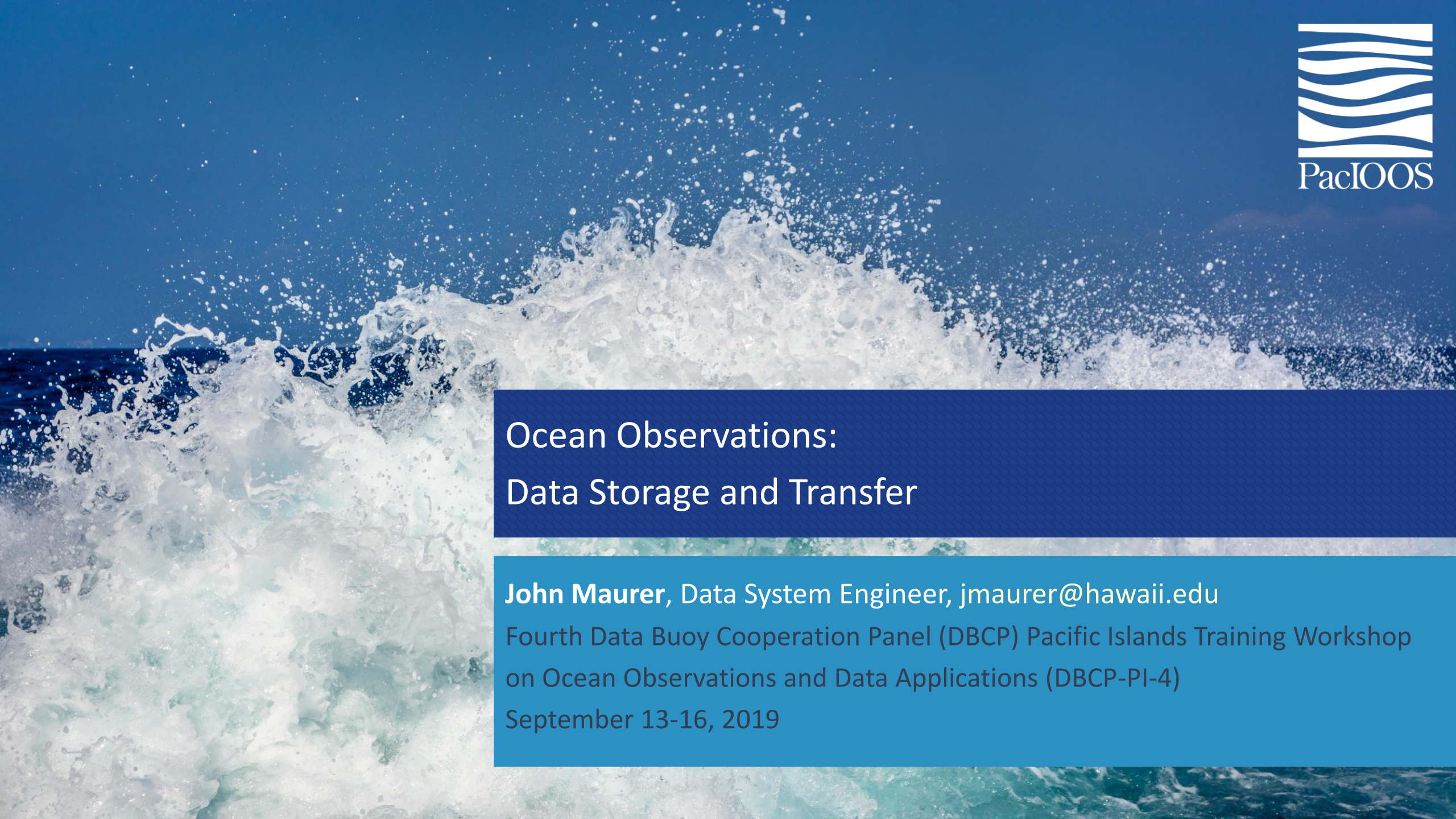


Ocean Observations:
Data Storage and Transfer

John Maurer, Data System Engineer, jmaurer@hawaii.edu

Fourth Data Buoy Cooperation Panel (DBCP) Pacific Islands Training Workshop on Ocean Observations and Data Applications (DBCP-PI-4)

September 13-16, 2019

DATA STORAGE AND TRANSFER

PacIOOS
PACIFIC ISLANDS OCEAN OBSERVING SYSTEM

Got Telemetry?

got telemetry?

Near Real-Time (NRT)

Delayed Mode

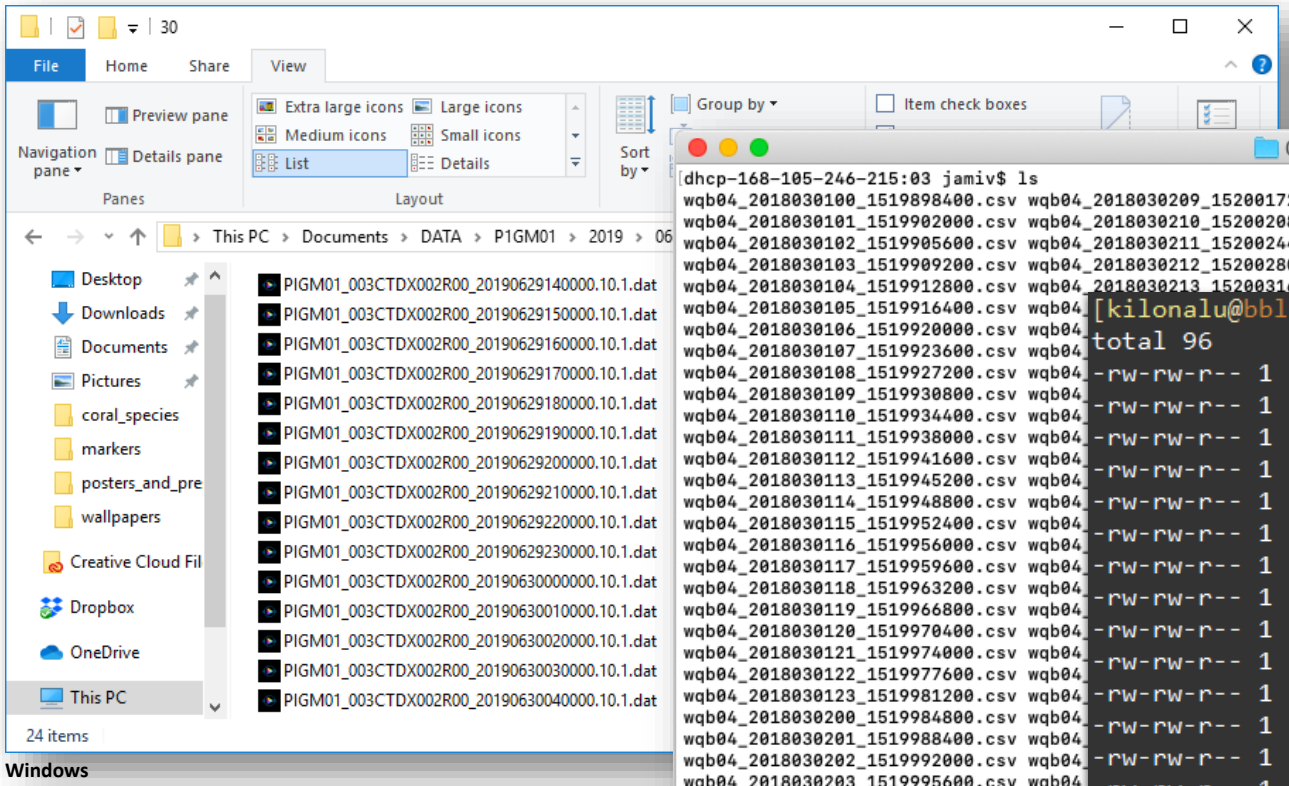
YES

NO

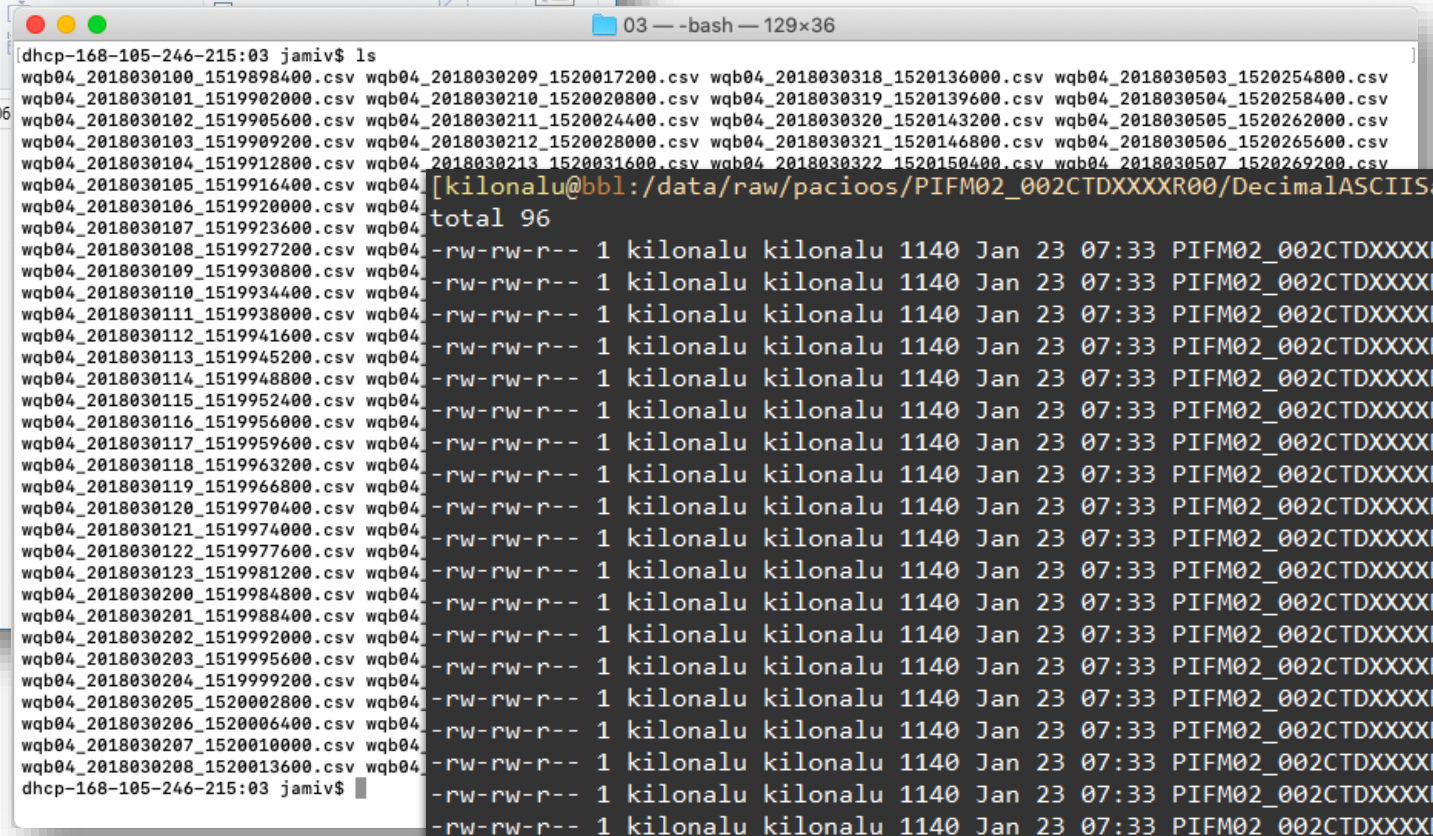
DATA STORAGE AND TRANSFER

PacIOOS
PACIFIC ISLANDS OCEAN OBSERVING SYSTEM

Raw Files



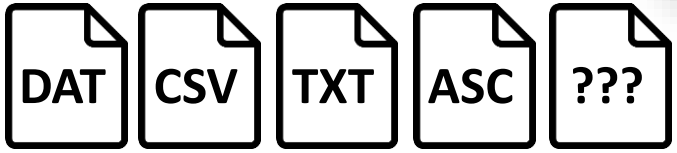
Windows



Mac

Linux

Example file suffixes:



DATA STORAGE AND TRANSFER

Raw Files: PacIOOS Nearshore Sensor Example

SBE16plus_01605268_2017_05_03_jm.txt - Notepad

File Edit Format View Help

```
* Sea-Bird SBE16plus  Data File:
* FileName = C:\Documents and Settings\Jeff Sevadjian\Desktop\gordon\PacIOOS\NS02\20170503\SBE16plus_01605268_2017_05_03.hex
* Software version 1.1f
* Temperature SN = 5268
* Conductivity SN = 5268
* System UpLoad Time = May 03 2017 20:32:18
* <ApplicationData>
* <Seaterm232>
* <SoftwareVersion>1.1f</SoftwareVersion>
* <BuildDate>27-Apr-2011</BuildDate>
* </Seaterm232>
* </ApplicationData>
* <InstrumentState>
* <HardwareData DeviceType='SBE16plus' SerialNumber='01605268'>
*    <Manufacturer>Sea-Bird Electronics, Inc.</Manufacturer>
*    <FirmwareVersion>2.5.2</FirmwareVersion>
*    <FirmwareDate>12 Mar 2013 11:50</FirmwareDate>
*    <CommandSetVersion>2.3</CommandSetVersion>
*    <PCBAssembly PCBSerialNum='not assigned' AssemblyNum='41054F'/>
*    <PCBAssembly PCBSerialNum='not assigned' AssemblyNum='41580'/>
*    <PCBAssembly PCBSerialNum='not assigned' AssemblyNum='41056F'/>
*    <PCBAssembly PCBSerialNum='not assigned' AssemblyNum='not assigned'/>
*    <MfgDate>31 march 2008</MfgDate>
*    <InternalSensors>
*       <Sensor id='Main Temperature'>
*          <type>temperature0</type>
*          <SerialNumber>01605268</SerialNumber>
*       </Sensor>
*       <Sensor id='Main Conductivity'>
*          <type>conductivity-0</type>
*          <SerialNumber>01605268</SerialNumber>
*       </Sensor>
*       <Sensor id='Main Pressure'>
*          <type>none</type>
*          <SerialNumber>not assigned</SerialNumber>
*       </Sensor>
*    </InternalSensors>
```

XML information

.hex file

KEEP CALM AND SCROLL DOWN

SBE 16plus V2

SEA·BIRD SCIENTIFIC

DATA STORAGE AND TRANSFER

PacIOOS
PACIFIC ISLANDS OCEAN OBSERVING SYSTEM

Raw Files: PacIOOS Nearshore Sensor Example

SBE16plus_01605268_2017_05_03_jm.txt - Notepad

File Edit Format View Help

```
* Sea-Bird SBE16plus  Data File:
* FileName = C:\Documents and Settings\Jeff Sevadjian\Desktop\gordon\PacIOOS\NS02\20170503\SBE16plus_01605268_2017_05_03.hex
* Software version 1.1f
* Temperature SN = 5268
* Conductivity SN = 5268
* System UpLoad Time = May 03 2017 20:32:18
* <ApplicationData>
* <Seaterm232>
* <SoftwareVersion>1.1f</SoftwareVersion>
* <BuildDate>27-Apr-2011</BuildDate>
* </Seaterm232>
* </ApplicationData>
* <InstrumentState>
* <HardwareData DeviceType='SBE16plus' SerialNumber='0
*    <Manufacturer>Sea-Bird Electronics, Inc.</Manufac
*    <FirmwareVersion>2.5.2</FirmwareVersion>
*    <FirmwareDate>12 Mar 2013 11:50</FirmwareDate>
*    <CommandSetVersion>2.3</CommandSetVersion>
*    <PCBAssembly PCBSerialNum='not assigned' Assembly
*    <PCBAssembly PCBSerialNum='not assigned' Assembly
*    <PCBAssembly PCBSerialNum='not assigned' Assembly
*    <PCBAssembly PCBSerialNum='not assigned' Assembly
*    <MfgDate>31 march 2008</MfgDate>
*    <InternalSensors>
*       <Sensor id='Main Temperature'>
*          <type>temperature0</type>
*          <SerialNumber>01605268</SerialNumber>
*       </Sensor>
*       <Sensor id='Main Conductivity'>
*          <type>conductivity-0</type>
*          <SerialNumber>01605268</SerialNumber>
*       </Sensor>
*       <Sensor id='Main Pressure'>
*          <type>none</type>
*          <SerialNumber>not assigned</SerialNumber>
*       </Sensor>
*    </InternalSensors>
```

SBE16plus_01605268_2017_05_03_jm.txt - Notepad

File Edit Format View Help

```
03A01109CDAB04A2FD2D1F051535
03872209CDAD03EA0B161F051625
03765C09CDAF0D32178A1F051715
03650A09CDAD1DB143F21F051805
034C2F09CD8F037A041B1F0518F5
032E0D09CD43037804171F0519E5
03162709CCDB03E7079C1F051AD5
02FFEB09CC9A03DA07971F051BC5
03409F18AAB01539099C1F051CB5
0340FD1891C50EFC07F61F051DA5
03402E1887A9121008721F051E95
0340DB1892D0104408A41F051F85
0340F618946115260 7B71F052075
034077188BFF132E09DD1F052165
034008188BDB12DE09AD1F052255
0340201893C3129E096D1F052345
0341DA18A20415D8090E1F052435
03404118951615 6808C41F052525
033F691891A1138F09E01F052615
033F36189419127007D91F052705
033F6618A2FC12FE08D61F0527F5
033E3E18A478148709BD1F0528E5
033CAF1892B8111308591F0529D5
033EB318AE47140D09001F052AC5
033E9218A282170609BC1F052BB5
03406C18A47B1447097C1F052CA5
033E4918B34C17B50A7F1F052D95
033CB3189D6F14B60A0E1F052E85
033B7A18A0E0119108771F052F75
033BE118A20F14A7092D1F053065
033BED189EE5136E0AEE1F053155
033B8F18A1CA128F08761F053245
033E5118A9A9154809CE1F053335
033C3518A17F12E008781F053425
032F81181EB7139D09101F053515
033C89189B6714C608A61F053605
033C7E18A16F180F097F1F0536F5
```

data in hexadecimal format

☹

SBE 16plus V2

SEA·BIRD SCIENTIFIC

DATA STORAGE AND TRANSFER

Raw Files: PacIOOS Nearsh

SBE16plus_01605268_2017_05_03_jm.txt - Notepad

File Edit Format View Help

```
* Sea-Bird SBE16plus  Data File:
* FileName = C:\Documents and Settings\Jeff Sevadjian\Deskto
* Software version 1.1f
* Temperature SN = 5268
* Conductivity SN = 5268
* System UpLoad Time = May 03 2017 20:32:18
* <ApplicationData>
* <Seaterm232>
* <SoftwareVersion>1.1f</SoftwareVersion>
* <BuildDate>27-Apr-2011</BuildDate>
* </Seaterm232>
* </ApplicationData>
* <InstrumentState>
* <HardwareData DeviceType='SBE16plus' SerialNumber='0
*    <Manufacturer>Sea-Bird Electronics, Inc.</Manufac
*    <FirmwareVersion>2.5.2</FirmwareVersion>
*    <FirmwareDate>12 Mar 2013 11:50</FirmwareDate>
*    <CommandSetVersion>2.3</CommandSetVersion>
*    <PCBAssembly PCBSerialNum='not assigned' Assembly
*    <PCBAssembly PCBSerialNum='not assigned' Assembly
*    <PCBAssembly PCBSerialNum='not assigned' Assembly
*    <PCBAssembly PCBSerialNum='not assigned' Assembly
*    <MfgDate>31 march 2008</MfgDate>
*    <InternalSensors>
*       <Sensor id='Main Temperature'>
*          <type>temperature0</type>
*          <SerialNumber>01605268</SerialNumber>
*       </Sensor>
*       <Sensor id='Main Conductivity'>
*          <type>conductivity-0</type>
*          <SerialNumber>01605268</SerialNumber>
*       </Sensor>
*       <Sensor id='Main Pressure'>
*          <type>none</type>
*          <SerialNumber>not assigned</SerialNumber>
*       </Sensor>
*    </InternalSensors>
```


Notes:

- If you will be using Seasave to acquire real-time data, you must set **OutputFormat=0**.
- When using Seaterm232's Upload menu, Seaterm232 always uploads data from memory in raw hex, regardless of the user-programmed format, providing the data in a format that SBE Data Processing can use.
- Our software uses the equations shown to perform these calculations; alternatively, you can use the equations to develop your own processing software.
- The internally mounted pressure sensor is an absolute sensor, so its **raw** output includes the effect of atmospheric pressure (14.7 psi). As shown on the Calibration Sheet, Sea-Bird's calibration (and resulting calibration coefficients) is in terms of psia. However, when outputting pressure in **engineering units**, the 16*plus* V2 outputs pressure relative to the ocean surface (i.e., at the surface the output pressure is 0 decibars). The 16*plus* V2 uses the following equation to convert psia to decibars:
  pressure (dbar) =
  [pressure (psia) - 14.7] * 0.689476
- SBE 50 units are dependent on **OutputFormat**= programmed into the SBE 50; if you will be using Seasave or SBE Data Processing, you must set the SBE 50 format to psia (**OutputFormat=1**).

OutputFormat=0 (raw frequencies and voltages in Hex)

Data is output in the order listed, with no spaces or commas between parameters. Shown with each parameter is the number of digits, and how to calculate the parameter from the data (use the decimal equivalent of the hex data in the equations).

1. Temperature A/D counts = tttttt
2. Conductivity frequency (Hz) = cccccc / 256
3. (if **PType=1**) Internally mounted strain gauge pressure sensor pressure A/D counts = pppppp
4. (if **PType=1**) Internally mounted strain gauge pressure sensor pressure temperature compensation voltage = vvvv / 13,107
5. (if **PType=3**) Internally mounted Quartz pressure sensor pressure frequency (Hz) = pppppp / 256
6. (if **PType=3**) Internally mounted Quartz pressure sensor temperature compensation voltage = vvvv / 13,107
7. (if **Volt0=Y**) External voltage 0= vvvv / 13,107
8. (if **Volt1=Y**) External voltage 1 = vvvv / 13,107
9. (if **Volt2=Y**) External voltage 2 = vvvv / 13,107
10. (if **Volt3=Y**) External voltage 3 = vvvv / 13,107
11. (if **Volt4=Y**) External voltage 4 = vvvv / 13,107
12. (if **Volt5=Y**) External voltage 5 = vvvv / 13,107
13. (if **SBE38=Y**) SBE 38 temperature (°C, ITS-90) = (tttttt / 100,000) – 10
14. (if **SBE50=Y**) SBE 50 pressure (decibars, psia, meters, or feet) = (pppppp / 10,000) – 100
15. (if **WetLabs=Y**) WET Labs RS-232 sensor = wwwwxxxxyyyy where wwww, xxxx, and yyyy are raw signal counts for each sensor; yyyy all 0's for dual sensor; xxxx and yyyy all 0's for single sensor
16. (if **GTD=Y** or **DualGTD=Y**) GTD #1 pressure (millibars) = pppppppp / 100,000
17. (if **GTD=Y** or **DualGTD=Y**) GTD #1 temperature (°C, ITS-90) = (tttttt / 100,000) - 10
18. (if **DualGTD=Y**) GTD #2 pressure (millibars) = pppppppp / 100,000
19. (if **DualGTD=Y**) GTD #2 temperature (°C, ITS-90) = (tttttt / 100,000) - 10
20. (if **Optode=Y**) Optode oxygen (micromoles/liter) = (oooooo / 10,000) – 10
21. (if **SBE63=Y**) SBE 63 oxygen phase (µsec) = (oooooo / 100,000) – 10
22. (if **SBE63=Y**) SBE 63 oxygen temperature voltage = (tttttt / 1,000,000) – 1
23. Time seconds since January 1, 2000 = ssssssss

Example: 16*plus* V2 with internally mounted strain gauge pressure sensor and 2 external voltages sampled,
example scan = tttttteccccpppppppvvvvvvvvvvvvvvssssssss = 0A53711BC7220C14C17D82030505940EC4270B

- Temperature = tttttt = 0A5371 (676721 decimal); temperature A/D counts = 676721
- Conductivity = 1BC722 (1820450 decimal); conductivity frequency = 1820450 / 256 = 7111.133 Hz
- Internally mounted strain gauge pressure = pppppp = 0C14C1 (791745 decimal);
  Strain gauge pressure A/D counts = 791745
- Internally mounted strain gauge temperature compensation = vvvv = 7D82 (32,130 decimal);
  Strain gauge temperature = 32,130 / 13,107 = 2.4514 volts
- First external voltage = vvvv = 0305 (773 decimal); voltage = 773 / 13,107 = 0.0590 volts
- Second external voltage = vvvv = 0594 (1428 decimal); voltage = 1428 / 13,107 = 0.1089 volts
- Time = ssssssss = 0EC4270B (247,736,075 decimal); seconds since January 1, 2000 = 247,736,075

SBE 16plus V2

DATA STORAGE AND TRANSFER

Raw Files: PacIOOS Nearsh

PacIOOS
PACIFIC ISLANDS OCEAN OBSERVING SYSTEM

SBE16plus_01605268_2017_05_03_jm.txt - Notepad

File Edit Format View Help

```
* Sea-Bird SBE16plus  Data File:
* FileName = C:\Documents and Settings\Jeff Sevadjian\Deskto
* Software version 1.1f
* Temperature SN = 5268
* Conductivity SN = 5268
* System UpLoad Time = May 03 2017 20:32:18
* <ApplicationData>
* <Seaterm232>
* <SoftwareVersion>1.1f</SoftwareVersion>
* <BuildDate>27-Apr-2011</BuildDate>
* </Seaterm232>
* </ApplicationData>
* <InstrumentState>
* <HardwareData DeviceType='SBE16plus' SerialNumber='0
*    <Manufacturer>Sea-Bird Electronics, Inc.</Manufac
*    <FirmwareVersion>2.5.2</FirmwareVersion>
*    <FirmwareDate>12 Mar 2013 11:50</FirmwareDate>
*    <CommandSetVersion>2.3</CommandSetVersion>
*    <PCBAssembly PCBSerialNum='not assigned' Assembly
*    <PCBAssembly PCBSerialNum='not assigned' Assembly
*    <PCBAssembly PCBSerialNum='not assigned' Assembly
*    <PCBAssembly PCBSerialNum='not assigned' Assembly
*    <MfgDate>31 march 2008</MfgDate>
*    <InternalSensors>
*       <Sensor id='Main Temperature'>
*          <type>temperature0</type>
*          <SerialNumber>01605268</SerialNumber>
*       </Sensor>
*       <Sensor id='Main Conductivity'>
*          <type>conductivity-0</type>
*          <SerialNumber>01605268</SerialNumber>
*       </Sensor>
*       <Sensor id='Main Pressure'>
*          <type>none</type>
*          <SerialNumber>not assigned</SerialNumber>
*       </Sensor>
*    </InternalSensors>
```


Notes:

- If you will be using Seasave to acquire real-time data, you must set **OutputFormat=0**.
- When using Seaterm232's Upload menu, Seaterm232 always uploads data from memory in raw hex, regardless of the user-programmed format, providing the data in a format that SBE Data Processing can use.
- Our software uses the equations shown to perform these calculations; alternatively, you can use the equations to develop your own processing software.
- The internally mounted pressure sensor is an absolute sensor, so its **raw** output includes the effect of atmospheric pressure (14.7 psi). As shown on the Calibration Sheet, Sea-Bird's calibration (and resulting calibration coefficients) is in terms of psia. However, when outputting pressure in **engineering units**, the 16*plus* V2 outputs pressure relative to the ocean surface (i.e., at the surface the output pressure is 0 decibars). The 16*plus* V2 uses the following equation to convert psia to decibars:
  pressure (dbar) =
  [pressure (psia) - 14.7] * 0.689476
- SBE 50 units are dependent on **OutputFormat**= programmed into the SBE 50; if you will be using Seasave or SBE Data Processing, you must set the SBE 50 format to psia (**OutputFormat=1**).

OutputFormat=0 (raw frequencies and voltages in Hex)

Data is output in the order listed, with no spaces or commas between parameters. Shown with each parameter is the number of digits, and how to calculate the parameter from the data (use the decimal equivalent of the hex data in the equations).

