SOAR SeaFET Quality Control Script

Version 1.0 | July 15, 2024

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User instructions:

- Data file types are csv, with 'comma' delimiter
- Look at example files to ensure the four sensor variable headers are included and the same:
- DTUTC, VINT, TEMPC (datetime in UTC timezone, internal voltage, temperature in celsius)
- Look at bottle file to ensure four variable headers are included and the same:
- DT, pH, spectTC, DIC, TA, Sal, QC (datetime local timezone (PST/PDT), pH from spec, temp from spec, ...
- DIC, TA, salinity from bottle and QC flag)
- Row comments begin with '#'

Step 1: Load sensor data files and bottle files

Select SeaFET and discrete bottle/tris files using the buttons below.

Provide the folder path for CO2SYS (v3.1.2).

```
File start time =

02/01/2024 01:00:00

File end time =

04/17/2024 06:20:00
```

Step 2: Enter start and end datetimes (UTC) to trim the deployment (mm/dd/yyyy hh:mm:ss)

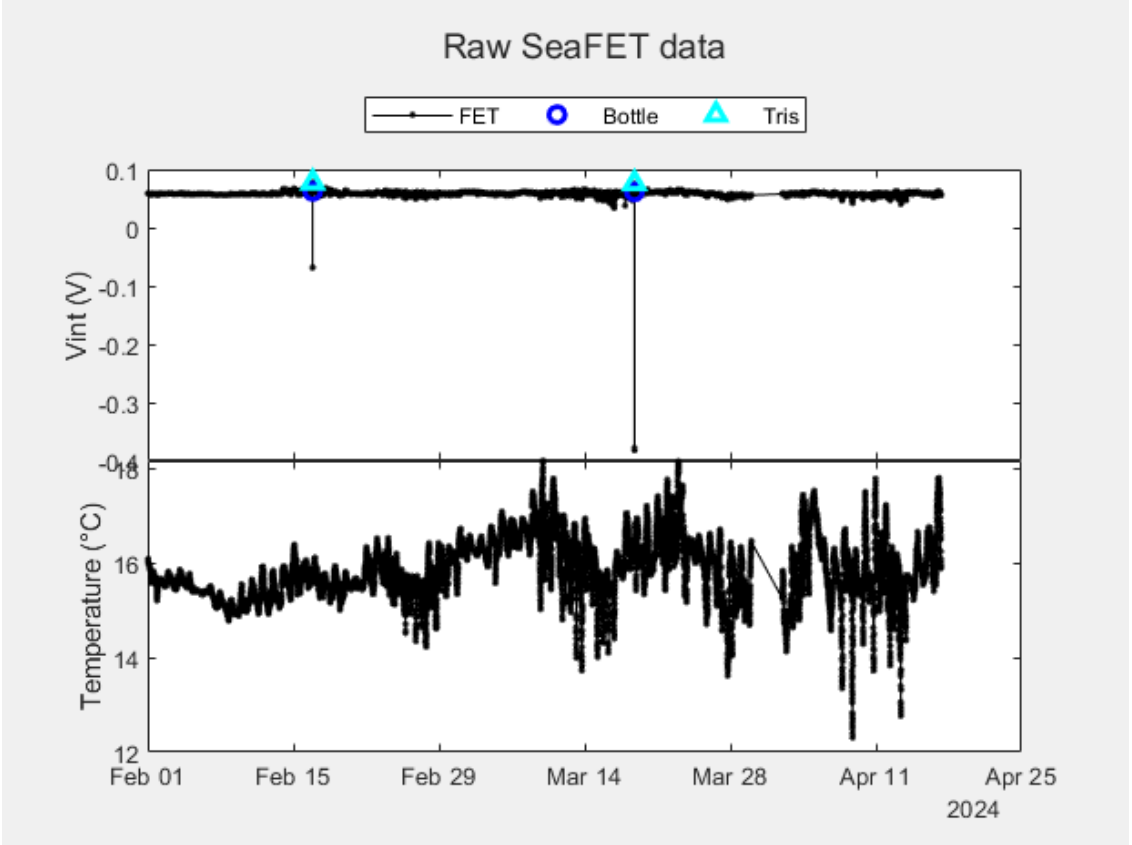
Use the fields below to edit the start and end datetimes of the deployment.

