

***MANAGING, DISPLAYING, AND
SHARING CONTINUOUS
MONITORING DATA VIA 52° NORTH
SENSOR OBSERVATION SERVICE
(SOS)***

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OUTLINE

- Background
- Examples
- Next Steps
- Conclusion, Summary, Questions, Comments



BACKGROUND

- What this all About and What can it do for me?
- The SOS standard defines a Web Service Interface that allows querying sensor observations and managing the sensor data.
 - <http://www.opengeospatial.org/standards/sos>
- There is more to 52° North

52° NORTH – SENSOR OBSERVATION SERVICE (SOS)

52° North is an initiative for open source geospatial software started in 2004, <http://52north.org/>.

- One project developed under the 52°North initiative is the Sensor Observation Service (SOS). SOS is designed to provide web access to observational data including both near real-time sensor data and more traditional discrete grab sampling data
- Key features include the following:
 - Allows data to be loaded from multiple sources.
 - Provides web and geospatial access to near real-time sensor data and discrete grab sampling data.
 - Allows for customization and add-ons.



DATABASE - 52° NORTH – SENSOR OBSERVATION SERVICE (SOS)

- Challenge Statement: How to manage water quality data from different sources and sensor types including traditional discrete sampling as well as continuous monitoring?
- Potential Solution: The 52° North Sensor Observation System (SOS) is a web accessible interface that can aggregate traditional discrete monitoring data with continuously monitored data.
- Our experience: It's about the tools on top the data that help you get your work done.
 - Existing Tools
 - New Tools



EQUIPMENT FOR CONTINUOUS WATER QUALITY MONITORING

Many different options!

- Sensors & sondes have become more affordable
- Can be deployed year-round, seasonally, etc.
- Can measure single or multiple parameters:
 - Temperature, water level, DO, conductivity, turbidity, pH, nutrients
- Can be set to record measurements at desired intervals (15-minute, 30-minute, etc.)

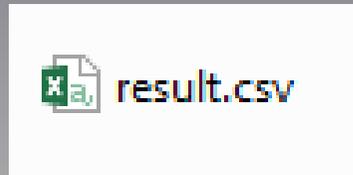


SOS DATA UPLOAD

Data can be uploaded to SOS in a variety of formats:

1

From existing databases through simple upload of CSV files to FTP



Examples:

- archived discrete monitoring data
- field downloaded data

2

Data uploaded to servers



Examples:

- USGS stations
- Water Quality Portal (STORET/NWIS)

3

Sensors linked to web client



Examples:

- Sensors with telemetry



Select a station

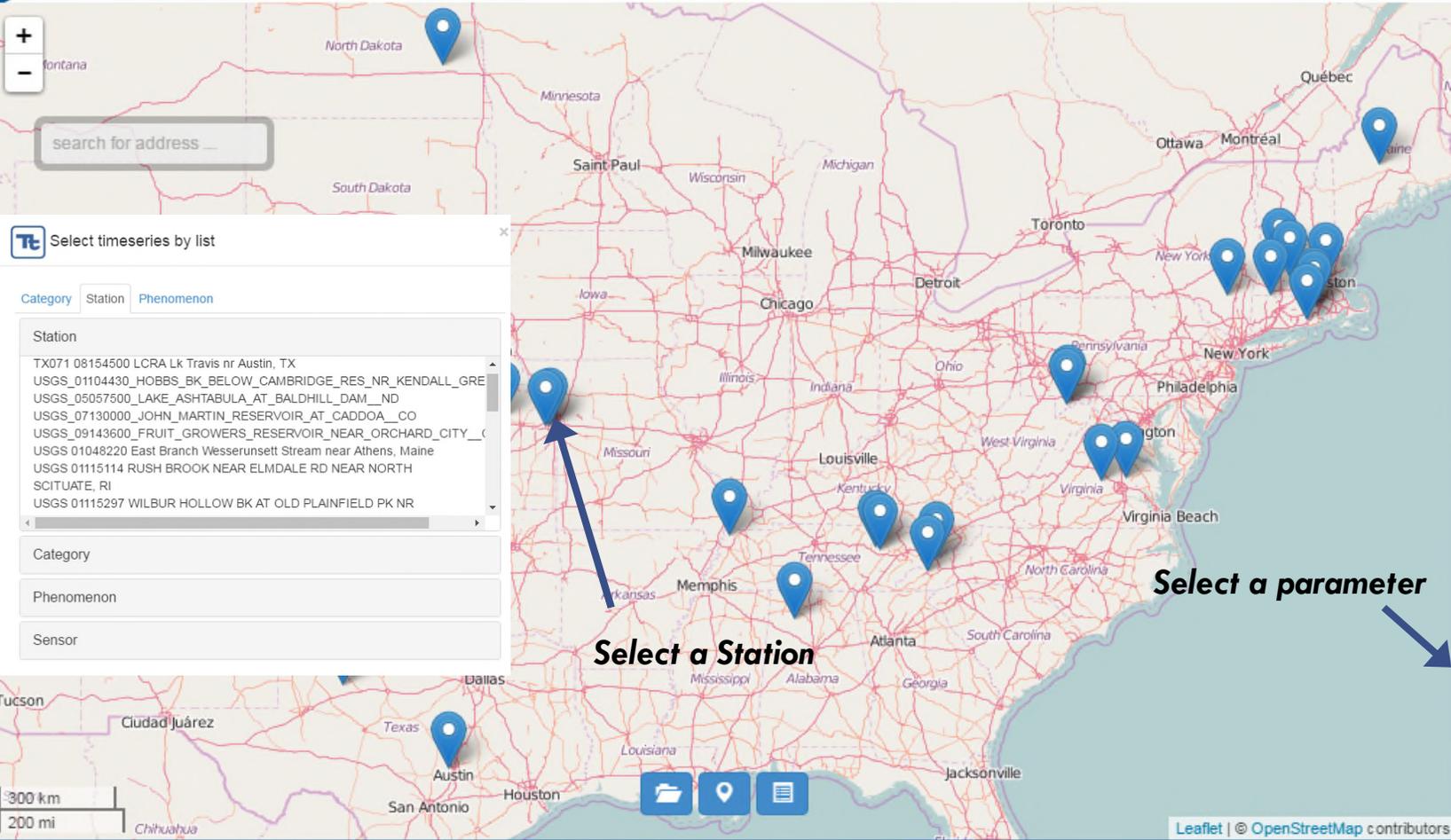
52 NORTH - SOS AT A GLANCE

★ Favorites



⚙ Settings

📊 Chart view



search for address ...

Select timeseries by list

Category Station Phenomenon

- Station
- TX071 08154500 LCRA Lk Travis nr Austin, TX
- USGS_01104430_HOBBS_BK_BELOW_CAMBRIDGE_RES_NR_KENDALL_GRE
- USGS_05057500_LAKE_ASHTABULA_AT_BALDHILL_DAM_ND
- USGS_07130000_JOHN_MARTIN_RESERVOIR_AT_CADDOA_CO
- USGS_09143600_FRUIT_GROWERS_RESERVOIR_NEAR_ORCHARD_CITY_C
- USGS 01048220 East Branch Wesserunsett Stream near Athens, Maine
- USGS 01115114 RUSH BROOK NEAR ELMDALE RD NEAR NORTH SCITUATE, RI
- USGS 01115297 WILBUR HOLLOW BK AT OLD PLAINFIELD PK NR

