

# **PLOWS Data Archive and Sounding Composite Update**



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NCAR/EOL**

# PLOWS Data Management Web Site at NCAR/EOL



PLOWS Project Description	Data Access
<p>The <b>Profiling of Winter Storms (PLOWS)</b> field program is focused on obtaining a greater understanding of the mesoscale structure and dynamics of cyclonic weather systems and the improvement of 0-48 hr cool season quantitative precipitation forecasts. Variability in the location, type, and intensity of precipitation is often determined by precipitation banding and/or embedded convection, particularly in the northwest and warm frontal quadrant in cyclones where frontal structures and associated frontal circulations are modified by deformation flow.</p> <p>The field campaign is comprised of two field seasons. The first took place from 7 February to 31 March 2009 (PLOWS 2008-2009) and the second will take place 1 November to 15 December 2009 and 15 January to 28 February 2010 (PLOWS 2009-2010). PLOWS is a mobile project focused on the Midwestern United States (Illinois, Indiana, Iowa, Minnesota, Missouri, Nebraska, and Wisconsin).</p> <p>A number of research observational systems are taking part in PLOWS:</p> <ul style="list-style-type: none"> <li>• NSF/NCAR C-130 with the University of Wyoming Cloud Radar and Lidar (second phase only);</li> <li>• University of Alabama-Huntsville Mobile Integrated Profiling System (MIPS);</li> <li>• University of Alabama-Huntsville Mobile Alabama X-Band (MAX) Radar;</li> <li>• NCAR/EOL Mobile Integrated Sounding System (MISS);</li> <li>• University of Missouri Radiosondes</li> </ul>  <p><b>Scientific Objectives</b></p> <p>PLOWS will address the following research issues:</p> <ol style="list-style-type: none"> <li>1. What are the predominant spatial patterns of organized precipitation substructures, such as bands and generating cells, in these quadrants and how do they evolve?</li> <li>2. How do frontal scale systems above and within the boundary layer such as warm fronts, cold fronts aloft, and occluded fronts relate to these precipitation substructures?</li> <li>3. What are the thermodynamic and kinematic structures of these frontal systems including the distribution of moisture and vertical motion?</li> <li>4. What instabilities and types of mesoscale forcing (e.g., moist CSI, moist frontogenesis, gravity waves, and elevated upright convection) control the generation and evolution of precipitation substructures?</li> <li>5. How do microphysical processes vary between the different precipitation substructures and what are the consequences?</li> <li>6. Is instability triggered in ice-saturated ascent critical in some of these instances and is it through the release of the latent heat of deposition that instabilities can persist?</li> </ol>	<p><b>Master List of All PLOWS Data Sets</b></p> <ul style="list-style-type: none"> <li>PLOWS 2009-2010 Field Catalog</li> <li>PLOWS 2008-2009 Field Catalog</li> <li><b>Data Policy (DRAFT)</b></li> <li>Dataset Documentation Guidelines</li> <li>Data Submission Instructions</li> </ul> <hr/> <p><b>Publications</b></p> <hr/> <p><b>Documents</b></p> <ul style="list-style-type: none"> <li>Detailed Site Survey Information</li> </ul> <hr/> <p><b>Meetings</b></p> <ul style="list-style-type: none"> <li>PLOWS Overview Meeting (8 Jan 2010)</li> <li>PLOWS Planning Meeting (18 Sept 2009; Champaign, IL)</li> </ul> <hr/> <p><b>Mailing Lists</b></p> <ul style="list-style-type: none"> <li>EOL PLOWS</li> </ul> <hr/> <p><b>Participant Web Pages</b></p> <ul style="list-style-type: none"> <li>UIUC PLOWS Home Page</li> <li>NCAR/EOL MISS PLOWS 2009-2010</li> <li>NCAR/EOL MISS PLOWS 2008-2009</li> <li>UAH MIPS/MAX</li> </ul>  <hr/> <p><b>Photography</b></p> <ul style="list-style-type: none"> <li>PLOWS Deployment Photos</li> <li>PLOWS Education and Outreach Photos</li> </ul> <hr/> <p><b>Media and Outreach</b></p> <ul style="list-style-type: none"> <li>Facebook</li> <li>UCAR Magazine PLOWS article</li> </ul> <hr/> <p><b>PLOWS Sponsors</b></p> <ul style="list-style-type: none"> <li>National Science Foundation</li> </ul>

