



A METADATA CONVENTION FOR PASSIVE ACOUSTIC RECORDINGS VERSION 1.0

Shane Guan¹, Hassan Moustahfid², Anna Milan³ and Jacqueline Mize⁴

¹ NOAA/National Marine Fisheries Service, Office of Protected Resources Silver Spring, MD, USA

^{2*} NOAA/ U.S. Integrated Ocean Observing System, Silver Spring, MD, USA

(corresponding author. hassan.moustahfid@noaa.gov)

³ NOAA, National Geophysical Data Center, Boulder, CO, USA

⁴ NOAA, National Coastal Data Development Center, Stennis, MS, USA

Version 1.0
August 2014

DOCUMENT VALIDATION



U.S. IOOS Program Office Validation



Zdenka S. Willis, Director, U.S. IOOS Program Office

08/14/14

Date

Table of Contents

DOCUMENT VALIDATION	2
ENDORSEMENT DISCLAIMER.....	4
ACKNOWLEDGEMENTS.....	5
Background	6
Summary of Metadata Categories.....	6
Mission / project metadata	6
Platform metadata	6
Recording equipment metadata.....	6
Definition of Attributes for Passive Acoustic Recordings Metadata	7
Category I: Mission and Project.....	7
Category II: Platform	12
Category III: Recording Equipment (sensor, pre-amplifier, A/D converter, additional signal conditioning).....	16
ISO 19115 XML Template for NOAA Passive Acoustic Recordings	19

ENDORSEMENT DISCLAIMER

Mention of a commercial company or product does not constitute an endorsement by NOAA. Use of information from this publication for publicity or advertising purposes concerning proprietary products or the tests of such products is not authorized

ACKNOWLEDGEMENTS

Special thanks go to Sofia VanParijs (NOAA, NEFSC), Jason Gedamke (NOAA, NMFS OS&T) for comments and suggestions that considerably improved this document content. We also appreciate the support from Jolie Harrison (NOAA, NMFS OPR), Zdenka Willis (US IOOS), Charlie Alexander (IOOS), and Dr. Christopher Fox (NGDC) for supporting this joint effort.

Background

The objective of this document is to present metadata that supports the mission of the National Oceanic and Atmospheric Administration (NOAA) for acquisition, archiving, and dissemination of ocean passive acoustic data. Metadata is data that describes data. A metadata convention is a systemic set of metadata attributes that have been developed to describe a particular genre or type of data. This document attempts to create a host metadata list that is necessary to describe passive acoustic datasets from various platforms and sensors from NOAA's different line offices. The metadata list will further be used to develop a "machine-readable" metadata template to be tested among passive acoustic data holders and the community. Hopefully it will eventually be adopted as the NOAA metadata standard for passive acoustic recordings. The terms "metadata convention" and "metadata standard" are often used interchangeably. This document details a "convention" which may be followed, as against a "standard" that is more stringent and must be adhered to. The goal of the eventual development of such a standard will facilitate discovery and exchange of passive acoustic recording data while ensuring its archivability and longevity.

Summary of Metadata Categories

Mission / project metadata

This is the metadata that gives a high level description of the overarching initiative (e.g., mission, project, ocean observing system) under which passive acoustic data are collected.

Platform metadata

This metadata set includes vessel, glider, drifting buoy, and fixed platform (buoy-moored sensor, suspended sensor, and bottom-mounted sensor, etc.). This metadata describes the platform used to collect passive acoustic data.

Recording equipment metadata

This metadata include instruments involved in passive acoustic data collection. The category includes instrumentation, which describes a collection of the instrument package, and each separate component of the instrument package: hydrophone / sensor, pre-amplifier, analogue/digital converter, and recorder.

Definition of Attributes for Passive Acoustic Recordings Metadata

Category I: Mission and Project

<u>Metadata name</u>	<u>Definition</u>	<u>Data type</u> ¹	<u>Unit</u>	<u>Authority</u>
project_ID	ID number of mission or project, if exists	S		
project_name	Name of mission or project	S		
project_abstract	Free text description of the mission or project, its purpose, scientific objectives and area of operation. Other instruments and experiments within the mission or project which may or may not relate directly to the passive acoustic data can be included	S		
project_purpose	Free text description of the purpose or objective of the project or mission			
data_acknowledgement	Any users (including re-packagers) of this data are required to clearly acknowledge the source of the material in this format. E.g., acknowledge contribution of the datasets	S		
principal_investigator	Name of the principal investigator in charge of the mission or project	S		
organizationName	Name and address of the organization, facility, or agency where the original data were produced	S		ISO 19115-2:2009(E)
principal_investigator_position	Position and title of the principal investigator	S		
principal_investigator_phone	Principal investigator's phone number	S		

¹ "S" denotes the entry is a text value, while "N" denotes the entry is a numeric value.

