

# DATA COMMITTEE UPDATE

## 8 JANUARY, 2024

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TIM AHERN, IRIS/EARTHSCOPE EMERITUS, ESO DATA COMMITTEE

JOEL SIMON, EARTHSCOPE-OCEANS

CRISTOPH WALDMAN, MARUM

- Joel Simon, Princeton
  - Now Chair of FDSN WG V
  - Responsible for the effort to get MH data into GeoCSV format
    - GeoCSV files for MH can be found at <http://ds.iris.edu/data/reports/MH/>
- Christoph Waldman, Marum
- We would like to add a member from SUSTECH.
  - Yong Yu will be invited to join the committee

## 3

# SHIPMENT OF US AND FRENCH MERMAID DATA IN 2023

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- 1.69 gigabytes shipped to 16 distinct locations
- Shipped to 5 countries
  - US 75.5% France 20.8% China 3.5% Hong Kong 0.3% Japan <0.1%
  - 99.7% shipped FDSN Dataselect web service

| station | Bytes       | Gibibytes    | Percent |
|---------|-------------|--------------|---------|
| P0008   | 402,280,448 | 0.374653 GiB | 22.2 %  |
| P0010   | 362,942,464 | 0.338017 GiB | 20.0 %  |
| P0006   | 262,496,256 | 0.244469 GiB | 14.5 %  |
| P0009   | 151,650,304 | 0.141235 GiB | 8.4 %   |
| P0012   | 98,885,632  | 0.092094 GiB | 5.5 %   |
| P0011   | 97,095,680  | 0.090427 GiB | 5.4 %   |
| P0013   | 86,675,456  | 0.080723 GiB | 4.8 %   |
| P0023   | 69,312,512  | 0.064552 GiB | 3.8 %   |
| P0016   | 58,474,496  | 0.054459 GiB | 3.2 %   |
| P0020   | 32,935,936  | 0.030674 GiB | 1.8 %   |
| P0022   | 32,677,888  | 0.030434 GiB | 1.8 %   |
| P0007   | 31,440,896  | 0.029282 GiB | 1.7 %   |
| P0017   | 26,902,528  | 0.025055 GiB | 1.5 %   |
| P0021   | 25,358,336  | 0.023617 GiB | 1.4 %   |
| P0024   | 21,266,432  | 0.019806 GiB | 1.2 %   |
| P0019   | 19,259,392  | 0.017937 GiB | 1.1 %   |
| P0018   | 18,132,992  | 0.016888 GiB | 1.0 %   |
| P0025   | 13,217,792  | 0.012310 GiB | 0.7 %   |

# 4 DATA COMMITTEE TOPICS

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- GeoCSV update
- Proposed 2024 ESO Data Policy



# IDENTIFIED GEOCSV COMPONENTS

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- GeoCSV Header
- Column Identifiers
- A series of Elements as needed
  - Time and SNCL Information (normally necessary)
    - Start time, network, Station, Location, Channel
  - Positional Information
    - Latitude, Longitude, Elevation, Depth
  - Sensor information
    - SensorDescription, Scale, Scale Frequency, Scale Units
  - Timing Information
    - SampleRate, TimeDelay, TimeCorrection
  - Orientation Information
    - Dip, Azimuth, Uncertainties