1. Temperature A/D counts = ttttt
2. Conductivity frequency (Hz) = cccccc / 256
3. (if **PType=1**) Internally mounted strain gauge pressure sensor pressure A/D counts = pppppp
4. (if **PType=1**) Internally mounted strain gauge pressure sensor pressure temperature compensation voltage = vvvv / 13,107
5. (if **PType=3**) Internally mounted Quartz pressure sensor pressure frequency (Hz) = pppppp / 256
6. (if **PType=3**) Internally mounted Quartz pressure sensor temperature compensation voltage = vvvv / 13,107

Example: 16*plus* V2 with internally mounted strain gaug
example scan = ttttttccccccppppppvvvvvvvvvvvvssssssss

- Temperature = ttttt = 0A5371 (676721 decimal);
- Conductivity = 1BC722 (1820450 decimal);
- Internally mounted strain gauge pressure = pppppp
  Strain gauge pressure A/D counts = 791745
- Internally mounted strain gauge temperature compe
  Strain gauge temperature = 32,130 / 13,107 = 2.45
- First external voltage = vvvv = 0305 (773 decimal)
- Second external voltage = vvvv = 0594 (1428 deci
- Time = ssssssss = 0EC4270B (247,736,075 decima

SBE 16plus V2

ns02_backfill_20170503_JM.txt - Notepad

File Edit Format View Help

```
24.0961,  0.00078, 0.0905, 4.9449,   0.0132, 28 Jun 2016 11:00:05
24.7770,  0.00079, 0.0764, 0.2165,   0.0134, 28 Jun 2016 11:04:05
25.2444,  0.00080, 0.2577, 0.4598,   0.0135, 28 Jun 2016 11:08:05
25.7353,  0.00079, 0.5799, 1.3271,   0.0136, 28 Jun 2016 11:12:05
26.4549,  0.00070, 0.0679, 0.0802,   0.0136, 28 Jun 2016 11:16:05
27.3526,  0.00046, 0.0678, 0.0799,   0.0132, 28 Jun 2016 11:20:05
28.0854,  0.00014, 0.0762, 0.1486,   0.0129, 28 Jun 2016 11:24:05
28.7848, -0.00006, 0.0752, 0.1482,   0.0000, 28 Jun 2016 11:28:05
26.7960,  5.34633, 0.4145, 0.1877,  33.9326, 28 Jun 2016 11:32:05
26.7851,  5.29604, 0.2927, 0.1555,  33.5818, 28 Jun 2016 11:36:05
26.8091,  5.27569, 0.3528, 0.1650,  33.4196, 28 Jun 2016 11:40:05
26.7890,  5.29814, 0.3177, 0.1688,  33.5939, 28 Jun 2016 11:44:05
26.7859,  5.30129, 0.4131, 0.1507,  33.6187, 28 Jun 2016 11:48:05
26.8006,  5.28441, 0.3746, 0.1926,  33.4878, 28 Jun 2016 11:52:05
26.8135,  5.28413, 0.3685, 0.1890,  33.4765, 28 Jun 2016 11:56:05
26.8107,  5.30005, 0.3636, 0.1841,  33.5918, 28 Jun 2016 12:00:05
26.7595,  5.32880, 0.4266, 0.1769,  33.8341, 28 Jun 2016 12:04:05
26.8069,  5.30272, 0.4181, 0.1712,  33.6136, 28 Jun 2016 12:08:05
26.8319,  5.29575, 0.3820, 0.1929,  33.5459, 28 Jun 2016 12:12:05
26.8379,  5.30072, 0.3601, 0.1533,  33.5770, 28 Jun 2016 12:16:05
26.8323,  5.33076, 0.3709, 0.1726,  33.7950, 28 Jun 2016 12:20:05
26.8667,  5.33376, 0.4009, 0.1902,  33.7913, 28 Jun 2016 12:24:05
26.9131,  5.29794, 0.3335, 0.1630,  33.5029, 28 Jun 2016 12:28:05
26.8531,  5.35359, 0.3916, 0.1758,  33.9426, 28 Jun 2016 12:32:05
26.8569,  5.32980, 0.4497, 0.1901,  33.7702, 28 Jun 2016 12:36:05
26.8019,  5.33378, 0.3960, 0.1852,  33.8387, 28 Jun 2016 12:40:05
26.8654,  5.36376, 0.4630, 0.2050,  34.0060, 28 Jun 2016 12:44:05
26.9126,  5.31955, 0.4045, 0.1964,  33.6568, 28 Jun 2016 12:48:05
26.9491,  5.32650, 0.3431, 0.1653,  33.6797, 28 Jun 2016 12:52:05
26.9370,  5.32889, 0.4034, 0.1792,  33.7055, 28 Jun 2016 12:56:05
26.9356,  5.32250, 0.3795, 0.2135,  33.6611, 28 Jun 2016 13:00:05
26.9466,  5.32834, 0.3625, 0.1653,  33.6947, 28 Jun 2016 13:04:05
26.8645,  5.34425, 0.4157, 0.1915,  33.8677, 28 Jun 2016 13:08:05
26.9273,  5.32775, 0.3687, 0.1654,  33.7045, 28 Jun 2016 13:12:05
27.3086,  5.06646, 0.3831, 0.1770,  31.5951, 28 Jun 2016 13:16:05
26.9175,  5.31545, 0.4057, 0.1689,  33.6241, 28 Jun 2016 13:20:05
26.9188,  5.32763, 0.4699, 0.1855,  33.7098, 28 Jun 2016 13:24:05
```

data in CSV format

☺

.cap file

SEA-BIRD SCIENTIFIC

DATA STORAGE AND TRANSFER

PacIOOS
PACIFIC ISLANDS OCEAN OBSERVING SYSTEM

Raw Files

```
#   69.84    8.65    70.270000    347.02    999.000000000    928.17    -999.0    02 Nov 2018 14:00:00
#   69.70    8.63    70.320000    343.69    999.000000000    930.01    -999.0    02 Nov 2018 14:15:00
#   69.75    8.62    69.300000    347.89    999.000000000    929.68    -999.0    02 Nov 2018 14:30:00
#   69.96    8.64    67.410000    355.14    999.000000000    927.60    -999.0    02 Nov 2018 14:45:00
#   69.69    8.60    70.130000    346.78    999.000000000    925.89    -999.0    02 Nov 2018 15:00:00
#   69.39    8.56    68.190000    348.28    999.000000000    925.82    -999.0    02 Nov 2018 15:15:00
#   69.16    8.52    66.350000
#   69.16    8.52    69.160000
#   69.01    8.49    65.390000
#   68.74    8.46    63.560000
#   68.71    8.46    63.740000
#   68.59    8.44    67.580000
#   68.64    8.45    62.970000
#   68.57    8.44    63.720000
#   68.24    8.40    66.540000
#   67.99    8.37    64.500000
#   68.00    8.37    68.210000
#   67.79    8.35    66.400000
#   68.20    8.41    66.690000
#   68.16    8.40    66.700000
#   68.40    8.43    62.200000
#   68.41    8.44    67.420000
#   68.26    8.42    65.030000
#   68.29    8.43    65.880000
#   68.41    8.44    65.020000
#   68.34    8.44    61.310000
#   68.17    8.42    65.910000
#   68.11    8.41    61.820000
#   68.12    8.41    66.370000
#   68.10    8.41    64.480000
#   67.82    8.38    65.970000
```

no header row

```
observation_time_iso8601, temp_c, pressure_mb, relative_humidity, rain_rate_in_per_hr, wind_degrees, wind_mph, wind_ten_min_gust_mph
2019-06-23T11:50:00-10:00, 27.4, 1018.4, 79, 0.0000, 139, 13.0, 15.0
2019-06-23T11:55:00-10:00, 27.3, 1018.2, 77, 0.0000, 133, 13.0, 15.0
2019-06-23T12:00:00-10:00, 27.4, 1018.1, 78, 0.0000, 132, 13.0, 15.0
2019-06-23T12:05:00-10:00, 27.5, 1018.2, 79, 0.0000, 141, 13.0, 15.0
2019-06-23T12:10:00-10:00, 27.6, 1018.2, 78, 0.0000, 136, 12.0, 15.0
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2019-06-23T12:20:00-10:00, 27.7, 1018.2, 77, 0.0000, 159, 11.0, 14.0
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2019-06-23T12:30:00-10:00, 27.6, 1018.3, 83, 0.0000, 181, 10.0, 12.0
2019-06-23T12:35:00-10:00, 27.6, 1018.3, 83, 0.0000, 182, 10.0, 12.0
2019-06-23T12:40:00-10:00, 27.7, 1018.3, 84, 0.0000, 190, 10.0, 11.0
2019-06-23T12:45:00-10:00, 27.6, 1018.2, 83, 0.0000, 197, 10.0, 11.0
2019-06-23T12:50:00-10:00, 27.6, 1018.3, 83, 0.0000, 199, 10.0, 12.0
2019-06-23T12:55:00-10:00, 27.6, 1018.3, 83, 0.0000, 197, 10.0, 12.0
2019-06-23T13:00:00-10:00, 27.6, 1018.1, 84, 0.0000, 188, 10.0, 11.0
2019-06-23T13:05:00-10:00, 27.6, 1018.2, 83, 0.0000, 186, 9.0, 10.0
2019-06-23T13:10:00-10:00, 27.6, 1018.1, 83, 0.0000, 174, 9.0, 10.0
2019-06-23T13:15:00-10:00, 27.6, 1018.0, 82, 0.0000, 174, 9.0, 10.0
2019-06-23T13:20:00-10:00, 27.7, 1018.2, 83, 0.0000, 166, 8.0, 10.0
2019-06-23T13:25:00-10:00, 27.8, 1018.2, 81, 0.0000, 158, 8.0, 9.0
2019-06-23T13:30:00-10:00, 27.8, 1018.2, 82, 0.0000, 155, 8.0, 9.0
2019-06-23T13:40:00-10:00, 27.9, 1018.2, 79, 0.0000, 156, 8.0, 9.
2019-06-23T13:45:00-10:00, 28.0, 1018.2, 80, 0.0000, 167, 8.0, 9.
2019-06-23T13:50:00-10:00, 28.0, 1018.3, 81, 0.0000, 159, 8.0, 9.
2019-06-23T13:55:00-10:00, 28.1, 1018.2, 80, 0.0000, 169, 8.0, 9.
2019-06-23T14:00:00-10:00, 28.0, 1018.3, 80, 0.0000, 165, 8.0, 9.
2019-06-23T14:05:00-10:00, 27.9, 1018.3, 79, 0.0000, 160, 8.0, 9.
2019-06-23T14:10:00-10:00, 27.9, 1018.3, 80, 0.0000, 155, 8.0, 9.
2019-06-23T14:15:00-10:00, 27.9, 1018.4, 81, 0.0000, 155, 8.0, 9.
2019-06-23T14:20:00-10:00, 27.9, 1018.5, 81, 0.0000, 163, 7.0, 8.
2019-06-23T14:25:00-10:00, 28.0, 1018.5, 80, 0.0000, 150, 7.0, 7.
```

header row

# of decimal places varies

"missing data" value

datetime string format

```
29.2707   5.598730   1.591 -999.0 -999.0   33.9120   23 Apr 2019 11:01:58
29.3072   5.602445   1.580 -999.0 -999.0   33.9115   23 Apr 2019 11:05:58
29.3384   5.605997   1.580 -999.0 -999.0   33.9137   23 Apr 2019 11:09:58
29.3583   5.607673   1.592 -999.0 -999.0   33.9110   23 Apr 2019 11:13:58
29.3824   5.609676   1.572 -999.0 -999.0   33.9076   23 Apr 2019 11:17:58
29.4181   5.613461   1.550 -999.0 -999.0   33.9082   23 Apr 2019 11:21:58
29.4452   5.616712   1.542 -999.0 -999.0   33.9112   23 Apr 2019 11:25:58
29.4597   5.617818   1.552 -999.0 -999.0   33.9085   23 Apr 2019 11:29:58
29.4690   5.618025   1.534 -999.0 -999.0   33.9033   23 Apr 2019 11:33:58
29.4941   5.619391   1.515 -999.0 -999.0   33.8949   23 Apr 2019 11:37:58
29.5042   5.620624   1.522 -999.0 -999.0   33.8962   23 Apr 2019 11:41:58
29.5447   5.623408   1.496 -999.0 -999.0   33.8866   23 Apr 2019 11:45:58
29.5543   5.624664   1.510 -999.0 -999.0   33.8883   23 Apr 2019 11:49:58
29.5658   5.624589   1.499 -999.0 -999.0   33.8798   23 Apr 2019 11:53:58
29.5917   5.627628   1.502 -999.0 -999.0   33.8821   23 Apr 2019 11:57:58
```

opening character

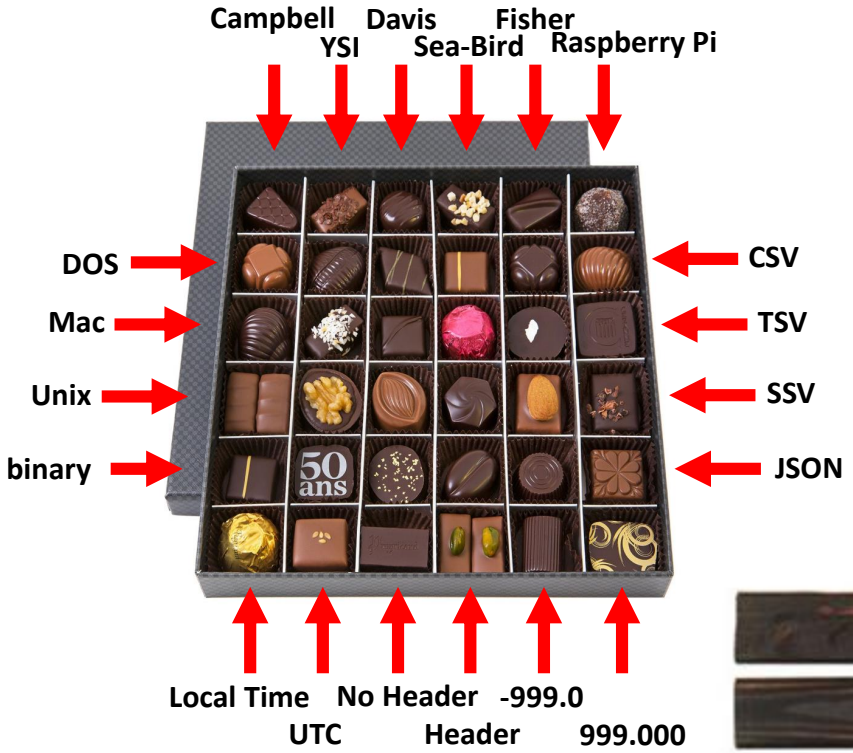
tab-separated values (TSV)

comma-separated values (CSV)

space-separated values (SSV)

DATA STORAGE AND TRANSFER

Box Of Chocolates



DATA STORAGE AND TRANSFER

PacIOOS
PACIFIC ISLANDS OCEAN OBSERVING SYSTEM

Raw Files

DOCUMENTATION

D

- variables
- units of measure
- missing value
- sampling interval
- time zone
- datetime format
- calibration coefficients?
- sampling location (latitude, longitude, water depth)
- **README** (*good*), self-documenting file (*e.g.*, **NetCDF**) (*better*), and/or metadata (**ISO-19115** or **FGDC**) (*best*)

ORGANIZATION

O

- file duration (e.g., daily, hourly, monthly)
- filename convention
- directory structure

CONSISTENCY

C

- changes to any of the above can impact users and break automated processes
- e.g., column ordering, syntax, missing value, etc.

DATA STORAGE AND TRANSFER

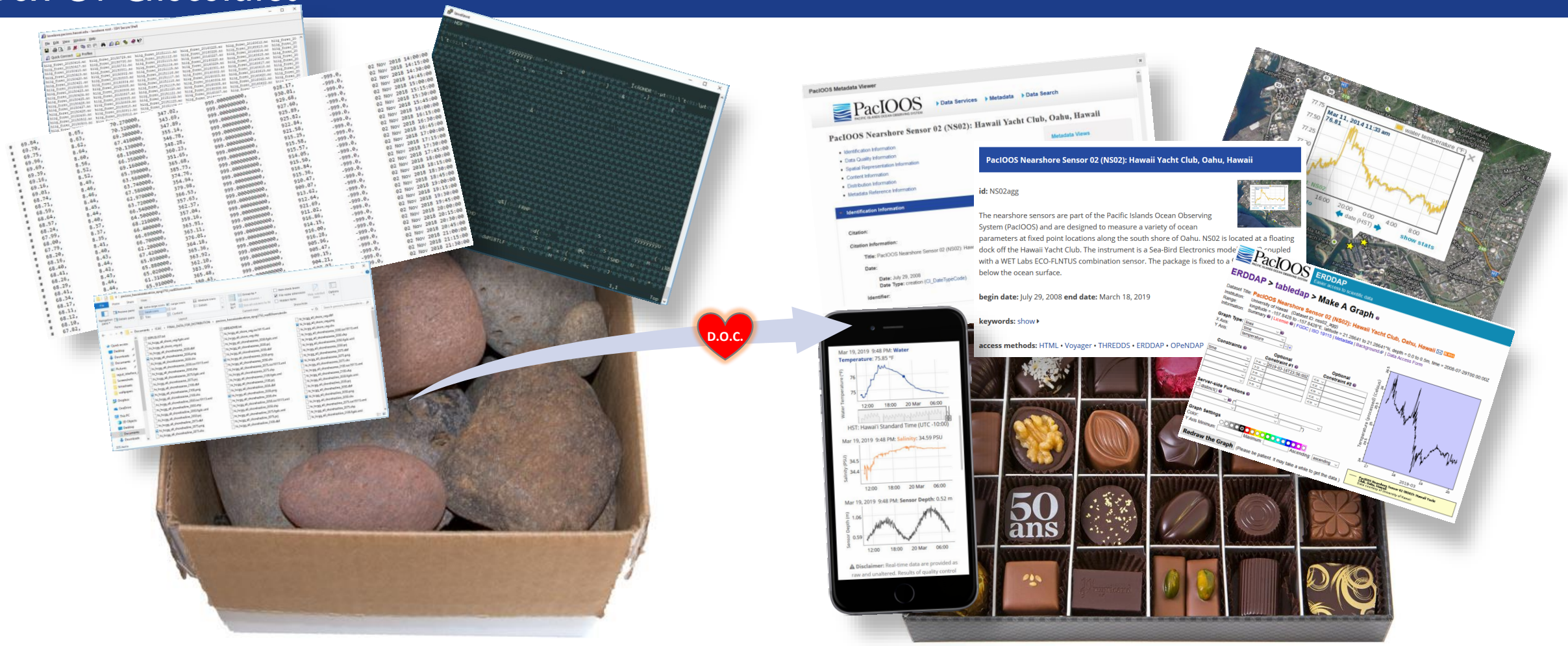
PacIOOS
PACIFIC ISLANDS OCEAN OBSERVING SYSTEM

Box Of Chocolates

DATA STORAGE AND TRANSFER

PacIOOS
PACIFIC ISLANDS OCEAN OBSERVING SYSTEM

Box Of Chocolates



DATA STORAGE AND TRANSFER

PacIOOS
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Web Accessible

- FTP client software free, but users must install (*e.g.,* **SSH**, **PuTTY**, **WinSCP**, **FileZilla**, **CyberDuck**)
- Command-line utility also available for Unix/Mac: **pwd**, **cd**, **lcd**, **ls**, **get**, **bye**
- **mget** (multiple get) command useful for downloading many files at once (*e.g.*, **mget *.dat**)
- can also access through a web browser; example: ftp://ftp.soest.hawaii.edu

- a.k.a. web-accessible folder (**WAF**)
- access through web browser
- no special FTP clients or commands needed
- time-consuming to download multiple files (*i.e.,* no "mget" command)—but can be automated via shell script or Python, *etc.*
- **wget** and **curl** useful Unix command-line utilities for downloading a file at a URL

- **NOAA** Environmental Research Division's Data Access Program (ERDDAP)
- aggregates *files* into virtual *datasets*
- subset time/space/variables on-the-fly
- multiple output formats and web services
- rudimentary data visualization (good for QC)
- standardization and interoperability: plug into the global research community!
- **installation and configuration learning curve**

DATA STORAGE AND TRANSFER

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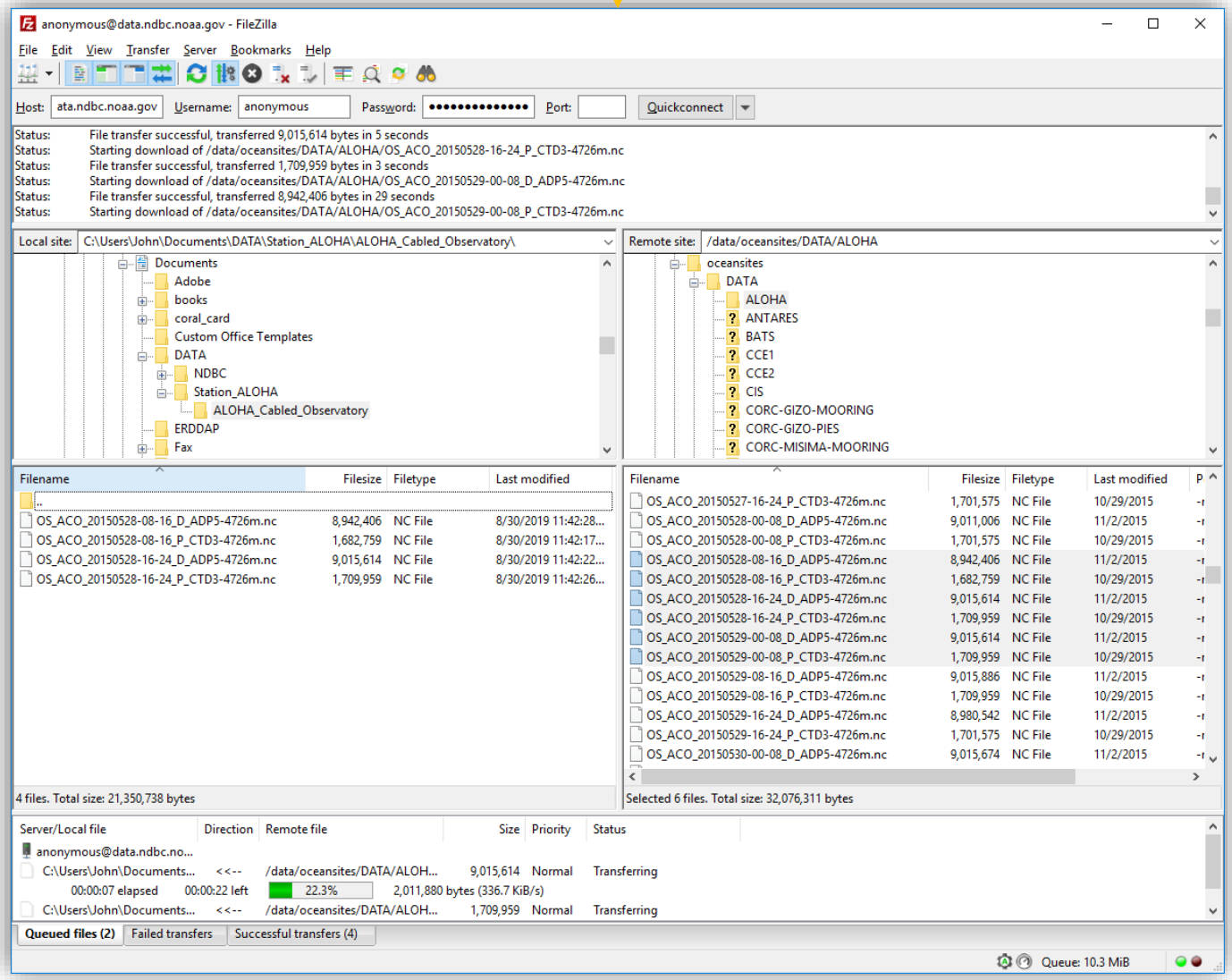
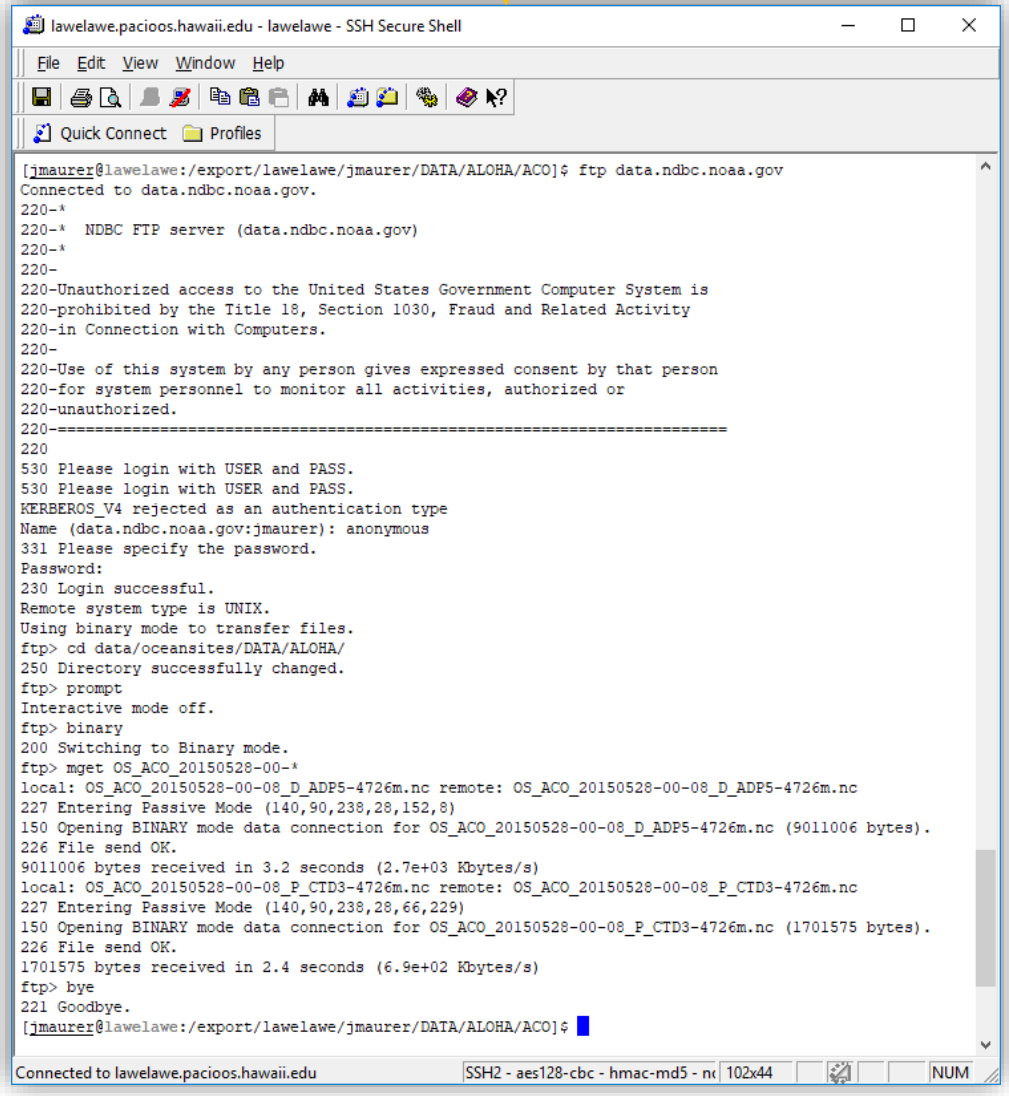
Web Accessible

FTP Client:

FTP Command-Line:





