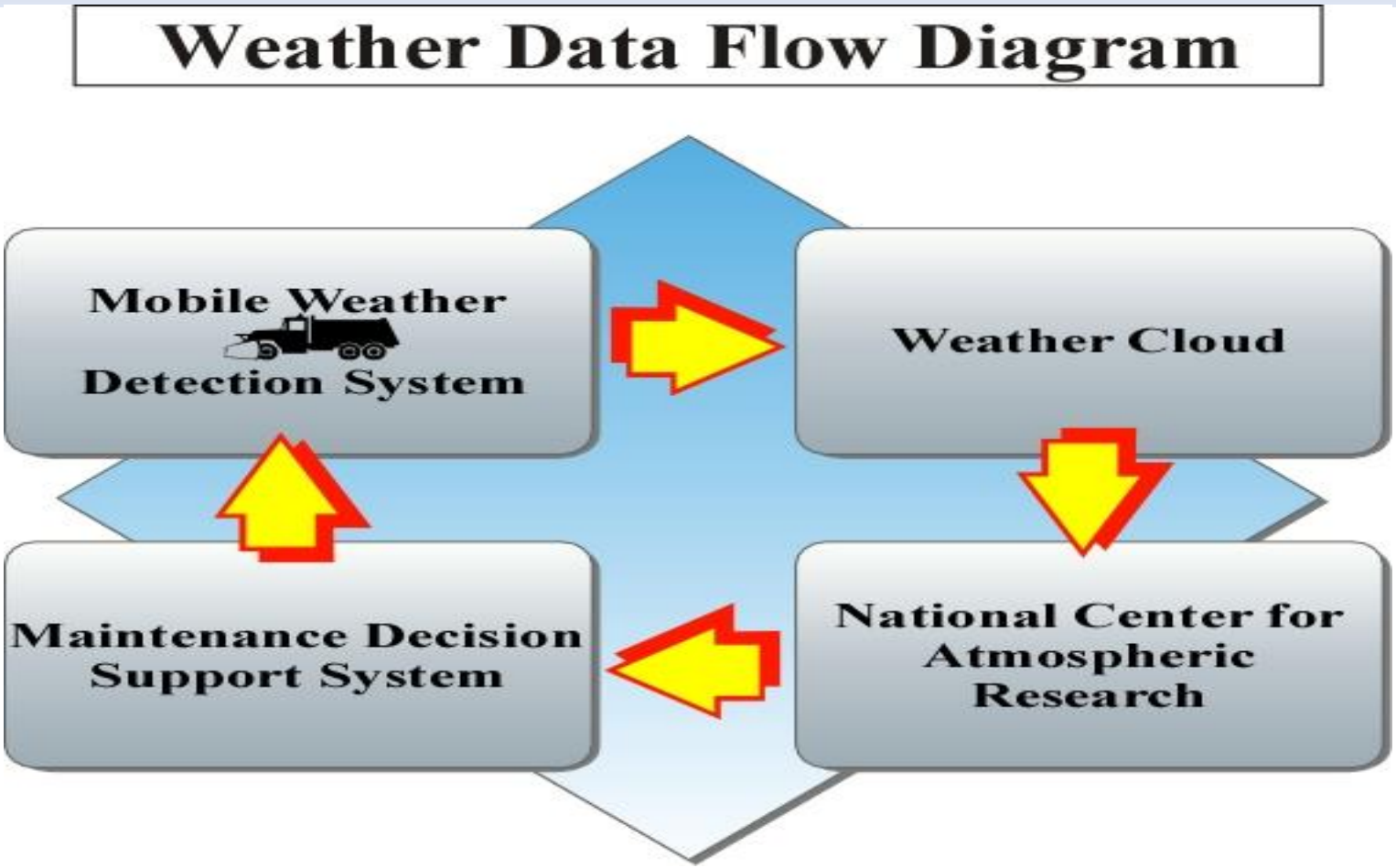
- Ground temperature updated every 15 minutes
- Pavement surface down to 72“