# A GEOCSV EXAMPLE FROM P0008

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#dataset: GeoCSV 2.0
#created: 2023-09-01T20:01:17Z
#automaids: v3.5.3 (https://github.com/earthscopeoceans/automaids [doi: 10.5281/zenodo.5057096])
#delimiter: ','
#lineterminator: '\n'
#field_unit,ISO_8601,unitless,unitless,unitless,unitless,degrees_north,degrees_east,meters,meters,unitless,factor,hertz,unitless,hertz,seconds,seconds
#field_type,datetime,string,string,string,string,float,float,float,float,string,float,float,string,float,float,float
MethodIdentifier,StartTime,Network,Station,Location,Channel,Longitude,Latitude,Elevation,Depth,SensorDescription,Scale,ScaleFrequency,ScaleUnits,SampleRate
Measurement:GPS:u-blox_NEO-M8N,2018-08-05T13:23:15Z,MH,P0008,,nan,-12.008233,-172.023102,0,0,MERMAIDHydrophone(452.020),nan,nan,,nan,0.000030,nan
Measurement:GPS:u-blox_NEO-M8N,2018-08-05T13:32:46Z,MH,P0008,,nan,-12.006967,-172.018723,0,0,MERMAIDHydrophone(452.020),nan,nan,,nan,0.000062,nan
Measurement:GPS:u-blox_NEO-M8N,2018-08-06T13:47:22Z,MH,P0008,,nan,-12.047700,-172.013565,0,0,MERMAIDHydrophone(452.020),nan,nan,,nan,0.437377,nan
Measurement:GPS:u-blox_NEO-M8N,2018-08-06T13:48:40Z,MH,P0008,,nan,-12.047684,-172.013687,0,0,MERMAIDHydrophone(452.020),nan,nan,,nan,0.000000,nan
Measurement:GPS:u-blox_NEO-M8N,2018-08-06T13:54:20Z,MH,P0008,,nan,-12.047584,-172.014252,0,0,MERMAIDHydrophone(452.020),nan,nan,,nan,0.000000,nan
Algorithm:automaids:v3.5.3,2018-08-08T01:42:00Z,MH,P0008,00,BDH,-12.074427,-171.996506,0,1531,MERMAIDHydrophone(452.020),-149400,1.0,Pa,20.0,nan,-0.290870
Measurement:GPS:u-blox_NEO-M8N,2018-08-15T00:10:52Z,MH,P0008,,nan,-12.205566,-171.903763,0,0,MERMAIDHydrophone(452.020),nan,nan,,nan,1.643707,nan
Measurement:GPS:u-blox_NEO-M8N,2018-08-15T00:12:58Z,MH,P0008,,nan,-12.205900,-171.904053,0,0,MERMAIDHydrophone(452.020),nan,nan,,nan,0.000000,nan
Measurement:GPS:u-blox_NEO-M8N,2018-08-15T00:23:25Z,MH,P0008,,nan,-12.207367,-171.905502,0,0,MERMAIDHydrophone(452.020),nan,nan,,nan,0.000184,nan
Measurement:GPS:u-blox_NEO-M8N,2018-08-15T00:26:41Z,MH,P0008,,nan,-12.207784,-171.905991,0,0,MERMAIDHydrophone(452.020),nan,nan,,nan,0.000000,nan
Algorithm:automaids:v3.5.3,2018-08-16T05:47:33Z,MH,P0008,00,BDH,-12.231257,-171.890152,0,1527,MERMAIDHydrophone(452.020),-149400,1.0,Pa,20.0,nan,-0.242693
Algorithm:automaids:v3.5.3,2018-08-17T15:43:28Z,MH,P0008,00,BDH,-12.255579,-171.868423,0,1521,MERMAIDHydrophone(452.020),-149400,1.0,Pa,20.0,nan,-0.523292
Measurement:GPS:u-blox_NEO-M8N,2018-08-17T21:17:47Z,MH,P0008,,nan,-12.261200,-171.865814,0,0,MERMAIDHydrophone(452.020),nan,nan,,nan,0.569366,nan
Measurement:GPS:u-blox_NEO-M8N,2018-08-17T21:20:36Z,MH,P0008,,nan,-12.261483,-171.865891,0,0,MERMAIDHydrophone(452.020),nan,nan,,nan,0.000000,nan
Measurement:GPS:u-blox_NEO-M8N,2018-08-17T21:30:53Z,MH,P0008,,nan,-12.262450,-171.866318,0,0,MERMAIDHydrophone(452.020),nan,nan,,nan,-0.000153,nan
Measurement:GPS:u-blox_NEO-M8N,2018-08-17T21:34:04Z,MH,P0008,,nan,-12.262750,-171.866470,0,0,MERMAIDHydrophone(452.020),nan,nan,,nan,0.000000,nan
Algorithm:automaids:v3.5.3,2018-08-19T00:20:02Z,MH,P0008,00,BDH,-12.279121,-171.850571,0,1514,MERMAIDHydrophone(452.020),-149400,1.0,Pa,20.0,nan,-0.212875
Algorithm:automaids:v3.5.3,2018-08-19T00:39:30Z,MH,P0008,00,BDH,-12.279303,-171.850372,0,1509,MERMAIDHydrophone(452.020),-149400,1.0,Pa,20.0,nan,-0.215457
Algorithm:automaids:v3.5.3,2018-08-19T00:52:59Z,MH,P0008,00,BDH,-12.279428,-171.850235,0,1511,MERMAIDHydrophone(452.020),-149400,1.0,Pa,20.0,nan,-0.217243