Source: *Univ Hawaii ALOHA Cabled Observatory (ACO) via NOAA/NDBC*

DATA STORAGE AND TRANSFER

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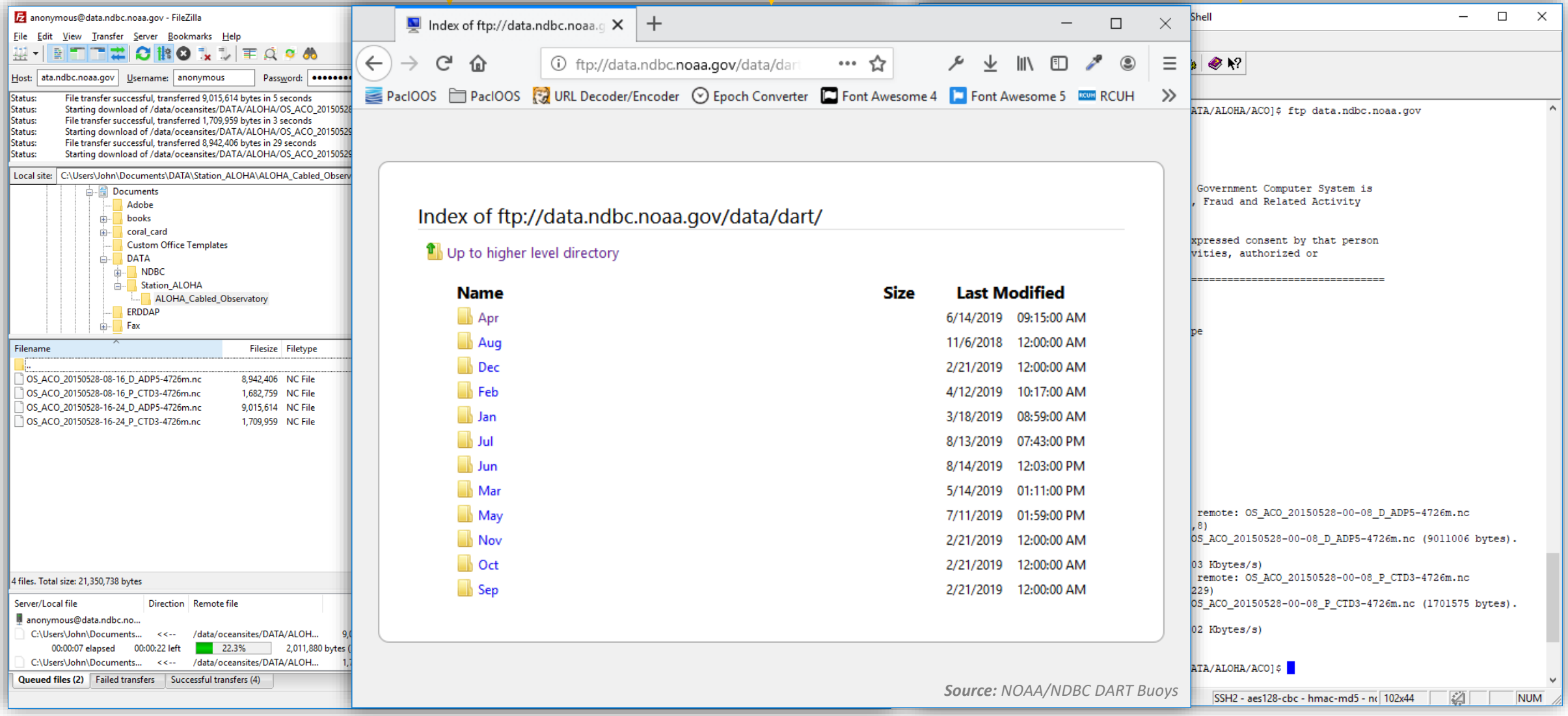
Web Accessible

FTP Client: **FTP Web Browser:** **FTP Command-Line:**



DATA STORAGE AND TRANSFER

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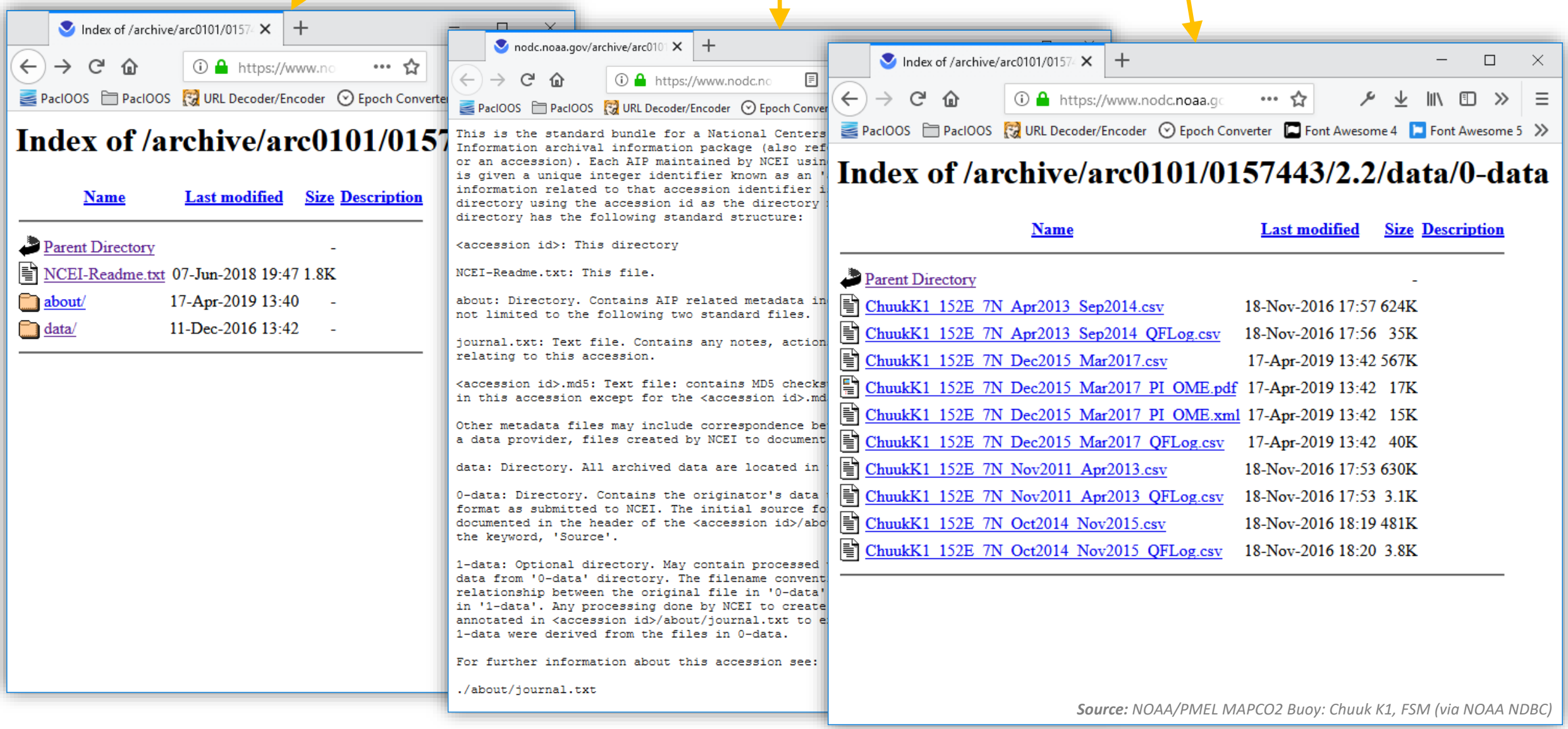
Web Accessible HTTP WAF: README Download Files Individually



Index of /archive/arc0101/0157443/2.2/data/0-data

Name	Last modified	Size	Description
Parent Directory		-	
ChuukK1_152E_7N_Apr2013_Sep2014.csv	18-Nov-2016 17:57	624K	
ChuukK1_152E_7N_Apr2013_Sep2014_QFLog.csv	18-Nov-2016 17:56	35K	
ChuukK1_152E_7N_Dec2015_Mar2017.csv	17-Apr-2019 13:42	567K	
ChuukK1_152E_7N_Dec2015_Mar2017_PI_OME.pdf	17-Apr-2019 13:42	17K	
ChuukK1_152E_7N_Dec2015_Mar2017_PI_OME.xml	17-Apr-2019 13:42	15K	
ChuukK1_152E_7N_Dec2015_Mar2017_QFLog.csv	17-Apr-2019 13:42	40K	
ChuukK1_152E_7N_Nov2011_Apr2013.csv	18-Nov-2016 17:53	630K	
ChuukK1_152E_7N_Nov2011_Apr2013_QFLog.csv	18-Nov-2016 17:53	3.1K	
ChuukK1_152E_7N_Oct2014_Nov2015.csv	18-Nov-2016 18:19	481K	
ChuukK1_152E_7N_Oct2014_Nov2015_QFLog.csv	18-Nov-2016 18:20	3.8K	

Source: NOAA/PMEL MAPCO2 Buoy: Chuuk K1, FSM (via NOAA NDBC)

DATA STORAGE AND TRANSFER

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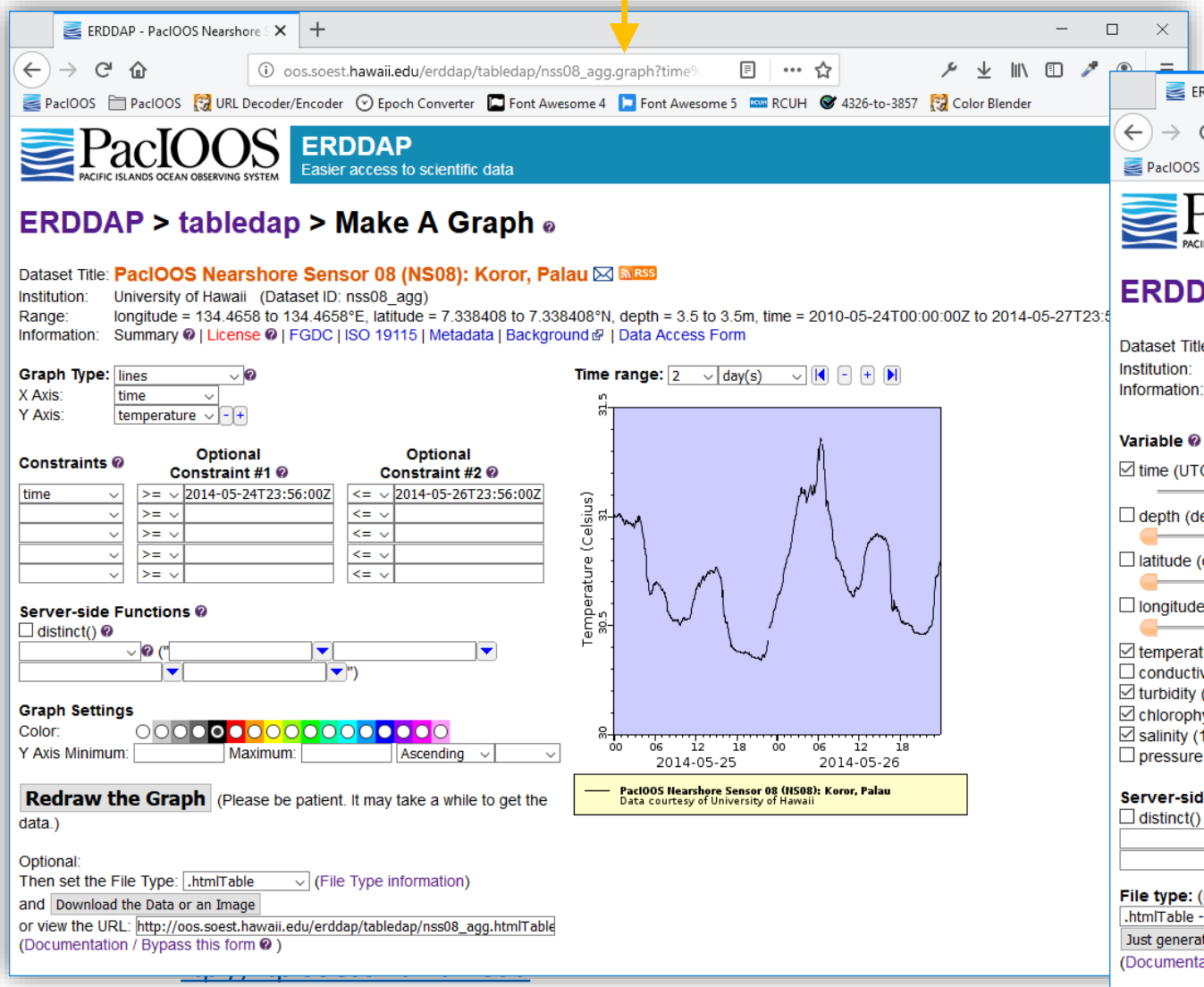
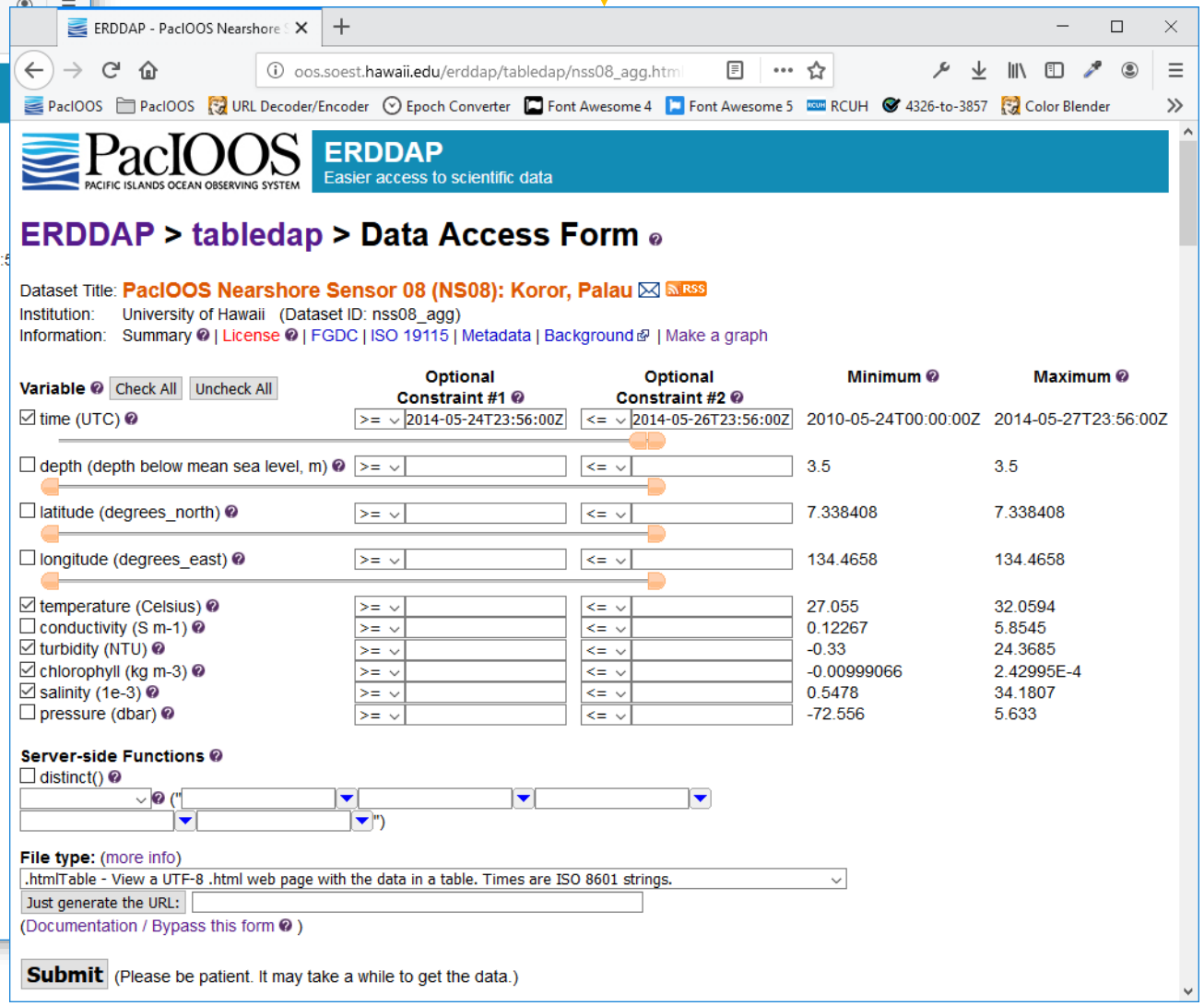
PACIFIC ISLANDS OCEAN OBSERVING SYSTEM

Web Accessible ERDDAP Make A Graph:



ERDDAP Data Access Form:



DATA STORAGE AND TRANSFER

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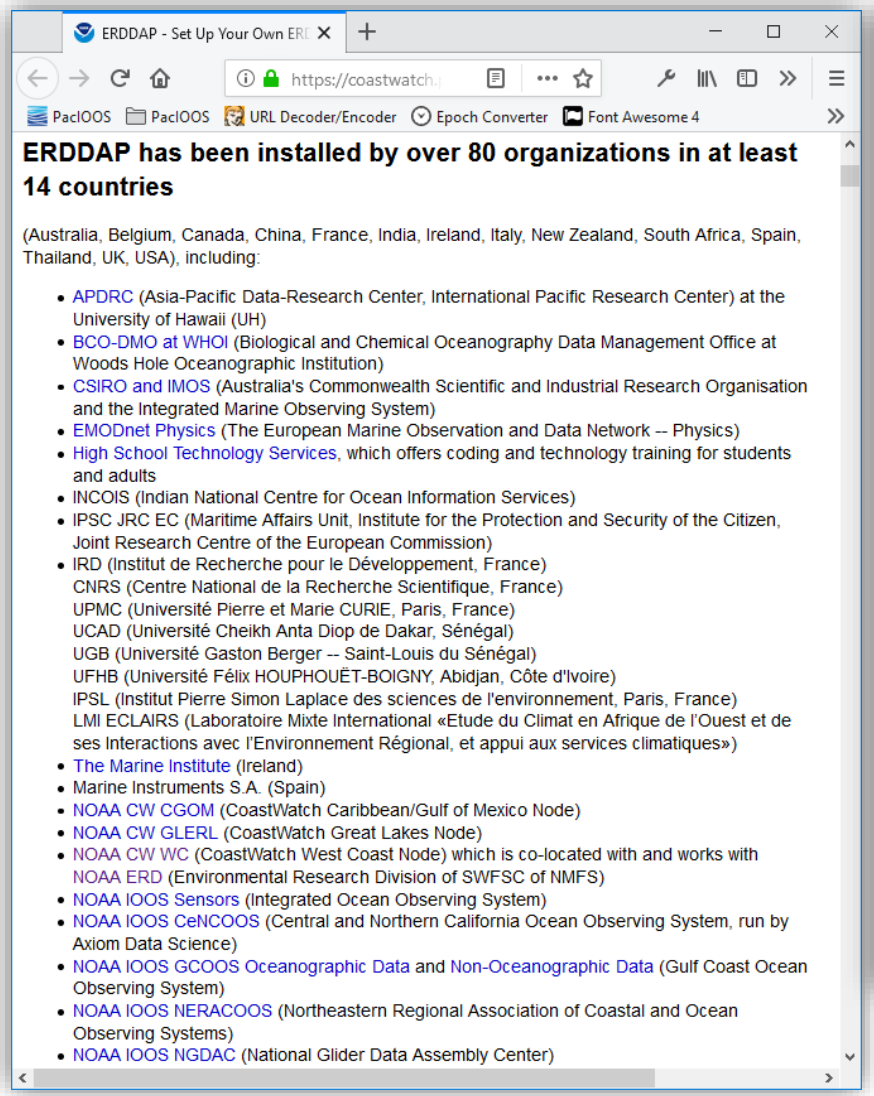
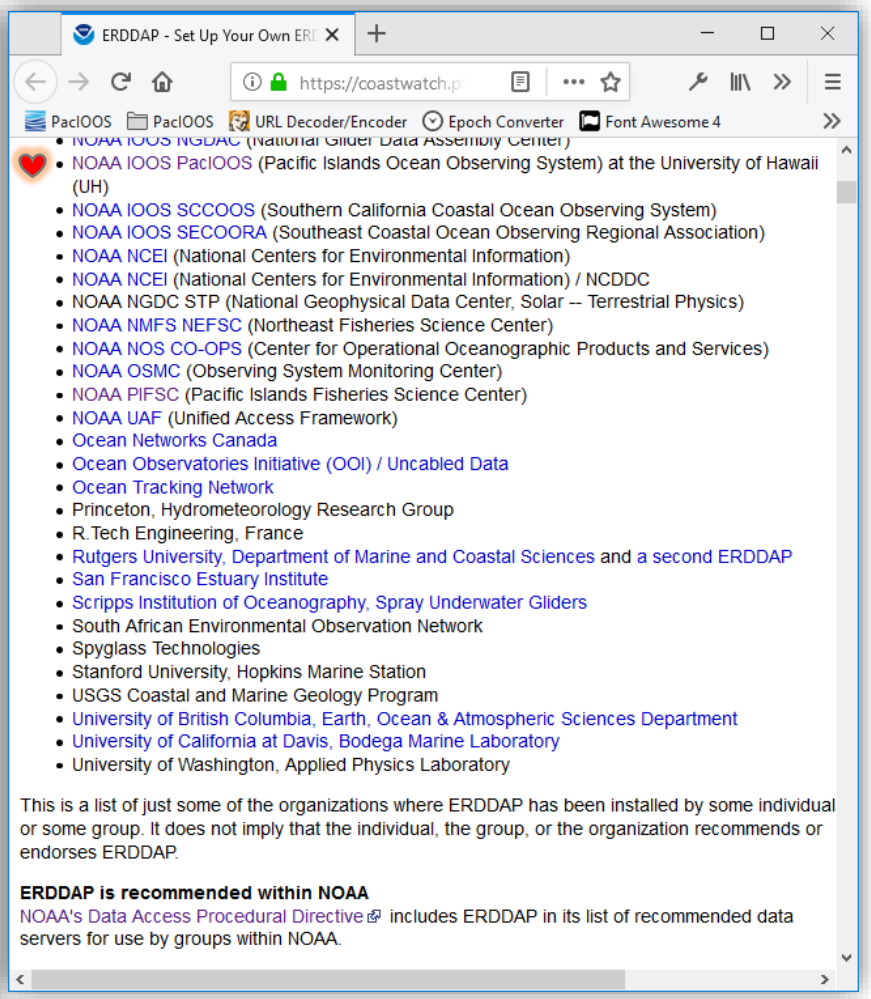
Web Accessible





DATA STORAGE AND TRANSFER

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Web Accessible

- E-mail users data upon request or subscription
- Manually intensive for data manager
- Users need to specify time period of interest, etc.: provide request form?
- Data volume might be too large for e-mail (even with ZIP, gzip, or other compression methods)
- Users **cannot automate data ingest** procedures

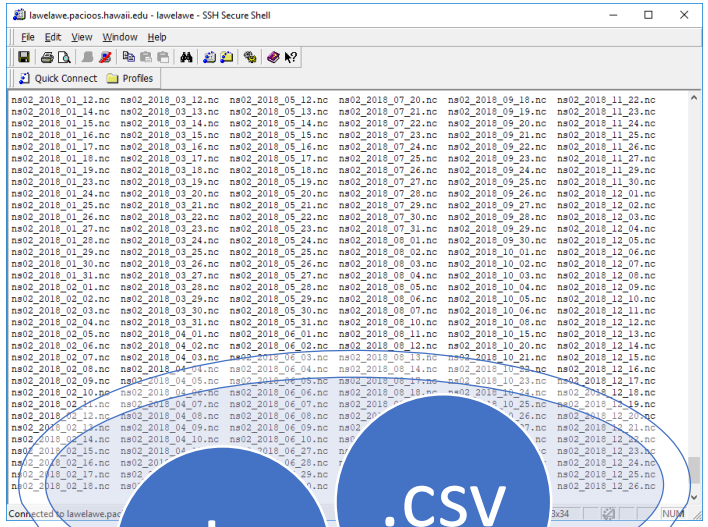
- Can share folders with select users and/or share link publicly
- Shared users receive e-mail notifications when new data are available, and these files automatically get pushed to their account
- **Cannot automate data ingest** procedures: unpredictable file URL; new file discovery.
- Size constraints for free usage; subscription options (**$**) for increased storage.

- Ditto Dropbox…
- Could upload data in raw format *or* import to **Google Spreadsheets** for added features

DATA STORAGE AND TRANSFER

PacIOOS
PACIFIC ISLANDS OCEAN OBSERVING SYSTEM

ERDDAP: Environmental Research Division's Data Access Program



.dat

.csv

.nc

ERDDAP

abstract

aggregate

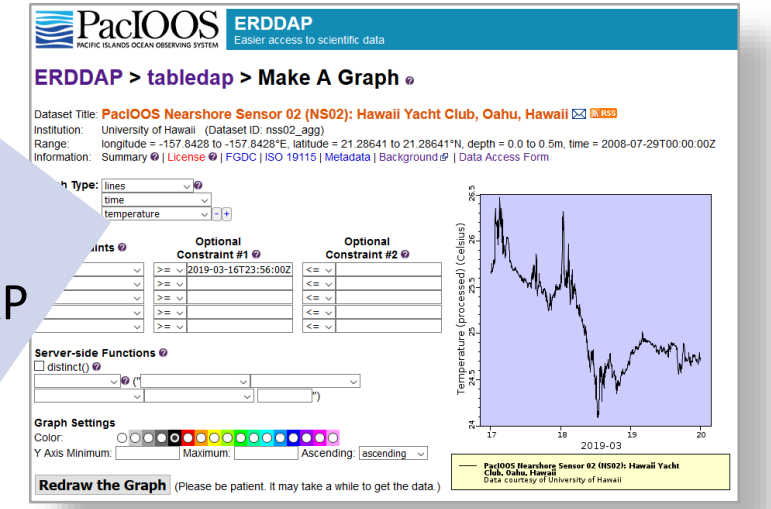
Web Services

OPeNDAP

format

subset

http://pacioos.org/erddap/



REST = Representational State Transfer

API = Application Programming Interface

~~http://some.address.org/directory/*filename.nc*~~

http://some.address.org/give-me?*dataset*&*vars*&*time*&*format*

DATA STORAGE AND TRANSFER

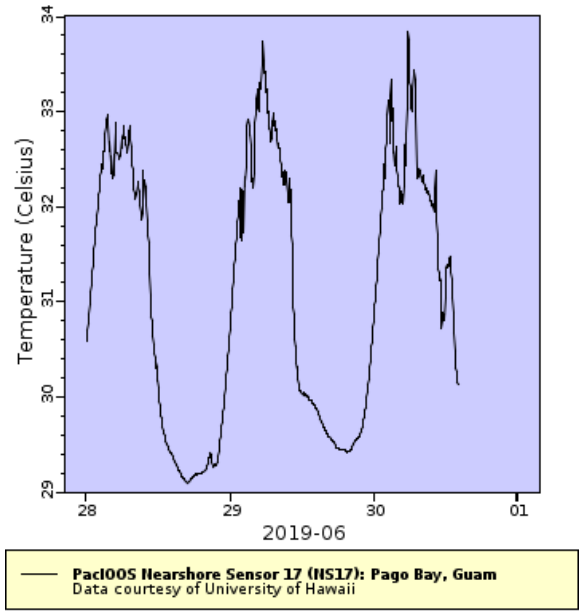
PacIOOS
PACIFIC ISLANDS OCEAN OBSERVING SYSTEM

ERDDAP: Output Formats

Data fileTypes	Description	Info	Example
.asc	View OPeNDAP-style ISO-8859-1 comma-separated text.	info	example
.csv	Download a ISO-8859-1 comma-separated text table (line 1: names; line 2: units; ISO 8601 times).	info	example
.csvp	Download a ISO-8859-1 .csv file with line 1: name (units). Times are ISO 8601 strings.	info	example
.csv0	Download a ISO-8859-1 .csv file without column names or units. Times are ISO 8601 strings.	info	example
.dataTable	A JSON file formatted for use with the Google Visualization client library (Google Charts).	info	example
.das	View the dataset's metadata via an ISO-8859-1 OPeNDAP Dataset Attribute Structure (DAS).	info	example
.dds	View the dataset's structure via an ISO-8859-1 OPeNDAP Dataset Descriptor Structure (DDS).	info	example
.dods	OPeNDAP clients use this to download the data in the DODS binary format.	info	example
.esriCsv	Download a ISO_8859_1 .csv file for ESRI's ArcGIS 9.x and below (separate date and time columns).	info	example
.fgdc	View the dataset's UTF-8 FGDC .xml metadata.	info	example
.geoJson	Download longitude,latitude,otherColumns data as a UTF-8 GeoJSON .json file.	info	example
.graph	View a Make A Graph web page.	info	example
.help	View a web page with a description of tabledap.	info	example
.html	View an OPeNDAP-style HTML Data Access Form.	info	example
.htmlTable	View a UTF-8 .html web page with the data in a table. Times are ISO 8601 strings.	info	example
.iso19115	View the dataset's ISO 19115-2/19139 UTF-8 .xml metadata.	info	example
.itx	Download an ISO-8859-1 Igor Text File. Each response column becomes a wave.	info	example
.json	View a table-like UTF-8 JSON file (missing value = 'null'; times are ISO 8601 strings).	info	example
.jsonlCSV1	View a UTF-8 JSON Lines CSV file with column names on line 1 (mv = 'null'; times are ISO 8601 strings).	info	example
.jsonlCSV	View a UTF-8 JSON Lines CSV file without column names (mv = 'null'; times are ISO 8601 strings).	info	example
.jsonlKVP	View a UTF-8 JSON Lines file with Key:Value pairs (missing value = 'null'; times are ISO 8601 strings).	info	example