Project Description

Data Access

Field Catalog

Publications

Documentation

Meetings

Mailing Lists

PLOWS Web Pages

Photography

<http://www.eol.ucar.edu/projects/plows/>



# PLOWS Field Catalogs

**PLOWS 2009-2010  
Field Catalog**



**PLOWS 2008-2009  
Field Catalog**

- Catalog Home
- Daily Reports
- Operational Products
- Model/Forecast Products
- Research Products
- Missions
- Tools & Links

- Daily Reports
- Operational Products
- Model Products
- Research Products
- Mission Summary Table

Phase	IOP	Begin Date/Time	End Date/Time	Operations Area	Research Catalog Products	IOP Summary	Facilities
PLOWS 2009-2010	IOP-13 (RF06)	1200 UTC 16 January 2010	0000 UTC 17 January 2010	<b>Huntsville, AL</b> Moulton, AL (MIPS/UMR; <a href="#">Map</a> ) Courtland, AL (MAX; <a href="#">Map</a> ) Northern AL (C130; <a href="#">Map</a> )	<a href="#">Operational</a> <a href="#">Model</a> <a href="#">Radar</a> <a href="#">Research</a>	<a href="#">IOP-13</a>	MIPS, MAX, ARMOR, UMR, C-130
	IOP-14	1800 UTC 23 January 2010	1800 UTC 24 January 2010	<b>Milwaukee, WI</b> Whitewater, WI (MIPS; <a href="#">Map</a> ) Whitewater, WI (UMR; <a href="#">Map</a> ) Fort Atkinson, WI (MISS; <a href="#">Map</a> )	<a href="#">Operational</a> <a href="#">Model</a> <a href="#">Radar</a> <a href="#">Research</a>	<a href="#">IOP-14</a>	MIPS, MISS, UMR
	IOP-15 (RF07)	0000 UTC 29 January 2010	1200 UTC 30 January 2010	<b>Paducah, KY</b> Vienna, IL (MISS; <a href="#">Map</a> ) Missouri (C130; <a href="#">Map</a> )	<a href="#">Operational</a> <a href="#">Model</a> <a href="#">Radar</a> <a href="#">Research</a>	<a href="#">IOP-15</a>	MISS, C-130
	IOP-16 (RF08)	1500 UTC 01 February 2010	1800 UTC 01 February 2010	<b>Illinois</b>	<a href="#">Operational</a> <a href="#">Model</a> <a href="#">Radar</a> <a href="#">Research</a>	<a href="#">IOP-16</a>	C-130 (WCR calibration)
	IOP-17 (RF09)	0000 UTC 04 February 2010	1200 UTC 06 February 2010	<b>Indianapolis, IN</b> Martinsville, IN (MIPS; <a href="#">Map</a> ) Monrovia, IN (MAX; <a href="#">Map</a> ) Franklin, IN (MISS; <a href="#">Map</a> ) LA/AK/MS (C130; <a href="#">Map</a> )	<a href="#">Operational</a> <a href="#">Model</a> <a href="#">Radar</a> <a href="#">Research</a>	<a href="#">IOP-17</a>	MIPS, MAX, MISS, C-130

[http://catalog.eol.ucar.edu/plows\\_08-09](http://catalog.eol.ucar.edu/plows_08-09)  
[http://catalog.eol.ucar.edu/plows\\_09-10](http://catalog.eol.ucar.edu/plows_09-10)



# PLOWS Field Catalog Statistics

- **Reports/Summaries (Status, Mission, and Operations)**
  - 257 documents and image files (0.20 GB)
  - 271 documents and image files (0.33 GB)
- **Research Platform Products (Aircraft, Surface, Lidar, Upper Air)**
  - 193 image files (9.70 MB)
  - 2572 image files (0.42 GB)
- **Operational Products (Satellite, Surface, Radar, Upper Air)**
  - 305,928 image files (20.38 GB)
  - 1,848,400 image files (92.72 GB)
- **Model Output Imagery (Analysis and Forecast Fields)**
  - 116,579 image files (9.46 GB)
  - 454,013 image files (33.64 GB)
- **TOTALS:** 422,957 files (30.04 GB)  
2,305,256 files (127.12 GB)                      2,728,213 total products

[http://catalog.eol.ucar.edu/plows\\_08-09/](http://catalog.eol.ucar.edu/plows_08-09/)