Category

Phenomenon

Sensor

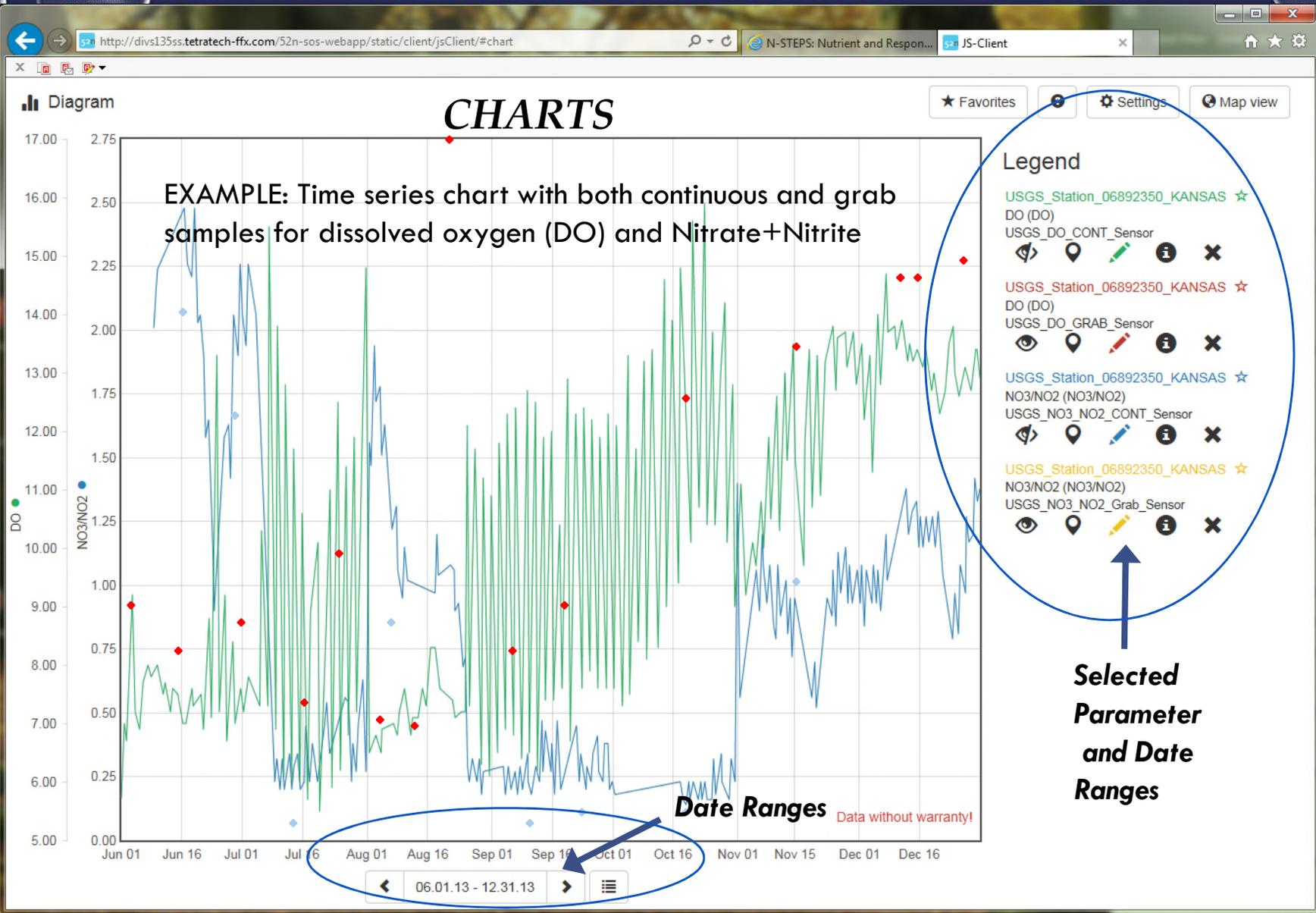
Select a Station

Select a parameter

- Select Characteristics
- Dissolved oxygen, water, unfiltered, mg/l
 - Elevation above NGVD 1929, ft
 - Elevation of reservoir water surface above datum, ft
 - Gage height, ft
 - Lake or reservoir water surface elevation above NGVD 1929, feet
 - Nitrate plus nitrite, water, in situ, mg/L as N
 - pH, water, unfiltered, field, standard units
 - Precipitation, total, in
 - Reservoir storage, acre-ft
 - Specific conductance, water, unfiltered, microsiemens per centimeter at 25°C
 - Streamflow, ft³/s
 - Temperature, water, °C
 - Wind direction, degrees clockwise from true or north
 - Wind speed, miles per hour

Data within the SOS web client can be viewed geospatially, as time series charts with multiple variables and monitoring stations, as a data table, or downloaded for further processing as CSV files





VIEWING DATA AND CHARTS

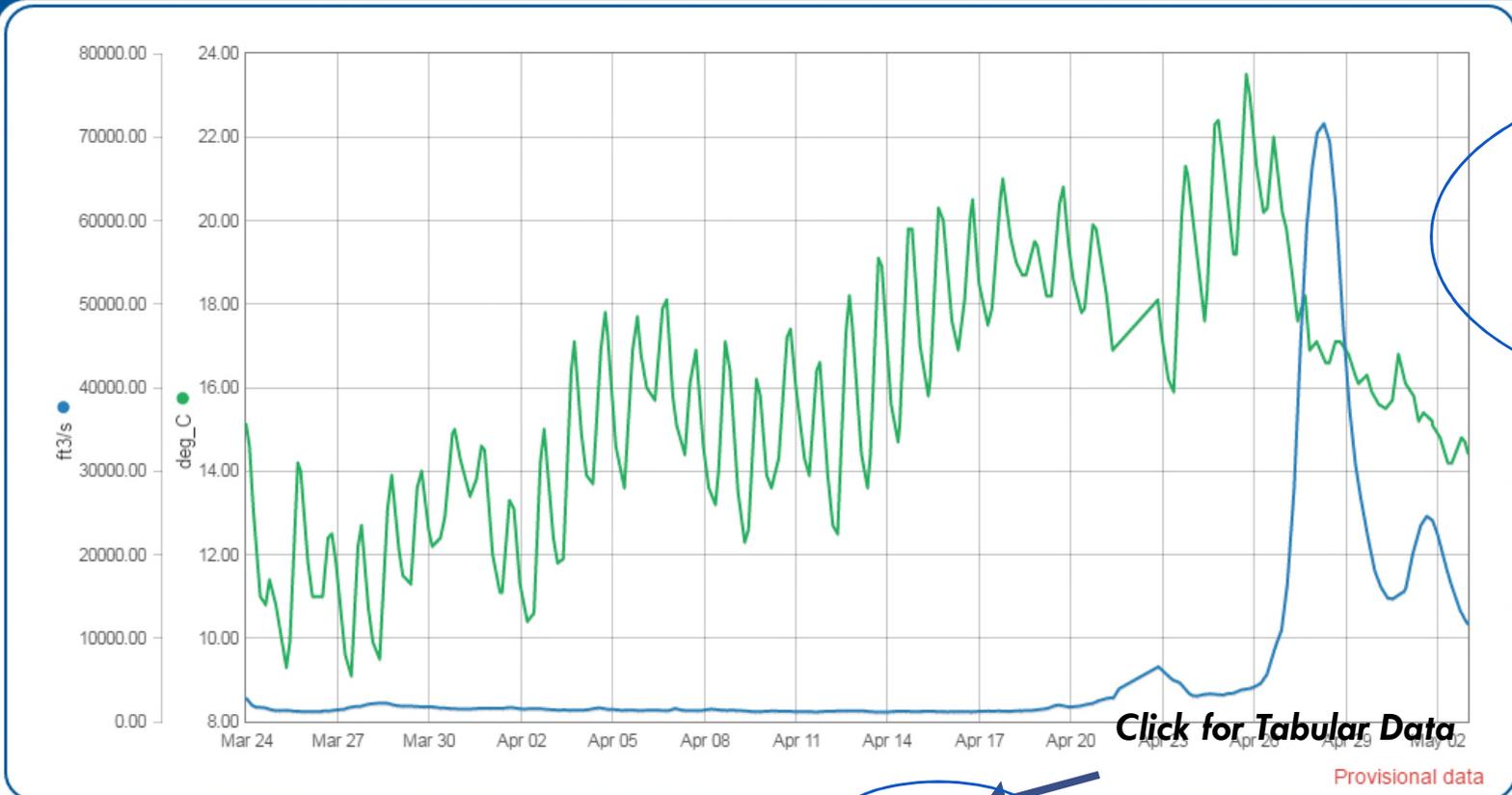
Tt Chart

★ Favorites

?