Data fileTypes	Description	Info	Example
.mat	Download a MATLAB binary file.	info	example
.nc	Download a flat, table-like, NetCDF-3 binary file with COARDS/CF/ACDD metadata.	info	example
.ncHeader	View the UTF-8 header (the metadata) for the NetCDF-3 .nc file.	info	example
.ncCF	Download a NetCDF-3 CF Discrete Sampling Geometries file (Contiguous Ragged Array).	info	example
.ncCFHeader	View the UTF-8 header (the metadata) for the .ncCF file.	info	example
.ncCFMA	Download a NetCDF-3 CF Discrete Sampling Geometries file (Multidimensional Array).	info	example
.ncCFMAHeader	View the UTF-8 header (the metadata) for the .ncCFMA file.	info	example
.nccsv	Download a NetCDF-3-like 7-bit ASCII NCCSV .csv file with COARDS/CF/ACDD metadata.	info	example
.nccsvMetadata	View the dataset's metadata as the top half of a 7-bit ASCII NCCSV .csv file.	info	example
.ncoJson	Download a UTF-8 NCO lvl=2 JSON file with COARDS/CF/ACDD metadata.	info	example
.odvTxt	Download longitude,latitude,time,otherColumns as an ISO-8859-1 ODV Generic Spreadsheet File (.txt).	info	example
.subset	View an HTML form which uses faceted search to simplify picking subsets of the data.	info	example
.tsv	Download a ISO-8859-1 tab-separated text table (line 1: names; line 2: units; ISO 8601 times).	info	example
.tsvp	Download a ISO-8859-1 .tsv file with line 1: name (units). Times are ISO 8601 strings.	info	example
.tsv0	Download a ISO-8859-1 .tsv file without column names or units. Times are ISO 8601 strings.	info	example
.wav	Download a .wav audio file. All columns must be numeric and of the same type.	info	example
.xhtml	View a UTF-8 XHTML (XML) file with the data in a table. Times are ISO 8601 strings.	info	example

Image fileTypes	Description	Info	Example
.kml	View a .kml file, suitable for Google Earth.	info	example
.smallPdf	View a small .pdf image file with a graph or map.	info	example
.pdf	View a standard, medium-sized .pdf image file with a graph or map.	info	example
.largePdf	View a large .pdf image file with a graph or map.	info	example
.smallPng	View a small .png image file with a graph or map.	info	example
.png	View a standard, medium-sized .png image file with a graph or map.	info	example
.largePng	View a large .png image file with a graph or map.	info	example
.transparentPng	View a .png image file (just the data, without axes, landmask, or legend).	info	example



For examples and further details, please visit:
https://coastwatch.pfeg.noaa.gov/erddap/tabledap/documentation.html#fileType

DATA STORAGE AND TRANSFER

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PACIFIC ISLANDS OCEAN OBSERVING SYSTEM

ERDDAP: Output Formats

Data fileTypes	Description	Info	E
.asc	View OPeNDAP-style ISO-8859-1 comma-separated text.	info	e
.csv	Download a ISO-8859-1 comma-separated text table (line 1: names; line 2: units; ISO 8601 times).	info	e
.csvp	Download a ISO-8859-1 .csv file with line 1: name (units). Times are ISO 8601 strings.	info	e
.csv0	Download a ISO-8859-1 .csv file without column names or units. Times are ISO 8601 strings.	info	e
.dataTable	A JSON file formatted for use with the Google Visualization client library (Google Charts).	info	e
.das	View the dataset's metadata via an ISO-8859-1 OPeNDAP Dataset Attribute Structure (DAS).	info	e
.dds	View the dataset's structure via an ISO-8859-1 OPeNDAP Dataset Descriptor Structure (DDS).	info	e
.dods	OPeNDAP clients use this to download the data in the DODS binary format.	info	e
.esriCsv	Download a ISO_8859_1 .csv file for ESRI's ArcGIS 9.x and below (separate date and time columns).	info	e
.fgdc	View the dataset's UTF-8 FGDC .xml metadata.	info	e
.geoJson	Download longitude,latitude,otherColumns data as a UTF-8 GeoJSON .json file.	info	e
.graph	View a Make A Graph web page.	info	e
.help	View a web page with a description of tabledap.	info	e
.html	View an OPeNDAP-style HTML Data Access Form.	info	e
.htmlTable	View a UTF-8 .html web page with the data in a table. Times are ISO 8601 strings.	info	e
.iso19115	View the dataset's ISO 19115-2/19139 UTF-8 .xml metadata.	info	e
.itx	Download an ISO-8859-1 Igor Text File. Each response column becomes a wave.	info	e
.json	View a table-like UTF-8 JSON file (missing value = 'null'; times are ISO 8601 strings).	info	e
.jsonlCSV1	View a UTF-8 JSON Lines CSV file with column names on line 1 (mv = 'null'; times are ISO 8601 strings).	info	e
.jsonlCSV	View a UTF-8 JSON Lines CSV file without column names (mv = 'null'; times are ISO 8601 strings).	info	e
.jsonlKVP	View a UTF-8 JSON Lines file with Key:Value pairs (missing value = 'null'; times are ISO 8601 strings).	info	example

PacIOOS
PACIFIC ISLANDS OCEAN OBSERVING SYSTEM

ERDDAP
Easier access to scientific data

time	temperature	conductivity	turbidity	chlorophyll	salinity
UTC	Celsius	S m-1	NTU	kg m-3	1e-3
2019-08-27T22:00:00Z	28.5807	5.52234	5.088	3.1920001E-6	33.8784
2019-08-27T22:04:00Z	28.6388	5.52571	8.426	3.2159999E-6	33.8602
2019-08-27T22:08:00Z	28.6484	5.53238	2.9360003	3.371E-6	33.8993
2019-08-27T22:12:00Z	28.658	5.53495	2.452	3.249E-6	33.9103
2019-08-27T22:16:00Z	28.7173	5.53903	2.5699997	3.2280002E-6	33.8961
2019-08-27T22:20:00Z	28.7393	5.53857	2.646	3.2609998E-6	33.8773
2019-08-27T22:24:00Z	28.7289	5.54225	7.4939995	3.203E-6	33.91
2019-08-27T22:28:00Z	28.7355	5.54403	3.0559998	2.7320002E-6	33.9175
2019-08-27T22:32:00Z	28.7329	5.54619	3.0879998	3.383E-6	33.9342
2019-08-27T22:36:00Z	28.6955	5.54443	2.354	3.2980001E-6	33.9488
2019-08-27T22:40:00Z	28.6868	5.5437	2.5239997	2.708E-6	33.95
2019-08-27T22:44:00Z	28.7021	5.54261	2.79	3.4439997E-6	33.9315
2019-08-27T22:48:00Z	28.7331	5.54361	2.8140001	3.3469998E-6	33.9163
2019-08-27T22:52:00Z	28.7563	5.54563	5.442	3.095E-6	33.9137
2019-08-27T22:56:00Z	28.7677	5.54748	2.496	3.308E-6	33.9184
2019-08-27T23:00:00Z	28.7849	5.55307	6.448	4.217E-6	33.9446
2019-08-27T23:04:00Z	28.7941	5.55906	2.9579997	3.3459999E-6	33.9792
2019-08-27T23:08:00Z	28.8393	5.56038	3.508	3.7109999E-6	33.9561
2019-08-27T23:12:00Z	28.862	5.55854	3.3639998	3.3809997E-6	33.9273
2019-08-27T23:16:00Z	28.8812	5.5582	3.154	3.467E-6	33.9113
2019-08-27T23:20:00Z	28.847	5.55521	3.34	3.396E-6	33.915
2019-08-27T23:24:00Z	28.8453	5.5559	3.4380002	3.205E-6	33.921
2019-08-27T23:28:00Z	28.8393	5.55543	2.35	3.1439997E-6	33.922
2019-08-27T23:32:00Z	28.8324	5.55871	3.48	3.1069999E-6	33.9495
2019-08-27T23:36:00Z	28.8545	5.56089	2.716	3.249E-6	33.9487
2019-08-27T23:40:00Z	28.857	5.55998	3.244	3.5550001E-6	33.9407
2019-08-27T23:44:00Z	28.8535	5.55517	3.484	3.468E-6	33.9102
2019-08-27T23:48:00Z	28.8568	5.55623	3.7699997	3.156E-6	33.9151
2019-08-27T23:52:00Z	28.8836	5.56123	3.2480001	3.1799998E-6	33.9304
2019-08-27T23:56:00Z	28.8896	5.56831	2.48	3.01E-6	33.9747

ERDDAP, Version 2.01
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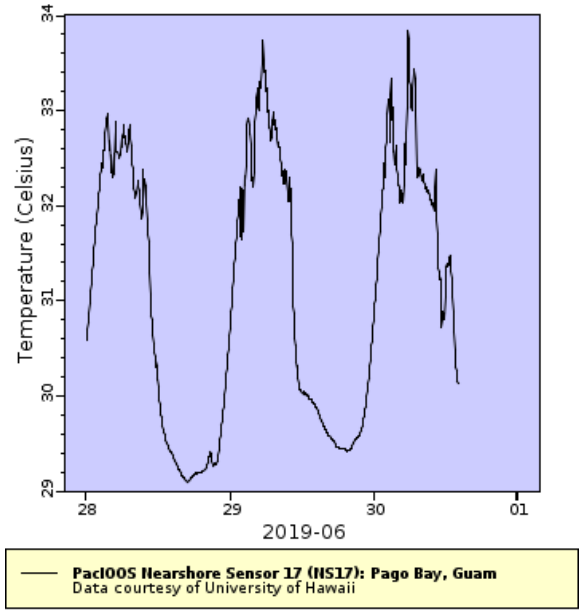
Image fileTypes	Description	Info	Example
.kml	View a .kml file, suitable for Google Earth.	info	example
.smallPdf	View a small .pdf image file with a graph or map.	info	example
.pdf	View a standard, medium-sized .pdf image file with a graph or map.	info	example
.largePdf	View a large .pdf image file with a graph or map.	info	example
.smallPng	View a small .png image file with a graph or map.	info	example
.png	View a standard, medium-sized .png image file with a graph or map.	info	example
.largePng	View a large .png image file with a graph or map.	info	example
.transparentPng	View a .png image file (just the data, without axes, landmask, or legend).	info	example



urther details, please visit:
https://coastwatch.pfeg.noaa.gov/erddap/tabledap/documentation.html#fileType

DATA STORAGE AND TRANSFER

PacIOOS
PACIFIC ISLANDS OCEAN OBSERVING SYSTEM

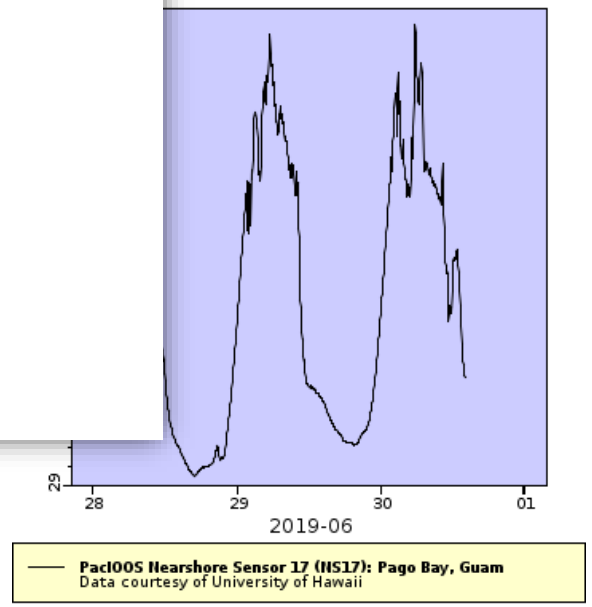
ERDDAP: Output Formats

Data file Types	Description	Info	Example
.asc	View OPeNDAP-style ISO-8859-1 comma text.		
.csv	Download a ISO-8859-1 comma-separate (line 1: names; line 2: units; ISO 8601 tim		
.csvp	Download a ISO-8859-1 .csv file with line (units). Times are ISO 8601 strings.		
.csv0	Download a ISO-8859-1 .csv file without or units. Times are ISO 8601 strings.		
.dataTable	A JSON file formatted for use with the Go Visualization client library (Google Charts		
.das	View the dataset's metadata via an ISO-8 OPeNDAP Dataset Attribute Structure (D		
.dds	View the dataset's structure via an ISO-8 OPeNDAP Dataset Descriptor Structure (		
.dods	OPeNDAP clients use this to download th DODS binary format.		
.esriCsv	Download a ISO_8859_1 .csv file for ESR and below (separate date and time colum		
.fgdc	View the dataset's UTF-8 FGDC .xml met		
.geoJson	Download longitude,latitude,otherColumn UTF-8 GeoJSON .json file.		
.graph	View a Make A Graph web page.		
.help	View a web page with a description of tab		
.html	View an OPeNDAP-style HTML Data Acce		
.htmlTable	View a UTF-8 .html web page with the da Times are ISO 8601 strings.		
.iso19115	View the dataset's ISO 19115-2/19139 U metadata.		
.itx	Download an ISO-8859-1 Igor Text File. Each response column becomes a wave.	info	example
.json	View a table-like UTF-8 JSON file (missing value = 'null'; times are ISO 8601 strings).	info	example
.jsonlCSV1	View a UTF-8 JSON Lines CSV file with column names on line 1 (mv = 'null'; times are ISO 8601 strings).	info	example
.jsonlCSV	View a UTF-8 JSON Lines CSV file without column names (mv = 'null'; times are ISO 8601 strings).	info	example
.jsonlKVP	View a UTF-8 JSON Lines file with Key:Value pairs (missing value = 'null'; times are ISO 8601 strings).	info	example

```
time (UTC),temperature (Celsius),conductivity (S m-1),turbidity (NTU),chlorophyll (kg m-3),salinity (1e-3)
2019-08-27T22:00:00Z,28.5807,5.52234,5.088,3.1920001E-6,33.8784
2019-08-27T22:04:00Z,28.6388,5.52571,8.426,3.2159999E-6,33.8602
2019-08-27T22:08:00Z,28.6484,5.53238,2.9360003,3.371E-6,33.8993
2019-08-27T22:12:00Z,28.658,5.53495,2.452,3.249E-6,33.9103
2019-08-27T22:16:00Z,28.7173,5.53903,2.5699997,3.2280002E-6,33.8961
2019-08-27T22:20:00Z,28.7393,5.53857,2.646,3.2609998E-6,33.8773
2019-08-27T22:24:00Z,28.7289,5.54225,7.4939995,3.203E-6,33.91
2019-08-27T22:28:00Z,28.7355,5.54403,3.0559998,2.7320002E-6,33.9175
2019-08-27T22:32:00Z,28.7329,5.54619,3.0879998,3.383E-6,33.9342
2019-08-27T22:36:00Z,28.6955,5.54443,2.354,3.2980001E-6,33.9488
2019-08-27T22:40:00Z,28.6868,5.5437,2.5239997,2.708E-6,33.95
2019-08-27T22:44:00Z,28.7021,5.54261,2.79,3.4439997E-6,33.9315
2019-08-27T22:48:00Z,28.7331,5.54361,2.8140001,3.3469998E-6,33.9163
2019-08-27T22:52:00Z,28.7563,5.54563,5.442,3.095E-6,33.9137
2019-08-27T22:56:00Z,28.7677,5.54748,2.496,3.308E-6,33.9184
2019-08-27T23:00:00Z,28.7849,5.55307,6.448,4.217E-6,33.9446
2019-08-27T23:04:00Z,28.7941,5.55906,2.9579997,3.3459999E-6,33.9792
2019-08-27T23:08:00Z,28.8393,5.56038,3.508,3.7109999E-6,33.9561
2019-08-27T23:12:00Z,28.862,5.55854,3.3639998,3.3809997E-6,33.9273
2019-08-27T23:16:00Z,28.8812,5.5582,3.154,3.467E-6,33.9113
2019-08-27T23:20:00Z,28.847,5.55521,3.34,3.396E-6,33.915
2019-08-27T23:24:00Z,28.8453,5.5559,3.4380002,3.205E-6,33.921
2019-08-27T23:28:00Z,28.8393,5.55543,2.35,3.1439997E-6,33.922
2019-08-27T23:32:00Z,28.8324,5.55871,3.48,3.1069999E-6,33.9495
2019-08-27T23:36:00Z,28.8545,5.56089,2.716,3.249E-6,33.9487
2019-08-27T23:40:00Z,28.857,5.55998,3.244,3.5550001E-6,33.9407
2019-08-27T23:44:00Z,28.8535,5.55517,3.484,3.468E-6,33.9102
2019-08-27T23:48:00Z,28.8568,5.55623,3.7699997,3.156E-6,33.9151
2019-08-27T23:52:00Z,28.8836,5.56123,3.2480001,3.1799998E-6,33.9304
2019-08-27T23:56:00Z,28.8896,5.56831,2.48,3.01E-6,33.9747
```

Data file Types	Description	Info	Example
.wav	Download a .wav audio file. All columns must be numeric and of the same type.	info	example
.xhtml	View a UTF-8 XHTML (XML) file with the data in a table. Times are ISO 8601 strings.	info	example

Image file Types	Description	Info	Example
	suitable for Google Earth.	info	example
	df image file with a graph or map.	info	example
	d, medium-sized .pdf image file with a	info	example
	df image file with a graph or map.	info	example
	ng image file with a graph or map.	info	example
	d, medium-sized .png image file with a	info	example
	ng image file with a graph or map.	info	example
	age file (just the data, without axes, egend).	info	example



For examples and further details, please visit:
https://coastwatch.pfeg.noaa.gov/erddap/tabledap/documentation.html#fileType

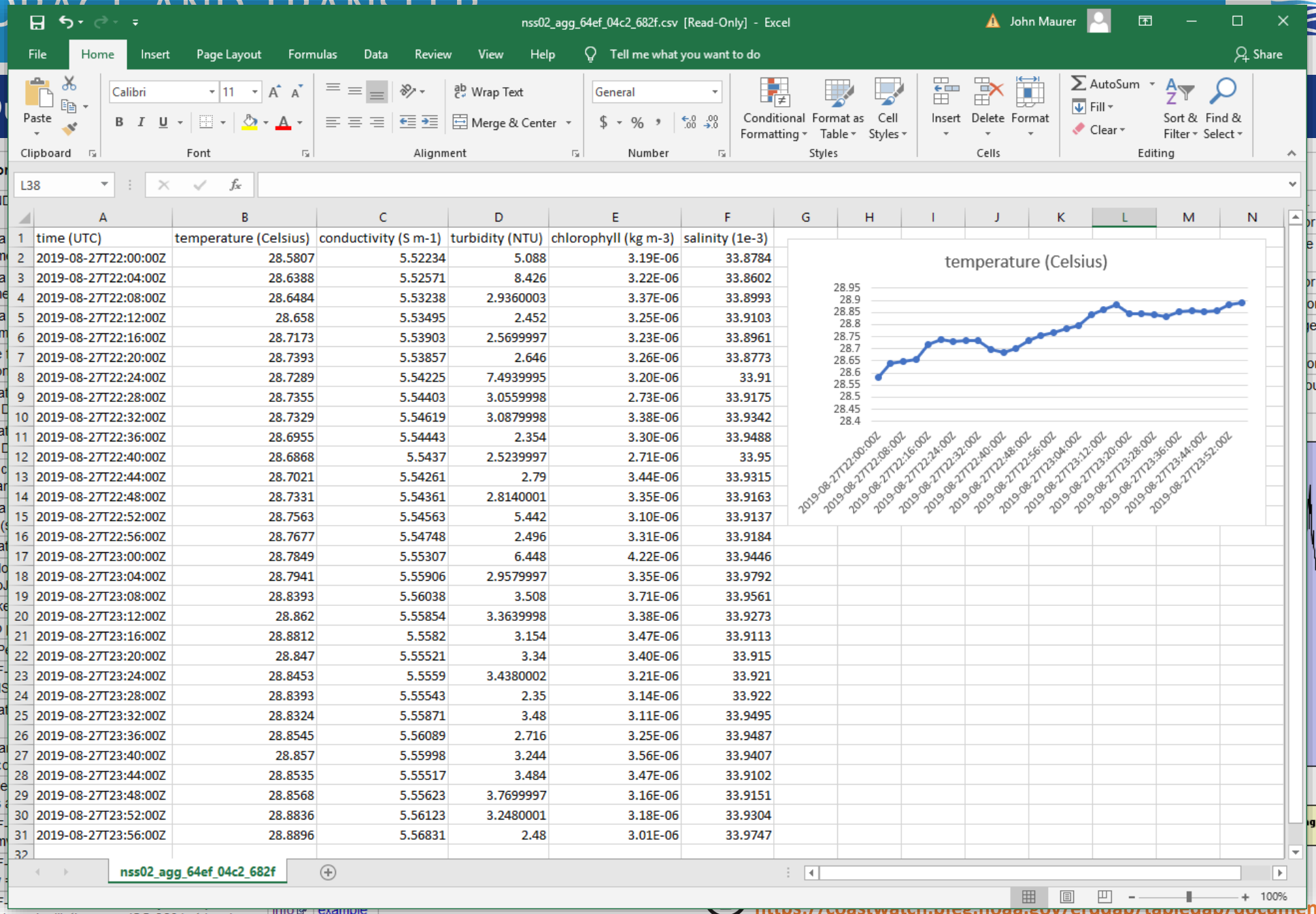
DATA STORAGE AND TRANSFER

PacIOOS
PACIFIC ISLANDS OCEAN OBSERVING SYSTEM

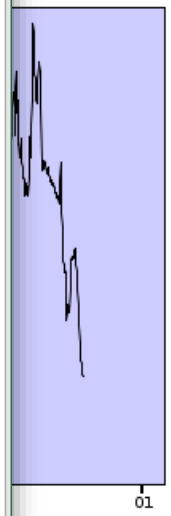
ERDDAP: O

Data file Types	Description
.asc	View OPeND text.
.csv	Download a (line 1: nam
.csvp	Download a (units). Time
.csv0	Download a or units. Tim
.dataTable	A JSON file Visualization
.das	View the dat OPeNDAP D
.dds	View the dat OPeNDAP D
.dods	OPeNDAP c DODS binar
.esriCsv	Download a and below (
.fgdc	View the dat
.geoJson	Download lo UTF-8 GeoJ
.graph	View a Make
.help	View a web
.html	View an OPe
.htmlTable	View a UTF- Times are IS
.iso19115	View the dat metadata.
.itx	Download a response co
.json	View a table 'null'; times
.jsonlCSV1	View a UTF- on line 1 (m
.jsonlCSV	View a UTF- names (mv
.jsonlKVP	View a UTF- (missing value = 'null'; times are ISO 8601 strings).

Info	Example
info	example
info	example
info	example
info	example
info	example
info	example
info	example



	A	B	C	D	E	F
1	time (UTC)	temperature (Celsius)	conductivity (S m-1)	turbidity (NTU)	chlorophyll (kg m-3)	salinity (1e-3)
2	2019-08-27T22:00:00Z	28.5807	5.52234	5.088	3.19E-06	33.8784
3	2019-08-27T22:04:00Z	28.6388	5.52571	8.426	3.22E-06	33.8602
4	2019-08-27T22:08:00Z	28.6484	5.53238	2.9360003	3.37E-06	33.8993
5	2019-08-27T22:12:00Z	28.658	5.53495	2.452	3.25E-06	33.9103
6	2019-08-27T22:16:00Z	28.7173	5.53903	2.5699997	3.23E-06	33.8961
7	2019-08-27T22:20:00Z	28.7393	5.53857	2.646	3.26E-06	33.8773
8	2019-08-27T22:24:00Z	28.7289	5.54225	7.4939995	3.20E-06	33.91
9	2019-08-27T22:28:00Z	28.7355	5.54403	3.0559998	2.73E-06	33.9175
10	2019-08-27T22:32:00Z	28.7329	5.54619	3.0879998	3.38E-06	33.9342
11	2019-08-27T22:36:00Z	28.6955	5.54443	2.354	3.30E-06	33.9488
12	2019-08-27T22:40:00Z	28.6868	5.5437	2.5239997	2.71E-06	33.95
13	2019-08-27T22:44:00Z	28.7021	5.54261	2.79	3.44E-06	33.9315
14	2019-08-27T22:48:00Z	28.7331	5.54361	2.8140001	3.35E-06	33.9163
15	2019-08-27T22:52:00Z	28.7563	5.54563	5.442	3.10E-06	33.9137
16	2019-08-27T22:56:00Z	28.7677	5.54748	2.496	3.31E-06	33.9184
17	2019-08-27T23:00:00Z	28.7849	5.55307	6.448	4.22E-06	33.9446
18	2019-08-27T23:04:00Z	28.7941	5.55906	2.9579997	3.35E-06	33.9792
19	2019-08-27T23:08:00Z	28.8393	5.56038	3.508	3.71E-06	33.9561
20	2019-08-27T23:12:00Z	28.862	5.55854	3.3639998	3.38E-06	33.9273
21	2019-08-27T23:16:00Z	28.8812	5.5582	3.154	3.47E-06	33.9113
22	2019-08-27T23:20:00Z	28.847	5.55521	3.34	3.40E-06	33.915
23	2019-08-27T23:24:00Z	28.8453	5.5559	3.4380002	3.21E-06	33.921
24	2019-08-27T23:28:00Z	28.8393	5.55543	2.35	3.14E-06	33.922
25	2019-08-27T23:32:00Z	28.8324	5.55871	3.48	3.11E-06	33.9495
26	2019-08-27T23:36:00Z	28.8545	5.56089	2.716	3.25E-06	33.9487
27	2019-08-27T23:40:00Z	28.857	5.55998	3.244	3.56E-06	33.9407
28	2019-08-27T23:44:00Z	28.8535	5.55517	3.484	3.47E-06	33.9102
29	2019-08-27T23:48:00Z	28.8568	5.55623	3.7699997	3.16E-06	33.9151
30	2019-08-27T23:52:00Z	28.8836	5.56123	3.2480001	3.18E-06	33.9304
31	2019-08-27T23:56:00Z	28.8896	5.56831	2.48	3.01E-06	33.9747
32						



go Bay, Guam

https://coastwatch.pfeg.noaa.gov/erddap/tabledap/documentation.html#fileType

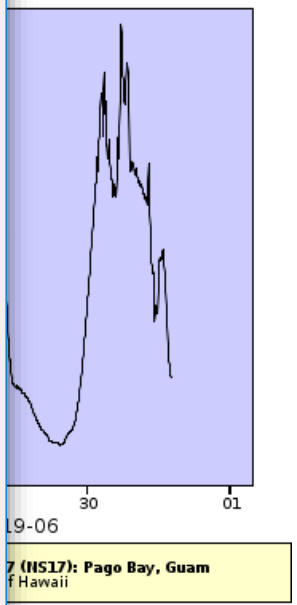
DATA STORAGE AND TRANSFER

PacIOOS
PACIFIC ISLANDS OCEAN OBSERVING SYSTEM

ERDDAP: Output

Data fileTypes	Description
.asc	View OPeNDAP-style ISO- text.
.csv	Download a ISO-8859-1 c (line 1: names; line 2: units
.csvp	Download a ISO-8859-1 .c (units). Times are ISO 860
.csv0	Download a ISO-8859-1 .c or units. Times are ISO 86
.dataTable	A JSON file formatted for u Visualization client library (
.das	View the dataset's metada OPeNDAP Dataset Attribut
.dds	View the dataset's structur OPeNDAP Dataset Descrip
.dods	OPeNDAP clients use this DODS binary format.
.esriCsv	Download a ISO_8859_1 and below (separate date
.fgdc	View the dataset's UTF-8
.geoJson	Download longitude,latitud UTF-8 GeoJSON .json file.
.graph	View a Make A Graph web
.help	View a web page with a de
.html	View an OPeNDAP-style H
.htmlTable	View a UTF-8 .html web pa Times are ISO 8601 string
.iso19115	View the dataset's ISO 19 metadata.
.itx	Download an ISO-8859-1 response column becomes
.json	View a table-like UTF-8 JS 'null'; times are ISO 8601 s
.jsonlCSV1	View a UTF-8 JSON Lines on line 1 (mv = 'null'; times
.jsonlCSV	View a UTF-8 JSON Lines names (mv = 'null'; times a
.jsonlKVP	View a UTF-8 JSON Lines (missing value = 'null'; times are ISO 8601 strings).

