

# 2014 to 2016 Environment Data Update

Renee Walton

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- Earned Bachelor's and Master's of Science in Meteorology at ISU
- Fine-tuned programming skills as a development meteorologist at the Aviation Weather Center in Kansas City, MO
- Working to improve weather data collection and handling for G2F
  - Developed system for weather data collection and curation
  - Developing solutions to improve metadata collection and custom data selection

# Thank you

Liz Lee

# Weather data issues

# Issues and solutions concerning weather data

- Weather data cannot be truly cleaned or verified without making comparisons to nearby stations
  - Solutions:
    - Obtain data from nearest National Weather Service (NWS) Automated Surface Observing System (ASOS)
    - Consult World Meteorological Organization guidelines<sup>1</sup> to determine reasonable range and variability between measurements
    - Use station specifications to determine reasonable differences between experiment station and nearby NWS ASOS observations

1. World Meteorological Organization, 2004: Guidelines on Quality Control Procedures for Data from Automatic Weather Stations.

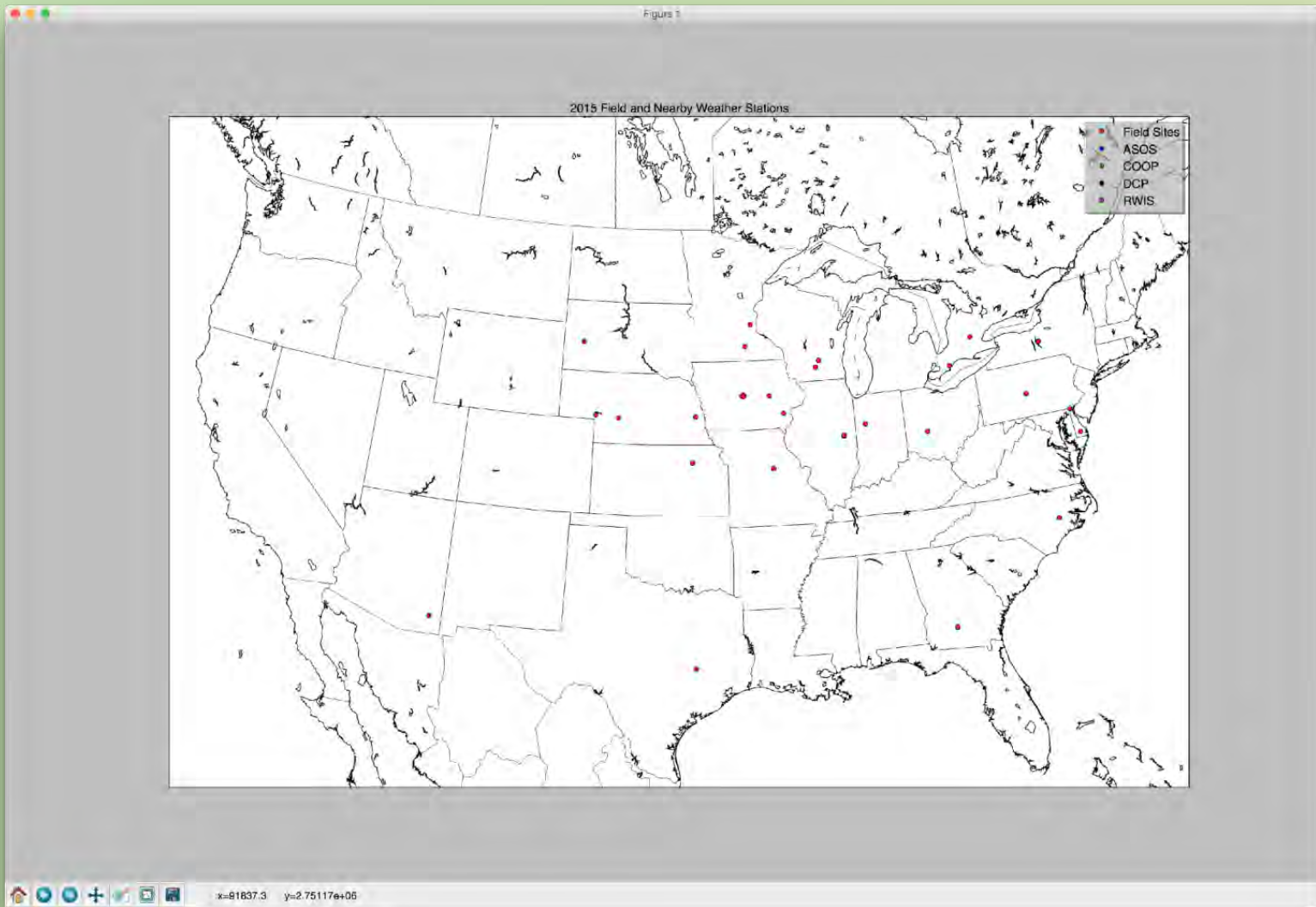
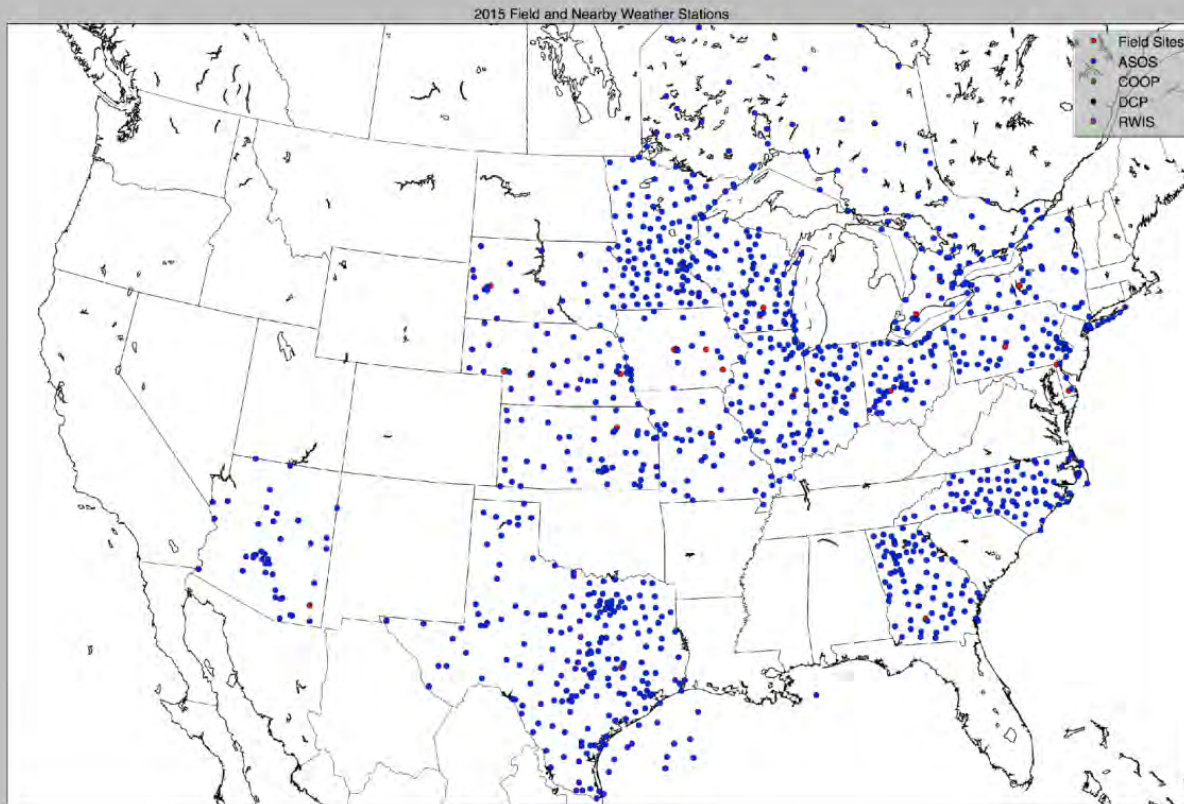