⚙ Settings

📍 Map view



Legend

USGS 06892350 KANSAS R AT DESOTO, KS ★
Temperature, water, °C (deg_C)
USGS_06892350_18
🔍 📍 ✎ ⓘ ✕
➤ First value at 03/22/2016 14:00 (12 deg_C)
➤ Last value at 05/03/2016 08:15 (14.1 deg_C)
📄 Data as CSV (Zip Archive)

USGS 06892350 KANSAS R AT DESOTO, KS ★
Streamflow, ft³/s (ft³/s)
USGS_06892350_01
🔍 📍 ✎ ⓘ ✕

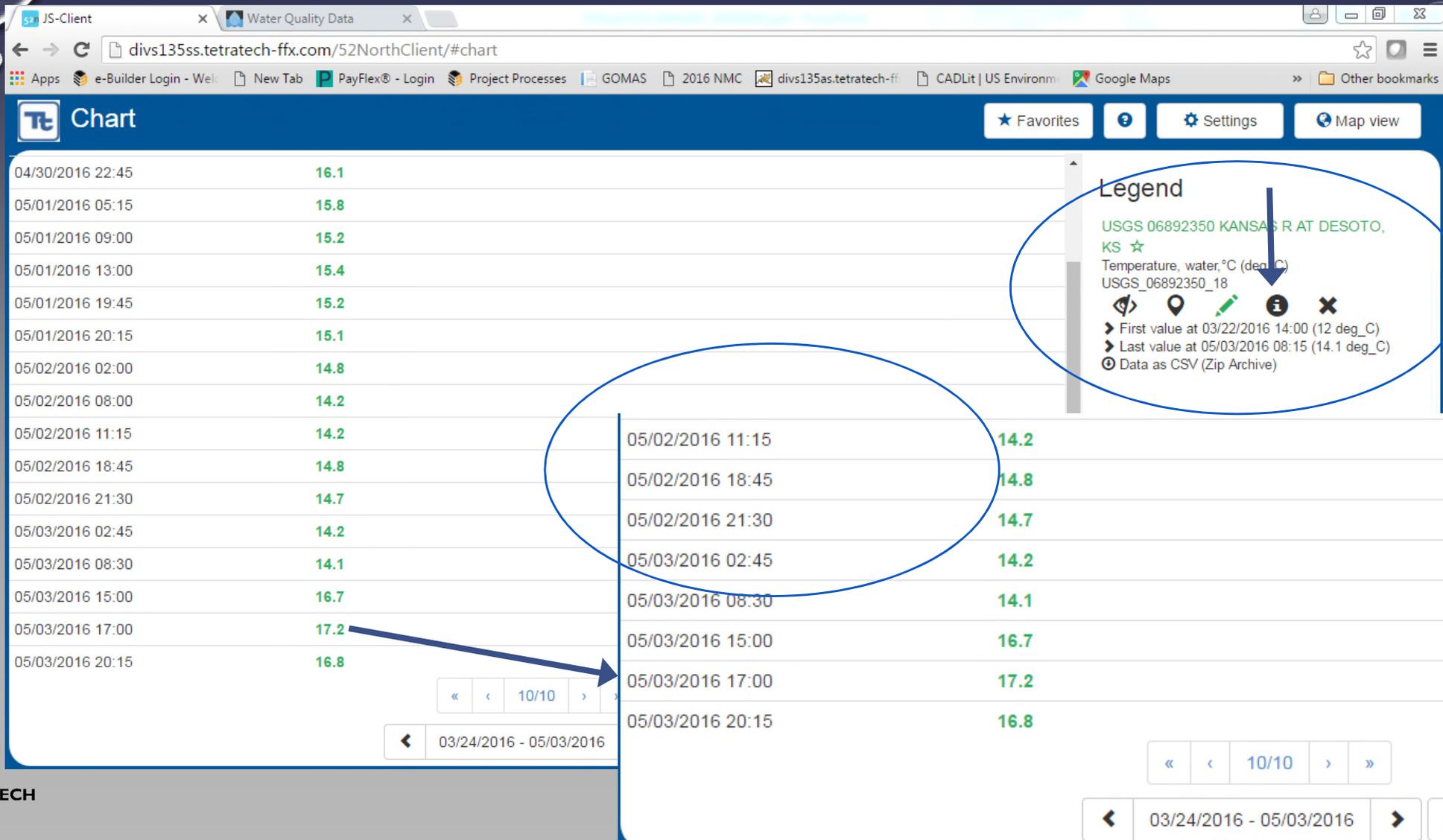
Click Information Icon

Click for Tabular Data

◀ 03/24/2016 - 05/02/2016 ▶ ⓘ

📁 📍 📄

VIEWING TABULAR DATA



VIEWING DATA AND CHARTS

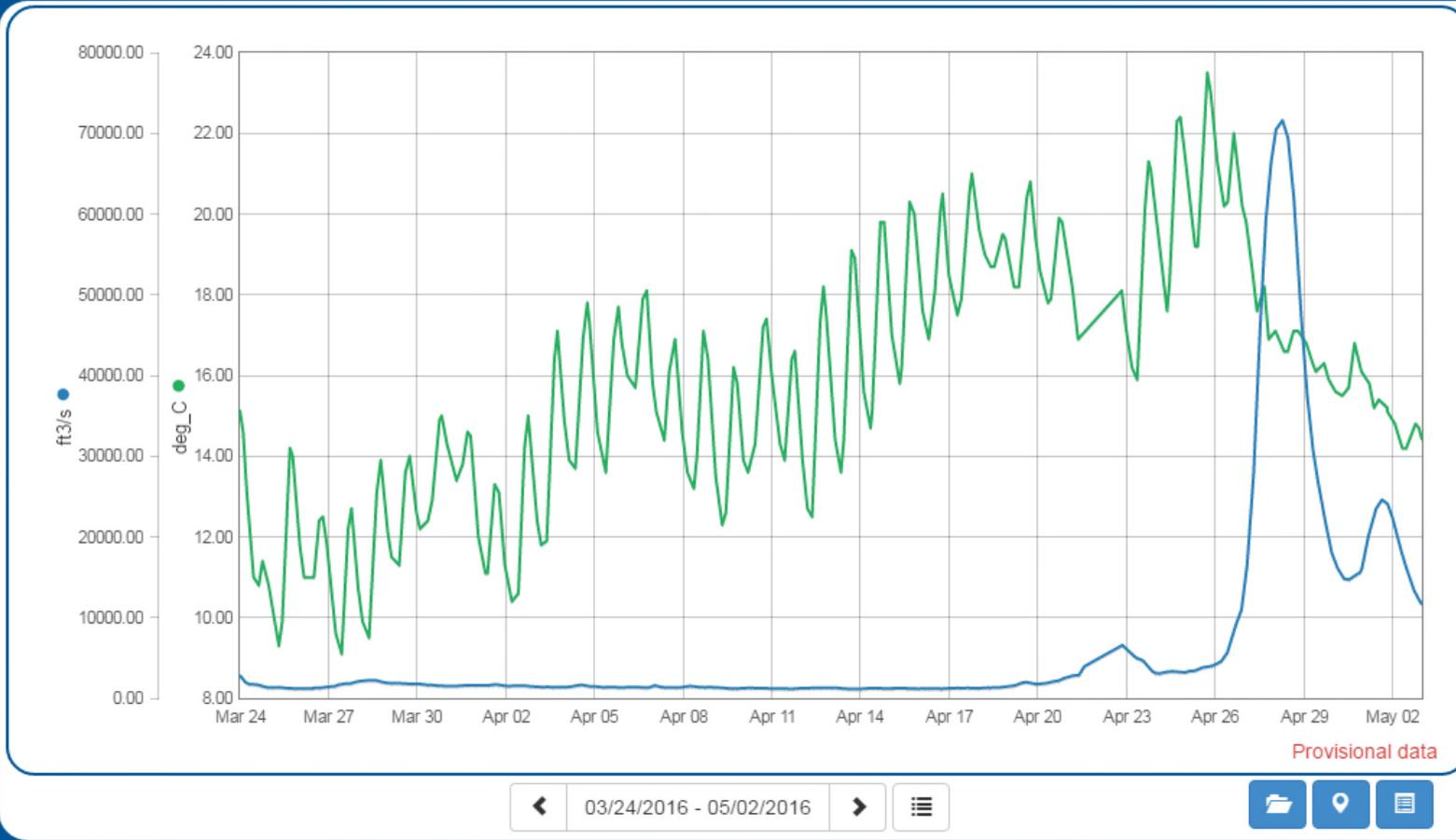
Tt Chart

★ Favorites

?