	Info	Example
ogle Earth.	info	example
a graph or map.	info	example
.pdf image file with a	info	example
a graph or map.	info	example
h a graph or map.	info	example
.png image file with a	info	example
h a graph or map.	info	example
data, without axes,	info	example



Panoply: Panoply — Sources

File Edit View History Bookmarks Plot Window Help

Create Plot | Combine Plot | Open Dataset | Remove | Remove All | Hide Info

Datasets | Catalogs | Bookmarks

Name	Long Name	Type
nss02_agg_d25f_2...	PacIOOS Nearshore Senso...	Local File
chlorophyll	Chlorophyll (processed)	Geo2D
conductivity	Conductivity (processed)	Geo2D
depth	depth below mean sea level	1D
latitude	Latitude	1D
longitude	Longitude	1D
salinity	Salinity (processed)	Geo2D
temperature	Temperature (processed)	Geo2D
time	Time	1D
turbidity	Turbidity (processed)	Geo2D

Show: All variables

File "nss02_agg_d25f_2417_7756.nc"

File type: NetCDF-3/CDM

```
netcdf file:/C:/Users/John/Downloads/nss02_agg_d25f_2417_7756.nc {
  dimensions:
    row = 30;
  variables:
    float longitude(row=30);
      :_CoordinateAxisType = "Lon";
      :actual_range = -157.8428f, -157.8428f; // float
      :axis = "X";
      :ioos_category = "Location";
      :long_name = "Longitude";
      :short_name = "lon";
      :standard_name = "longitude";
      :units = "degrees_east";

    float latitude(row=30);
      :_CoordinateAxisType = "Lat";
      :actual_range = 21.28641f, 21.28641f; // float
      :axis = "Y";
      :ioos_category = "Location";
      :long_name = "Latitude";
      :short_name = "lat";
      :standard_name = "latitude";
      :units = "degrees_north";

    float depth(row=30);
      :_CoordinateAxisType = "Height";
      :_CoordinateZisPositive = "down";
      :actual_range = 0.5f, 0.5f; // float
      :axis = "Z";
```

ocumentation.html#fileType

DATA STORAGE AND TRANSFER

PacIOOS
PACIFIC ISLANDS OCEAN OBSERVING SYSTEM

ERDDAP: Output

Data fileTypes	Description
.asc	View OPeNDAP-style ISO- text.
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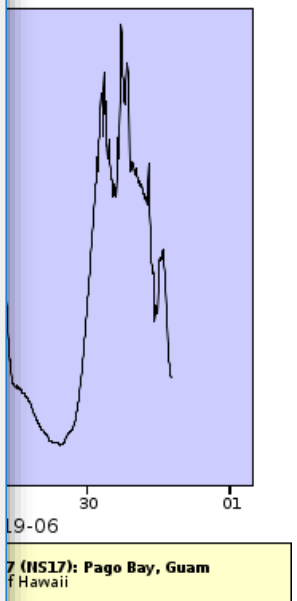
.csvp	Download a ISO-8859-1 .c (units). Times are ISO 860
.csv0	Download a ISO-8859-1 .c or units. Times are ISO 86
.dataTable	A JSON file formatted for u Visualization client library (
.das	View the dataset's metada OPeNDAP Dataset Attribut
.dds	View the dataset's structur OPeNDAP Dataset Descrip
.dods	OPeNDAP clients use this DODS binary format.
.esriCsv	Download a ISO_8859_1 and below (separate date
.fgdc	View the dataset's UTF-8
.geoJson	Download longitude,latitud UTF-8 GeoJSON .json file.
.graph	View a Make A Graph web
.help	View a web page with a de
.html	View an OPeNDAP-style H
.htmlTable	View a UTF-8 .html web pa Times are ISO 8601 string
.iso19115	View the dataset's ISO 191 metadata.
.itx	Download an ISO-8859-1 response column becomes
.json	View a table-like UTF-8 JS 'null'; times are ISO 8601 s
.jsonlCSV1	View a UTF-8 JSON Lines on line 1 (mv = 'null'; times
.jsonlCSV	View a UTF-8 JSON Lines names (mv = 'null'; times a
.jsonlKVP	View a UTF-8 JSON Lines (missing value = 'null'; times are ISO 8601 strings).

	Info	Example
ogle Earth.	info	example
a graph or map.	info	example
.pdf image file with a	info	example
a graph or map.	info	example
h a graph or map.	info	example
.png image file with a	info	example
h a graph or map.	info	example
data, without axes,	info	example



Panoply: Panoply — Sources

File Edit Vie

Create Plot

Datasets

Nam

nss02_a

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Show: All variables

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756.nc {

temperature in nss02_agg_d25f_2417_7756

File Edit View History Bookmarks Plot Window Help

Plot Array 1

Temperature (processed)

Temperature (processed) (Celsius)

28.9
28.8
28.8
28.7
28.6
28.6

0.0 4.8 9.7 14.5 19.3 24.2 29.0

row

Temperature (processed) (Celsius)

Data Min = 28.6, Max = 28.9

Array(s) Grid Stroke Labels

Plot Array 1 Only

Array 1: temperature

No additional dimensions

https://coastwatch.pfeg.noaa.gov/erddap/tabledap/documentation.html#fileType

DATA STORAGE AND TRANSFER

ERDDAP: Output Formats

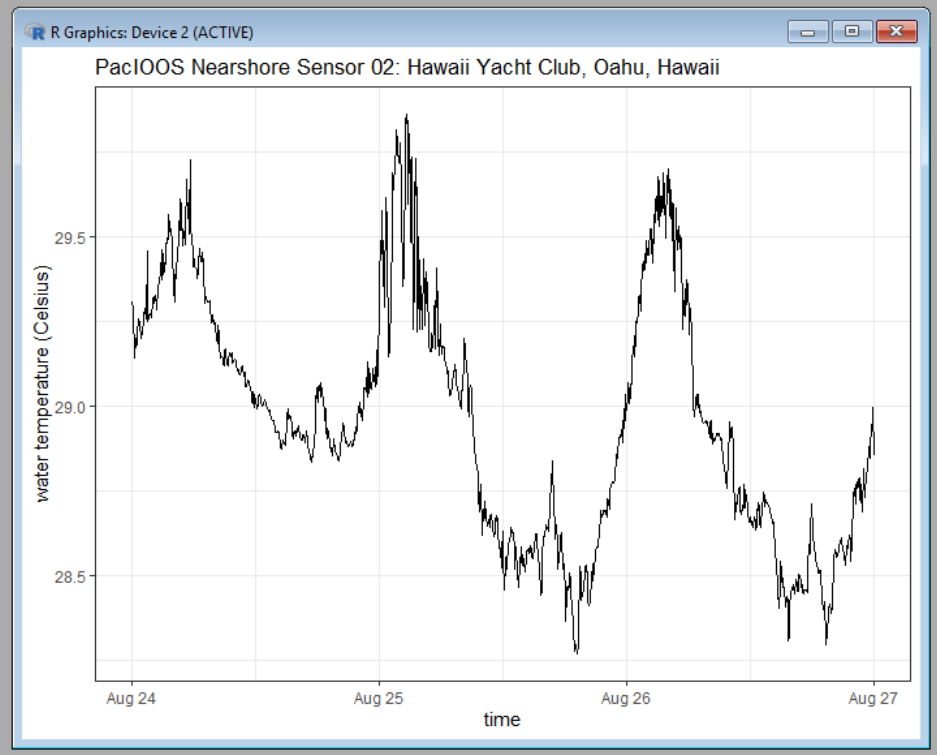
RGui (64-bit)

File History Resize Windows

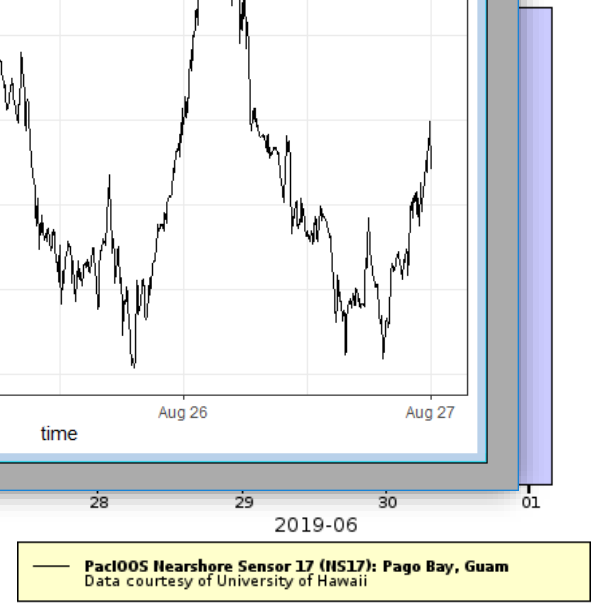
R Console

```
> # Load libraries. If not installed yet, first run:
> # install.packages("rerddap")
> # install.packages("ggplot2")
> # install.packages("parsedate")
> library("rerddap")
> library("ggplot2")
> library("parsedate")
>
> # Tell "rerddap" to use PacIOOS ERDDAP server:
> Sys.setenv(RERDDAP_DEFAULT_URL = "http://oos.soest.hawaii.edu/erddap/")
>
> # Load data by specifying an ERDDAP identifier and subset params:
> nss02_info <- info("nss02_agg")
> nss02_data <- tabledap(nss02_info, fields = c("time", "temperature"), 'time>=2019-08-24', 'time<=2019-08-27')
>
> # Convert temperatures from char to num:
> nss02_data$temperature <- as.numeric(nss02_data$temperature)
>
> # Convert times char to R date-time:
> nss02_data$time <- parse_iso_8601(nss02_data$time)
>
> # Make time series plot:
> ggplot(nss02_data, aes(time, temperature)) +
+   geom_line() +
+   theme_bw() +
+   ylab("water temperature (Celsius)") +
+   ggtitle("PacIOOS Nearshore Sensor 02: Hawaii Yacht Club, Oahu, Hawaii")
>
```

R Graphics: Device 2 (ACTIVE)



Data file Ty			Info	Example
.asc			info	example
.csv			info	example
.csvp			info	example
.csv0			info	example
.dataT			info	example
.das			info	example
.dds			info	example
.dods			info	example
.esriC			info	example
.fgdc				
.geoJs				
.graph				
.help				
.html				
.htmlT				
.iso19				
.itx				
.json	View a table-like UTF-8 JSON file (missing value = 'null'; times are ISO 8601 strings).	info	example	
.jsonlCSV1	View a UTF-8 JSON Lines CSV file with column names on line 1 (mv = 'null'; times are ISO 8601 strings).	info	example	
.jsonlCSV	View a UTF-8 JSON Lines CSV file without column names (mv = 'null'; times are ISO 8601 strings).	info	example	
.jsonlKVP	View a UTF-8 JSON Lines file with Key:Value pairs (missing value = 'null'; times are ISO 8601 strings).	info	example	
	numeric and of the same type.	info	example	
.xhtml	View a UTF-8 XHTML (XML) file with the data in a table. Times are ISO 8601 strings.	info	example	



For examples and further details, please visit:
https://coastwatch.pfeg.noaa.gov/erddap/tabledap/documentation.html#fileType

DATA STORAGE AND TRANSFER

PacIOOS
PACIFIC ISLANDS OCEAN OBSERVING SYSTEM

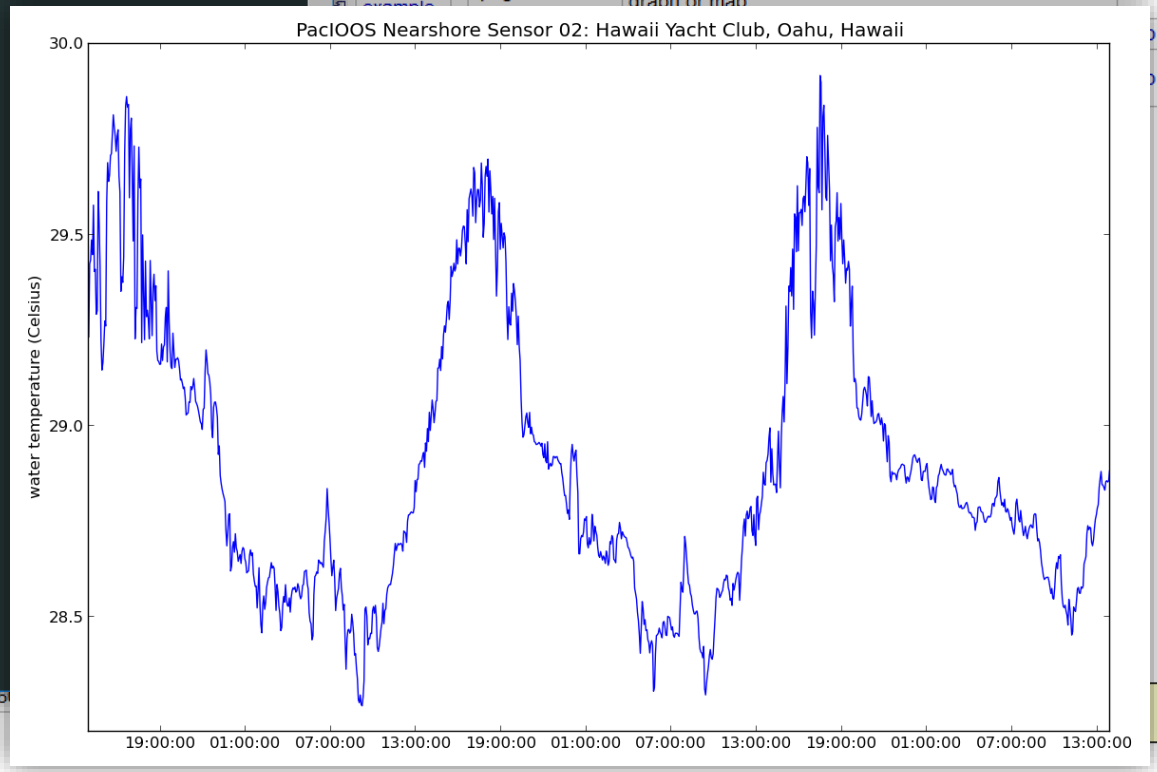
ERDDAP

lawelawe

```
Python 2.7 (r27:82500, Jan 26 2011, 11:47:03)
[GCC 4.1.2 20071124 (Red Hat 4.1.2-42)] on linux2
Type "help", "copyright", "credits" or "license" for more information.
>>> # Import required Python modules:
... from pydap.client import open_dods
>>> import matplotlib.pyplot as plt
>>> import datetime
>>>
>>> # Load data by specifying an ERDDAP .dods URL with subset params:
... nss02_dods = open_dods('http://oos.soest.hawaii.edu/erddap/tabledap/nss02_agg.dods?time,temperature&time>=20
19-08-24T23:56:00Z')
>>>
>>> # All data stored in "s" object (for sequence):
... nss02_data = nss02_dods['s']
>>>
>>> # Convert epoch timestamps to Python datetimes:
... time = [datetime.datetime.fromtimestamp(date) for date in nss02_data['time']]
>>>
>>> # Extract water temperatures:
... temperature = [x for x in nss02_data['temperature']]
>>>
>>> # Make time series plot:
... plt.figure(figsize=(12,8))
<matplotlib.figure.Figure object at 0x13c6fe50>
>>> plt.plot(time, temperature)
[<matplotlib.lines.Line2D object at 0x13e1c0d0>]
>>> plt.title('PacIOOS Nearshore Sensor 02: Hawaii Yacht Club, Oahu, Hawaii')
<matplotlib.text.Text object at 0x13d26bd0>
>>> plt.ylabel('water temperature (Celsius)')
<matplotlib.text.Text object at 0x13d18dd0>
>>> plt.tight_layout()
>>> plt.show()
>>>
>>> # Save plot:
... plt.savefig('nss02_data.png')
>>>
```

Example
example
example
example
example

Image fileTypes	Description	Info	Example
.kml	View a .kml file, suitable for Google Earth.	info	example
.smallPdf	View a small .pdf image file with a graph or map.	info	example
.pdf	View a standard, medium-sized .pdf image file with a graph or map.	info	example
.largePdf	View a large .pdf image file with a graph or map.	info	example
.smallPng	View a small .png image file with a graph or map.	info	example
.png	View a standard, medium-sized .png image file with a graph or map.	info	example



.jsonlCSV1	View a UTF-8 JSON Lines CSV file with column names on line 1 (mv = 'null'; times are ISO 8601 strings).	info	example
.jsonlCSV	View a UTF-8 JSON Lines CSV file without column names (mv = 'null'; times are ISO 8601 strings).	info	example
.jsonlKVP	View a UTF-8 JSON Lines file with Key:Value pairs (missing value = 'null'; times are ISO 8601 strings).	info	example

For examples and further details, please visit:
https://coastwatch.pfeg.noaa.gov/erddap/tabledap/documentation.html#fileType

DATA STORAGE AND TRANSFER

E

MATLAB R2019a - academic use

HOME | PLOTS | APPS

New Script | New Live Script | New | Open | Find Files | Compare | Import Data | Save Workspace | New Variable | Open Variable | Clear Workspace | Favorites | Analyze Code | Run and Time | Clear Commands | Simulink | Layout | Preferences | Set Path | Add-Ons | Help | Community | Request Support | Learn MATLAB

FILE | VARIABLE | CODE | SIMULINK | ENVIRONMENT | RESOURCES

C: ▸ Users ▸ John ▸ Documents ▸ MATLAB

Command Window

```
>> % Load data by specifying ERDDAP .mat URL with subset params:
>> load(urlwrite('http://oos.soest.hawaii.edu/erddap/tabledap/nss02_agg.mat?time,temperature&time>=2019-08-25T00:00:00Z&time<=2019-08-27T00:00:00Z', 'nss02_agg.mat'))
>> % Make time series plot:
>> plot(datetime(nss02_agg.time, 'convertfrom','posixtime'), nss02_agg.temperature)
>> % Add plot labels:
>> title('PacIOOS Nearshore Sensor 02 (NS02): Hawaii Yacht Club, Oahu, Hawaii')
>> ylabel('water temperature (Celsius)')
>> xlabel('UTC')
>>
```

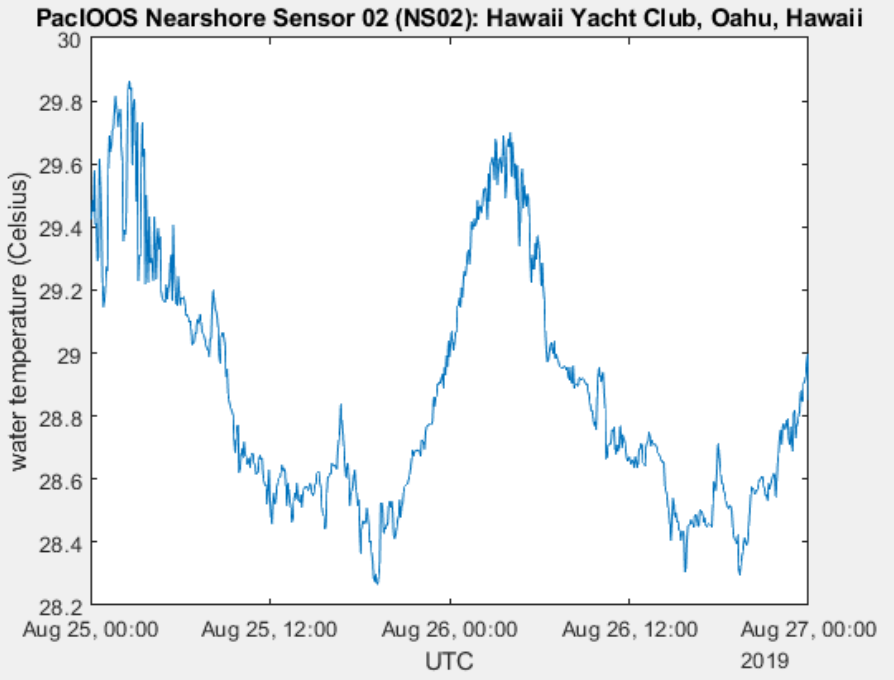
Workspace

Name	Value
nss02_agg	1x1 struct

MATLAB

Figure 1

File Edit View Insert Tools Desktop Window Help



.jsonlKVP	(missing value = 'null'; times are ISO 8601 strings).	info	example

https://coastwatch.pfeg.noaa.gov/erddap/tabledap/documentation.html#fileType

DATA STORAGE AND TRANSFER

PacIOOS
ING SYSTEM

ERDD


```
−<gmd:identificationInfo>
 −<gmd:MD_DataIdentification id="DataIdentification">
  −<gmd:citation>
   −<gmd:CI_Citation>
    −<gmd:title>
     −<gco:CharacterString>
        PacIOOS Nearshore Sensor 02 (NS02): Hawaii Yacht Club, Oahu, Hawaii
      </gco:CharacterString>
     </gmd:title>
    −<gmd:date>
     +<gmd:CI_Date></gmd:CI_Date>
     </gmd:date>
    −<gmd:date>
     −<gmd:CI_Date>
      −<gmd:date>
         <gco:Date>2008-07-29</gco:Date>
       </gmd:date>
      −<gmd:dateType>
         <gmd:CI_DateTypeCode codeList="https://data.noaa.gov/resources/iso19139/schema
         /resources/Codelist/gmxCodelists.xml#gmd:CI_DateTypeCode"
         codeListValue="issued">issued</gmd:CI_DateTypeCode>
       </gmd:dateType>
      </gmd:CI_Date>
     </gmd:date>
    −<gmd:identifier>
     −<gmd:MD_Identifier>
      −<gmd:authority>
       −<gmd:CI_Citation>
        −<gmd:title>
           <gco:CharacterString>oos.soest.hawaii.edu</gco:CharacterString>
         </gmd:title>
         <gmd:date gco:nilReason="inapplicable"/>
        </gmd:CI_Citation>
       </gmd:authority>
      −<gmd:code>
         <gco:CharacterString>nss02_agg</gco:CharacterString>
       </gmd:code>
     </gmd:MD_Identifier>
    </gmd:identifier>
   −<gmd:citedResponsibleParty>
    −<gmd:CI_ResponsibleParty>
     −<gmd:individualName>
         <gco:CharacterString>Margaret McManus</gco:CharacterString>
       </gmd:individualName>
      −<gmd:organisationName>
         <gco:CharacterString>University of Hawaii</gco:CharacterString>
       </gmd:organisationName>
```


ISO 19115-2/19139


```
−<metadata xsi:noNamespaceSchemaLocation="http://fgdcxml.sourceforge.net/schema/fgdc-std-012-2002/fgdc-
 std-012-2002.xsd">
 −<idinfo>
  −<citation>
   −<citeinfo>
    −<origin>
       Project: Pacific Islands Ocean Observing System (PacIOOS) Name: Margaret McManus Email:
       mamc@hawaii.edu Institution: University of Hawaii InfoURL: https://www.pacioos.hawaii.edu/water
       /sensor-hawaiiyachtclub/ Source URL: http://pacioos.org
     </origin>
     <pubdate>20080729</pubdate>
    −<title>
       PacIOOS Nearshore Sensor 02 (NS02): Hawaii Yacht Club, Oahu, Hawaii
     </title>
     <edition>Unknown</edition>
     <geoform>tabular digital data</geoform>
    −<pubinfo>
       <pubplace>Honolulu, HI, USA</pubplace>
      −<publish>
         ERDDAP, version 2.01, at Pacific Islands Ocean Observing System (PacIOOS)
       </publish>
     </pubinfo>
    −<onlink>
       http://oos.soest.hawaii.edu/erddap/tabledap/nss02_agg.html
     </onlink>
    −<onlink>
       http://oos.soest.hawaii.edu/erddap/tabledap/nss02_agg.graph
     </onlink>
    −<lworkcit>
     −<citeinfo>
        <origin>Pacific Islands Ocean Observing System (PacIOOS)</origin>
       </citeinfo>
     </lworkcit>
   </citeinfo>
  </citation>
 −<descript>
  −<abstract>
     The nearshore sensors are part of the Pacific Islands Ocean Observing System (PacIOOS) and are
     designed to measure a variety of ocean parameters at fixed point locations along the south shore of Oahu.
     NS02 is located at a floating dock off the Hawaii Yacht Club. The instrument is a Sea-Bird Electronics
     model 16+ V2 coupled with a WET Labs ECO-FLNTUS combination sensor. The package is fixed to a
     floating dock just below the ocean surface.
   </abstract>
   <purpose>Unknown</purpose>
  −<supplinf>
     https://www.pacioos.hawaii.edu/water/sensor-hawaiiyachtclub/
   </supplinf>
```


FGDC
FEDERAL GEOGRAPHIC DATA COMMITTEE

FGDC-STD-001-1998

Data file Types			
.asc			
.csv			
.csvp			
.csv0			
.dataTabl			
.das			
.dds			
.dods			
.esriCsv			
.fgdc			
.geoJson			
.graph			
.help			
.html			
.htmlTable			
.iso19115			
.itx			
.json			
.jsonlCSV			
.jsonlCSV			
.jsonlKVP	View a UTF-8 JSON Lines file with Key:Value pairs (missing value = 'null'; times are ISO 8601 strings).	info	example

xample
xample
xample
xample
xample
xample
xample
xample

For examples and further details, please visit:
https://coastwatch.pfeg.noaa.gov/erddap/tabledap/documentation.html#fileType

DATA STORAGE AND TRANSFER

PacIOOS
PACIFIC ISLANDS OCEAN OBSERVING SYSTEM

ERDDAP: Output Formats

Data fileTypes	Description	Info	
.asc	View OPeNDAP-style ISO-8859-1 comma-separated text.	info	
.csv	Download a ISO-8859-1 comma-separated text table (line 1: names; line 2: units; ISO 8601 times).	info	
.csvp	Download a ISO-8859-1 .csv file with line 1: name (units). Times are ISO 8601 strings.	info	
.csv0	Download a ISO-8859-1 .csv file without column names or units. Times are ISO 8601 strings.	info	
.dataTable	A JSON file formatted for use with the Google Visualization client library (Google Charts).	info	
.das	View the dataset's metadata via an ISO-8859-1 OPeNDAP Dataset Attribute Structure (DAS).	info	
.dds	View the dataset's structure via an ISO-8859-1 OPeNDAP Dataset Descriptor Structure (DDS).	info	
.dods	OPeNDAP clients use this to download the data in the DODS binary format.	info	
.esriCsv	Download a ISO_8859_1 .csv file for ESRI's ArcGIS 9.x and below (separate date and time columns).	info	
.fgdc	View the dataset's UTF-8 FGDC .xml metadata.	info	
.geoJson	Download longitude,latitude,otherColumns data as a UTF-8 GeoJSON .json file.	info	
.graph	View a Make A Graph web page.	info	
.help	View a web page with a description of tabledap.	info	
.html	View an OPeNDAP-style HTML Data Access Form.	info	
.htmlTable	View a UTF-8 .html web page with the data in a table. Times are ISO 8601 strings.	info	
.iso19115	View the dataset's ISO 19115-2/19139 UTF-8 .xml metadata.	info	
.itx	Download an ISO-8859-1 Igor Text File. Each response column becomes a wave.	info	
.json	View a table-like UTF-8 JSON file (missing value = 'null'; times are ISO 8601 strings).	info	
.jsonlCSV1	View a UTF-8 JSON Lines CSV file with column names on line 1 (mv = 'null'; times are ISO 8601 strings).	info	
.jsonlCSV	View a UTF-8 JSON Lines CSV file without column names (mv = 'null'; times are ISO 8601 strings).	info	example
.jsonlKVP	View a UTF-8 JSON Lines file with Key:Value pairs (missing value = 'null'; times are ISO 8601 strings).	info	example