Algorithm:automaids:v3.5.3,2018-08-19T02:19:21Z,MH,P0008,00,BDH,-12.280232,-171.849335,0,1515,MERMAIDHydrophone(452.020),-149400,1.0,Pa,20.0,nan,-0.228692
Algorithm:automaids:v3.5.3,2018-08-19T03:07:24Z,MH,P0008,00,BDH,-12.280680,-171.848831,0,1515,MERMAIDHydrophone(452.020),-149400,1.0,Pa,20.0,nan,-0.235061
Algorithm:automaids:v3.5.3,2018-08-19T04:20:04Z,MH,P0008,00,BDH,-12.281357,-171.848068,0,1519,MERMAIDHydrophone(452.020),-149400,1.0,Pa,20.0,nan,-0.244693
Algorithm:automaids:v3.5.3,2018-08-19T04:29:09Z,MH,P0008,00,BDH,-12.281442,-171.847977,0,1519,MERMAIDHydrophone(452.020),-149400,1.0,Pa,20.0,nan,-0.245898
Algorithm:automaids:v3.5.3,2018-08-19T05:59:02Z,MH,P0008,00,BDH,-12.282278,-171.847031,0,1519,MERMAIDHydrophone(452.020),-149400,1.0,Pa,20.0,nan,-0.257811
Algorithm:automaids:v3.5.3,2018-08-19T06:37:18Z,MH,P0008,00,BDH,-12.282635,-171.846634,0,1510,MERMAIDHydrophone(452.020),-149400,1.0,Pa,20.0,nan,-0.262883
Algorithm:automaids:v3.5.3,2018-08-19T07:07:36Z,MH,P0008,00,BDH,-12.282917,-171.846313,0,1520,MERMAIDHydrophone(452.020),-149400,1.0,Pa,20.0,nan,-0.266900
Algorithm:automaids:v3.5.3,2018-08-19T07:49:18Z,MH,P0008,00,BDH,-12.283305,-171.845886,0,1507,MERMAIDHydrophone(452.020),-149400,1.0,Pa,20.0,nan,-0.272426
Algorithm:automaids:v3.5.3,2018-08-19T08:18:19Z,MH,P0008,00,BDH,-12.283575,-171.845581,0,1503,MERMAIDHydrophone(452.020),-149400,1.0,Pa,20.0,nan,-0.276273
Algorithm:automaids:v3.5.3,2018-08-19T10:45:20Z,MH,P0008,00,BDH,-12.284945,-171.844040,0,1504,MERMAIDHydrophone(452.020),-149400,1.0,Pa,20.0,nan,-0.295761
Algorithm:automaids:v3.5.3,2018-08-19T11:00:53Z,MH,P0008,00,BDH,-12.285089,-171.843872,0,1508,MERMAIDHydrophone(452.020),-149400,1.0,Pa,20.0,nan,-0.297822
Algorithm:automaids:v3.5.3,2018-08-19T15:06:10Z,MH,P0008,00,BDH,-12.287374,-171.841309,0,1517,MERMAIDHydrophone(452.020),-149400,1.0,Pa,20.0,nan,-0.330334
Algorithm:automaids:v3.5.3,2018-08-19T18:44:21Z,MH,P0008,00,BDH,-12.289405,-171.839035,0,1498,MERMAIDHydrophone(452.020),-149400,1.0,Pa,20.0,nan,-0.359255
Algorithm:automaids:v3.5.3,2018-08-19T18:49:50Z,MH,P0008,00,BDH,-12.289456,-171.838974,0,1496,MERMAIDHydrophone(452.020),-149400,1.0,Pa,20.0,nan,-0.359982
Algorithm:automaids:v3.5.3,2018-08-19T19:13:35Z,MH,P0008,00,BDH,-12.289678,-171.838730,0,1499,MERMAIDHydrophone(452.020),-149400,1.0,Pa,20.0,nan,-0.363131
Algorithm:automaids:v3.5.3,2018-08-19T23:24:07Z,MH,P0008,00,BDH,-12.292010,-171.836105,0,1502,MERMAIDHydrophone(452.020),-149400,1.0,Pa,20.0,nan,-0.396341
Measurement:GPS:u-blox_NEO-M8N,2018-08-20T05:05:16Z,MH,P0008,,nan,-12.294117,-171.836166,0,0,MERMAIDHydrophone(452.020),nan,nan,,nan,0.441558,nan
Measurement:GPS:u-blox_NEO-M8N,2018-08-20T05:11:31Z,MH,P0008,,nan,-12.293883,-171.837067,0,0,MERMAIDHydrophone(452.020),nan,nan,,nan,0.000062,nan
Measurement:GPS:u-blox_NEO-M8N,2018-08-20T05:30:22Z,MH,P0008,,nan,-12.293150,-171.839966,0,0,MERMAIDHydrophone(452.020),nan,nan,,nan,0.000428,nan
Measurement:GPS:u-blox_NEO-M8N,2018-08-20T05:36:19Z,MH,P0008,,nan,-12.292916,-171.840851,0,0,MERMAIDHydrophone(452.020),nan,nan,,nan,0.000030,nan
Algorithm:automaids:v3.5.3,2018-08-21T22:35:31Z,MH,P0008,00,BDH,-12.292279,-171.818924,0,1497,MERMAIDHydrophone(452.020),-149400,1.0,Pa,20.0,nan,-0.439514
Algorithm:automaids:v3.5.3,2018-08-22T15:29:16Z,MH,P0008,00,BDH,-12.292337,-171.808548,0,1504,MERMAIDHydrophone(452.020),-149400,1.0,Pa,20.0,nan,-0.620691