⚙ Settings

📍 Map view



Legend

USGS 06892350 KANSAS R AT DESOTO, KS ☆

Temperature, water, °C (deg_C)
USGS_06892350_18

🔍 📍 ✎ ⓘ ✕

➤ First value at 03/22/2016 14:00 (12 deg_C)
➤ Last value at 05/03/2016 08:15 (14.1 deg_C)
📄 Data as CSV (Zip Archive)

USGS 06892350 KANSAS R AT DESOTO, KS ☆

Streamflow, ft³/s (ft3/s)
USGS_06892350_01

🔍 📍 ✎ ⓘ ✕



Click for Close Up Map



Select a station

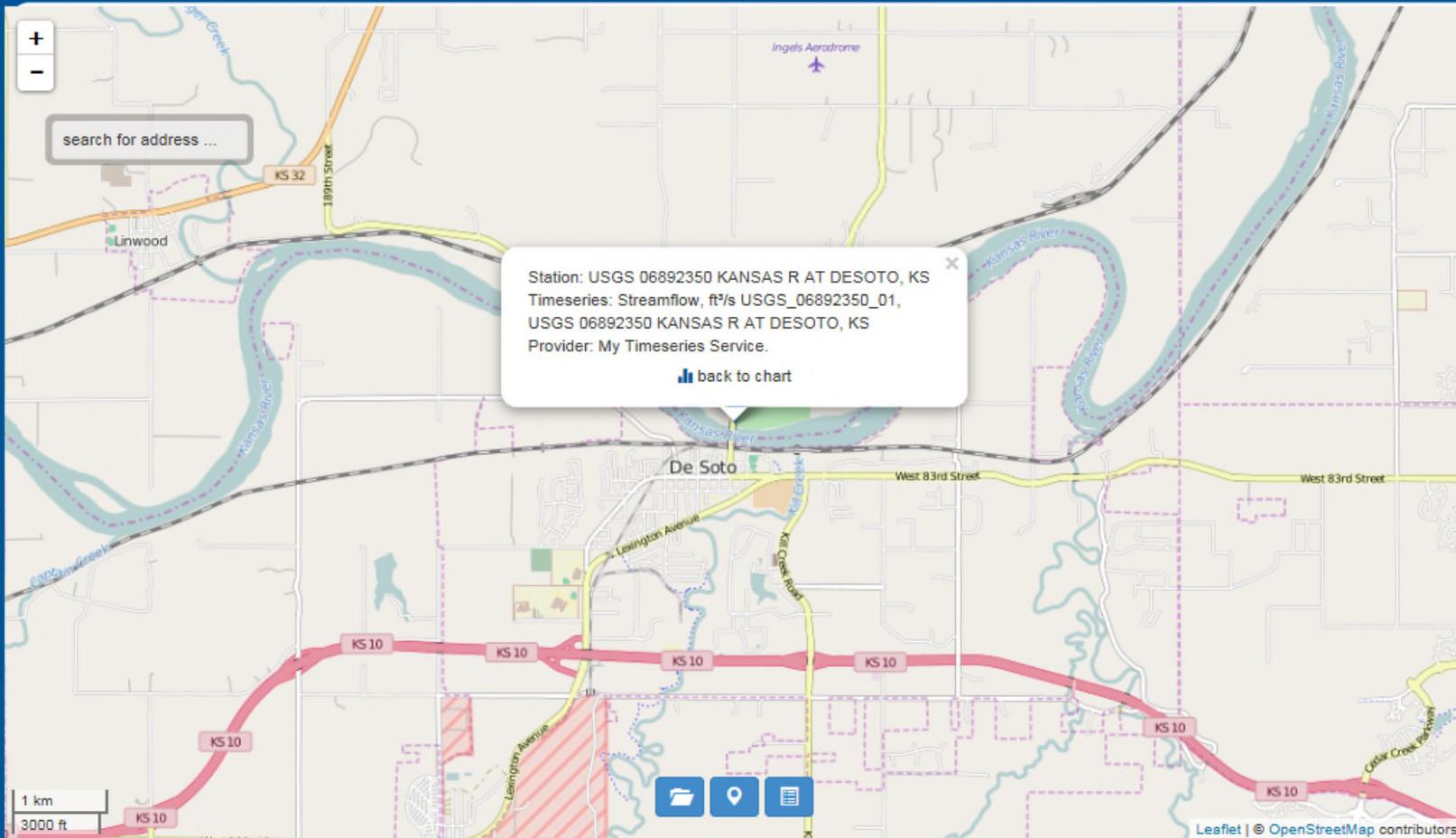
ZOOM INTO STATION LOCATION

★ Favorites



⚙ Settings

📊 Chart view



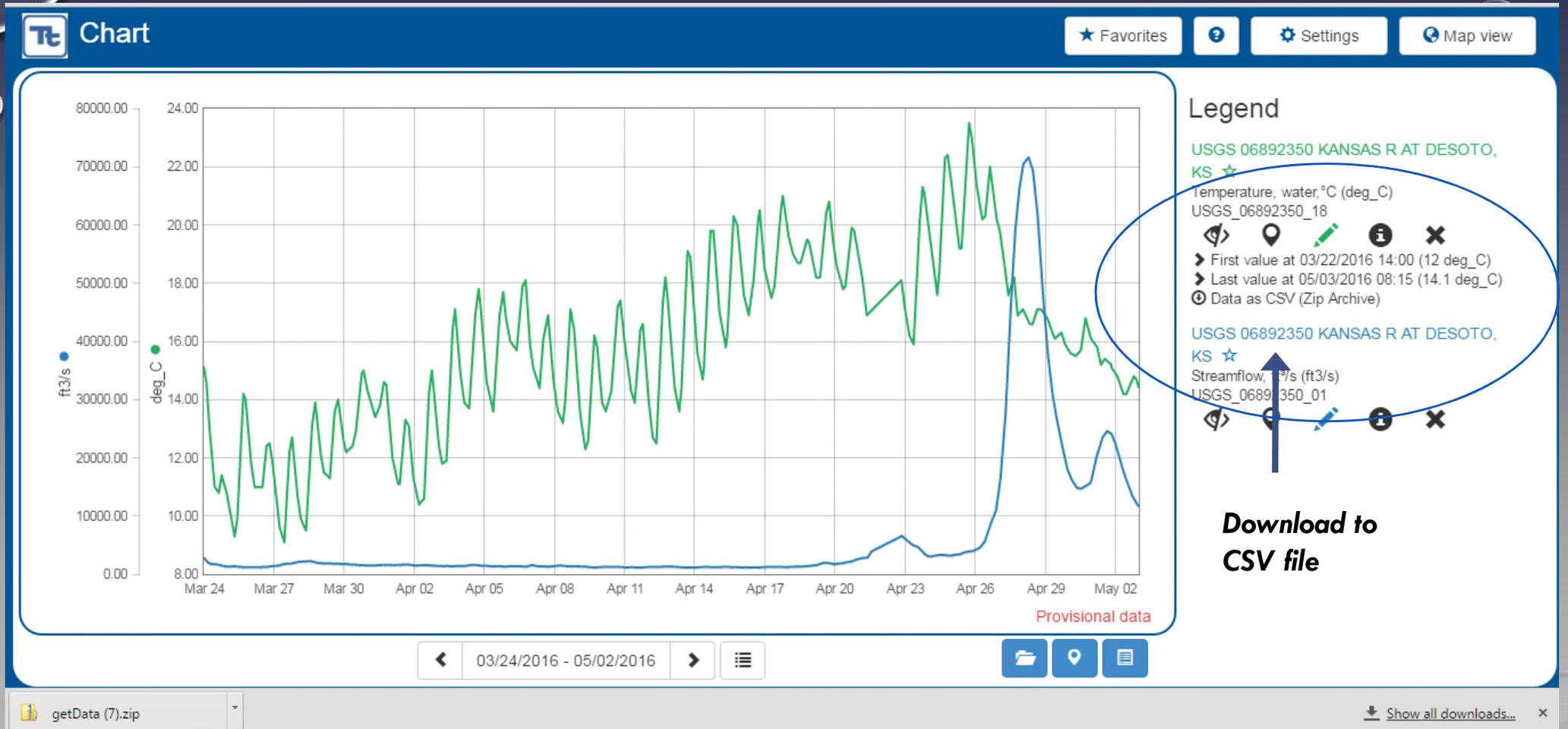
Station: USGS 06892350 KANSAS R AT DESOTO, KS
 Timeseries: Streamflow, ft³/s USGS_06892350_01,
 USGS 06892350 KANSAS R AT DESOTO, KS
 Provider: My Timeseries Service.