Sample

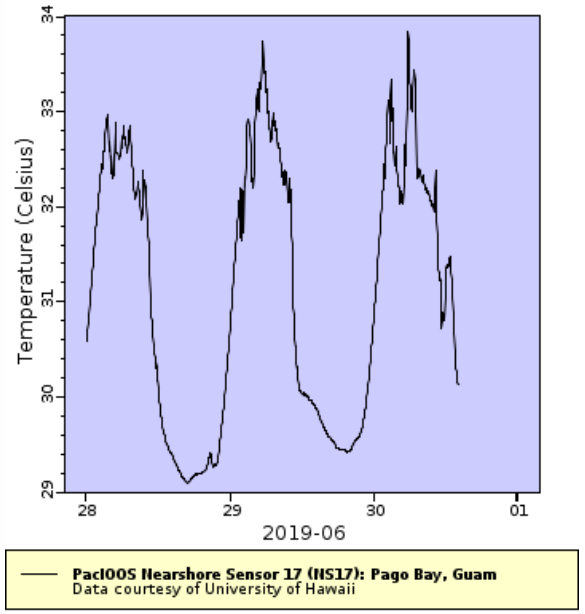

```
{
  "table": {
    "columnNames": ["time", "temperature"],
    "columnTypes": ["String", "float"],
    "columnUnits": ["UTC", "Celsius"],
    "rows": [
      ["2019-08-25T00:00:00Z", 29.4241],
      ["2019-08-25T00:04:00Z", 29.435],
      ["2019-08-25T00:08:00Z", 29.487],
      ["2019-08-25T00:12:00Z", 29.4487],
      ["2019-08-25T00:16:00Z", 29.5782],
      ["2019-08-25T00:20:00Z", 29.4044],
      ["2019-08-25T00:24:00Z", 29.4102],
      ["2019-08-25T00:28:00Z", 29.2926],
      ["2019-08-25T00:32:00Z", 29.3019],
      ["2019-08-25T00:36:00Z", 29.6139],
      ["2019-08-25T00:40:00Z", 29.5328],
      ["2019-08-25T00:44:00Z", 29.4189],
      ["2019-08-25T00:48:00Z", 29.2238],
      ["2019-08-25T00:52:00Z", 29.1466],
      ["2019-08-25T00:56:00Z", 29.1654],
      ["2019-08-25T01:00:00Z", 29.2136],
      ["2019-08-25T01:04:00Z", 29.2749],
      ["2019-08-25T01:08:00Z", 29.262],
      ["2019-08-25T01:12:00Z", 29.5853],
      ["2019-08-25T01:16:00Z", 29.6893],
      ["2019-08-25T01:20:00Z", 29.6402],
      ["2019-08-25T01:24:00Z", 29.6565],
      ["2019-08-25T01:28:00Z", 29.7081],
      ["2019-08-25T01:32:00Z", 29.7128],
      ["2019-08-25T01:36:00Z", 29.7664],
      ["2019-08-25T01:40:00Z", 29.8145],
      ["2019-08-25T01:44:00Z", 29.7827],
      ["2019-08-25T01:48:00Z", 29.7588],
      ["2019-08-25T01:52:00Z", 29.719],
      ["2019-08-25T01:56:00Z", 29.7583],
      ["2019-08-25T02:00:00Z", 29.7753],
      ["2019-08-25T02:04:00Z", 29.6539],
      ["2019-08-25T02:08:00Z", 29.6122],
      ["2019-08-25T02:12:00Z", 29.3526],
      ["2019-08-25T02:16:00Z", 29.3906],
      ["2019-08-25T02:20:00Z", 29.3759],
      ["2019-08-25T02:24:00Z", 29.4427],
      ["2019-08-25T02:28:00Z", 29.7149]
    ]
  }
}
```


Ln: 56 Col: 1

{JSON}

JavaScript Object Notation

	Description	Info	Example
	View a .kml file, suitable for Google Earth.	info	example
	View a small .pdf image file with a graph or map.	info	example
	View a standard, medium-sized .pdf image file with a graph or map.	info	example
	View a large .pdf image file with a graph or map.	info	example
	View a small .png image file with a graph or map.	info	example
	View a standard, medium-sized .png image file with a graph or map.	info	example
	View a large .png image file with a graph or map.	info	example
tPng	View a .png image file (just the data, without axes, landmask, or legend).	info	example



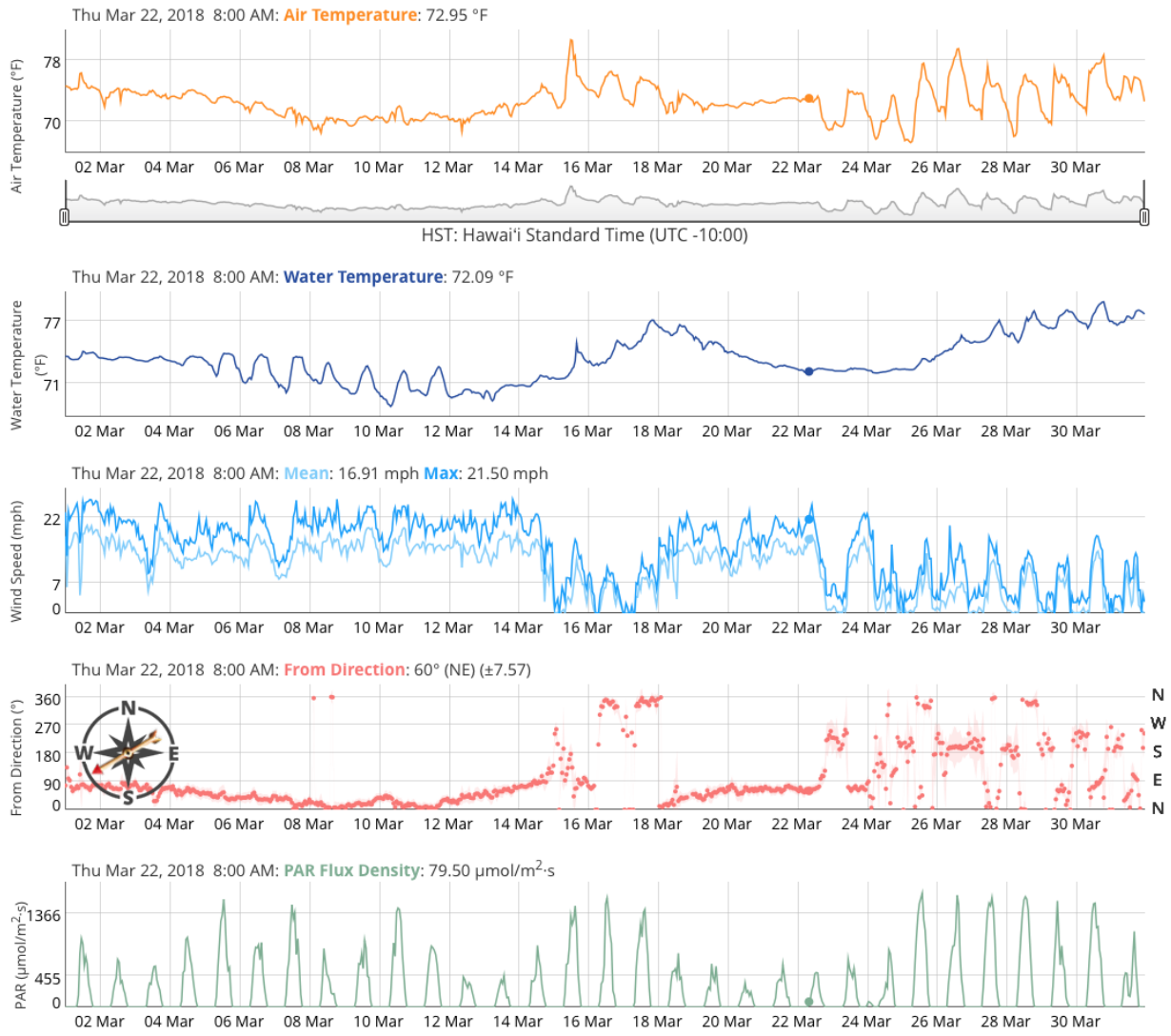
For examples and further details, please visit:
https://coastwatch.pfeg.noaa.gov/erddap/tabledap/documentation.html#fileType

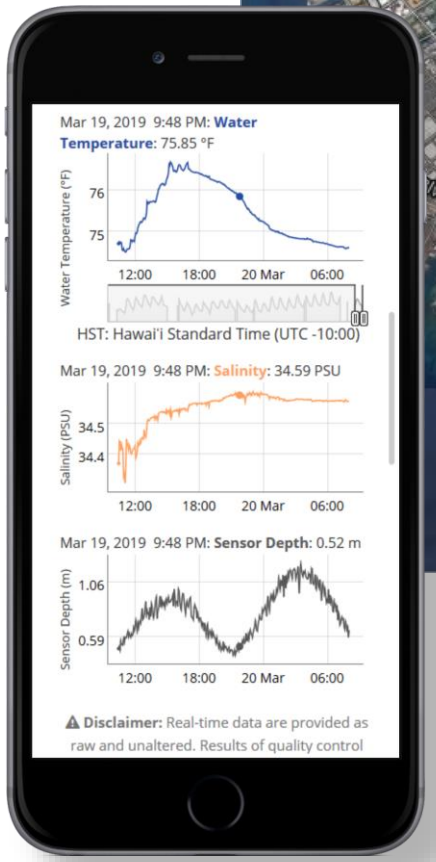
DATA STORAGE AND TRANSFER

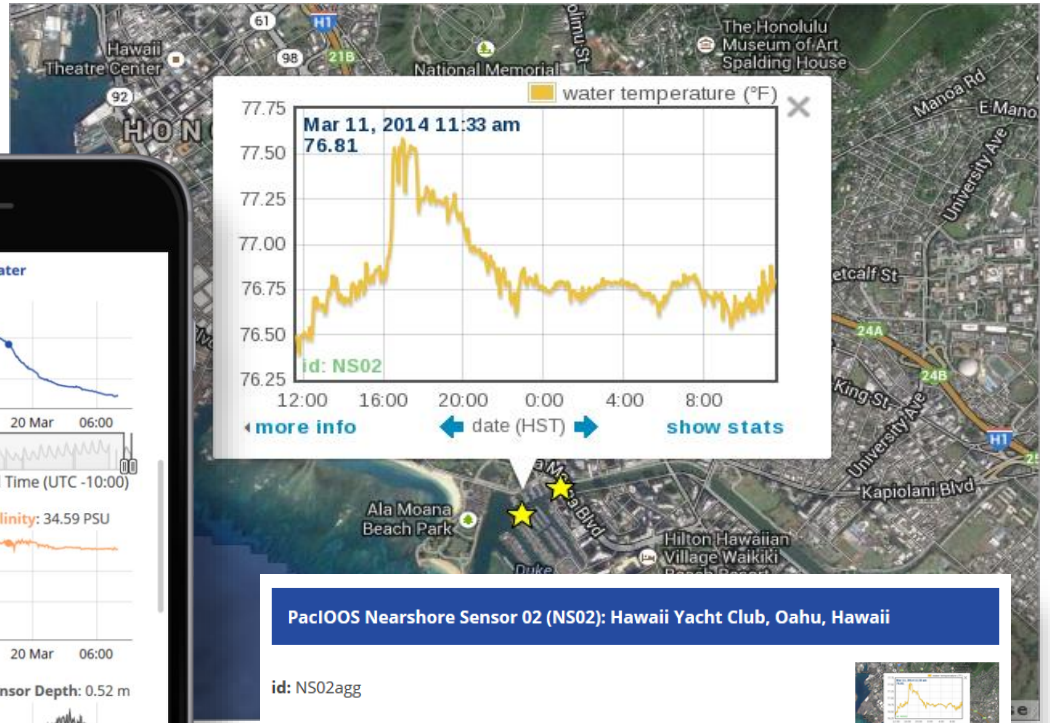
PacIOOS
PACIFIC ISLANDS OCEAN OBSERVING SYSTEM

Dynamic Custom Data Visualization

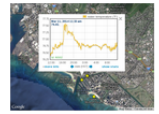
start date: time window: 30 days temperature: °F °C wind: mph knots km/h rain: in mm







PacIOOS Nearshore Sensor 02 (NS02): Hawaii Yacht Club, Oahu, Hawaii



id: NS02agg

The nearshore sensors are part of the Pacific Islands Ocean Observing System (PacIOOS) and are designed to measure a variety of ocean parameters at fixed point locations along the south shore of Oahu. NS02 is located at a floating dock off the Hawaii Yacht Club. The instrument is a Sea-Bird Electronics model 16+ V2 coupled with a WET Labs ECO-FLNTUS combination sensor. The package is fixed to a floating dock just below the ocean surface.

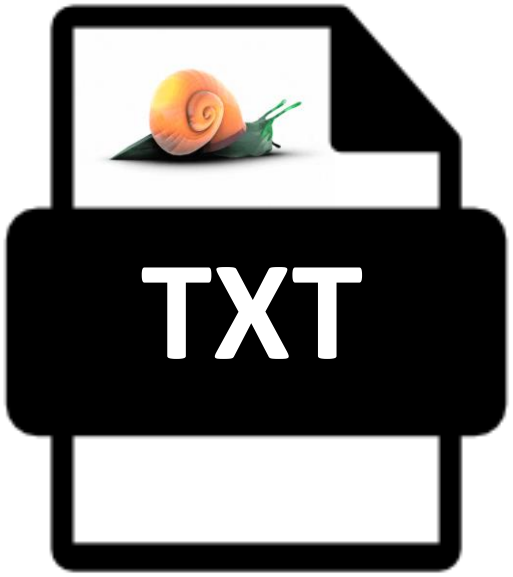
begin date: July 29, 2008 **end date:** March 18, 2019

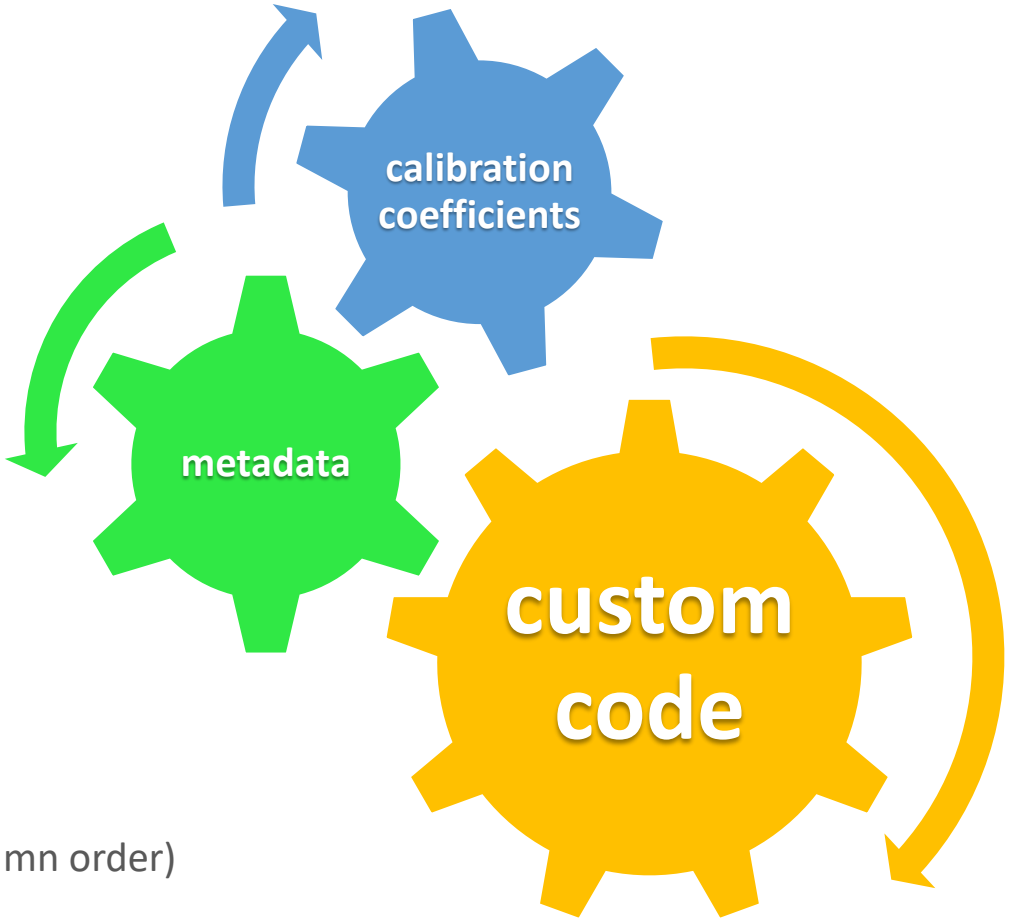
keywords: show

access methods: HTML • Voyager • THREDDS • ERDDAP • OPeNDAP

NEARSHORE SENSORS

NetCDF: Network Common Data Form





- "Black box"
- Formats vary considerably (*e.g.*, csv, ssv, tsv, headers, column order)

- For scientific data
- Binary format (efficient, portable)
- Self-describing (contains metadata)
- Community standards
- PacIOOS generates daily files

DATA STORAGE AND TRANSFER

PacIOOS
PACIFIC ISLANDS OCEAN OBSERVING SYSTEM

ERDDAP Installation

Bob Simons
NOAA Environmental Research Division
Monterey, California, USA

Java

Apache Tomcat

Is the installation procedure hard? Can I do it?

The initial installation takes some time, but it isn't very hard. You can do it. If you get stuck, email me at `bob dot simons at noaa dot gov`. I will help you.
Or, you can join the ERDDAP Google Group / Mailing List and post your question there.

How To Do the Initial Setup of ERDDAP on Your Server

ERDDAP can run on any server that supports Java and Tomcat (and perhaps other application servers). ERDDAP has been tested on Linux (including on Amazon's AWS), Mac, and Windows computers.

- **Amazon** -- If you are installing ERDDAP on an Amazon Web Services EC2 instance, see this Amazon Web Services Overview (below) first.
- **Docker** -- Axiom now offers ERDDAP in a Docker container.
  If you don't already use Docker, we don't recommend this.
  If you chose to install ERDDAP via Docker, we don't offer any support for the installation process.
  We haven't worked with Docker yet. If you work with this, please send us your comments.
- **Linux and Macs** -- ERDDAP works great on Linux and Mac computers.
- **Windows** -- Windows is fine for testing ERDDAP and for personal use, but we don't recommend using it for public ERDDAPs. Running ERDDAP on Windows may have problems: notably, ERDDAP may be unable to delete and/or rename files quickly. This is probably due to antivirus software (e.g., from McAfee and Norton) which is checking the files for viruses. If you run into this problem (which can be seen by error messages in the log.txt file like "Unable to delete ..."), changing the antivirus software's settings may partially alleviate the problem. Or consider using a Linux or Mac server instead.

For further details, please visit:
https://coastwatch.pfeg.noaa.gov/erddap/download/setup.html

DATA STORAGE AND TRANSFER

PacIOOS
PACIFIC ISLANDS OCEAN OBSERVING SYSTEM

ERDDAP Configuration

datasets.xml

Some Assembly Required
Setting up a dataset in ERDDAP isn't just a matter of pointing to the dataset's directory or URL. You have to write a chunk of XML for datasets.xml which describes the dataset.

Making the datasets.xml takes considerable effort for the first few datasets, but **it gets easier**. After the first dataset, you can often re-use a lot of your work for the next dataset. Fortunately, there are two Tools to help you create the XML for each dataset in datasets.xml.
If you get stuck, please send an email with the details to `bob dot simons at noaa dot gov`.
Or, you can join the ERDDAP Google Group / Mailing List and post your question there.

For further details, please visit:
https://coastwatch.pfeg.noaa.gov/erddap/download/setupDatasetsXml.html

DATA STORAGE AND TRANSFER

PacIOOS
PACIFIC ISLANDS OCEAN OBSERVING SYSTEM

ERDDAP Configuration

datasets.xml

Some Assembly Required
Setting up a dataset in ERDDAP isn't just a matter of pointing to the dataset's directory or URL. You have to write a chunk of XML for datasets.xml which describes the dataset.

Making the datasets.xml takes considerable effort for the first few datasets, but **it gets easier**. After the first dataset, you can often re-use a lot of your work for the next dataset. Fortunately, there are two Tools to help you create the XML for each dataset in datasets.xml.
If you get stuck, please send an email with the details to `bob dot simons at noaa dot gov`.
Or, you can join the ERDDAP Google Group / Mailing List and post your question there.

ERDDAP command-line utilities:

- **GenerateDatasetsXml**

  generate a rough draft of the dataset XML for almost any type of dataset

- **DasDds**

  *test and refine the XML prior to adding to your **datasets.xml***

For further details, please visit:
https://coastwatch.pfeg.noaa.gov/erddap/download/setupDatasetsXml.html

lawelawe.pacioos.hawaii.edu - lawelawe - SSH Secure Shell

File Edit View Window Help

Quick Connect Profiles

#1/4

```
    <dataset type="EDDTableFromNcFiles" datasetID="nss02_agg">
        <nDimensions>4</nDimensions>
        <reloadEveryNMinutes>10</reloadEveryNMinutes>
        <fileDir>/export/lawelawel/nss/ns02/agg/</fileDir>
        <recursive>false</recursive>
        <fileNameRegex>ns02_.*\.nc</fileNameRegex>
        <metadataFrom>last</metadataFrom>
        <preExtractRegex>^ns02_</preExtractRegex>
        <postExtractRegex>\.nc</postExtractRegex>
        <sortedColumnSourceName>time</sortedColumnSourceName>
        <defaultGraphQuery>time,temperature&amp;time&gt;=max(time)-3days&amp;.draw=lines</defaultGraphQuery>
        <defaultDataQuery>time,temperature,conductivity,turbidity,chlorophyll,salinity&amp;time&gt;=max(time)-3days</default
DataQuery>
        <addAttributes>
            <att name="title">PacIOOS Nearshore Sensor 02 (NS02): Hawaii Yacht Club, Oahu, Hawaii</att>
            <att name="summary">The nearshore sensors are part of the Pacific Islands Ocean Observing System (PacIOOS) and a
re designed to measure a variety of ocean parameters at fixed point locations along the south shore of Oahu. NS02 is located
 at a floating dock off the Hawaii Yacht Club. The instrument is a Sea-Bird Electronics model 16+ V2 coupled with a WET Labs
 ECO-FLNTUS combination sensor. The package is fixed to a floating dock just below the ocean surface.</att>
            <att name="id">NS02agg</att>
            <att name="naming_authority">org.pacioos</att>
            <att name="Conventions">CF-1.6, ACDD-1.3</att>
            <att name="Metadata_Link">http://pacioos.org/metadata/NS02agg.html</att>
            <att name="ISO_Topic_Categories">environment, oceans</att>
            <att name="keywords">Earth Science &gt; Oceans &gt; Ocean Chemistry &gt; Chlorophyll, Earth Science &gt; Oceans
&gt; Ocean Optics &gt; Turbidity, Earth Science &gt; Oceans &gt; Ocean Temperature &gt; Water Temperature, Earth Science &gt
; Oceans &gt; Salinity/Density &gt; Conductivity, Earth Science &gt; Oceans &gt; Salinity/Density &gt; Salinity, Earth Scien
ce &gt; Oceans &gt; Water Quality</att>
            <att name="keywords_vocabulary">GCMD Science Keywords</att>
            <att name="platform">In Situ Land-based Platforms &gt; Ocean Platform/Ocean Stations &gt; Coastal Stations</att>
            <att name="platform_vocabulary">GCMD Platform Keywords</att>
            <att name="instrument">In Situ/Laboratory Instruments &gt; Chemical Meters/Analyzers &gt; &gt; &gt; Fluorometers
, In Situ/Laboratory Instruments &gt; Conductivity Sensors, In Situ/Laboratory Instruments &gt; Photon/Optical Detectors &gt
; &gt; &gt; Turbidity Meters, In Situ/Laboratory Instruments &gt; Profilers/Sounders &gt; &gt; &gt; CTD, In Situ/Laboratory
Instruments &gt; Temperature/Humidity Sensors &gt; &gt; &gt; Temperature Sensors</att>
            <att name="instrument_vocabulary">GCMD Instrument Keywords</att>
            <att name="locations">Continent &gt; North America &gt; United States Of America &gt; Hawaii, Ocean &gt; Pacific
 Ocean &gt; Central Pacific Ocean &gt; Hawaiian Islands &gt; Oahu &gt; Ala Wai Canal, Ocean &gt; Pacific Ocean &gt; Central
Pacific Ocean &gt; Hawaiian Islands &gt; Oahu &gt; Honolulu, Ocean &gt; Pacific Ocean &gt; Central Pacific Ocean &gt; Hawaii
an Islands &gt; Oahu &gt; Waikiki</att>
            <att name="locations_vocabulary">GCMD Location Keywords</att>
            <att name="standard_name_vocabulary">CF Standard Name Table v39</att>
            <att name="history">UH/SOEST (M. McManus), PacIOOS asset (07/2008), QARTOD QA/QC implemented (01/2016)</att>
            <att name="comment">Data produced by Dr. Margaret McManus (mamc@hawaii.edu). Point of contact: Gordon Walker (gw
alker@hawaii.edu).</att>
            <att name="geospatial_lat_min" type="double">21.286407</att>
            <att name="geospatial_lat_max" type="double">21.286407</att>
            <att name="geospatial_lon_min" type="double">-157.84276</att>
            <att name="geospatial_lon_max" type="double">-157.84276</att>
            <att name="geospatial_vertical_min" type="double">-0.5</att>
            <att name="geospatial_vertical_max" type="double">-0.5</att>
            <att name="geospatial_vertical_positive">up</att>
            <att name="geospatial_bounds">POINT Z (21.286407 -157.84276 -0.5)</att>
            <att name="geospatial_bounds_crs">EPSG:4326</att>
            <att name="geospatial_bounds_vertical_crs">EPSG:5829</att>
            <att name="time_coverage_end">present</att>
            <att name="time_coverage_start">2008-07-29T00:16:00Z</att>
            <att name="geospatial_lat_units">degrees_north</att>
                                                                                    7210,1        30%
```

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File Edit View Window Help

Quick Connect Profiles

#2/4

```
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            <att name="geospatial_lon_units">degrees_east</att>
            <att name="geospatial_lon_resolution" type="double">0.0</att>
            <att name="geospatial_vertical_units">m</att>
            <att name="geospatial_vertical_resolution" type="double">0.0</att>
            <att name="time_coverage_resolution">PT4M</att>
            <att name="creator_email">mamc@hawaii.edu</att>
            <att name="creator_name">Margaret McManus</att>
            <att name="creator_type">person</att>
            <att name="creator_url">http://www.soest.hawaii.edu/oceanography/faculty/mcmanus.html</att>
            <att name="creator_institution">University of Hawaii</att>
            <att name="date_created">2008-07-29</att>
            <att name="date_issued">2008-07-29</att>
            <att name="date_modified">2016-01-08</att>
            <att name="date_metadata_modified">2017-01-30</att>
            <att name="institution">University of Hawaii</att>
            <att name="project">Pacific Islands Ocean Observing System (PacIOOS)</att>
            <att name="program">Pacific Islands Ocean Observing System (PacIOOS)</att>
            <att name="contributor_name">Jim Potemra</att>
            <att name="contributor_role">distributor</att>
            <att name="publisher_email">info@pacioos.org</att>
            <att name="publisher_name">Pacific Islands Ocean Observing System (PacIOOS)</att>
            <att name="publisher_url">http://pacioos.org</att>
            <att name="publisher_institution">University of Hawaii</att>
            <att name="publisher_type">group</att>
            <att name="processing_level">near real-time (nrt)</att>
            <att name="license">The data may be used and redistributed for free but is not intended for legal use, since it
may contain inaccuracies. Neither the data Contributor, University of Hawaii, PacIOOS, NOAA, State of Hawaii nor the United
States Government, nor any of their employees or contractors, makes any warranty, express or implied, including warranties o
f merchantability and fitness for a particular purpose, or assumes any legal liability for the accuracy, completeness, or us
efulness, of this information.</att>
            <att name="acknowledgement">The Pacific Islands Ocean Observing System (PacIOOS) is funded through the National
Oceanic and Atmospheric Administration (NOAA) as a Regional Association within the U.S. Integrated Ocean Observing System (I
OOS). PacIOOS is coordinated by the University of Hawaii School of Ocean and Earth Science and Technology (SOEST).</att>
            <att name="cdm_data_type">Point</att>
            <att name="source">Sea-Bird Electronics model 16plus V2 coupled with a WET Labs ECO-FLNTUS combination sensor</a
tt>
            <att name="references">http://pacioos.org/water/sensor-hawaiiyachtclub/</att>
            <!-- ERDDAP-specific: -->
            <att name="infoUrl">http://pacioos.org/water/sensor-hawaiiyachtclub/</att>
            <att name="sourceUrl">http://pacioos.org</att>
            <att name="testOutOfDate">now-26hours</att>
        </addAttributes>
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                <att name="point_spacing">null</att>
            </addAttributes>
        </dataVariable>
        <dataVariable>
            <sourceName>z</sourceName>
            <destinationName>depth</destinationName>
            <dataType>float</dataType>
            <addAttributes>
                <att name="comment">The depth of the station, nominally 0 (see station information for details).</att>
                <att name="scale_factor" type="float">-1</att>
                                                                                    7261,1        30%
```