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# GEOCSV HEADER

| GeoCSV Header      |            |             |        |             |           |
|--------------------|------------|-------------|--------|-------------|-----------|
| Column Row Headers |            |             |        |             |           |
| Time + SNCL        | Positional | Sensor/Gain | Timing | Orientation | As Needed |

- GeoCSV Header

- #dataset: GeoCSV 2.0
- #created: 2021-07-28T23:25:20Z
- #automaid: v3.4.2 (<https://github.com/earthscopeoceans/automaid> (doi: 10.5281/zenodo.5057096))
- #delimiter: ','
- #lineterminator: '\n'

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# COLUMN ROW HEADERS

GeoCSV Header

Column Row Headers

Time + SNCL

Positional

Sensor/Gain

Timing

Orientation

As Needed

|                      |                     |                  |               |
|----------------------|---------------------|------------------|---------------|
| <b>degrees_north</b> | <b>degrees_east</b> | <b>meters</b>    | <b>meters</b> |
| <b>float</b>         | <b>float</b>        | <b>float</b>     | <b>float</b>  |
| <b>latitude</b>      | <b>longitude</b>    | <b>elevation</b> | <b>depth</b>  |



# POSSIBLE ELEMENTS – ESO EXAMPLE

Sensor orientation for MH OBS could go here  
go here

Header Column Row Headers

| Type         | Time and SNCL |          |          |          |          | Position     |              |           |        | Sensor       |         |              |            | Timing     |           |                |
|--------------|---------------|----------|----------|----------|----------|--------------|--------------|-----------|--------|--------------|---------|--------------|------------|------------|-----------|----------------|
| #field_unit  | ISO_8601      | unitless | unitless | unitless | unitless | degrees_nort | degrees_east | meters    | meters | unitless     | factor  | hertz        | unitless   | hertz      | seconds   | seconds        |
| #field_type  | datetime      | string   | string   | string   | string   | float        | float        | float     | float  | string       | float   | float        | string     | float      | float     | float          |
| MethodIden   | StartTime     | Network  | Station  | Location | Channel  | Latitude     | Longitude    | Elevation | Depth  | SensorDescri | Scale   | ScaleFrequer | ScaleUnits | SampleRate | TimeDelay | TimeCorrection |
| Measurement  | 2018-08-05T   | MH       | P0008    |          | nan      | -12.008233   | -172.0231    | 0         | 0      | MERMAIDHy    | nan     | nan          |            | nan        | 0.00003   | nan            |
| Measurement  | 2018-08-05T   | MH       | P0008    |          | nan      | -12.006967   | -172.01872   | 0         | 0      | MERMAIDHy    | nan     | nan          |            | nan        | -0.000062 | nan            |
| Measurement  | 2018-08-06T   | MH       | P0008    |          | nan      | -12.0477     | -172.01357   | 0         | 0      | MERMAIDHy    | nan     | nan          |            | nan        | 0.437377  | nan            |
| Measurement  | 2018-08-06T   | MH       | P0008    |          | nan      | -12.047684   | -172.01369   | 0         | 0      | MERMAIDHy    | nan     | nan          |            | nan        | 0         | nan            |
| Measurement  | 2018-08-06T   | MH       | P0008    |          | nan      | -12.047584   | -172.01425   | 0         | 0      | MERMAIDHy    | nan     | nan          |            | nan        | 0         | nan            |
| Algorithm:au | 2018-08-08T   | MH       | P0008    |          | 0 BDH    | -12.074427   | -171.99651   | 0         | 1531   | MERMAIDHy    | -149400 |              | 1 Pa       | 20         | nan       | -0.29087       |
| Measurement  | 2018-08-15T   | MH       | P0008    |          | nan      | -12.205566   | -171.90376   | 0         | 0      | MERMAIDHy    | nan     | nan          |            | nan        | 1.643707  | nan            |
| Measurement  | 2018-08-15T   | MH       | P0008    |          | nan      | -12.2059     | -171.90405   | 0         | 0      | MERMAIDHy    | nan     | nan          |            | nan        | 0         | nan            |
| Measurement  | 2018-08-15T   | MH       | P0008    |          | nan      | -12.207367   | -171.9055    | 0         | 0      | MERMAIDHy    | nan     | nan          |            | nan        | -0.000184 | nan            |
| Measurement  | 2018-08-15T   | MH       | P0008    |          | nan      | -12.207784   | -171.90599   | 0         | 0      | MERMAIDHy    | nan     | nan          |            | nan        | 0         | nan            |
| Algorithm:au | 2018-08-16T   | MH       | P0008    |          | 0 BDH    | -12.231257   | -171.89015   | 0         | 1527   | MERMAIDHy    | -149400 |              | 1 Pa       | 20         | nan       | -0.242693      |
| Algorithm:au | 2018-08-17T   | MH       | P0008    |          | 0 BDH    | -12.255579   | -171.86842   | 0         | 1521   | MERMAIDHy    | -149400 |              | 1 Pa       | 20         | nan       | -0.523292      |
| Measurement  | 2018-08-17T   | MH       | P0008    |          | nan      | -12.2612     | -171.86581   | 0         | 0      | MERMAIDHy    | nan     | nan          |            | nan        | 0.569366  | nan            |