[📊 back to chart](#)

Select Characteristics

- Dissolved oxygen, water, unfiltered, mg/L
- Elevation above NGVD 1929, ft
- Elevation of reservoir water surface above datum, ft
- Gage height, ft
- Lake or reservoir water surface elevation above NGVD 1929, feet
- Nitrate plus nitrite, water, in situ, mg/L as N
- pH, water, unfiltered, field, standard units
- Precipitation, total, in
- Reservoir storage, acre-ft
- Specific conductance, water, unfiltered, microsiemens per centimeter at 25°C
- Streamflow, ft³/s**
- Temperature, water, °C
- Wind direction, degrees clockwise from true north
- Wind speed, miles per hour

DOWNLOADING DATA



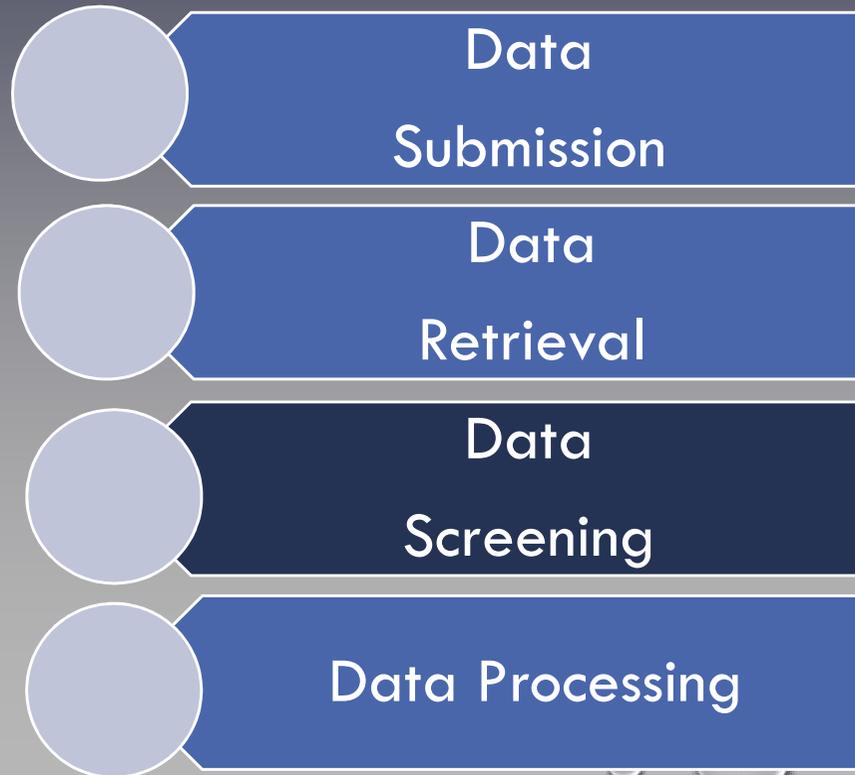
DOWNLOADING DATA

The screenshot shows an Excel spreadsheet with a data table. The table has columns for station ID, location, phenomenon, uom, date, and value. A blue oval highlights a section of the data, and a blue arrow points to a cell in row 186.

	A	B	C	D	E	F	G	H	I		
172	USGS 0685	KS;Tempe	water	°C;deg_C;2016-04-27T06:15:00.000-04:00;	18.6						
173	USGS 0685	KS;Tempe	water	°C;deg_C;2016-04-27T10:00:00.000-04:00;	17.6						
174	USGS 0685	KS;Tempe	water	°C;deg_C;2016-04-27T16:00:00.000-04:00;	18.2						
175	USGS 0685	KS;Tempe	water	°C;deg_C;2016-04-27T19:30:00.000-04:00;	16.9						
176	USGS 0685	KS;Tempe	water	°C;deg_C;2016-04-28T01:00:00.000-04:00;	17.1						
177	USGS 0685	KS;Tempe	water	°C;deg_C;2016-04-28T08:00:00.000-04:00;	16.6						
178	USGS 0685	KS;Tempe	water	°C;deg_C;2016-04-28T11:00:00.000-04:00;	16.6						
179	USGS 0685	KS;Tempe	water	°C;deg_C;2016-04-28T15:45:00.000-04:00;	18.8	USGS 06892350	KANSAS R AT DESOTO	KS;Temperature	water	°C;deg_C;2016-04-30T12:30:00.000-04:00;	15.7
180	USGS 0685	KS;Tempe	water	°C;deg_C;2016-04-28T19:30:00.000-04:00;	18.9	USGS 06892350	KANSAS R AT DESOTO	KS;Temperature	water	°C;deg_C;2016-04-30T17:15:00.000-04:00;	16.8
181	USGS 0685	KS;Tempe	water	°C;deg_C;2016-04-29T02:00:00.000-04:00;	19.0	USGS 06892350	KANSAS R AT DESOTO	KS;Temperature	water	°C;deg_C;2016-04-30T22:45:00.000-04:00;	16.1
182	USGS 0685	KS;Tempe	water	°C;deg_C;2016-04-29T07:15:00.000-04:00;	19.1	USGS 06892350	KANSAS R AT DESOTO	KS;Temperature	water	°C;deg_C;2016-05-01T05:00:00.000-04:00;	15.8
183	USGS 0685	KS;Tempe	water	°C;deg_C;2016-04-29T09:45:00.000-04:00;	19.1	USGS 06892350	KANSAS R AT DESOTO	KS;Temperature	water	°C;deg_C;2016-05-01T05:00:00.000-04:00;	15.8
184	USGS 0685	KS;Tempe	water	°C;deg_C;2016-04-29T16:30:00.000-04:00;	19.2	USGS 06892350	KANSAS R AT DESOTO	KS;Temperature	water	°C;deg_C;2016-05-01T09:00:00.000-04:00;	15.2
185	USGS 0685	KS;Tempe	water	°C;deg_C;2016-04-29T20:15:00.000-04:00;	19.3	USGS 06892350	KANSAS R AT DESOTO	KS;Temperature	water	°C;deg_C;2016-05-01T13:00:00.000-04:00;	15.4
186	USGS 0685	KS;Tempe	water	°C;deg_C;2016-04-30T01:45:00.000-04:00;	19.4	USGS 06892350	KANSAS R AT DESOTO	KS;Temperature	water	°C;deg_C;2016-05-01T16:00:00.000-04:00;	15.2
187	USGS 0685	KS;Tempe	water	°C;deg_C;2016-04-30T07:15:00.000-04:00;	19.4	USGS 06892350	KANSAS R AT DESOTO	KS;Temperature	water	°C;deg_C;2016-05-01T16:00:00.000-04:00;	15.2
188	USGS 0685	KS;Tempe	water	°C;deg_C;2016-04-30T12:30:00.000-04:00;	19.5	USGS 06892350	KANSAS R AT DESOTO	KS;Temperature	water	°C;deg_C;2016-05-01T19:45:00.000-04:00;	15.2
189	USGS 0685	KS;Tempe	water	°C;deg_C;2016-04-30T17:15:00.000-04:00;	19.6	USGS 06892350	KANSAS R AT DESOTO	KS;Temperature	water	°C;deg_C;2016-05-02T02:00:00.000-04:00;	14.8
190	USGS 0685	KS;Tempe	water	°C;deg_C;2016-04-30T22:45:00.000-04:00;	19.7	USGS 06892350	KANSAS R AT DESOTO	KS;Temperature	water	°C;deg_C;2016-05-02T08:00:00.000-04:00;	14.2
191	USGS 0685	KS;Tempe	water	°C;deg_C;2016-05-01T05:00:00.000-04:00;	19.7	USGS 06892350	KANSAS R AT DESOTO	KS;Temperature	water	°C;deg_C;2016-05-02T08:00:00.000-04:00;	14.2
192	USGS 0685	KS;Tempe	water	°C;deg_C;2016-05-01T09:00:00.000-04:00;	19.8	USGS 06892350	KANSAS R AT DESOTO	KS;Temperature	water	°C;deg_C;2016-05-02T11:15:00.000-04:00;	14.2
193	USGS 0685	KS;Tempe	water	°C;deg_C;2016-05-01T13:00:00.000-04:00;	19.9	USGS 06892350	KANSAS R AT DESOTO	KS;Temperature	water	°C;deg_C;2016-05-02T18:45:00.000-04:00;	14.8
194	USGS 0685	KS;Tempe	water	°C;deg_C;2016-05-01T16:00:00.000-04:00;	20.0	USGS 06892350	KANSAS R AT DESOTO	KS;Temperature	water	°C;deg_C;2016-05-02T19:15:00.000-04:00;	14.7
195	USGS 0685	KS;Tempe	water	°C;deg_C;2016-05-01T19:45:00.000-04:00;	20.0						
196	USGS 0685	KS;Tempe	water	°C;deg_C;2016-05-02T02:00:00.000-04:00;	14.8						
197	USGS 0685	KS;Tempe	water	°C;deg_C;2016-05-02T08:00:00.000-04:00;	14.2						

DATA MANAGEMENT

QC Data Before Submitting to the Database



DATA MANAGEMENT AND SCREENING

Challenges

- 1. Data compilation uses large fraction of resources**
- 2. Different data sources usually mean Different:**
 - **Parameter naming conventions**
 - **Units**
 - **Sample fraction (e.g., total, filtered)**
 - **Analytical methods**
 - **Inconsistent/undocumented procedures**
- **Which is Why we need Data Standards**
- **Which is Why we need Metadata**