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https://coastwatch.pfeg.noaa.gov/erddap/download/setupDatasetsXml.html

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File Edit View Window Help

Quick Connect Profiles

#3/4

```
        </addAttributes>
    </dataVariable>
    <dataVariable>
        <sourceName>lat</sourceName>
        <destinationName>latitude</destinationName>
        <dataType>float</dataType>
        <addAttributes>
        </addAttributes>
    </dataVariable>
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        <destinationName>longitude</destinationName>
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    </dataVariable>
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        <addAttributes>
            <att name="standard_name">sea_water_temperature</att>
            <att name="long_name">Temperature (processed)</att>
            <att name="units">Celsius</att>
            <att name="colorBarMinimum" type="double">11</att>
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            <att name="_FillValue" type="float">-999</att>
            <att name="ioos_category">Temperature</att>
        </addAttributes>
    </dataVariable>
    <dataVariable>
        <sourceName>cond</sourceName>
        <destinationName>conductivity</destinationName>
        <dataType>float</dataType>
        <addAttributes>
            <att name="standard_name">sea_water_electrical_conductivity</att>
            <att name="long_name">Conductivity (processed)</att>
            <att name="units">S m-1</att>
            <att name="colorBarMinimum" type="double">0</att>
            <att name="colorBarMaximum" type="double">50</att>
            <att name="_FillValue" type="float">-999</att>
            <att name="ioos_category">Unknown</att>
        </addAttributes>
    </dataVariable>
    <dataVariable>
        <sourceName>turb</sourceName>
        <destinationName>turbidity</destinationName>
        <dataType>float</dataType>
        <addAttributes>
            <att name="standard_name">sea_water_turbidity</att>
            <att name="long_name">Turbidity (processed)</att>
            <att name="units">NTU</att>
            <att name="colorBarMinimum" type="double">0</att>
            <att name="colorBarMaximum" type="double">10</att>
            <att name="_FillValue" type="float">-999</att>
            <att name="ioos_category">Optical Properties</att>
        </addAttributes>
    </dataVariable
```

7319,9 31%

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lawelawe.pacioos.hawaii.edu - lawelawe - SSH Secure Shell

File Edit View Window Help

Quick Connect Profiles

#4/4

```
            <dataType>float</dataType>
            <addAttributes>
                <att name="standard_name">sea_water_turbidity</att>
                <att name="long_name">Turbidity (processed)</att>
                <att name="units">NTU</att>
                <att name="colorBarMinimum" type="double">0</att>
                <att name="colorBarMaximum" type="double">10</att>
                <att name="_FillValue" type="float">-999</att>
                <att name="ioos_category">Optical Properties</att>
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        <dataVariable>
            <sourceName>flor</sourceName>
            <destinationName>chlorophyll</destinationName>
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                <att name="units">kg m-3</att>
                <att name="colorBarMinimum" type="double">0</att>
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                <att name="_FillValue" type="float">-999</att>
                <att name="ioos_category">Ocean Color</att>
            </addAttributes>
        </dataVariable>
        <dataVariable>
            <sourceName>salt</sourceName>
            <destinationName>salinity</destinationName>
            <dataType>float</dataType>
            <addAttributes>
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                <att name="colorBarMinimum" type="double">10</att>
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                <att name="_FillValue" type="float">-999</att>
                <att name="ioos_category">Salinity</att>
            </addAttributes>
        </dataVariable>
    </dataset>
</erddapDatasets
```

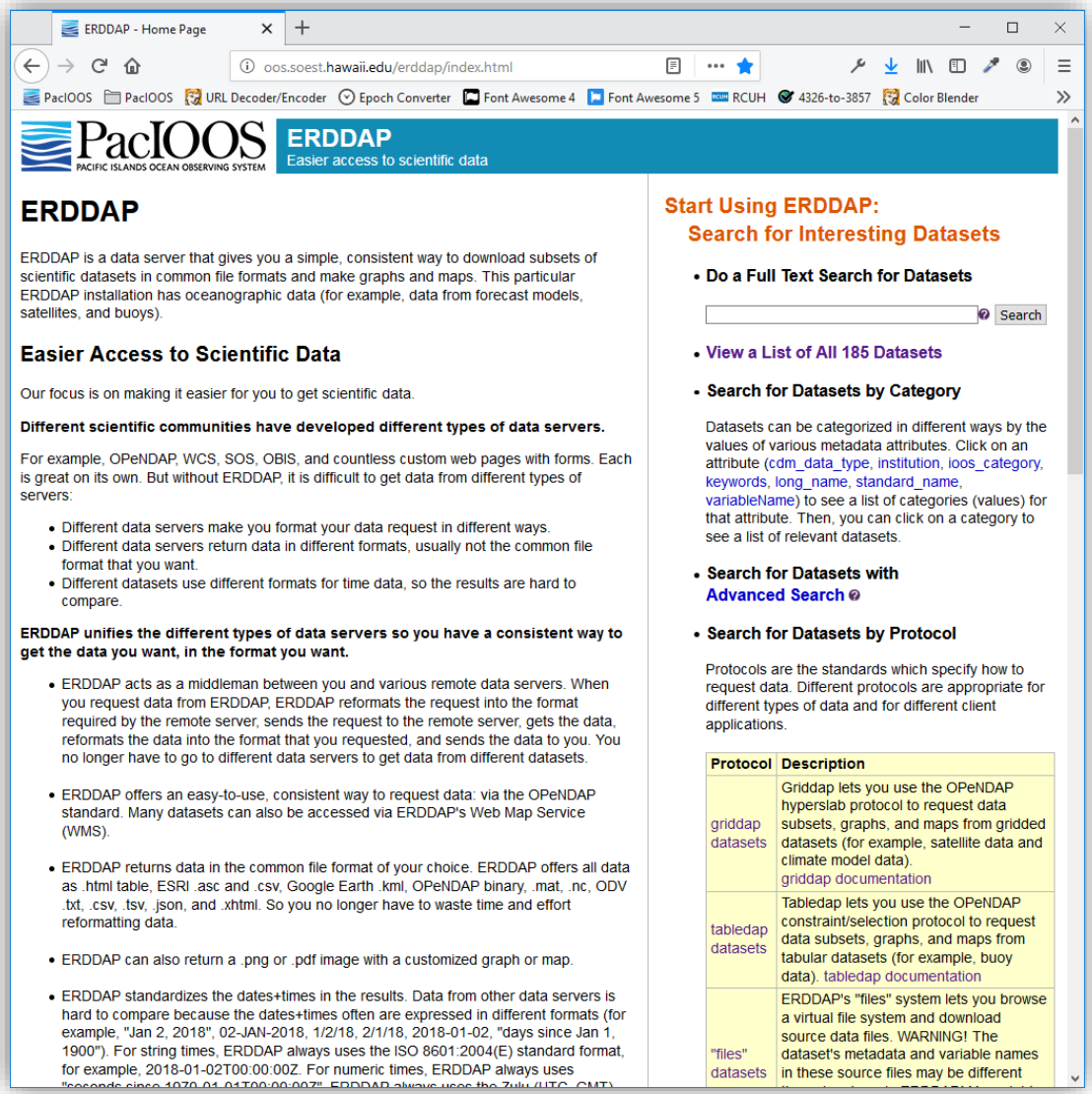
7350,1 Bot

Connected to lawelawe.pacioos.hawaii.edu SSH2 - aes128-cbc - hmac-md5 - n(124x59 NUM

https://coastwatch.pfeg.noaa.gov/erddap/download/setupDatasetsXml.html

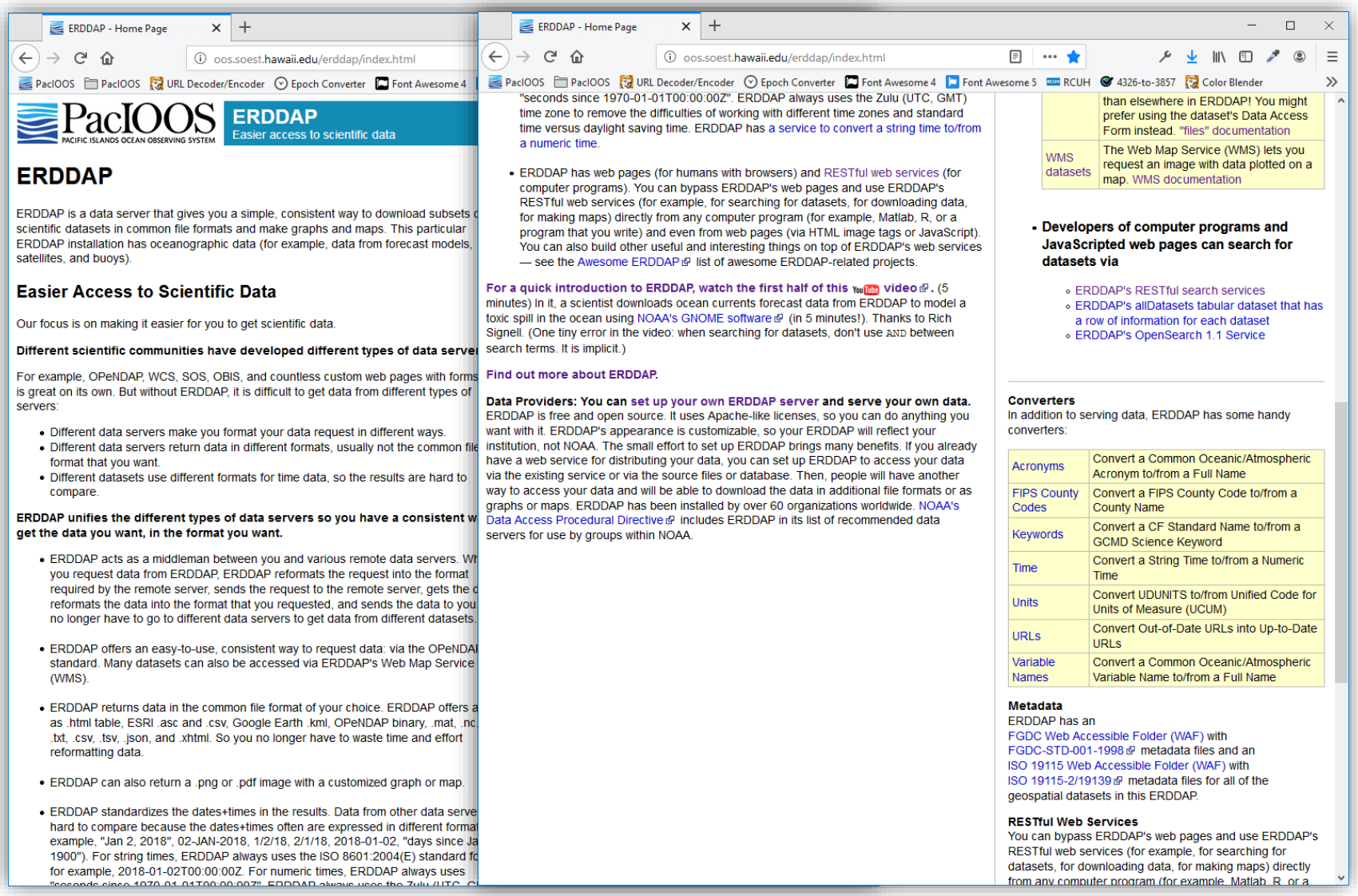
DATA STORAGE AND TRANSFER

ERDDAP Data Provider Form



DATA STORAGE AND TRANSFER

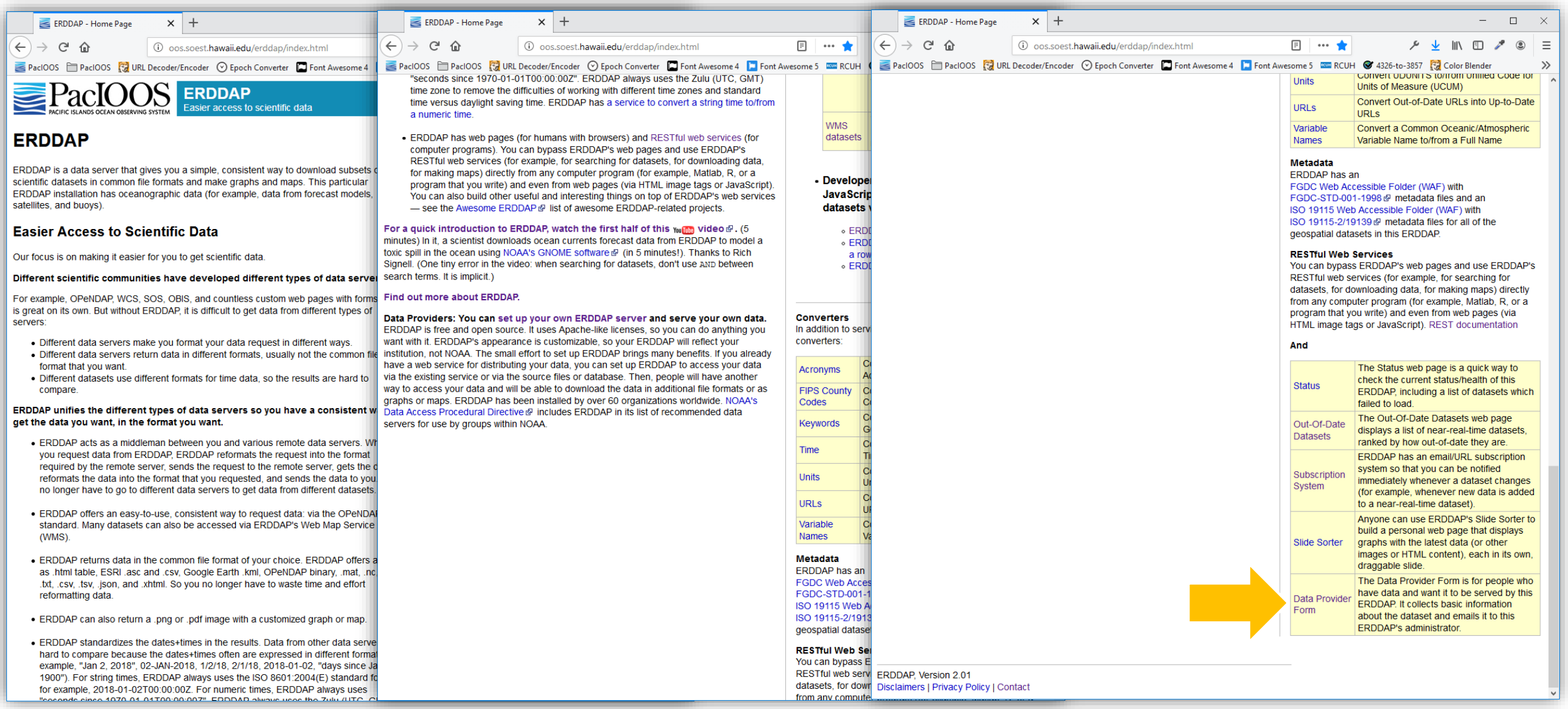
ERDDAP Data Provider Form



KEEP CALM AND SCROLL DOWN

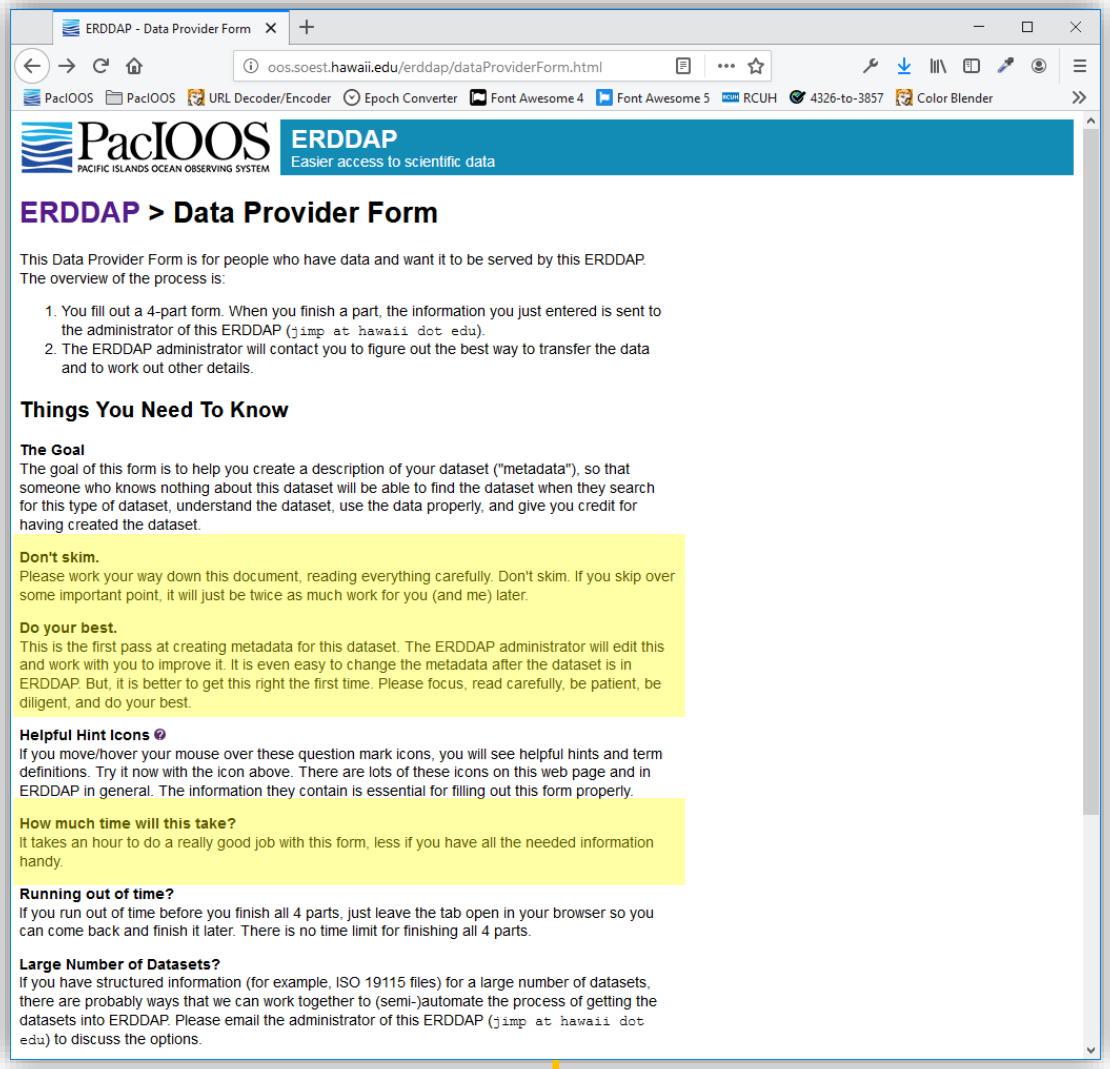
DATA STORAGE AND TRANSFER

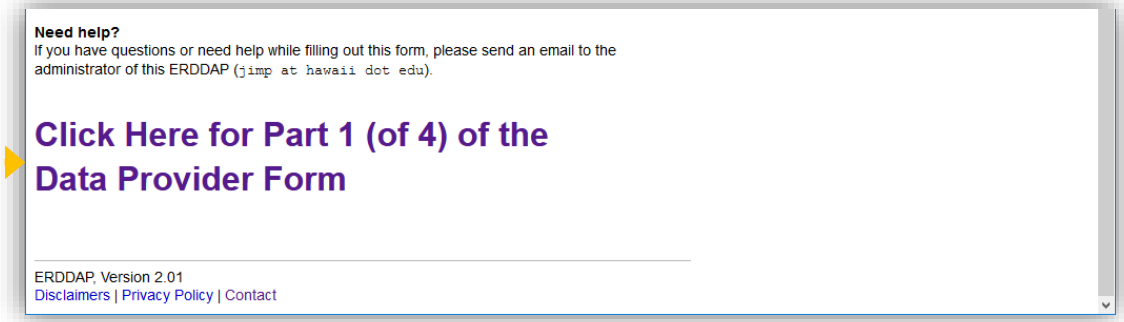
ERDDAP Data Provider Form



DATA STORAGE AND TRANSFER

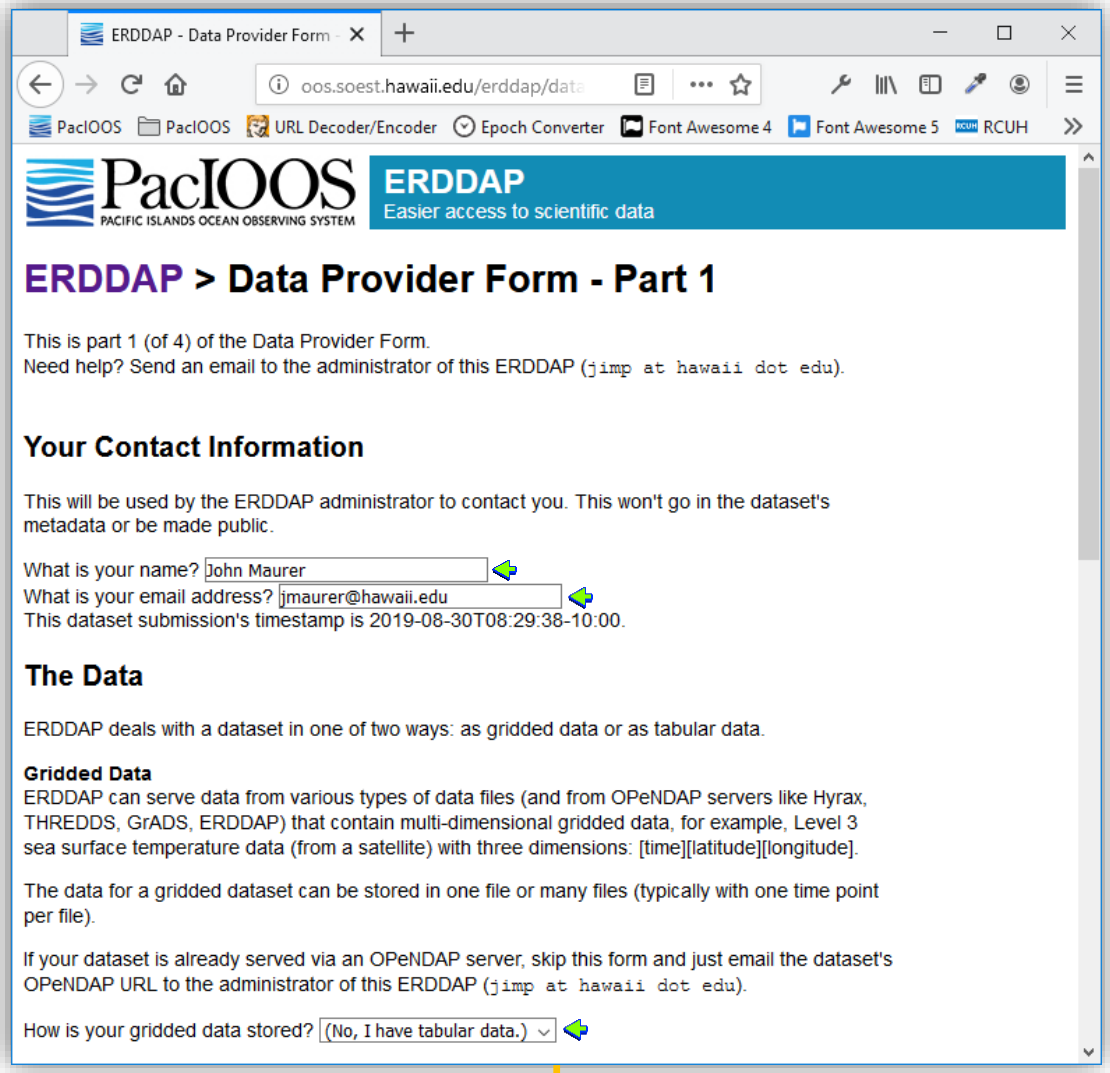
ERDDAP Data Provider Form

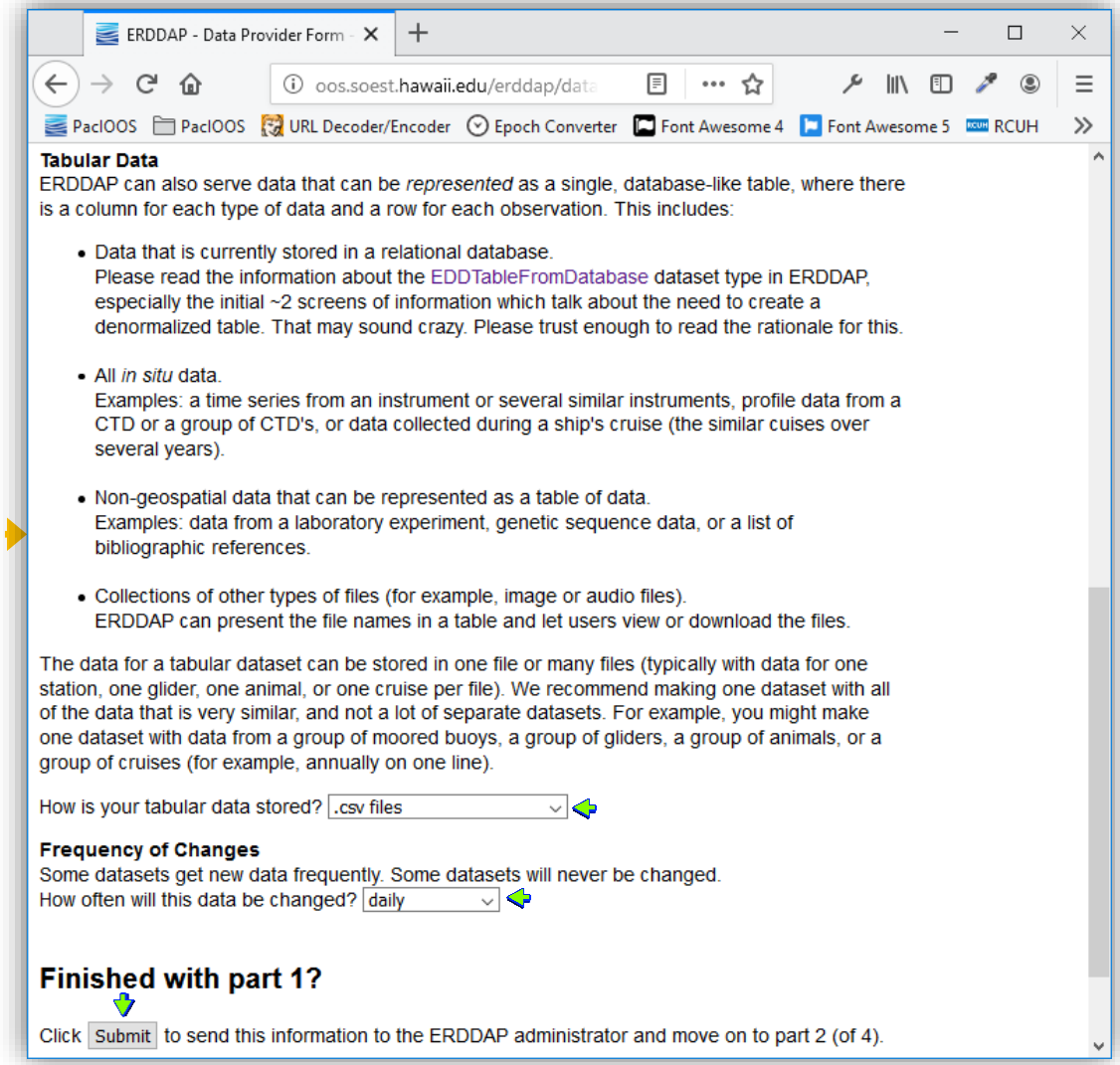




DATA STORAGE AND TRANSFER

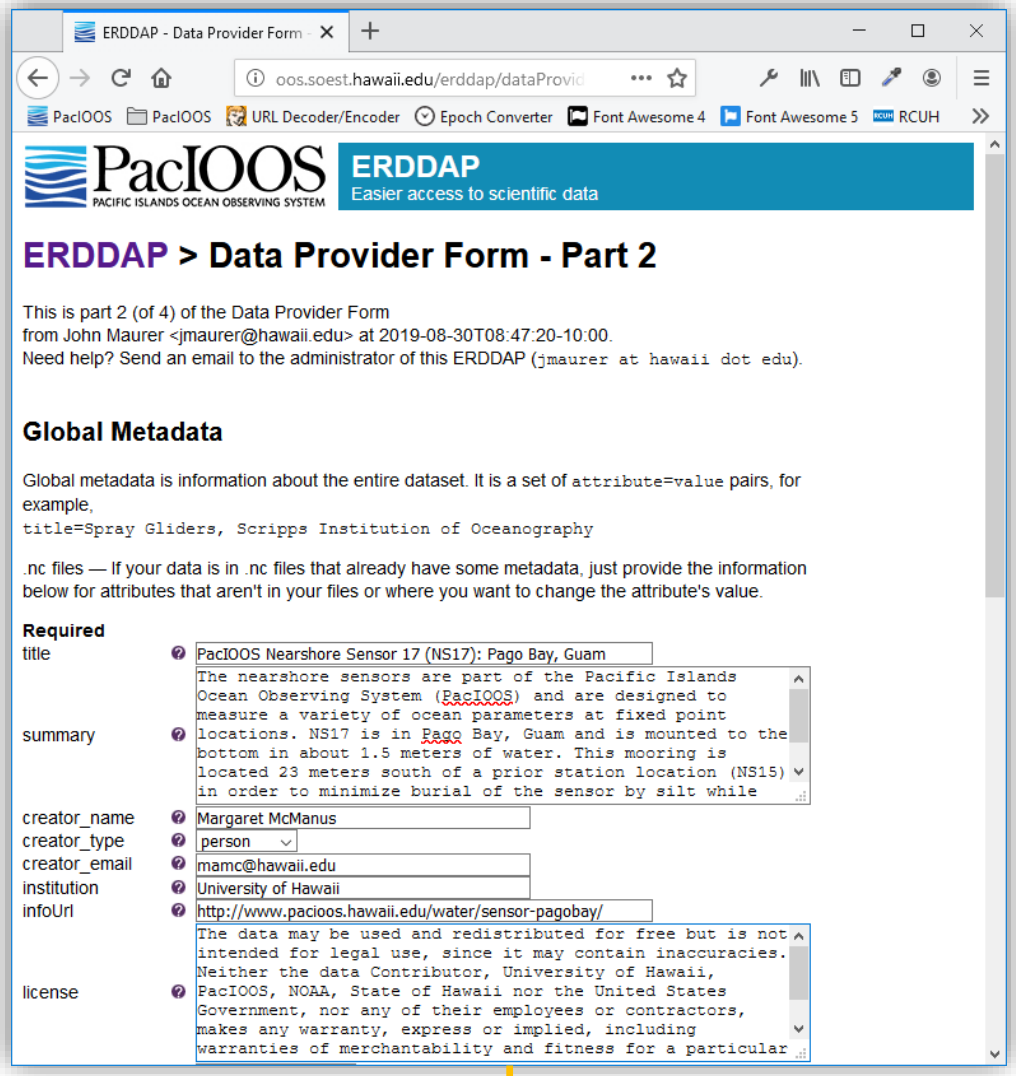
ERDDAP Data Provider Form: Part 1 (of 4)