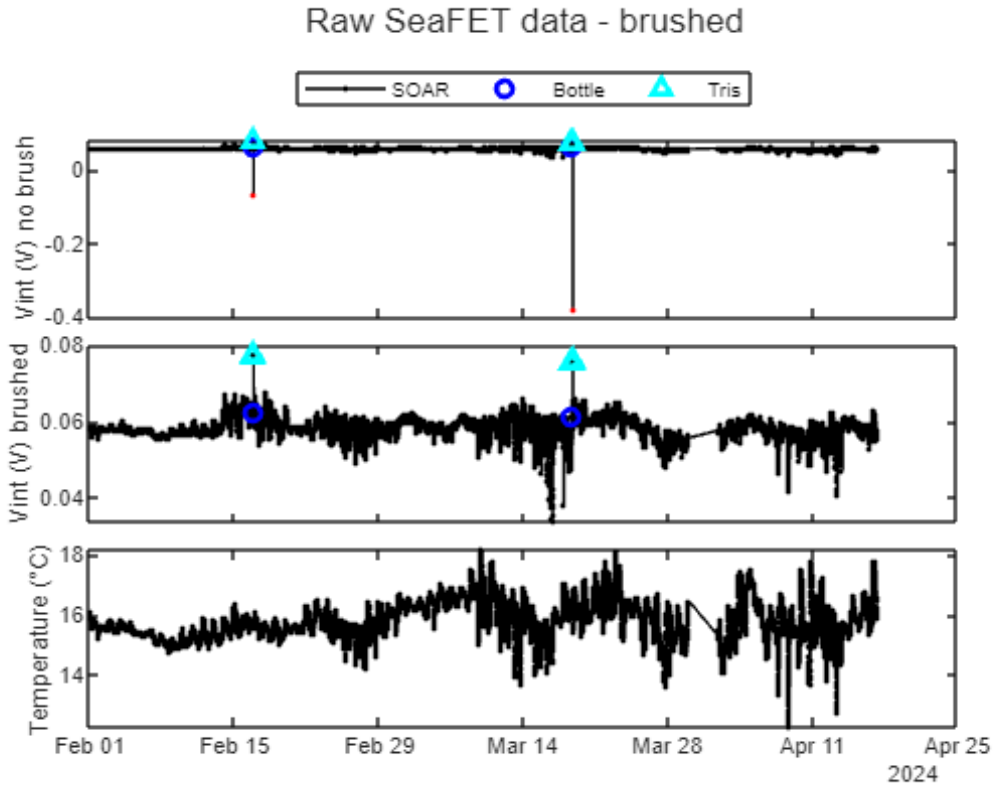
A plot of the raw data will open in a separate window. The user can "brush" bad data to NaN if desired.

Leave the figure window open and move on to the next step. The window will automaticall close.

```
Trimmed start time = 02/01/2024 01:00:00

Trimmed end time = 04/17/2024 06:20:00
```


Raw SeaFET data
FET
Bottle
Tris
Vint (V)
0.1
0
-0.1
-0.2
-0.3
-0.4
Temperature (°C)
18
16
14
12
Feb 01
Feb 15
Feb 29
Mar 14
Mar 28
Apr 11
Apr 25
2024


Raw SeaFET data - brushed
SOAR
Bottle
Tris
Vint (V) no brush
0
-0.2
-0.4
Vint (V) brushed
0.08
0.06
0.04
Temperature (°C)
18
16
14
Feb 01
Feb 15
Feb 29
Mar 14
Mar 28
Apr 11
Apr 25
2024

Number of discrete samples = 2

DTUTC	PHSPEC	TCSPEC	DIC	TA	SAL	QC
16-Feb-2024 20:40:00	8.0086	20	1981.4	2211.5	33.127	1
18-Mar-2024 18:45:00	8.0447	20	1968.4	2212.7	33.269	1

