



**Savannah River
National Laboratory®**

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The Fishnet Approach to Data Quality Control at SRNL

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Meteorologist

AMS 100th Annual Meeting
January 15, 2020

SRNL-STI-2019-00754

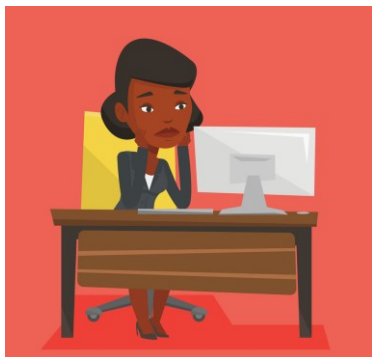
Savannah River Site Meteorological Monitoring Program

- SRS is a DOE Nuclear Facility located in Aiken, SC.
- The SRS Meteorological Monitoring Network consists of:
 - 8 Area Towers (2 instrument levels)
 - 3 Research Towers (multiple instrument levels)
- Data available in real-time
- Meteorological data used in multiple applications onsite:
 - *Emergency Preparedness & Response*
 - *Nuclear Facility Safety and Design (DSAs, etc.)*
 - *Research*



Streamlining the data QC and QA process

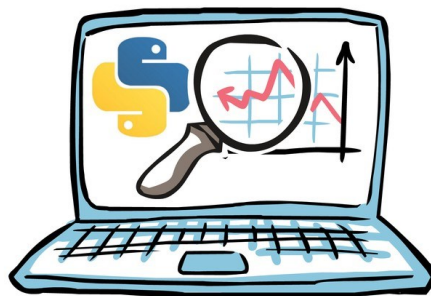
Extract Data



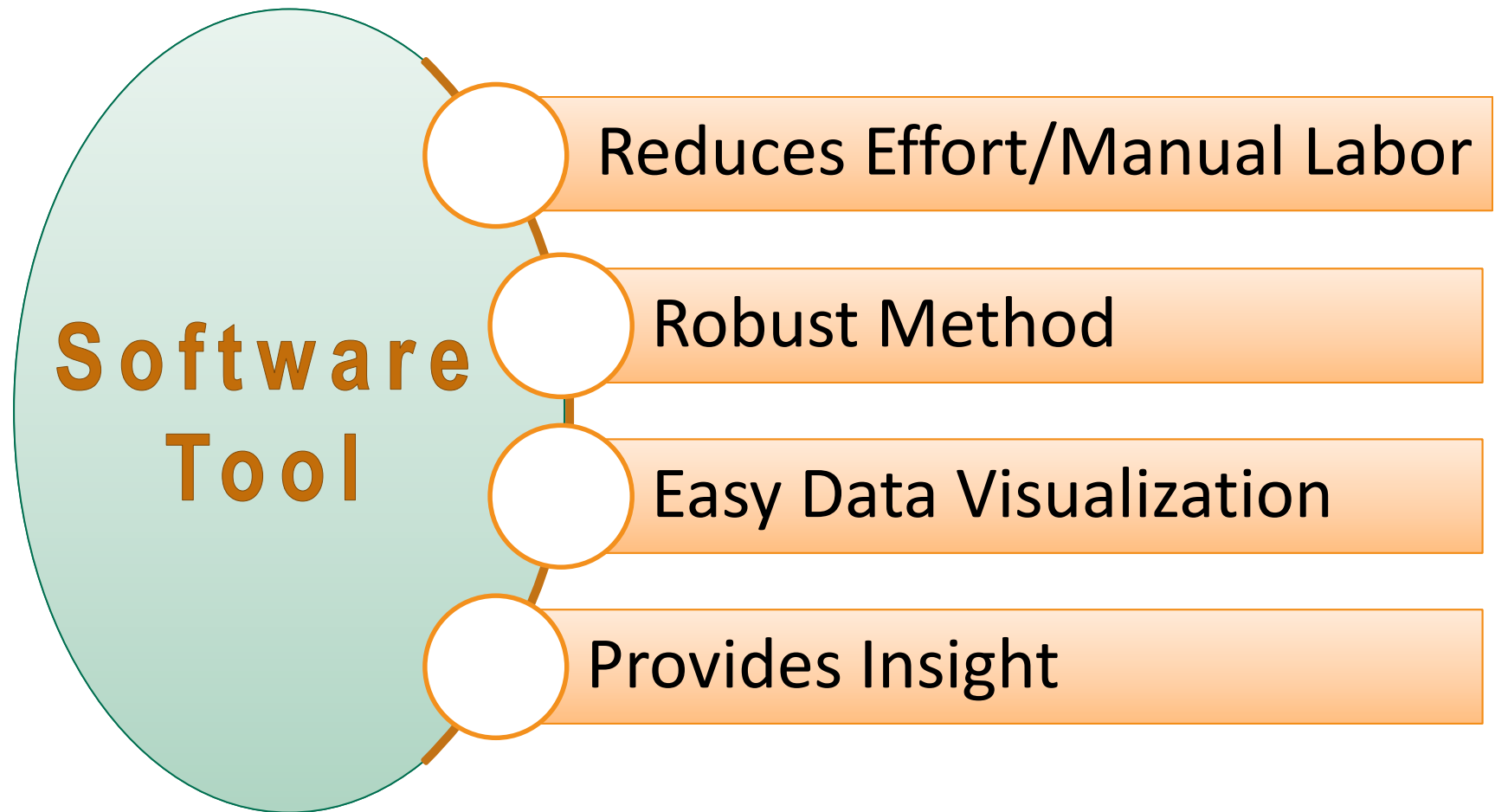
Visual inspection



Add QA flags and send to database



What should a good QA/QC software tool provide?



Fishnet is developed

- **FISHNET** – combs through the ‘sea’ of data, “pulls out” suspect data while allowing the good data to “pass through”.

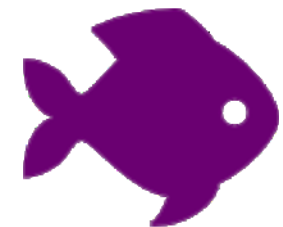
- One single source
- flags that are
- Automatically
- Provides differ
- Considers mo

and/or edit data



Drama

QA



Example of Fishnet Screen

Fishnet QA Temps Version 3.5.3

Save

Strip Charts Anomaly Editor Raw Data

N 61m Temperature from RH probe N 36m Temperature from RH probe N 18m Temperature from RH probe N 2m Temperature from RH probe N 61m Temperature from RH Probe linear sigma N 36m Temperature from RH probe linear sigma

Batch Edit	Start	End	Serial No	Code	User ID	Record Date	Manual Qa	Comment
<input type="checkbox"/>	2019-06-16 18:15:00	2019-06-16 18:45:00	846346	F	n9705	2019-12-19 19:12:06.626000		Out of criterion
<input type="checkbox"/>	2019-06-16 19:00:00	2019-06-16 19:00:00	846317	G	n9705	2019-12-19 19:12:06.618000		Good
<input type="checkbox"/>	2019-06-16 19:15:00	2019-06-16 19:15:00	846347	F	n9705	2019-12-19 19:12:06.627000		Out of criterion
<input type="checkbox"/>	2019-06-16 19:30:00	2019-06-16 19:30:00	846318	G	n9705	2019-12-19 19:12:06.618000		Good