DATA SCREENING

	A	B	C	D	E	G	V	AM	AQ	AR	AS	AT	AU	AV	AW	AX	
1	and methods pulled from the results table					Counts, min/ma			User Input--Opportunities to Update/Over Ride								
2																	
3																	
4	Parameter Name	Sample Fraction	PCODE	Units	Analytical Method	Num. Results	br k1	br k2	Apply Unif.?	Parameter Group	Parameter Name	Parameter Abbrev.	Units Conv. Mult.	Sample Fracti	Method		
5	CharacteristicName	ResultSampleF	USGSPC	ResultMeasu	ResultAnalytic	N	br	br	unifyA	parameter	parameterName	parameter	unitsFi	unitsCon	sampl	methodEquipApp	
6		ractionText	ode	re.Measu	alMethod.M				ppl	GroupA	Apply	erAbb	nal	vMult	eFr	lied	
98	Ammonia	Dissolved	--	mg/l	350.1	223			TRUE	Nitrogen	Ammonia	NH3	mg/L	1	fil	EPA 350.1	
99	Ammonia	Dissolved	--	mg/l	4500-NH3(G)	7			TRUE	Nitrogen	Ammonia	NH3	mg/L	1	fil	EPA 350.1	
100	Ammonia-nitrogen	Total	--	mg/l	350.1	37			TRUE	Nitrogen	Ammonia	NH3	mg/L	1	tot	EPA 350.1	
101	Ammonia-nitrogen	Total	--	mg/l	LEG_P00610	37			TRUE	Nitrogen	Ammonia	NH3	mg/L	1	tot	NA	
102	Ammonia-nitrogen	Total	--	mg/l	4500-NH3(H)	20			TRUE	Nitrogen	Ammonia	NH3	mg/L	1	tot	EPA 350.1	
103	Ammonia as NH3	Total	--	mg/l	MDEQ-EPA	4			TRUE	Nitrogen	Ammonia	NH3	mg/L	0.8224	tot	NA	
104	Ammonia-nitrogen	Total	--	mg/l	4500-NH3(F)	3			TRUE	Nitrogen	Ammonia	NH3	mg/L	1	tot	SM 4500-NH3-F	
105	Ammonia	Dissolved	--	--	350.1	277			FALSE	Nitrogen	Ammonia	NH3	NA	NA	NA	EPA 350.1	
106	Ammonia-nitrogen	Total	--	--	350.1	41			FALSE	Nitrogen	Ammonia	NH3	NA	NA	NA	EPA 350.1	
107	Ammonia	Dissolved	--	--	4500-NH3(G)	22			FALSE	Nitrogen	Ammonia	NH3	NA	NA	NA	EPA 350.1	
108	Ammonia-nitrogen as N	Dissolved	--	ueq/L	350.1	3			FALSE	Nitrogen	Ammonia	NH3	NA	NA	NA	EPA 350.1	
109	Ammonia	Total	--	mg/kg	4500-NH3(H)	3			FALSE	Nitrogen	Ammonia	NH3	NA	NA	NA	EPA 350.1	
110	Ammonia	Total	--	mg/kg	4500-NH3(G)	2			FALSE	Nitrogen	Ammonia	NH3	NA	NA	NA	EPA 350.1	
111	Ammonia	Total	--	--	4500-NH3(G)	2			FALSE	Nitrogen	Ammonia	NH3	NA	NA	NA	EPA 350.1	
112	Ammonia	Total	--	--	4500-NH3(H)	2			FALSE	Nitrogen	Ammonia	NH3	NA	NA	NA	EPA 350.1	
113	Ammonia	Total	--	mg/kg	350.1	1			FALSE	Nitrogen	Ammonia	NH3	NA	NA	NA	EPA 350.1	



KNOWLEDGE BASE---DATA SCREENING

Result Screening Rules

A	B	C	D
keep	qcRemark	columnName	columnValue
FALSE	ActivityTypeCode: blank	ActivityTypeCode	blank
FALSE	ActivityTypeCode: calibration check	ActivityTypeCode	calibration check
FALSE	ActivityTypeCode: negative control	ActivityTypeCode	negative control
FALSE	ActivityTypeCode: Not determined	ActivityTypeCode	Not determined
FALSE	ActivityTypeCode: Quality Control Sample-Other	ActivityTypeCode	Quality Control Sample-Other



Result Screening Rules -- Updated

Screening Outcome

A	B	C	D	E	F	G
keep	qcRemark	columnName	columnValue	beginCount	endCount	numFlag
FALSE	ActivityTypeCode: blank	ActivityTypeCode	blank	414352	414352	0
FALSE	ActivityTypeCode: calibration check	ActivityTypeCode	calibration check	414352	414352	0
FALSE	ActivityTypeCode: depletion	ActivityTypeCode	depletion	414352	414352	0
FALSE	ActivityTypeCode: negative control	ActivityTypeCode	negative control	414352	414352	0
FALSE	ActivityTypeCode: Not determined	ActivityTypeCode	Not determined	414352	414351	1
FALSE	ActivityTypeCode: Quality Control Sample-Other	ActivityTypeCode	Quality Control Sample-Other	414351	414351	0
FALSE	ActivityTypeCode: reference	ActivityTypeCode	reference	414351	414351	0
FALSE	ActivityTypeCode: spike	ActivityTypeCode	spike	414351	414351	0
TRUE	ActivityTypeCode: Field Msr/Obs	ActivityTypeCode	Field Msr/Obs	NA	NA	375319
TRUE	ActivityTypeCode: Sample-Routine	ActivityTypeCode	Sample-Routine	NA	NA	34961
TRUE	ActivityTypeCode: Quality Control Sample-Field Replicate	ActivityTypeCode	Quality Control Sample-Field Replicate	NA	NA	345
TRUE	ActivityTypeCode: Sample	ActivityTypeCode	Sample	NA	NA	180
TRUE	ActivityTypeCode: Quality Control Field Replicate Msr/Obs	ActivityTypeCode	Quality Control Field Replicate Msr/Obs	NA	NA	88
TRUE	ActivityTypeCode: Field Msr/Obs-Habitat Assessment	ActivityTypeCode	Field Msr/Obs-Habitat Assessment	NA	NA	66
TRUE	ActivityTypeCode: Quality Control Sample-Lab Duplicate	ActivityTypeCode	Quality Control Sample-Lab Duplicate	NA	NA	14
FALSE						

PARAMETER CONVERSION

includes manual review option

Data Screening

- Sites
- Results

Data Processing

- Parameters
- Units
- Sample Fraction
- Analytical Methods

A	B	C	D
keep ▾	qcRemark ▾	columnName ▾	columnValue ▾
FALSE	ActivityTypeCode: blank	ActivityTypeCode	blank
FALSE	ActivityTypeCode: calibration check	ActivityTypeCode	calibration check
FALSE	ActivityTypeCode: negative control	ActivityTypeCode	negative control
FALSE	ActivityTypeCode: Not determined	ActivityTypeCode	Not determined
FALSE	ActivityTypeCode: Quality Control Sample-Other	ActivityTypeCode	Quality Control Sample-Other
FALSE	ActivityMediaSubdivisionName: effluent	ActivityMediaSubdivisionName	effluent
FALSE	ResultCommentText: fail	ResultCommentText	fail
FALSE	ResultCommentText: holding time	ResultCommentText	holding time
FALSE	ResultCommentText: ice melted	ResultCommentText	ice melted
FALSE	ResultCommentText: improper	ResultCommentText	improper
FALSE	ResultCommentText: insufficient	ResultCommentText	insufficient
FALSE	ResultCommentText: malfunction	ResultCommentText	malfunction