# PLOWS Data Archive



## DATA BY CATEGORY

- Aircraft
- Hydrology
- Land Based
- Model
- Photography
- Radar
- Satellite
- Upper Air

[Back to PLOWS](#)

Email comments & questions to [codiac@ucar.edu](mailto:codiac@ucar.edu)

### Upper Air: Profiler

<a href="#">MISS 915 MHz Profiler Wind and Moments Data [NCAR/EOL]</a>	2009-09-01	
<a href="#">Mobile Integrated Profiling System (MIPS) 915 MHz Profiler Data [University of Alabama-Huntsville]</a>		
<a href="#">Mobile Integrated Profiling System (MIPS) Microwave Profiling Radiometer Data [University of Alabama-Huntsville]</a>		
<a href="#">Multi-Agency Profiler (MAP) Data [NOAA/ESRL]</a>	<b>Updated</b> 2010-03-31	
<a href="#">NOAA Profiler Network Radial Velocity Imagery [NOAA]</a>	<b>Updated</b> 2010-03-29	
<a href="#">NOAA Profiler Network Signal-Noise Ratio Imagery [NOAA]</a>	<b>Updated</b> 2010-03-26	
<a href="#">NOAA Profiler Network Wind Profile Imagery [NOAA]</a>	<b>Updated</b> 2010-03-29	

### Upper Air: Radiosonde

<a href="#">Constant Pressure Level Imagery [NCAR/EOL]</a>	<b>Updated</b> 2010-06-04	
<a href="#">GTS Sounding Observations (Global, GEMPAK) [NCAR/EOL]</a>	<b>Updated</b> 2010-03-31	
<a href="#">MISS Radiosonde Data [NCAR/EOL]</a>	<b>Updated</b> 2010-07-12	
<a href="#">National Weather Service Radiosonde Data [NCAR/EOL]</a>	2009-08-31	
<a href="#">University of Missouri 10-second Vertical Resolution Radiosonde Data Set [NCAR/EOL]</a>	<b>Updated</b> 2010-04-09	

### Upper Air: SODAR

<a href="#">Mobile Integrated Profiling System (MIPS) Doppler Sodar [University of Alabama-Huntsville]</a>		
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### Upper Air: Sounding Composites

<a href="#">5mb Vertical Resolution Sounding Composite [NCAR/EOL]</a>	2009-09-10	
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[http://data.eol.ucar.edu/master\\_list/?project=PLOWS](http://data.eol.ucar.edu/master_list/?project=PLOWS)



# PLOWS Data Archive (Operational Data Sets)

## Upper Air

Multi-Agency Profiler  
GTS Radiosonde (man/sig)  
AMDAR  
and others in composite

## Surface

ASOS 1-minute  
GTS METAR and SYNOP  
and mesonets

## Precipitation/Snow

NCEP/EMC Stage IV Precipitation Data  
NWS Cooperative Observer Daily Data  
NWS Coop and First Order Station Snowfall and Depth Data  
NOHRSC Snow Data Assimilation System Data (link)  
CoCoRaHS (link)

## Lightning

Vaisala NDLN Lightning Network (coming soon)

## Satellite

GOES-12 1km visible PLOWS sector (netCDF)  
GOES-12 4km all channels PLOWS sector (netCDF)

## Radar

WSR-88D Level II (link)  
WSR-88D Level III (link)

## Model

NOMADS (link)

[http://data.eol.ucar.edu/master\\_list/?project=PLOWS](http://data.eol.ucar.edu/master_list/?project=PLOWS)



# PLOWS Data Archive (Research Data Sets)

## Upper Air

- MISS Profiler (2008-2009 field season)
- MISS Radiosonde (both field seasons)
- MIPS Profiler and others (none yet)
- University of Missouri Radiosonde (both field seasons)

## Surface

- MISS (2008-2009 field season)
- MIPS (none yet)

## Aircraft (2009-2010 field season only)

- C-130 low rate data
- C-130 forward looking camera
- C-130 dropsondes
- WCR (link to Wyoming)
- WCL (none yet)

## Lightning

- MIPS Electric Field Mill (none yet)

## Photography

- Site survey photos (link to UIUC)
- Field season photos (link to UIUC)

## Radar

- MAX (none yet)

[http://data.eol.ucar.edu/master\\_list/?project=PLOWS](http://data.eol.ucar.edu/master_list/?project=PLOWS)