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<input type="checkbox"/>	2019-06-16 20:00:00	2019-06-17 11:00:00	846319	G	n9705	2019-12-19 19:12:06.618000		Good
<input type="checkbox"/>	2019-06-17 11:15:00	2019-06-17 11:30:00	846349	F	n9705	2019-12-19 19:12:06.627000		Out of criterion
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<input type="checkbox"/>	2019-06-17 12:45:00	2019-06-17 12:45:00	846350	F	n9705	2019-12-19 19:12:06.627000		Out of criterion
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<input type="checkbox"/>	2019-06-17 15:30:00	2019-06-17 15:30:00	846353	F	n9705	2019-12-19 19:12:06.619000		Good
<input type="checkbox"/>	2019-06-17 15:45:00	2019-06-17 15:45:00	846324	G	n9705	2019-12-19 19:12:06.619000		Good
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<input type="checkbox"/>	2019-06-17 17:00:00	2019-06-17 17:00:00	846356	F	n9705	2019-12-19 19:12:06.619000		Good
<input type="checkbox"/>	2019-06-17 17:15:00	2019-06-17 17:15:00	846327	G	n9705	2019-12-19 19:12:06.619000		Good
<input type="checkbox"/>	2019-06-17 18:00:00	2019-06-17 18:45:00	846357	F	n9705	2019-12-19 19:12:06.619000		Good
<input type="checkbox"/>	2019-06-17 19:00:00	2019-06-17 19:15:00	846328	G	n9705	2019-12-19 19:12:06.619000		Good
<input type="checkbox"/>	2019-06-17 19:30:00	2019-06-17 20:15:00	846358	F	n9705	2019-12-19 19:12:06.619000		Good
<input type="checkbox"/>	2019-06-17 20:30:00	2019-06-18 09:30:00	846329	G	n9705	2019-12-19 19:12:06.619000		Good
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<input type="checkbox"/>	2019-06-18 10:45:00	2019-06-19 15:45:00	846330	G	n9705	2019-12-19 19:12:06.619000		Good
<input type="checkbox"/>	2019-06-19 16:00:00	2019-06-19 16:00:00	846360	F	n9705	2019-12-19 19:12:06.619000		Good
<input type="checkbox"/>	2019-06-19 16:15:00	2019-06-19 16:30:00	846331	G	n9705	2019-12-19 19:12:06.619000		Good
<input type="checkbox"/>	2019-06-19 16:45:00	2019-06-19 18:00:00	846340	F	n9705	2019-12-19 19:12:06.619000		Good
<input type="checkbox"/>	2019-06-19 18:15:00	2019-06-21 05:45:00	846332	G	n9705	2019-12-19 19:12:06.619000		Good
<input type="checkbox"/>	2019-06-21 06:00:00	2019-06-21 06:15:00	846361	F	n9705	2019-12-19 19:12:06.619000		Good
<input type="checkbox"/>	2019-06-21 06:30:00	2019-06-21 07:15:00	846333	G	n9705	2019-12-19 19:12:06.621000		Good