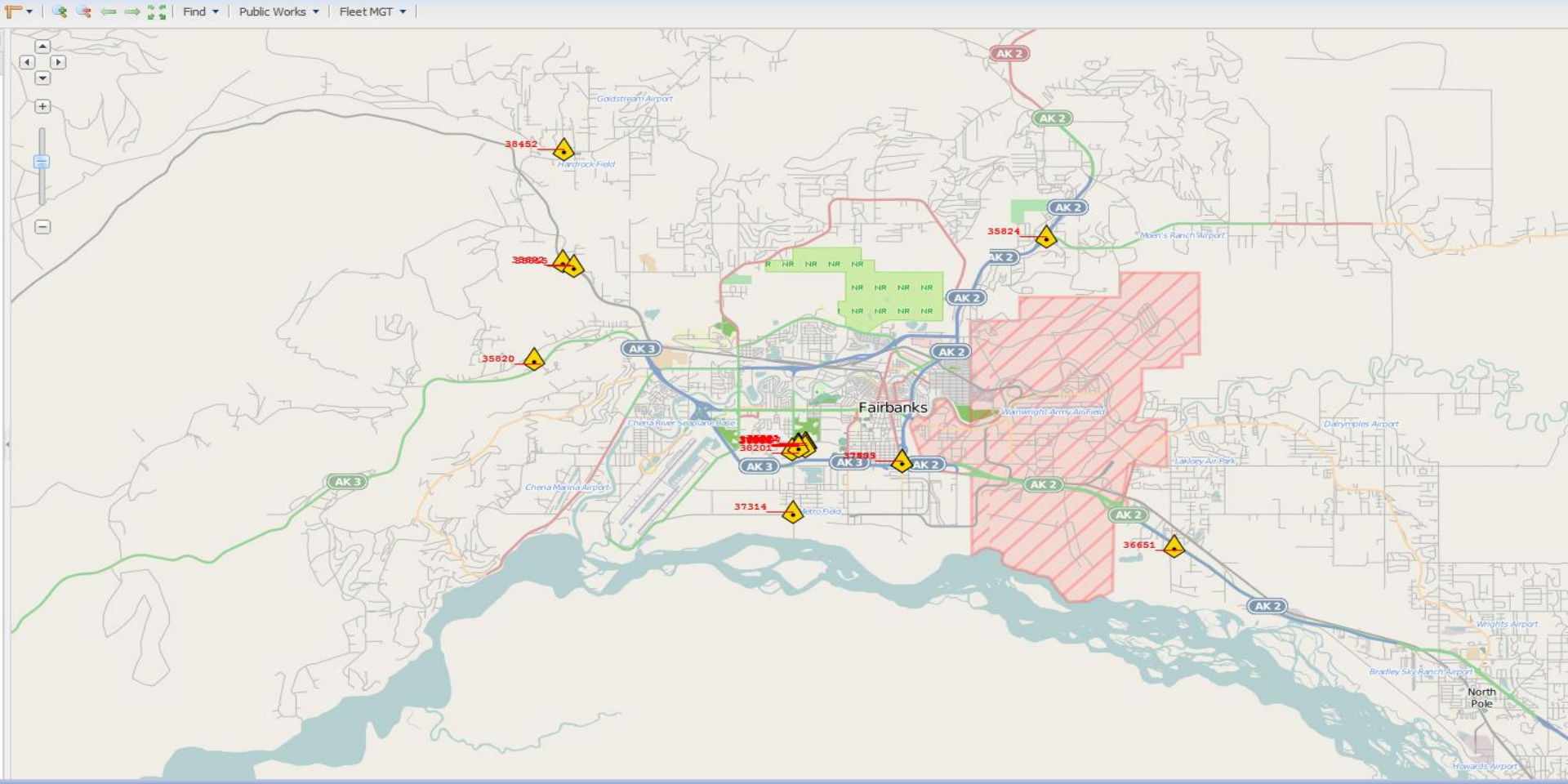
MOBILE WEATHER DETECTION SYSTEM

INTEGRATION WITH RWIS, TDP AND NWS DATA

MOBILE


Weather Data Flow Diagram
Mobile Weather Detection System
Weather Cloud
Maintenance Decision Support System
National Center for Atmospheric Research

WeatherCloud Dashboards



Lessons Learned

CHALANGES

- Since the MWDS delivers data by cell phone, it is important to insure the phone has a view of the horizon.
- We will always have spotty or no cell phone coverage in some areas, but the data is transmitted when back in coverage.
- The vehicle sensors only work when they can see the weather and the pavement, so it is important to keep them clean and calibrated.

FUTURE DEVELOPMENT

UAF FUNDED RESEARCH

- WeatherCloud fixed low power budget RWIS

FUTURE DOT&PF PROJECTS/INTEREST

- Joint UAF and DOT&PF project for ground freeze/thaw model for WeatherCloud RWIS to support Weight Restrictions
- Continued deployment of MDSS/MWDS
- Daimler tests Mercedes Benz Actros, the first autonomous tractor trailer on the roads

QUESTIONS?