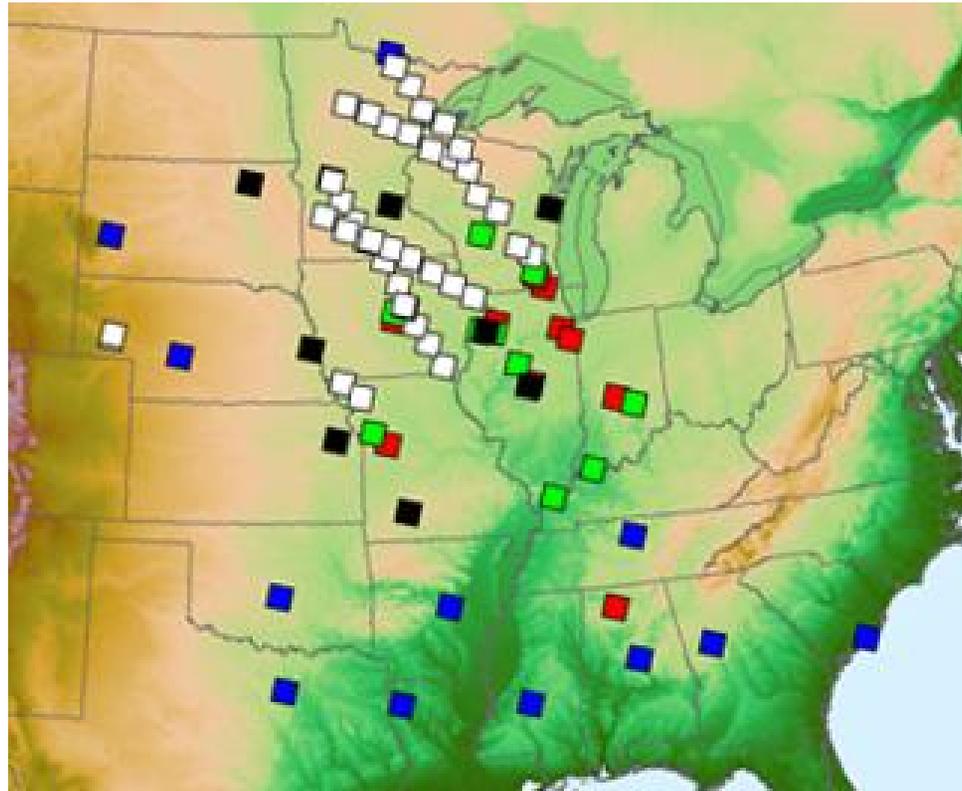


# PLOWS Sounding Data

- MISS – 14/105 (1 second)
- UMO – 27/65 (10 second)
- NWS core – 938/2106 (1 second)
- NWS+ - 0/115 (1 second)
- C-130 – 0/41 (0.5 second)

Total – 979/2432

Final High Resolution and 5mb Resolution Radiosonde Composite data sets include both field seasons and a total of 3411 soundings.



- IOP-11 – KINL
- IOP-12 and IOP-13 – KBMX and KOHX
- IOP-15 – KLZK
- IOP-17 – KSHV, KJAN and KLZK
- IOP-22 – KLZK, KOUN, KFWD and KSHV
- IOP-23 – KOUN, KLZK, KFWD, KCHS and KFFC
- IOP-24 – KLBF and KRAP

# PLOWS Dropsonde Data Quality

- A total of 51 dropsondes were released during 6 research flights and 1 test flight. Of these, 41 are included in the final archived data set.
- All dropsondes were processed through the ASPEN software which analyzes the data, performs smoothing and removes suspect data.
- Time series, profile, histogram and skewt plots were examined to examine data consistency, “fast fall” dropsondes (where the parachute did not properly deploy) and other data irregularities.
- The ten dropsondes not included in the final archive contained little quality data. These were due to the malfunctioning of the new launch detect mechanism during RF04.
- Three drops did not transmit all the way to the surface.
- Seven drops were “fast fall” or “partial fast fall”. With fast fall drops the wind measurements are unreliable and were set to missing.
- One drop was released with the cap still on the temp/RH sensor. Temperature, RH and geopotential altitude are set to missing for this sounding.