Fishnet QA Temps Version 3.5.3

Save

Strip Charts Anomaly Editor Raw Data

N 61m Temperature from RH probe N 36m Temperature from RH probe N 18m Temperature from RH probe N 2m Temperature from RH probe N 61m Temperature from RH Probe linear sigma N 36m Temperature from RH probe linear sigma

Batch Edit

Merge

Select All

Deselect All

Batch Edit

Manual QA Flag:

Comment:

Data Quality Code:

Cancel

2019-06-16 20:00:00

2019-06-17 11:15:00

Fatally Flawed

Uncalibrated Prob. Good

Biased But Representative

Intermittent Errors < 0.20

Good Data

Color Coding Aids for Place Keeping

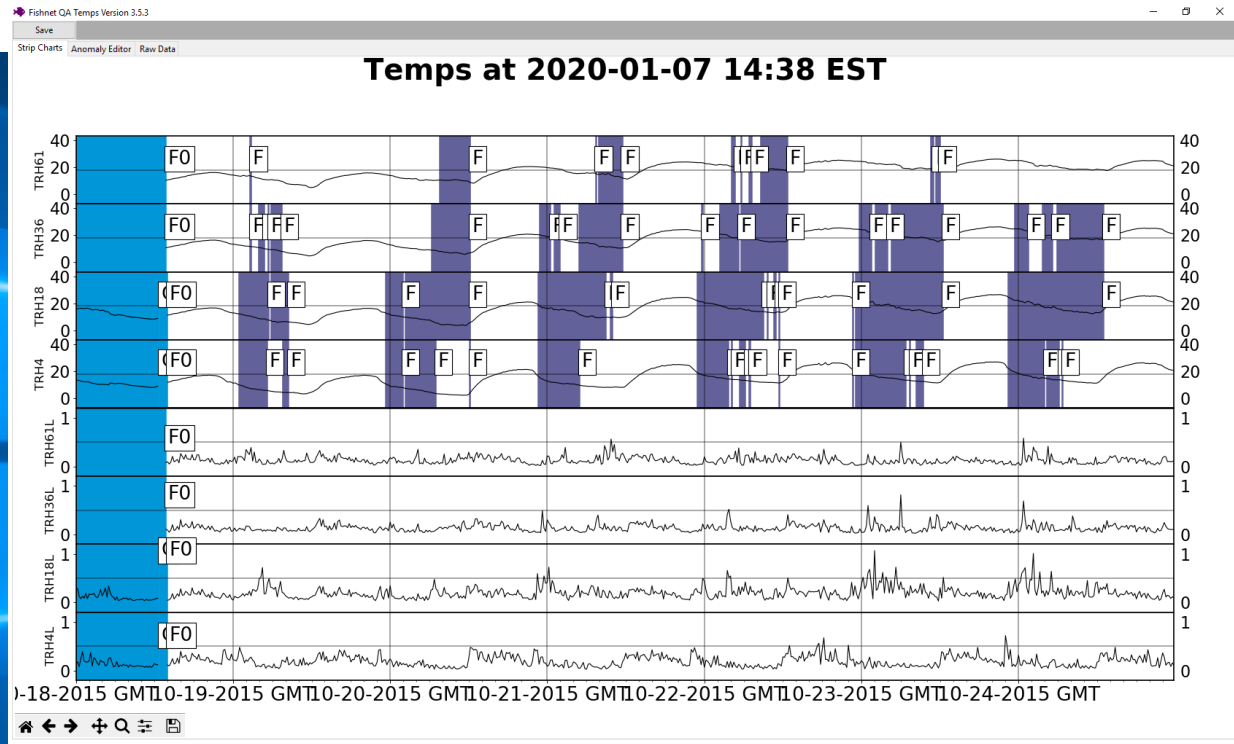
Fishnet Version 3.5.3

Select Date and Time
 Start: 2015-10-18 00:00:00
 End: 2015-10-24 23:45:00

Increment Week: - +
 Increment Month: - +
 Increment Year: - +

Query Type
 Area's: Climatology All
 5 Year Clim. 5 Year

QA Group
 Temps QA
 Group
 Wind Speed
 V Wind Dir
 H Wind Direct Vector
 Temps
 DewPts
 RH Probe
 Soil Temp
 Other



Fishnet QA Temps Version 3.5.3

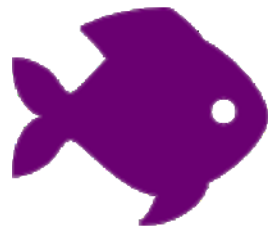
Strip Charts | Anomaly Editor | Raw Data

N 61m Temperature from RH probe | N 36m Temperature from RH probe | N 18m Temperature from RH probe | N 2m Temperature from RH probe | N 61m Temperature from RH Probe linear sigma | N 36m Temperature from RH probe linear sigma | N 18m Temperature from RH probe linear sigma

Batch Edit	Start	End	Serial No	Code	User ID	Record Date	Manual Qa	Comment
Batch Edit	2015-10-18 00:00:00	2015-10-18 13:30:00	852101	F	n9705	2020-01-07 19:37:11.247000	0	Missing values
Merge	2015-10-18 13:45:00	2015-10-19 02:15:00	851683	G	n9705	2020-01-07 19:33:12.541000		Good