TCINSITU	VINT	PHINSITU
15.676	0.062377	8.0742
16.299	0.061225	8.101

Number of tris injections = 7

DTUTC	QC	TCINSITU	VINT	PHINSITU
16-Feb-2024 20:50:00	2	15.816	0.077229	8.3873
16-Feb-2024 20:55:00	1	15.776	0.077365	8.3886
16-Feb-2024 21:00:00	1	15.736	0.077686	8.3899
18-Mar-2024 18:50:00	2	16.502	0.075748	8.3648
18-Mar-2024 18:55:00	1	16.43	0.075907	8.3672
18-Mar-2024 19:00:00	1	16.344	0.076026	8.37
18-Mar-2024 19:05:00	2	16.316	0.075889	8.3709

Apply quality control flags to discrete samples in a nx1 array, where n is the number of samples for each validation method:

Each QC flag is to be bracketed and split by a semicolon. Example: [1; 2; 1; 1; 2; 2]

QC =1 : good

QC = 2 : bad

QC = 3 : questionable

QC = 4: no sensor data

Original bottle QC flags:

[1; 1]

Original tris QC flags:

[2; 1; 1; 2; 1; 1; 2]

Copy and paste these array outputs into the boxes below to edit QC flags:

DTUTC	PHSPEC	TCSPEC	DIC	TA	SAL	QC
16-Feb-2024 20:40:00	8.0086	20	1981.4	2211.5	33.127	1
18-Mar-2024 18:45:00	8.0447	20	1968.4	2212.7	33.269	1

TCINSITU	VINT	PHINSITU
15.676	0.062377	8.0742
16.299	0.061225	8.101

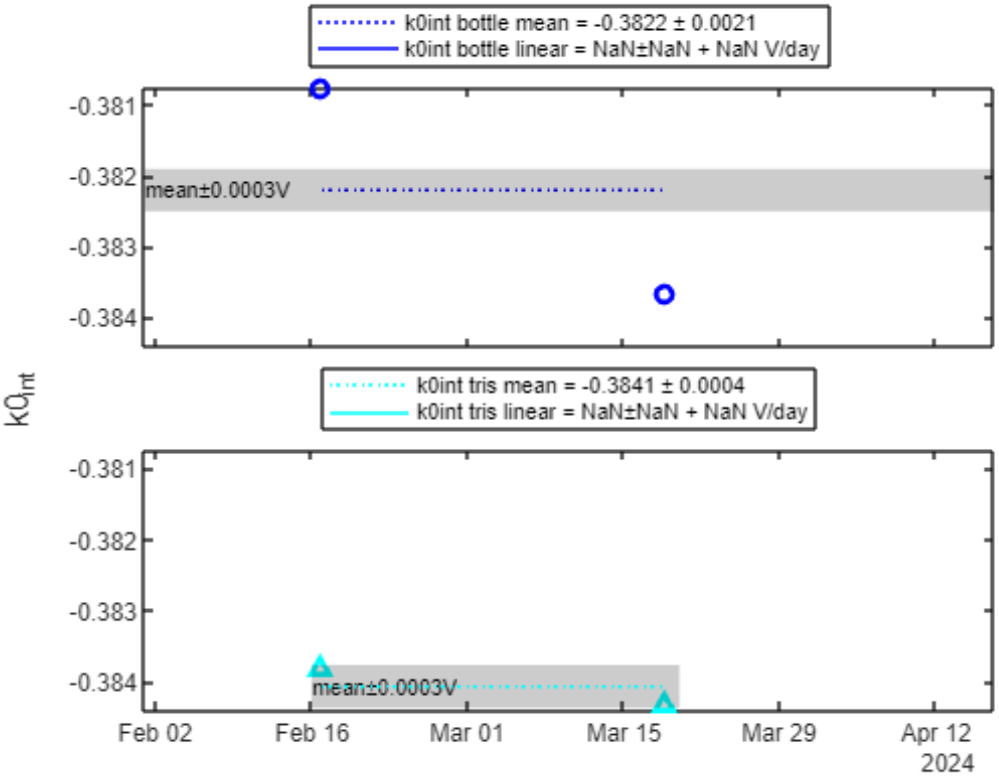
DTUTC	QC	TCINSITU	VINT	PHINSITU

```
16-Feb-2024 20:55:00    1      15.776     0.077365     8.3886
18-Mar-2024 19:00:00    1      16.344     0.076026       8.37
```

Step 3: Calculate k0 using k2 for bottle and tris measurements

Default k2 is from Martz et al. 2010: -0.00125 V/C for internal reference. Option to use an alternate value.