Figure 1



# Issues and solutions concerning weather data

- No instruction to set wind vane to North during station setup
  - Solution:
    - Compare wind to nearby, reliable weather station
    - Determine average discrepancy
    - Set correction value

	2014	2015
Stations requiring calibration	11	7
Total number of stations	31	32
Percent requiring calibration	35.5%	21.9%



# Issues and solutions concerning weather data

- No time zone listed in data files
  - Solutions:
    1. Compare diurnal cycle to nearby, reliable weather station to identify timing issues
    2. Estimate sunrise from solar radiation values and compare time to actual sunrise time

# Issues and solutions concerning weather data

- Vague instructions for station siting
  - Solutions:
    1. Update the SOP for 2017 to make setup instructions more explicit

## IV. WatchDog 2700 Weather Station Configuration

- IMPORTANT:** Before installation in the field, manually clear the logger's memory and replace batteries, following prompts through SpecWare software. Failure to clear the logger's memory and replace the batteries will result in loss of data.
- Perform any necessary equipment maintenance, e.g. check for corrosion, etc. See Appendix C for a detailed list of maintenance items.
- Setup and install your weather station before or at planting. See video, "How to Assemble a WatchDog Weather Station" on the [Wiki.Video Library](#), or see the [Complete Watchdog Weather Station Manual](#).

### How to install WatchDog 2700 in the field:

- Place weather station at edge of GxE field trial on level ground. The station should be placed no closer than a distance five times the height of the nearest obstruction. For example, fully grown corn can be up to 12 feet (3.6 meters) tall. Therefore, the weather station should be at least 60 feet (18 meters) away from the corn field to improve wind speed accuracy.
- For investigators with multiple GxE trial fields, weather stations should be located within ¼ mile of all trial fields. For trials > ¼ mile apart, or for trials varying water treatments, consider a second micro weather station to measure soil moisture differences.
- Ensure that the front of the weather station is facing south and will not be shaded by the canopy. This will improve solar radiation accuracy.
- Point the wind vane and anemometer away from the rest of the station. Failure to do so will affect rainfall and solar radiation accuracy.
- Spin the wind vane and anemometer. They should move freely. If not, use the allen wrench to loosen the screws.
- Install soil probes within GxE trial soil. See Appendix C for specific instructions to install soil probes with PVC pipe protector. Be sure to mark location of cable and weather station to alert passing combines and equipment.
- Record irrigation amounts and dates applied in metadata sheet.

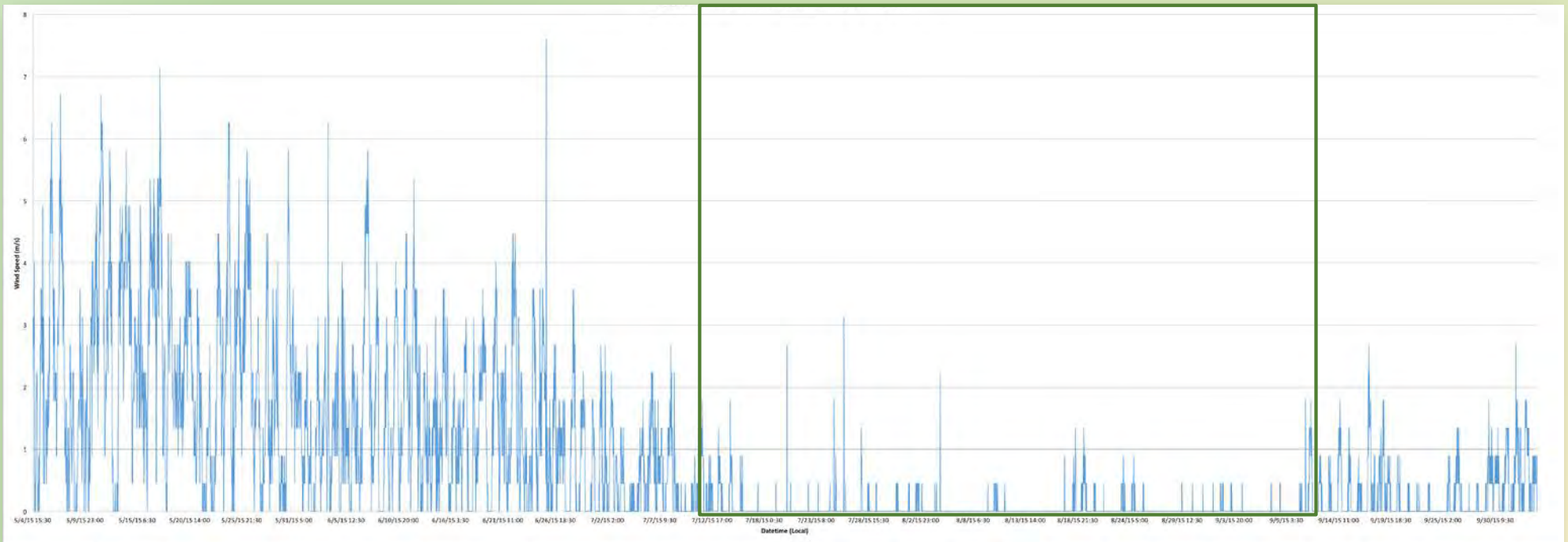
### How to configure WatchDog 2700 in the field:

- Set the logging interval to 30 minutes. The weather station will record the following information throughout the growing season:
  - Rainfall
  - Temperature and Dew point
  - Relative humidity
  - Solar radiation
  - Wind speed and direction
  - Soil temperature and moisture
- See Appendix C for more information on installing SpecWare9 software, downloading station data, maintaining your station and troubleshooting issues.

Visit [www.genomes2fields.org](http://www.genomes2fields.org) for the latest SOP and information updates

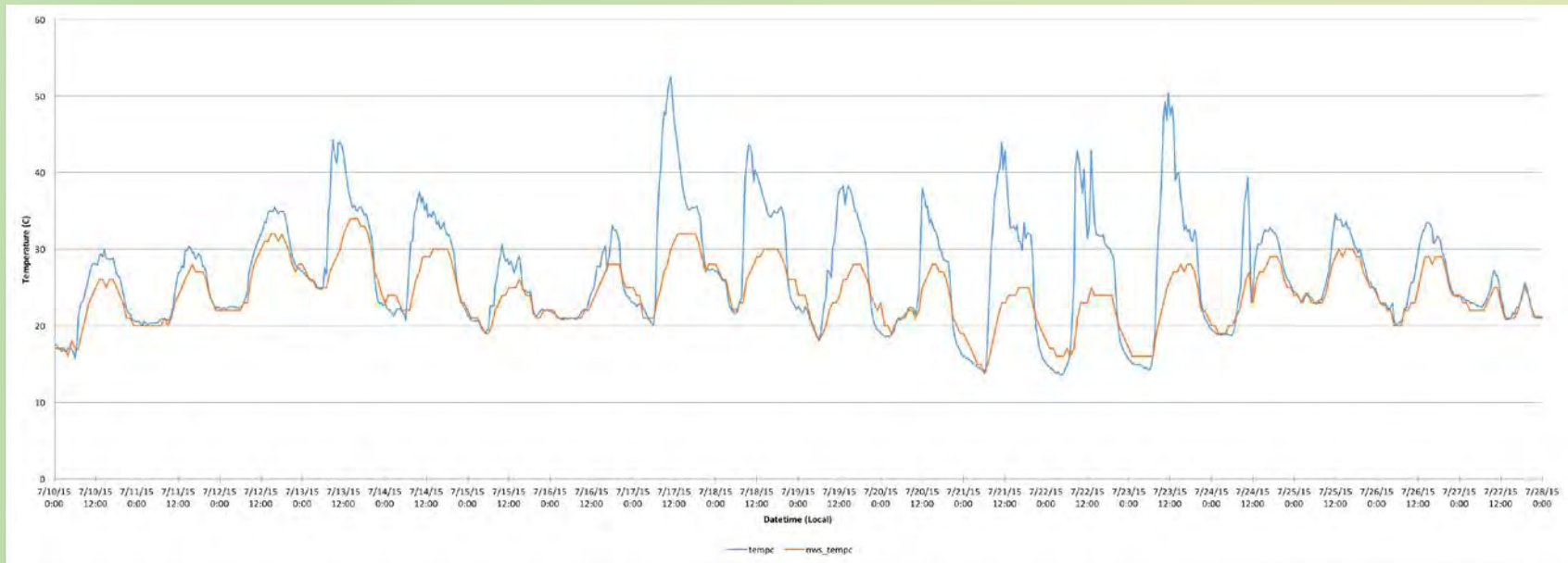
Questions? Contact Emily Rothfus, Research Coordinator, 608-890-3332, [ef.rote@scvcsu.org](mailto:ef.rote@scvcsu.org)