Select All	2015-10-19 02:30:00	2015-10-19 02:30:00	851695	F	n9705	2020-01-07 19:33:12.546000		Out of criterion
Deselect All	2015-10-19 02:45:00	2015-10-20 07:15:00	851684	G	n9705	2020-01-07 19:33:12.541000		Good
	2015-10-20 07:30:00	2015-10-20 12:15:00	851698	F	n9705	2020-01-07 19:33:12.547000		Out of criterion
	2015-10-20 12:15:00	2015-10-21 07:00:00	851685	G	n9705	2020-01-07 19:33:12.542000		Good
	2015-10-21 07:15:00	2015-10-21 07:15:00	851697	F	n9705	2020-01-07 19:33:12.547000		Out of criterion
	2015-10-21 07:30:00	2015-10-21 07:30:00	851686	G	n9705	2020-01-07 19:33:12.542000		Good
	2015-10-21 07:45:00	2015-10-21 11:15:00	851698	F	n9705	2020-01-07 19:33:12.547000		Out of criterion
	2015-10-21 11:30:00	2015-10-22 03:45:00	851687	G	n9705	2020-01-07 19:33:12.542000		Good
	2015-10-22 04:00:00	2015-10-22 04:30:00	851699	F	n9705	2020-01-07 19:33:12.547000		Out of criterion
	2015-10-22 04:45:00	2015-10-22 05:15:00	851688	G	n9705	2020-01-07 19:33:12.542000		Good
	2015-10-22 05:30:00	2015-10-22 05:30:00	851700	F	n9705	2020-01-07 19:33:12.547000		Out of criterion
	2015-10-22 05:45:00	2015-10-22 06:30:00	851689	G	n9705	2020-01-07 19:33:12.542000		Good
	2015-10-22 06:45:00	2015-10-22 07:00:00	851701	F	n9705	2020-01-07 19:33:12.548000		Out of criterion
	2015-10-22 07:15:00	2015-10-22 08:15:00	851690	G	n9705	2020-01-07 19:33:12.543000		Good

Main Benefits of Fishnet

- Reduces the time needed to complete QA
- Facilitates identification of periods of suspect data and subtle errors
- Unifies the process and allows educated assessment and decisions