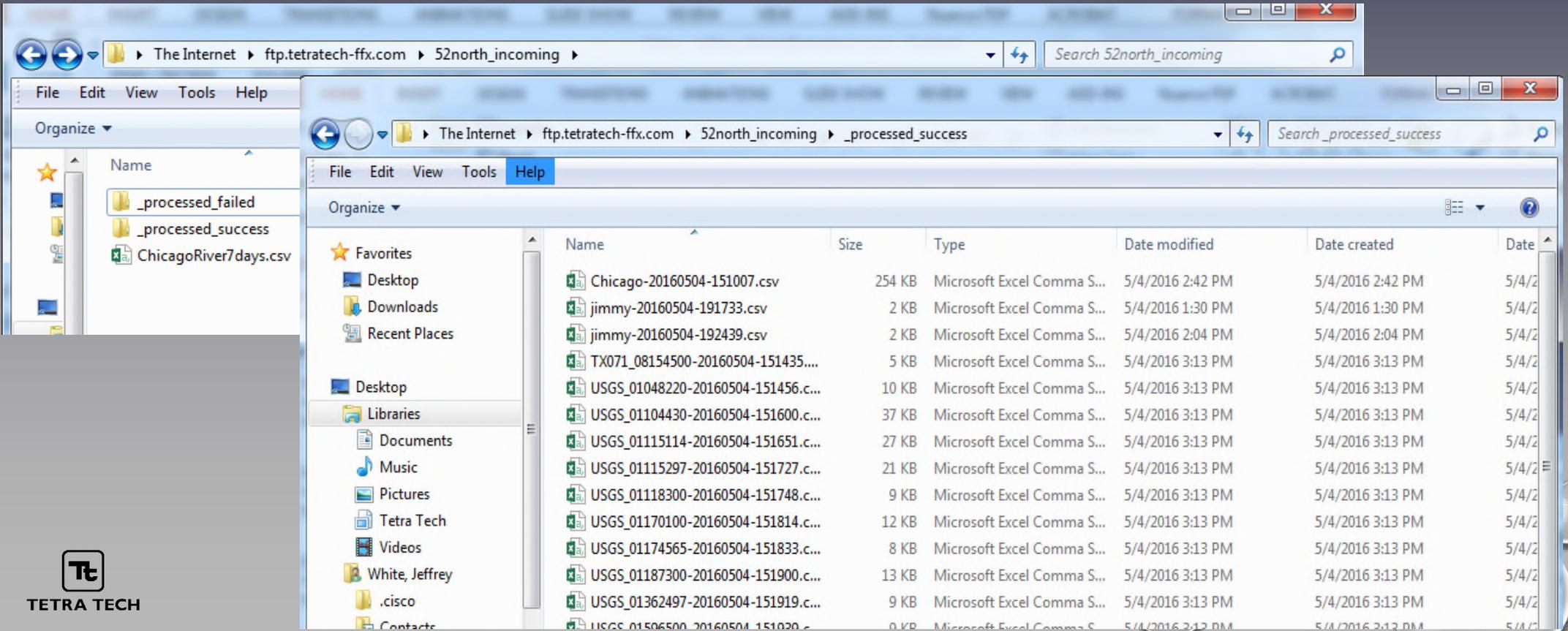
Parameter Conversion

A	B	C	D	E
CharacteristicName	parameterGroup	parameterName	parameterAbbrev	parameterRemark
Chlorophyll a	Algal Biomass	Chl-a	CHLA	
Chlorophyll a, uncorrected for pheophytin	Algal Biomass	Chl-a	CHLA	
Chlorophyll	Algal Biomass	Chl-a	CHLA	
Chlorophyll a, corrected for pheophytin	Algal Biomass	Chl-a, corrected	CHLA_C	
Chlorophyll a, free of pheophytin	Algal Biomass	Chl-a, corrected	CHLA_C	
Biomass, periphyton	Algal Biomass	Biomass, periphyton	PERI	
Pheophytin a	Algal Biomass	Pheophytin a	PHEO	
Ammonia-nitrogen as N	Nitrogen	Ammonia	NH3	*confirm NH3
Ammonia-nitrogen	Nitrogen	Ammonia	NH3	*confirm NH3
Ammonia	Nitrogen	Ammonia	NH3	*confirm NH3
Ammonia as NH3	Nitrogen	Ammonia	NH3	*confirm NH3
Ammonia as N	Nitrogen	Ammonia	NH3	*confirm NH3
Ammonia-nitrogen as NH3	Nitrogen	Ammonia	NH3	*confirm NH3



UPLOADING DATA

- How Do I get my Excel Files Uploaded?
- One option is to copy them to an FTP site



UPLOADED DATA - CHART



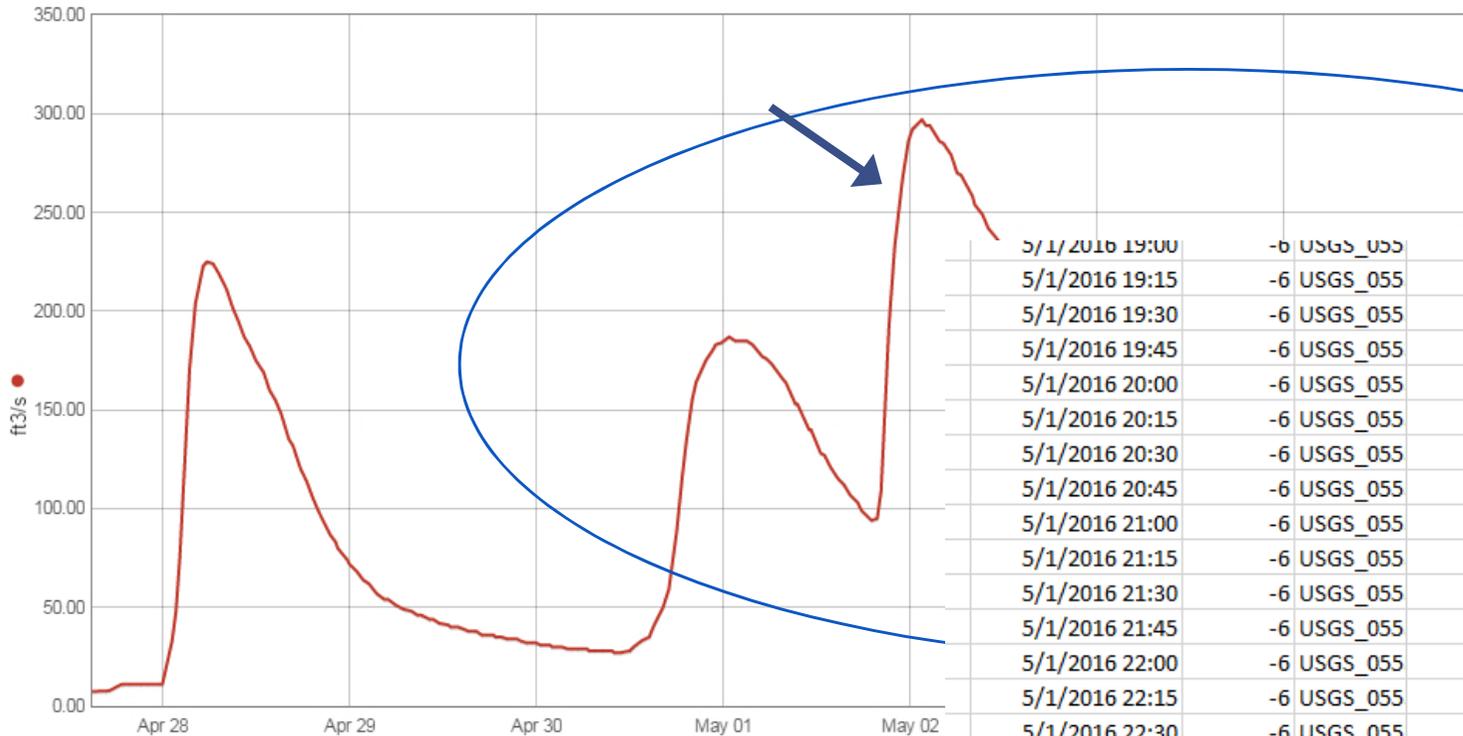
Chart

★ Favorites



⚙ Settings

📍 Map view



Legend

USGS_05534500_NORTH_BRANCH_CHICAGO_F

★
Streamflow, ft³/s (ft3/s)
USGS_05534500_04
🔍 📍 🗑️ ⓘ ✕
➤ First value at 04/27/2016 07:45 (7.9 ft3/s)

5/1/2016 19:00	-6	USGS_055	60	Streamflo	11	94 ft3/s
5/1/2016 19:15	-6	USGS_055	60	Streamflo	11	93 ft3/s
5/1/2016 19:30	-6	USGS_055	60	Streamflo	11	93 ft3/s
5/1/2016 19:45	-6	USGS_055	60	Streamflo	11	95 ft3/s
5/1/2016 20:00	-6	USGS_055	60	Streamflo	11	100 ft3/s
5/1/2016 20:15	-6	USGS_055	60	Streamflo	11	109 ft3/s
5/1/2016 20:30	-6	USGS_055	60	Streamflo	11	125 ft3/s
5/1/2016 20:45	-6	USGS_055	60	Streamflo	11	148 ft3/s
5/1/2016 21:00	-6	USGS_055	60	Streamflo	11	173 ft3/s
5/1/2016 21:15	-6	USGS_055	60	Streamflo	11	192 ft3/s
5/1/2016 21:30	-6	USGS_055	60	Streamflo	11	207 ft3/s
5/1/2016 21:45	-6	USGS_055	60	Streamflo	11	221 ft3/s
5/1/2016 22:00	-6	USGS_055	60	Streamflo	11	233 ft3/s
5/1/2016 22:15	-6	USGS_055	60	Streamflo	11	240 ft3/s
5/1/2016 22:30	-6	USGS_055	60	Streamflo	11	249 ft3/s
5/1/2016 22:45	-6	USGS_055	60	Streamflo	11	259 ft3/s
5/1/2016 23:00	-6	USGS_055	60	Streamflo	11	267 ft3/s
5/1/2016 23:15	-6	USGS_055	60	Streamflo	11	274 ft3/s
5/1/2016 23:30	-6	USGS_055	60	Streamflo	11	281 ft3/s
5/1/2016 23:45	-6	USGS_055	60	Streamflo	11	286 ft3/s
5/2/2016 0:00	-6	USGS_055	60	Streamflo	11	289 ft3/s