### Station Wind Speed Through 2015 Season



All wind speed data from a station placed within the field in 2015. From May – late June the wind variability is “normal”. However, as the corn reaches it’s final height in July the station becomes blocked and the wind speed measurements are compromised.

### Temperature in July of 2015 Season



Temperature for weather station placed very close to the field for the 2015 season. A heat-wave combined with high humidity from July 17 – July 23 caused the temperature in the field to be much higher than the temperature at the nearby NWS weather station.

# Issues and solutions concerning weather data

- Units for temperature, wind speed, rainfall not consistent between stations (even within stations)
  - Solution:
    - Determine units chosen from data files
    - Convert all units to metric as needed

# Data curation progress

# Weather data progress

- Developed pipeline that improves consistency and accuracy of weather data curation while reducing manual effort and turnaround time
- Completed curation of 2014 weather data and assisted with DOI submission
- Completed curation of 2015 weather data (with exception of two stations)
- Working on 2016 weather data – curation will take up to two weeks once all data is available

# Future considerations



# Data exchange

- Current setup:
  - Collaborators:
    - Submit metadata and fieldbook through Google Sheets form
    - Upload field info, phenotype, and performance data to CyVerse
    - Upload weather data to CyVerse
  - Data team:
    - Curate all data from collaborators
    - Upload curated data to CyVerse to directory visible by collaborators

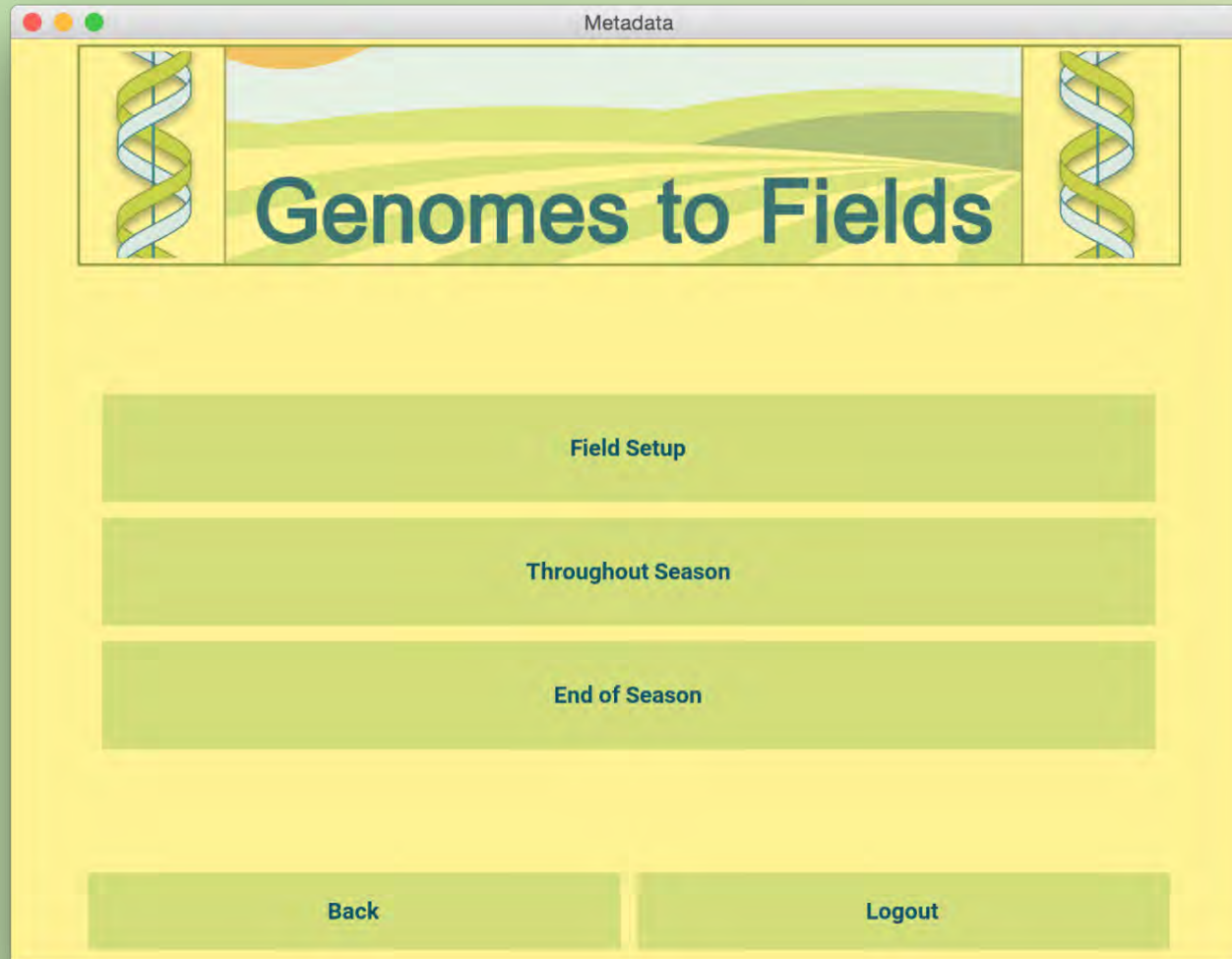
Is there anything about this process that works well? Doesn't work well?