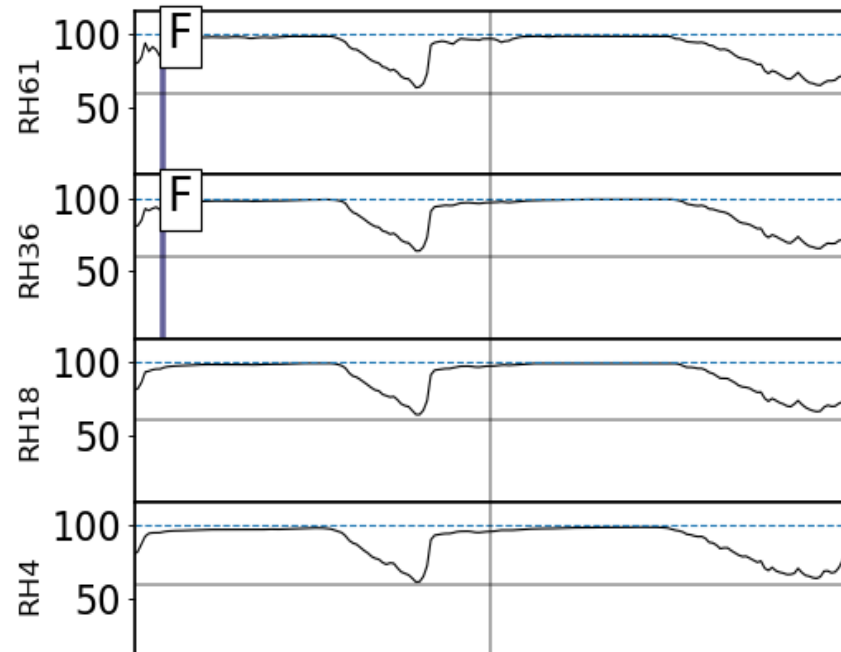


Future Work

- Improve rules and range checks
- Add checks for constant values

	N-61.0	N-36.0	N-18.0	N-2.0
2019-06-14 06:45:00	19.77 G	19.45 G	19.33 G	18.98 G
2019-06-14 07:00:00	19.46 G	19.07 G	18.94 G	17.62 G
2019-06-14 07:15:00	19.37 G	17.85 G	18.8 F	16.75 F
2019-06-14 07:30:00	19.59 G	18.63 G	18.55 G	16.9 G
2019-06-14 07:45:00	19.8 G	19.24 G	18.41 G	17.25 G
2019-06-14 08:00:00	19.05 G	18.74 G	18.31 G	17.13 G
2019-06-14 08:15:00	18.69 G	18.65 G	18.2 F	15.65 F
2019-06-14 08:30:00	18.83 G	18.0 G	18.57 F	15.23 F
2019-06-14 08:45:00	18.89 G	17.39 G	18.02 F	15.24 F
2019-06-14 09:00:00	18.87 G	17.06 G	17.71 F	15.06 F
2019-06-14 09:15:00	18.54 G	16.69 G	17.45 F	15.32 F
2019-06-14 09:30:00	18.27 G	16.54 G	16.63 F	14.47 F
2019-06-14 09:45:00	18.29 G	16.54 G	16.07 F	13.87 F
2019-06-14 10:00:00	18.4 G	17.64 F	14.9 F	13.45 G
2019-06-14 10:15:00	18.21 G	17.88 F	14.71 F	13.59 G
2019-06-14 10:30:00	18.1 G	17.67 F	14.56 F	13.43 G
2019-06-14 10:45:00	18.42 G	17.56 F	15.2 F	13.49 G
2019-06-14 11:00:00	18.45 G	17.86 G	16.23 F	13.99 F
2019-06-14 11:15:00	18.18 G	17.85 G	16.89 G	14.92 G
2019-06-14 11:30:00	18.05 G	17.82 G	17.47 G	16.4 G
2019-06-14 11:45:00	18.15 G	17.37 G	18.14 G	18.05 G

Temperature Inversions

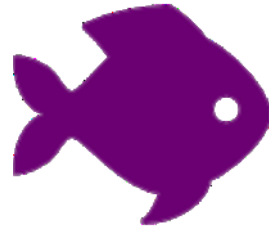


RH Sensor saturation

Machine learning?



Questions?



Special thanks to:

Andrew Kail, Steve Weinbeck, Evaleigh Bell, John Hamilton, Chuck Hunter