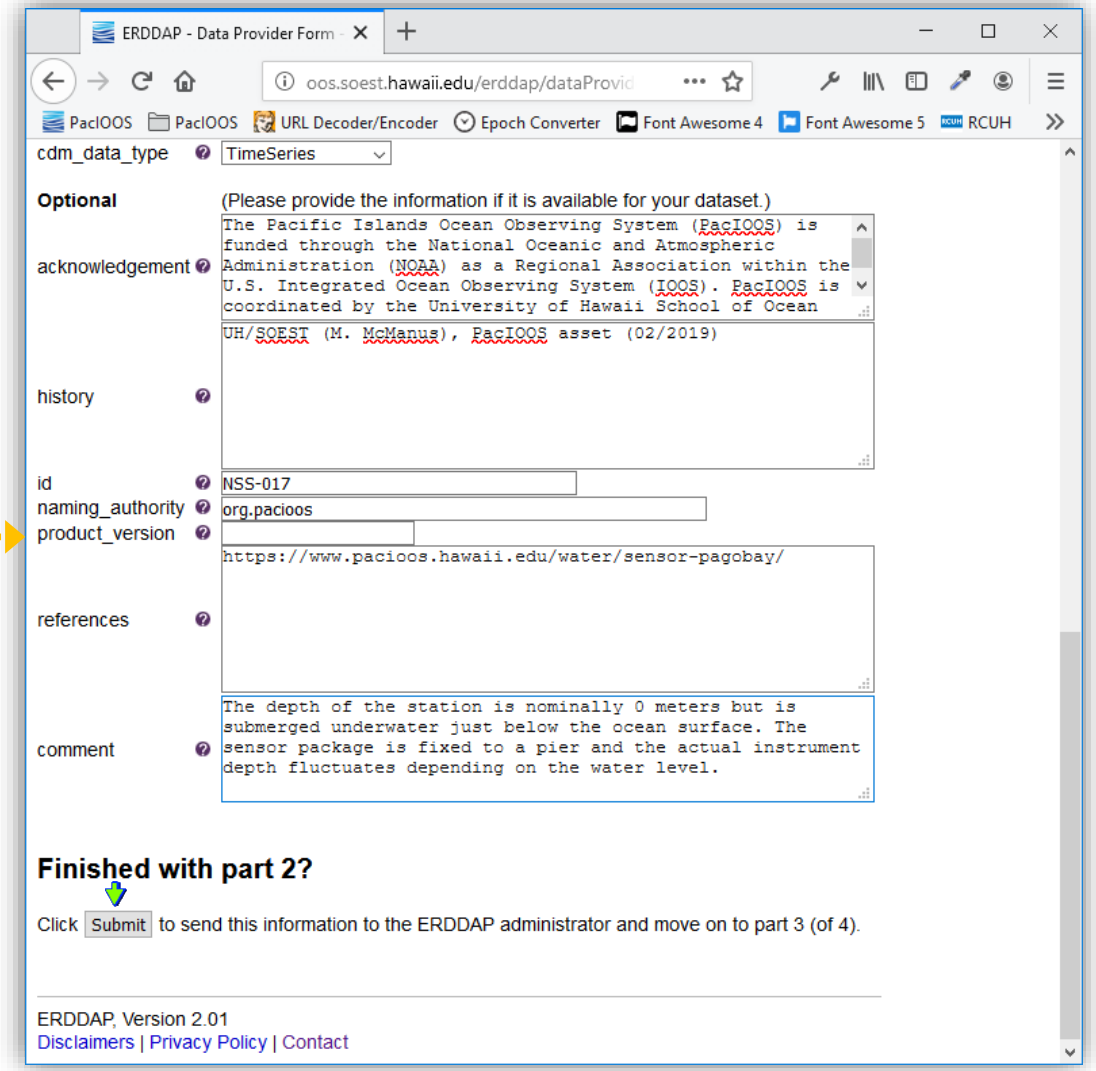




DATA STORAGE AND TRANSFER

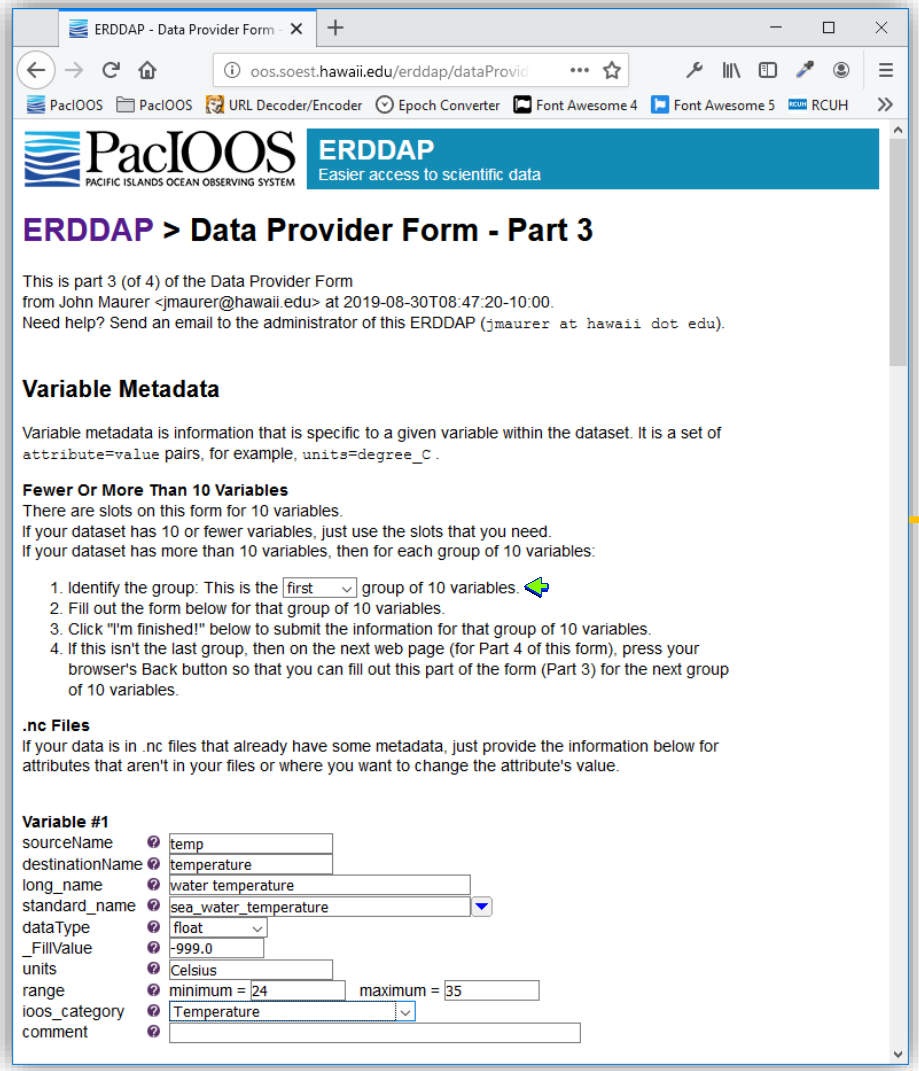
ERDDAP Data Provider Form: Part 2 (of 4)

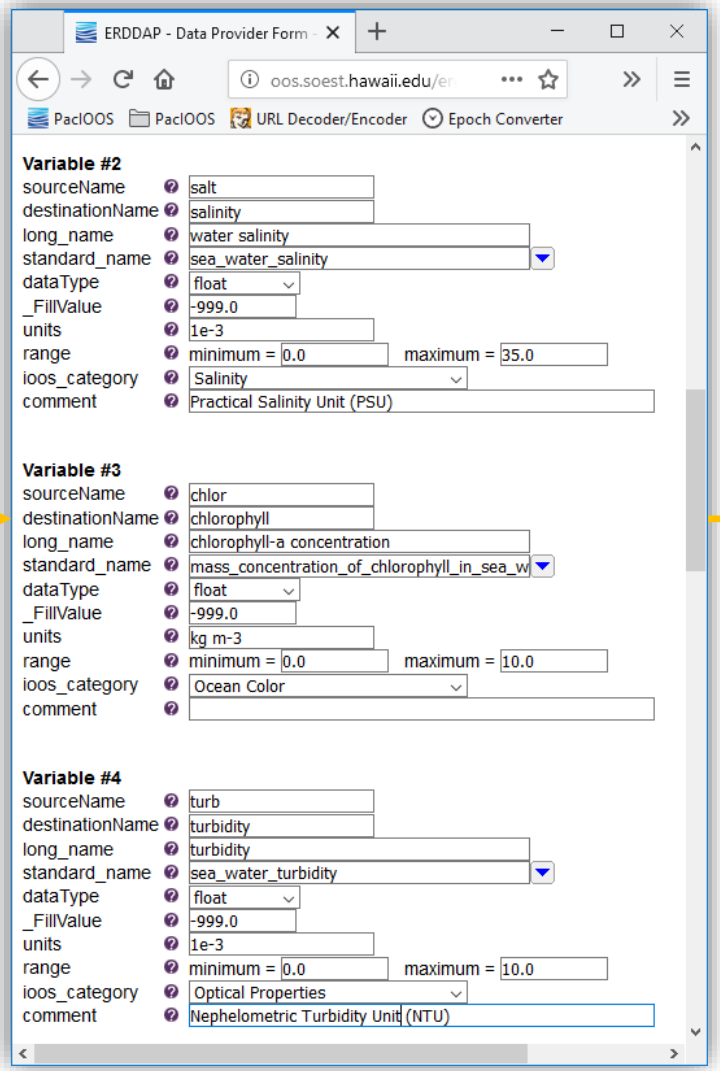


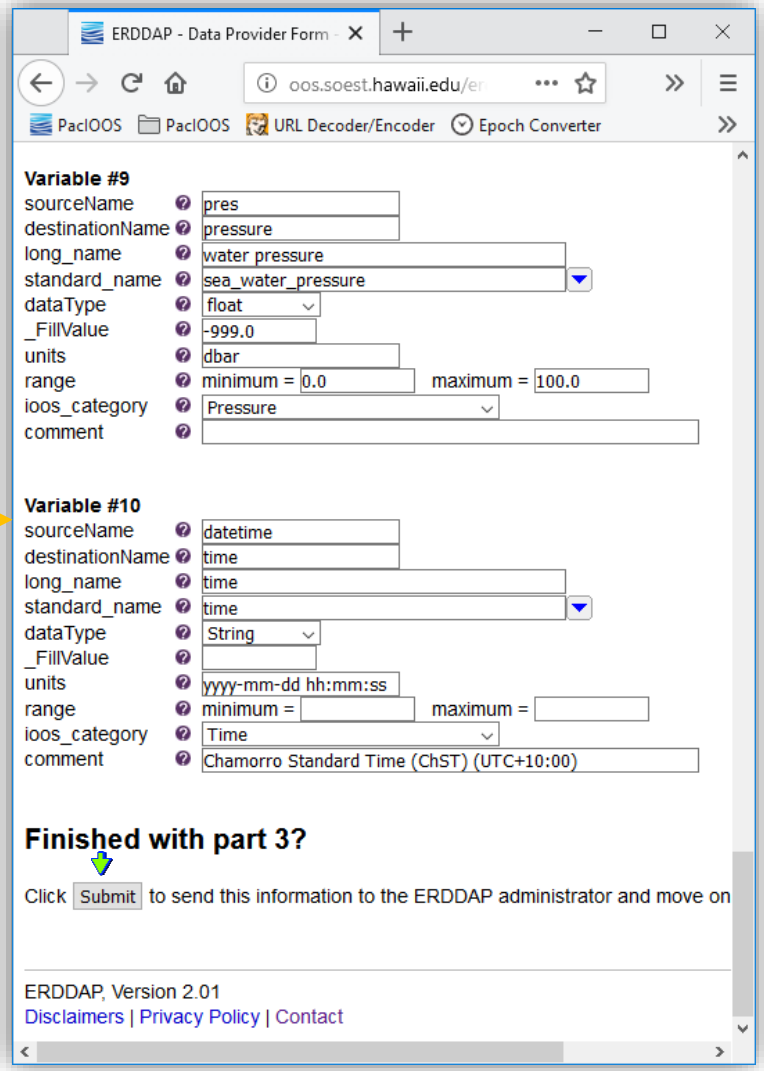


DATA STORAGE AND TRANSFER

ERDDAP Data Provider Form: Part 3 (of 4)

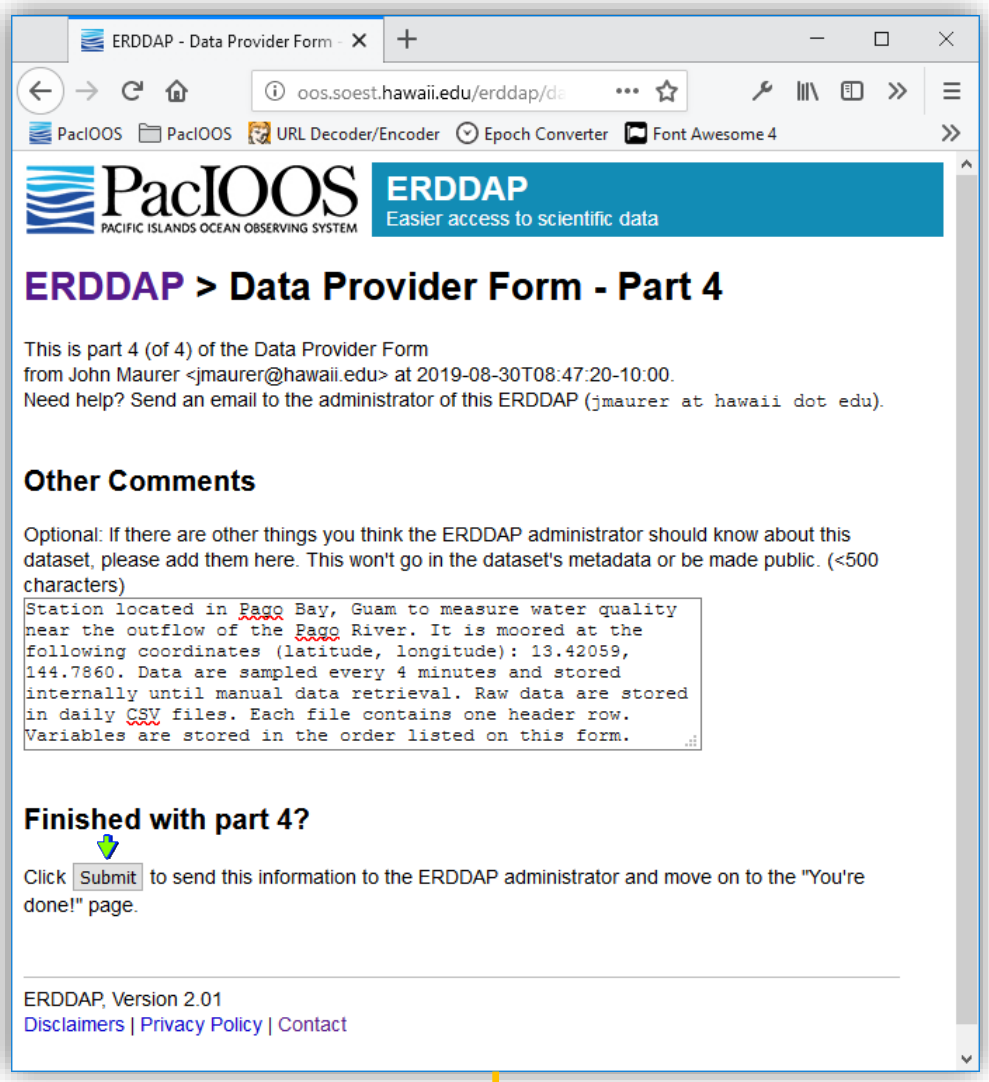


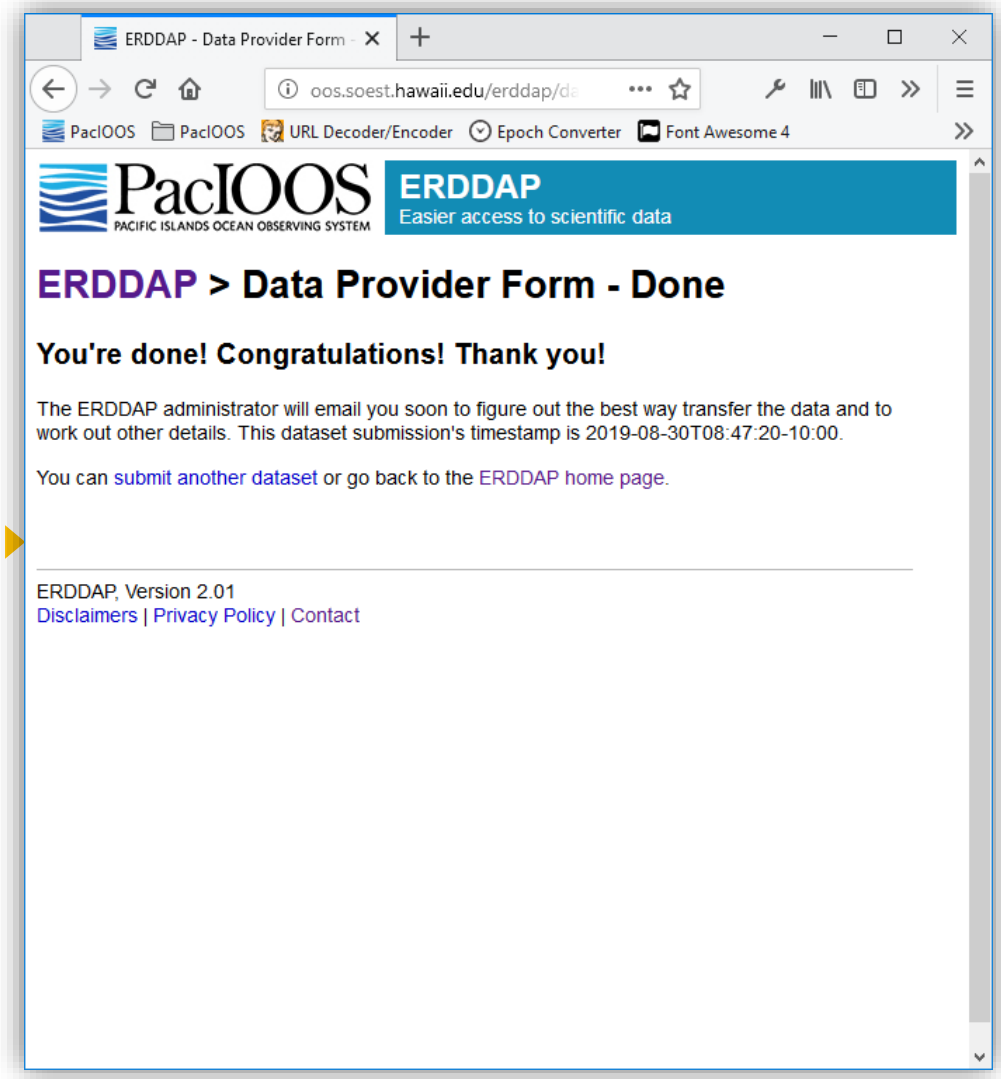




DATA STORAGE AND TRANSFER

ERDDAP Data Provider Form: Part 4 (of 4)

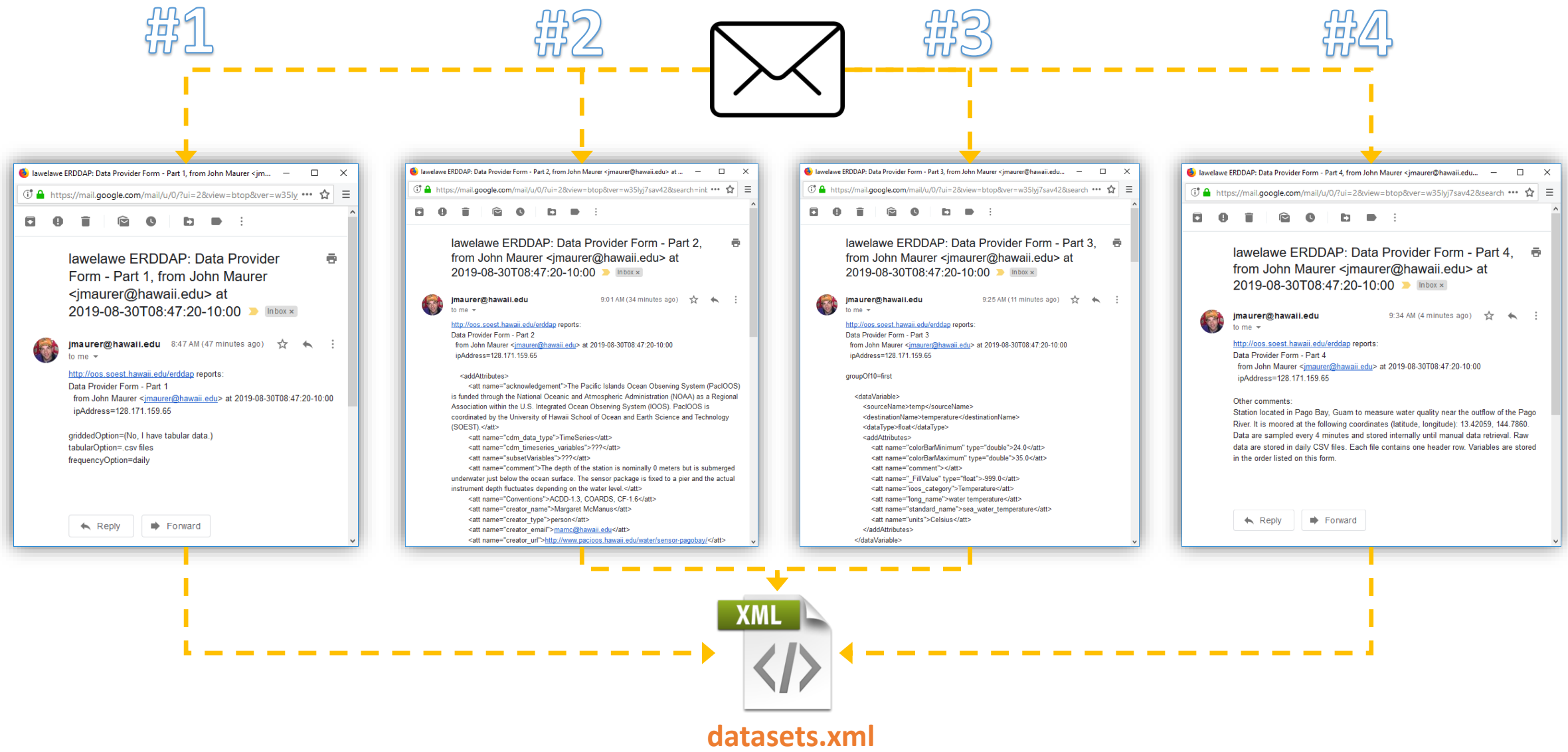




DATA STORAGE AND TRANSFER

PacIOOS
PACIFIC ISLANDS OCEAN OBSERVING SYSTEM

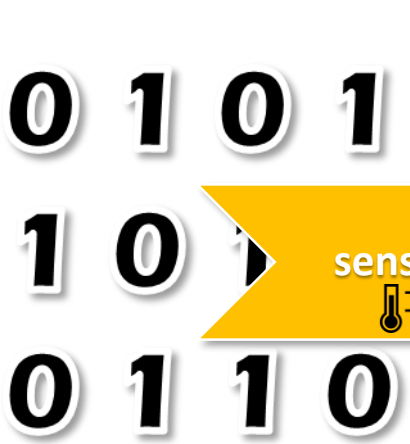
ERDDAP Data Provider Form: Admin Notifications



DATA STORAGE AND TRANSFER

PacIOOS
PACIFIC ISLANDS OCEAN OBSERVING SYSTEM

Summary



sensor

telemetry or retrieval

- **near real-time**
  - modem or iridium
- **delayed-mode**
  - visit site
  - internal memory or data logger
  - dump / export data

raw files

- **text format preferred**
  - avoid vendor-specific hexadecimal, binary, etc.
- **tabular preferred**
  - rows = by time
  - columns = by variable
- **formats vary widely**
  - CSV, TSV, SSV
  - header or not

D.O.C.

- **documentation**
  - README
  - metadata? (ISO, FGDC)
  - website?
- **organization**
  - organize by time
  - file span
  - filename convention
  - directory structure
- **consistency**
  - syntax
  - column order
  - missing value
  - units of measure
  - time zone

serving

- **FTP**
  - FTP/SFTP GUIs
  - mget command
- **HTTP**
  - web-accessible folder (WAF)
- **ERDDAP** ★
  - aggregates files into datasets
  - data visualization
  - front-end GUI (point-and-click) *and* back-end web services (programs)
  - can import text; NetCDF better
  - installation and set-up:
    - ✓ JAVA
    - ✓ Tomcat
    - ✓ datasets.xml
  - *or* submit data to an ERDDAP provider rather than set up your own: Data Provider Form
- **alternatives:** e-mail, Dropbox, Google Drive

users

- **people**
  - manual download
- **machines/programs**
  - automated ingest
  - model assimilation

PacIOOS ERDDAP:
http://pacioos.org/erddap/

For further details about ERDDAP, please visit:
https://coastwatch.pfeg.noaa.gov/erddap/information.html
https://coastwatch.pfeg.noaa.gov/erddap/download/setup.html

DATA STORAGE AND TRANSFER

PacIOOS
PACIFIC ISLANDS OCEAN OBSERVING SYSTEM

ERDDAP: Environmental Research Division's Data Access Program

For further details, please visit:
https://coastwatch.pfeg.noaa.gov/erddap/information.html

Thank you!

Any questions?

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