# PLOWS MISS Radiosonde Data Quality

- A total of 105 radiosondes were released during the Nov 2009-Mar 2010 field phase.
- All of the soundings had a radiation correction applied that takes into account the solar angle at time of launch, and removes solar heating that could skew the temperature measurements.
- All dropsondes were processed through the ASPEN software which analyzes the data, performs smoothing and removes suspect data.
- A variety of plots are examined to look for data quality issues.
- Four soundings required repair because the system “locked-up” during the flight when the radiosonde signal was lost. All four soundings reached at least 110 mb before lock-up.
- One sounding had a short period of descent due to icing.
- Eight soundings have problematic RH profiles. One hygrometer failed completely and returned only missing values. The others contain “dry spikes” due to inadequate ventilation caused by slow ascent (due to icing or under-filled balloons) or extreme cold and moist environments. The spikes were manually removed and in one cases additional bias correction was applied.

# AMDAR Data

AMDAR are the meteorological observations from commercial aircraft.

Sample of one day of obs below 20,000 ft (“soundings”).

**Parameters include:**

Time, latitude, longitude, altitude

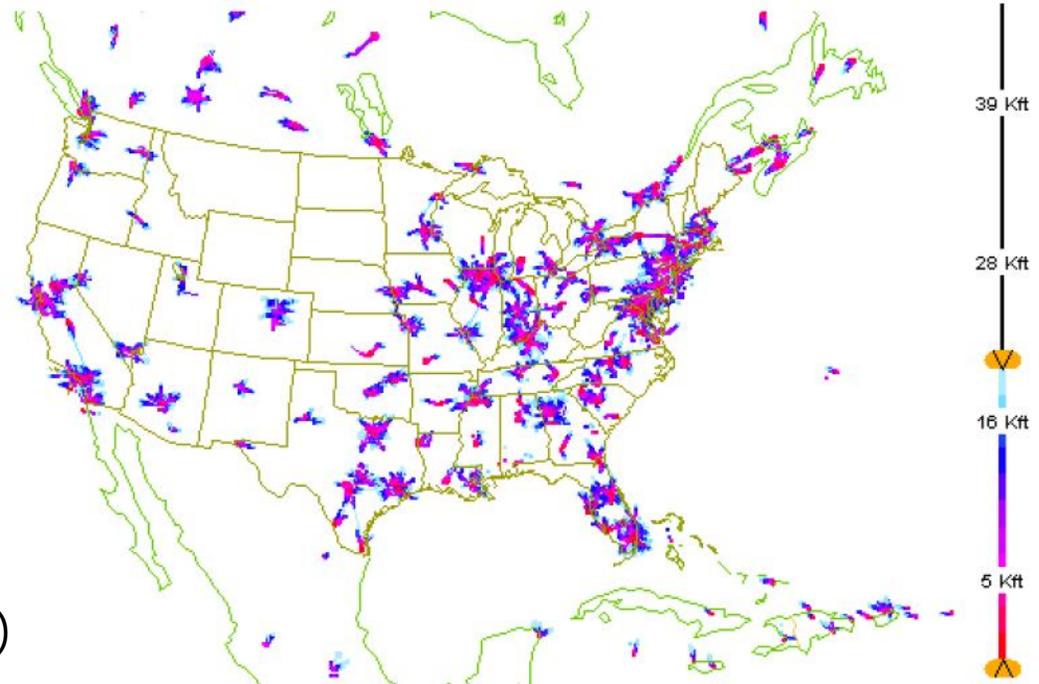
Temperature

Wind direction and wind speed

eddy dissipation rate (some UAL flights)

water vapor (few flights)

icing occurrence (few flights).