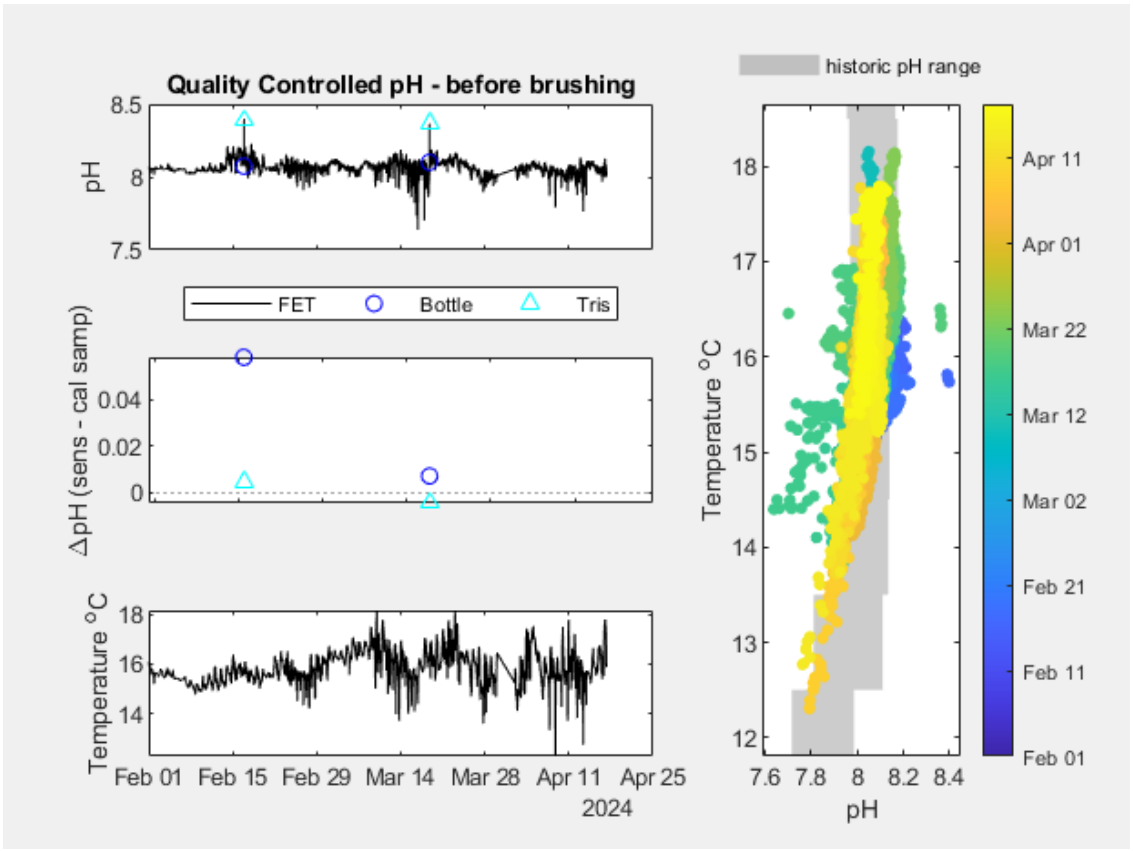
```
using k2int from Martz
```

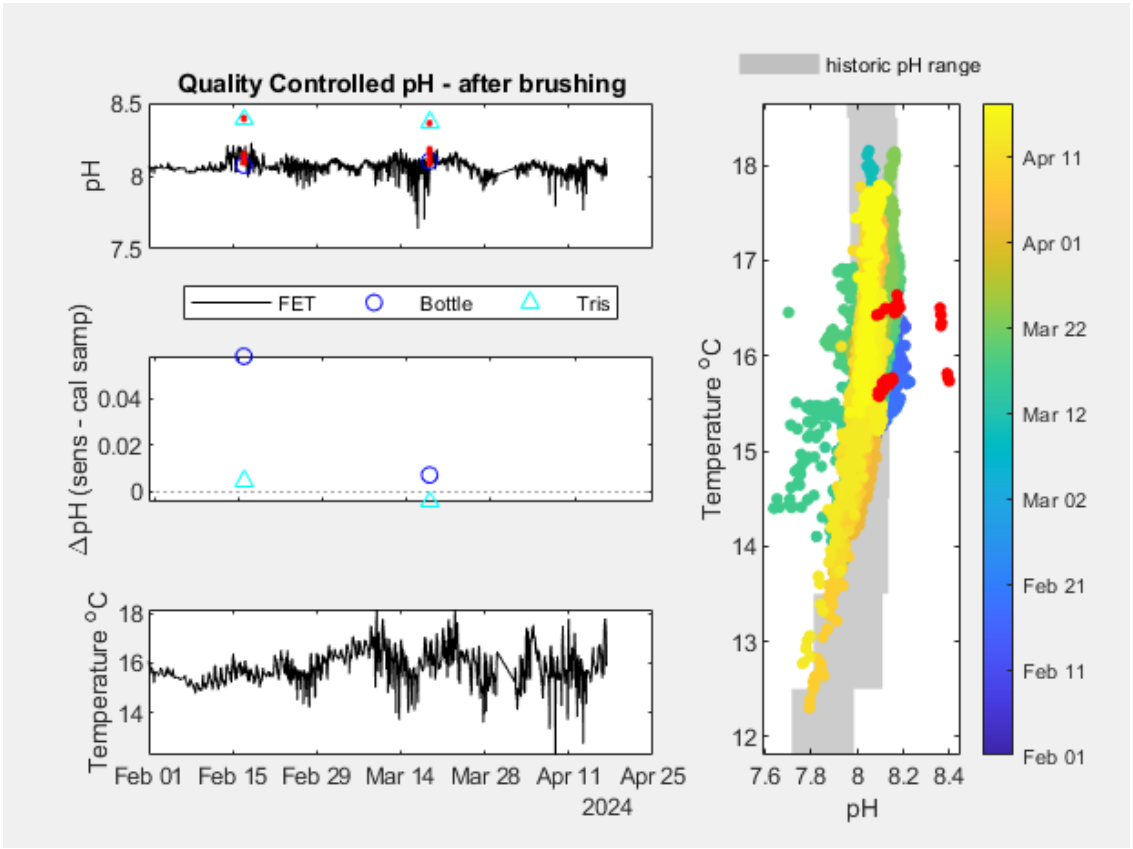


Step 4: Calculate corrected pH using k0

Choose k0 option to use or enter a value for each coefficient (default values shown):

```
k0int option used: tris mean
```


Quality Controlled pH - before brushing
pH
8.5
8
7.5
FET
Bottle
Tris
ΔpH (sens - cal samp)
0.04
0.02
0
Temperature °C
18
16
14
Feb 01
Feb 15
Feb 29
Mar 14
Mar 28
Apr 11
Apr 25
2024
historic pH range
Temperature °C
18
17
16
15
14
13
12
7.6
7.8
8
8.2
8.4
pH
Apr 11
Apr 01
Mar 22
Mar 12
Mar 02
Feb 21
Feb 11
Feb 01


Quality Controlled pH - after brushing
pH
8.5
8
7.5
FET
Bottle
Tris
ΔpH (sens - cal samp)
0.04
0.02
0
Temperature °C
18
16
14
Feb 01
Feb 15
Feb 29
Mar 14
Mar 28
Apr 11
Apr 25
2024
historic pH range
Temperature °C
18
17
16
15
14
13
12
7.6
7.8
8
8.2
8.4
pH
Apr 11
Apr 01
Mar 22
Mar 12
Mar 02
Feb 21
Feb 11
Feb 01

Final notes and export

Enter QC notes here:

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Operator: TW

Data gap Apr 1-2 due to cable issues and deployment being restarted. Sensor did not leave the water.

Removed all tris samples exept for last reading.

Tris mean k0, <= 0.0003 V std

Potential for bottle samples to be during biofouling.

Negligable change removing initial tris readings.

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