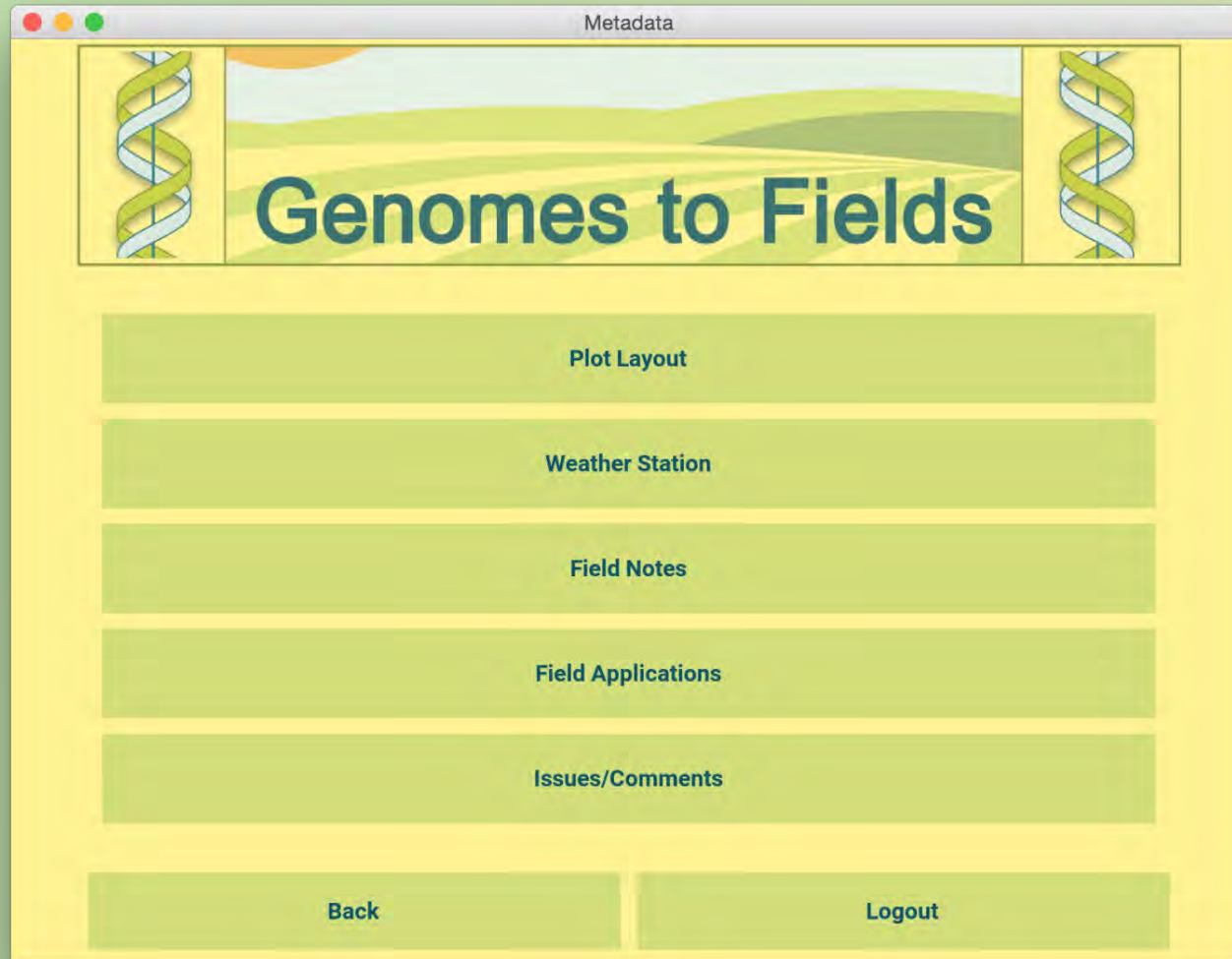
# Current metadata process

- Data team creates fixed form in Google Sheets for metadata collection with attached field book
- Collaborators fill out field book and metadata as necessary


What about this system works well? Doesn't work well?







Metadata



# Genomes to Fields

City:

Farm:

Field:


Trial ID:

Soil taxonomic ID:

Next >

Back Logout

Metadata



# Genomes to Fields

Plot length:

Alley length:

Row spacing:

Cardinal heading 1st pass:

Plot corners:

Metadata

### Set Plot Corners

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Southwest corner: 42.0,-96.6

Southeast corner:

Northeast corner:

Northwest corner:



# Next steps

- Use feedback regarding data exchange and metadata collection to make improvements as necessary
- Develop user interfaces that allows collaborators to easily download desired data in partnership with MaizeGDB
  - Select data by location over years
  - Select by variable
  - We need more example queries from you!
- Curate 2016 data and prepare for 2017



**Advanced Variation Search**

**Set Up Criteria**

Check the boxes next to the fields you want to search; if you just want to find records that have any value for that attribute, check the box and leave the criteria alone. You can use % or \* as a wildcard in the text fields.

- Show only variations  NOT of this type: All valid types
- Show only variations of this locus:
- Show only variations with this viability: Any valid viability
- Show only variations from this progenitor stock: Any valid progenitor stock
- Show only All valid dominance values variations.
- Show only variations caused by this mutagen: All valid mutagens
- Show only variations of this mutation type: All valid mutation types
- Show only variations that express this phenotype: (AND)
- Show only variations that express this phenotype:
- Show only variations available in this stock: (check the box and leave the text field blank for all variations with a stock)

Limit number of results to



Thank you!

## G2F Executive Committee

- [Pat Schnable \(Iowa State Univ\)](#), co-lead
- [Natalia de Leon \(Univ of WI\)](#), co-lead
- [Ed Buckler \(USDA/Cornell\)](#)
- [Shawn Kaeppler \(Univ of WI\)](#)
- [Jonathan Lynch \(Penn State Univ\)](#)
- [Nathan Springer \(Univ of MN\)](#)
- [David Ertl, Iowa Corn Growers' Association](#)



# Questions for you...

1. Is there anything about the data exchange process that works well? Doesn't work well?
2. What about the metadata collection process works well? Doesn't work well?
3. Can you think of any canned queries you would use frequently to download subsets of the Genomes to Fields data?