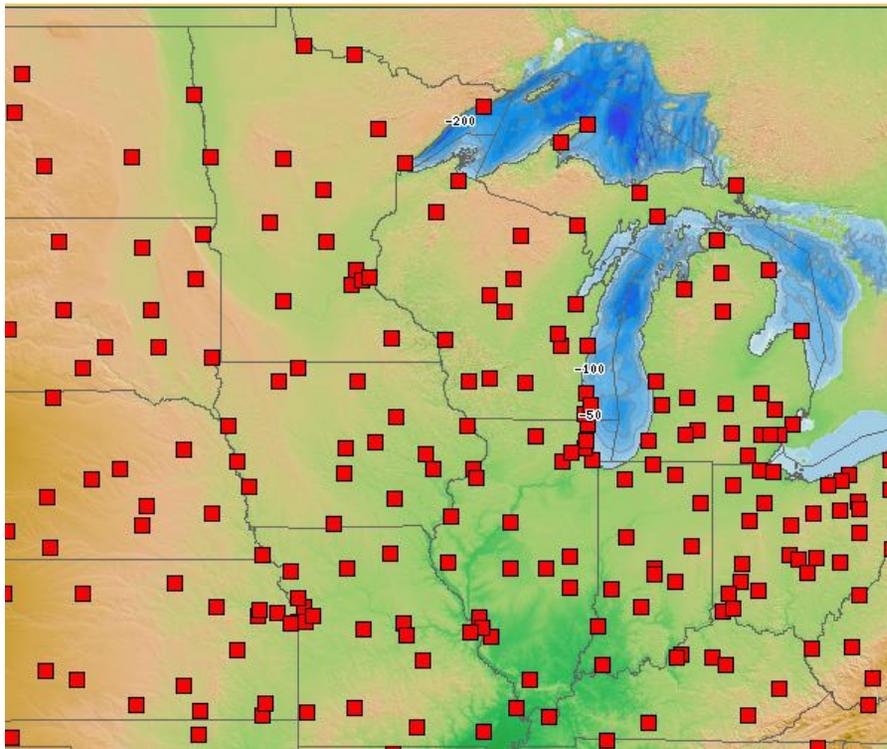
13-Oct-2009 00:00:00 -- 13-Oct-2009 23:59:59 (288074 obs loaded, 78754 in range, 7338 shown)

Moninger, et al 2010

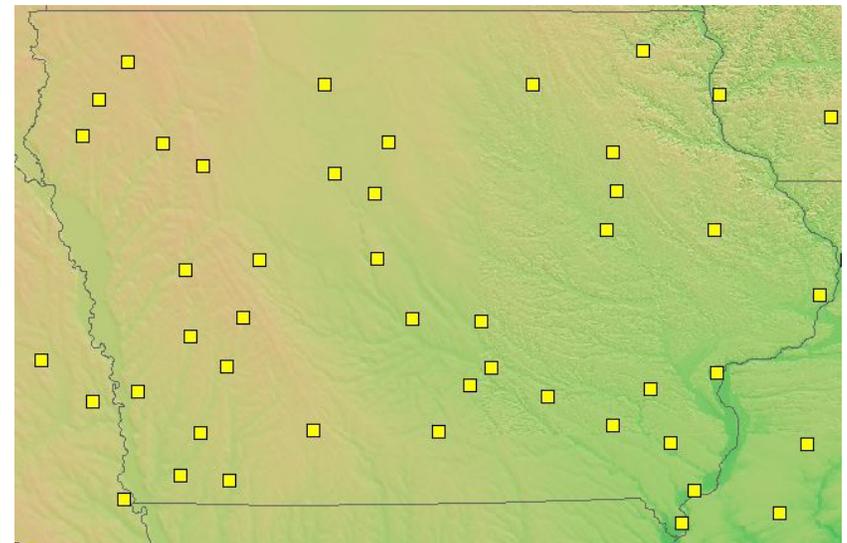
# PLOWS Surface Data (ASOS/IA AWOS)