# CURRENT STATUS

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- 2023 FDSN meetings at IUGG in Berlin
  - GeoCSV officially adopted as an FDSN Standard
  - In order to maximize use the goal is to merge the GeoCSV information into the existing StationXML standard
  - NSF has been contacted
    - Submit a short description of the project
    - Potential to fund small proposal outside of normal solicitation process and deadlines
    - My current estimate is about \$100K (not including overheads) to
      - Develop an application that will insert GeoCSV information files directly into StationXML
      - Extract information from StationXML and output compliant GeoCSV files in a lossless manner



# NEXT STEPS FOR GEOCSV

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- Find funding (NSF has been contacted)
- Two potential contractors currently developing cost proposals
- Select contractor
- Select host organization to support the proposal
  - Ronin Institute (low overhead) but need to become Ronin Scholar
  - EarthScope or Princeton (higher overhead but less difficult)
  - Another not-for-profit
- Write the proposal (a rough outline has been developed)
- Proposal will support application development and travel support to coordinate proposal adoption and outreach at targeted international and national meetings (IASPEI, AGU, etc.)
- Target release by August 2025 IASPEI/FDSN meeting





# DATA POLICY REDO

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- 2021 Proposal
- **Recommended Data Policy and Citation**
- The data policy established by ESO is quite progressive. Data from at least 10% of an ESO partners MERMAIDS should be released without any delay other than the time required for data curation.
- Data from all other stations must be released after two years.
- Reference ESO data using DOI 10.7914/SN/MH.

But some members had concerns with the above so.....

# PROPOSED 2024 EARTHSCOPE-OCEANS DATA POLICY

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EarthScope-Ocean stations rely on financial support from individual organizations and funding agencies. As such, specific organizations may have different requirements, and as such, individual organizations may determine their own data release policy.

Some partners in EarthScope-Oceans have adopted a very **Progressive Data Policy** which states:

*Data from at least 10% of an ESO partner's MERMAIDS should be released without any delay other than the time required for data curation. Data from all other stations will be released two years after recording.*

EarthScope-Ocean Partners that have adopted the Progressive Data Policy include:

- Géoazur, (France)
- Princeton University, (US)

Specific Data Policies in place by other EarthScope-Oceans Partners

- Stanford (US)
  - (insert specific policy here)
- Jamstec (Japan)
  - (insert specific policy here)
- EOST (France)
  - (insert specific policy here)
- Sustech (China)
  - (insert specific policy here)
- University of Sao Paulo and Observatorio Nacional of Brazil (Brazil)
  - (insert specific policy here)

**Data from EarthScope-Oceans shall reference ESO data using the International Federation of Digital Seismograph Networks (FDSN) DOI 10.7914/SN/MH**



# THANK YOU

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