◀ 04/27/2016 - 05/04/2016 ▶ ☰

UPLOADING DATA – LOG FILE

Download to
CSV file

```
feed_52north.log - Notepad
File Edit Format View Help
2016-04-29 14:22:43,006 - INFO - local file size is 10.0KB
2016-04-29 14:22:43,006 - INFO - ../data/unit_values/USGS_06892350_version2.csv
2016-04-29 14:22:43,006 - DEBUG - the columns are:foi_name,epsg_code,lat_va,long_va,altitude,date_string,timeoffset,sensor_u
2016-04-29 14:22:43,007 - DEBUG - found column for 'latitude' called 'lat_va'
2016-04-29 14:22:43,007 - DEBUG - found column for 'longitude' called 'long_va'
2016-04-29 14:22:43,009 - DEBUG - found column for 'epsg' called 'epsg_code'
2016-04-29 14:22:43,009 - DEBUG - found column for 'altitude' called 'altitude'
2016-04-29 14:22:43,009 - DEBUG - found column for 'date' called 'date_string'
2016-04-29 14:22:43,009 - DEBUG - found column for 'timeoffset' called 'timeoffset'
2016-04-29 14:22:43,009 - DEBUG - found column for 'sensor' called 'sensor_uri'
2016-04-29 14:22:43,009 - DEBUG - found column for 'parameter' called 'parameter_code'
2016-04-29 14:22:43,009 - DEBUG - found column for 'value' called 'value'
2016-04-29 14:22:43,009 - DEBUG - found column for 'units' called 'units'
2016-04-29 14:22:43,010 - INFO - there are 53 lines in the input file
2016-04-29 14:22:43,023 - INFO - created config file:
2016-04-29 14:22:43,023 - INFO - ../data/unit_values/USGS_06892350_version2.xml
2016-04-29 14:22:43,023 - INFO - log for this station is:
2016-04-29 14:22:43,023 - INFO - ../data/unit_values/USGS_06892350_version2.log
2016-04-29 14:22:43,025 - DEBUG - starting to feed data to SOS for configuration file
2016-04-29 14:22:43,025 - DEBUG - ../data/unit_values/USGS_06892350_version2.xml
2016-04-29 14:22:43,025 - DEBUG - shell_command=="C:\ProgramData\Oracle\Java\javapath\java.exe" -jar "C:\Data_and_Tools\usg:
2016-04-29 14:22:49,269 - INFO - import complete. log file size == 102.1KB
2016-04-29 14:22:49,447 - INFO - New observations: 53
2016-04-29 14:22:49,448 - DEBUG - finished feeding data to SOS for configuration file
2016-04-29 14:22:49,448 - DEBUG - ../data/unit_values/USGS_06892350_version2.xml
2016-04-29 14:22:49,450 - DEBUG - renamed data file to
2016-04-29 14:22:49,450 - DEBUG - ../data/unit_values/USGS_06892350_version2-20160429-142249.csv
2016-04-29 14:22:49,450 - INFO - finished processing file (0:00:06.444 seconds elapsed)
2016-04-29 14:22:49,450 - INFO - ../data/unit_values/USGS_06892350_version2.csv
```



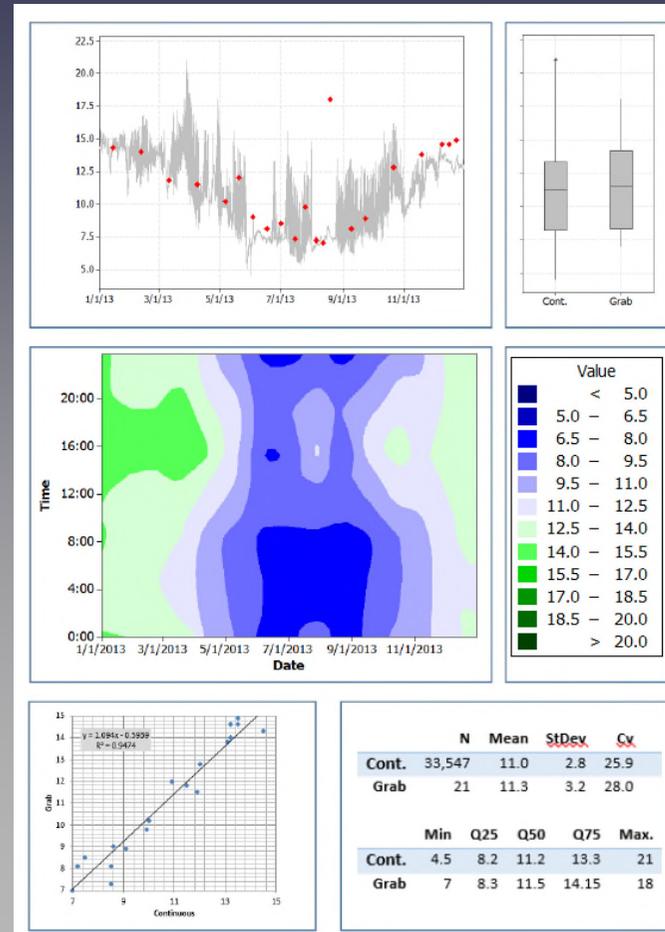
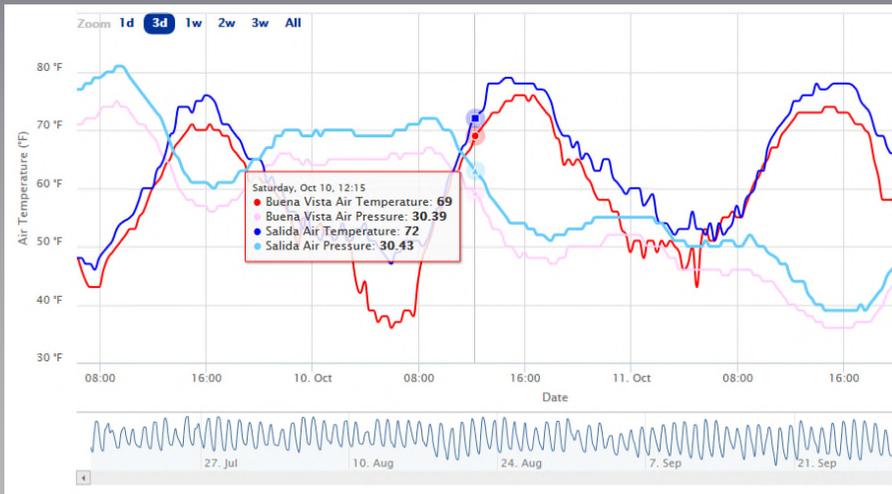
NEXT STEPS

- Tools and Procedures for QCing, Formatting and Deriving Summary Outputs
 - R Scripts, K9, L9 Workshops
 - Enhanced Charts and Visualization tools
- Join Discreet Sampling Data With Continuous Monitoring Data
 - Example, Benthic Macroinvertebrates Requires Field Visits
 - Collect field samples, Process samples in the laboratory, Calculate indicator terms.
 - Discreet Sampling Data from the Water Quality Portal



52 NORTH SOS CUSTOM CONFIGURATION

- Open source platform allows for a tremendous amount of customization from the 'out-of-the-box' configuration (example below)
- The SOS web client has capabilities to integrate with statistical packages like R to produce statistics and graphics such as those provided to the right



SUMMARY

- 52 North provides a platform for continuous monitoring data sharing.
- The 52 North (SOS) data model and client appear to be capable of storing and hosting both discrete grab and continuous data including near-real time sensor data from multiple sensor-types and monitoring organizations in a standardized, accessible format.
- 52 North allows for add-ons and customization leveraging statistical software such as R to compute summary statistics or other desired metrics.
- Plans to further develop capabilities to allow for hosting state and regional water quality monitoring data.