1-min data available from both networks

## ASOS Station Locations



## IA AWOS Station Locations

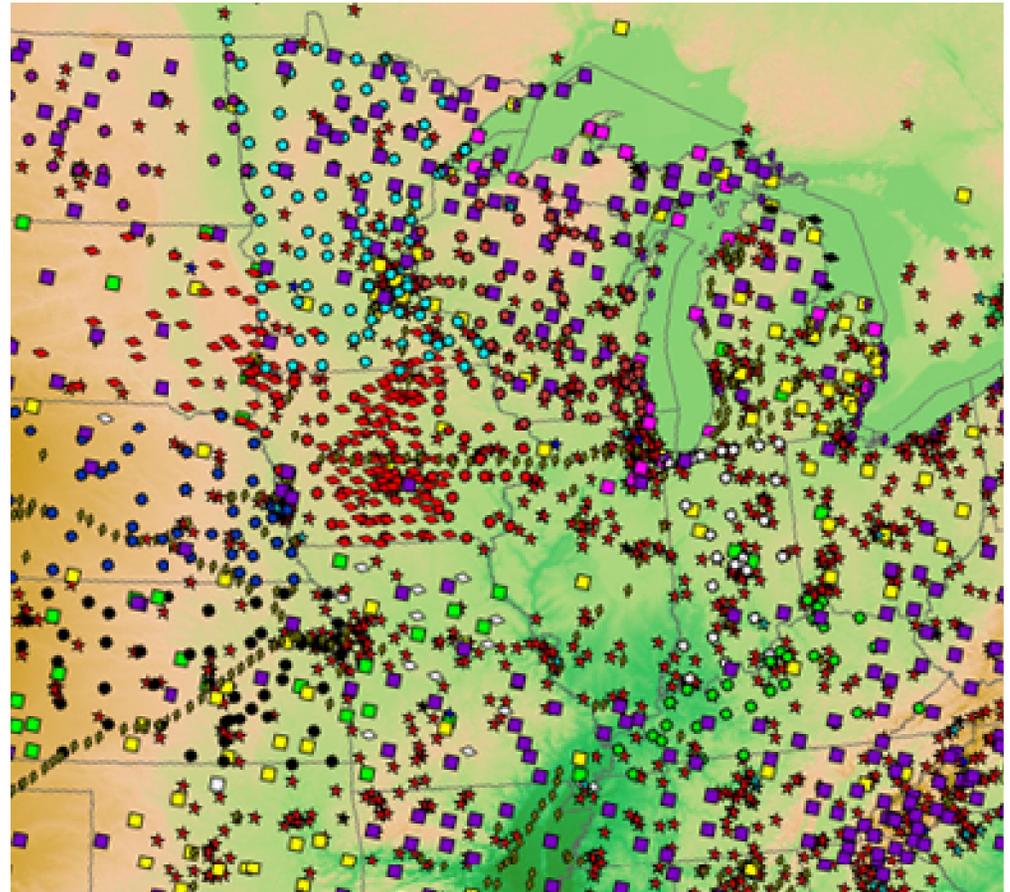


[http://data.eol.ucar.edu/master\\_list/?project=PLOWS](http://data.eol.ucar.edu/master_list/?project=PLOWS)



# PLOWS Surface Data (MADIS)

GADOT (30 min)  
IADOT (10 min)  
INDOT (10 min)  
KSDOT (15 min)  
KYDOT (5 min)  
MNDOT (10 min)  
NDDOT (hourly)  
NEDOT (20 min)  
OHDOT (5 min)  
VADOT (20 min)  
WIDOT (hourly)  
UPR  
IEM (20 min)  
LSU (5 min)  
MOCAWN (5 min)  
MQT Meso (30 min)  
NC-ECONet (hourly)  
Non-Federal AWOS (5 min)  
OK Mesonet (15 min)  
GPSMET/DDMET (15 min)  
HADS (hourly)  
NOS (6 min)  
RAWS (15 min)  
APRSWXNET (15 min)  
AWX (15 min)



[http://data.eol.ucar.edu/master\\_list/?project=PLOWS](http://data.eol.ucar.edu/master_list/?project=PLOWS)



# PLOWS Surface Data (Other Networks)

**Illinois Climate Network** – 19 stations in IL at hourly resolution

**Purdue Agriculture Automated Weather Stations** – 7 stations in IN at 30 minute resolution

**High Plains Climate Network** – 136 stations in CO, IA, KS, MN, MO, MT, NE, ND, SD and WY at hourly resolution

**Kentucky Mesonet** – 48 stations in KY at 5 minute resolution

**CLARUS (Road Weather Networks)** – state DOT stations in CO, **IL**, IN, IA, KS, KY, **MI**, MN, **MO**, NE, ND, OH, **OK**, **SC**, **SD**, **TN**, VA, WI  
plus **City of Indianapolis, McHenry County IL, OKC Micronet, and KS Turnpike**  
resolutions vary (those in red NOT part of MADIS)

[http://data.eol.ucar.edu/master\\_list/?project=PLOWS](http://data.eol.ucar.edu/master_list/?project=PLOWS)



# PLOWS Data Management Tasks

- Archival of all of the PLOWS research data sets.
- Are there other operational data set of interest for the archive?
- Are there other surface mesonets of interest or particular states/ regions of high interest?
- Project photography?
- Other issues?

[http://data.eol.ucar.edu/master\\_list/?project=PLOWS](http://data.eol.ucar.edu/master_list/?project=PLOWS)