principal_investigator_fax	Principal investigator's facsimile number	S		
principal_investigator_address	Principal investigator's address line	S		
principal_investigator_city	Principal investigator's address city	S		
principal_investigator_state	Principal investigator's state/province or region	S		
principal_investigator_zip	Principal investigator's ZIP or postal code	S		
principal_investigator_country	Principal investigator's country	S		
principal_investigator_email	Principal investigator's e-mail address	S		
contact_instruction	Description on how to contact the PI for data	S		
data_update_frequency	How often the acoustic data get updated	N		
last_data_update	The date when acoustic data were updated	N		
data_update_note	Notes for data updates	S		
data_center_contact_name	Name of the contact person at the data center	S		
data_center	Data center in charge of the data management or party who distributed the resource	S		
data_center_contact_position	Position and title of the contact person at the data center	S		
data_center_phone	Data center phone number	S		
data_center_fax	Data center facsimile number	S		
data_center_address	Address line of the data center	S		
data_center_city	City where the data center is located	S		
data_center_state	State or province where the data center is located	S		
data_center_zip	ZIP code or postal code of the data center	S		
data_center_country	Country where the data center is located	S		
data_center_e-mail	e-mail address of the data center	S		
data_center_website	Web site of the data center			
data_center_hours	Hours of service of the data center	S		

contact_instruction_data_center	Description on how to contact the data center	S		
data_file_name	File name of the acoustic data			
data_file_version	File version of the acoustic data			
data_type	Type of acoustic data (.wav, mp3, etc.)			
compression_technique	Acoustic data compression technique, if any			
ambient_noise	Place keyword for ambient noise			
animal_sound	Place keyword for animal sound			
anthropogenic_noise	Place keyword for anthropogenic noise			
Pacific_Ocean	Place keyword for Pacific Ocean			GCMD, keywords vs 8.0
Atlantic_Ocean	Place keyword for Atlantic Ocean			GCMD, keywords vs 8.0
Arctic_Ocean	Place keyword for Arctic Ocean			GCMD, keywords vs 8.0
Indian_Ocean	Place keyword for Indian Ocean			GCMD, keywords vs 8.0
place	Keywords for places			
vessel	Platform keyword for vessel			
glider	Platform keyword for glider			IOOS Platform Vocabulary
drifting_buoy	Platform keyword for drifting buoy			IOOS Platform Vocabulary
moored_buoy	Platform keyword for moored buoy			IOOS Platform Vocabulary
bottom_mounted	Platform keyword for bottom-mounted platform			
platform	Keywords for platforms			IOOS Platform Vocabulary

hydrophone_pressure_sensor	Instrument keyword for pressure sensor hydrophone			
hydrophone_vector_sensor	Instrument keyword for vector sensor hydrophone			
preamplifier	Instrument keyword for pre-amplifier			
AD_converter	Instrument keyword for A/D converter			
recorder_analogue	Instrument keyword for analogue recorder			
recorder_digital	Instrument keyword for digital recorder			
other_signal_conditioning	Instrument keyword for other signal conditioning devices			
instrument	Keywords for instrument			
NEFSC	dataCenter keyword for NEFSC			
SEFSC	dataCenter keyword for SEFSC			
NWFSC	dataCenter keyword for NWFSC			
SWFSC	dataCenter keyword for SWFSC			
AFSC	dataCenter keyword for AFSC			
PIFSC	dataCenter keyword for PIFSC			
dataCenter	Keywords for data centers			
data_restriction	Restriction of data distribution	S		
language	Language	S		
project_area_description	Description of the project area	S		
project_geospatial_longitude_minimum	Westernmost longitude of bounding box. A value between -180 and 180 decimal degrees East. Note it is possible for the numeric value of the “geospatial longitude maximum” to be less than the numeric value of the “geospatial longitude minimum.” In that instance the bounding box will have crossed the 180 degree longitude boundary between West and East.	N	degrees_east	CF

project_geospatial_longitude_maximum	Easternmost longitude of bounding box. A value between -180 and 180 decimal degrees East. Note it is possible for the numeric value of the “geospatial longitude maximum” to be less than the numeric value of the “geospatial longitude minimum.” In that instance the bounding box will have crossed the 180 degree longitude boundary between West and East.	N	degrees_east	CF
project_geospatial_latitude_minimum	Southernmost latitude of bounding box. A value between -90 and 90 decimal degrees North	N	degrees_north	CF
project_geospatial_latitude_maximum	Northernmost latitude of bounding box. A value between -90 and 90 decimal degrees North.	N	degrees_north	CF
project_start_date	Start data of mission or project in ISO 8601 format including local time zone. For example, a local time of 18:00 on the 24th of October 2008 would be represented as 2008-10-24T08:00:00Z+10 (local).	S		
project_end_date	As per mission_start_date	S		
minimum_sensor_depth	Minimum sensor depth in m			
maximum_sensor_depth	Maximum sensor depth in m			
supplemental_info	Additional info			

Category II: Platform

<u>Metadata name</u>	<u>Definition</u>	<u>Data type</u>	<u>Units</u>	<u>Authority</u>
vessel_name	Name of the vessel that was used to collect passive acoustic data.	S		
vessel_id	ID number of the vessel, if it exists	S		
acoustic_sampling_start_date	Start data of acoustic data collection in ISO 8601 format including local time zone. For example, a local time of 18:00 on the 24th of October 2008 would be represented as 2008-10-24T08:00:00Z+10 (local).			
platform_detail	Free field provide detailed description of the platform, include tow speed (for towed hydrophone or hydrophone array), number of sensors, array directivity in housing, array geometry, array beamwidth, platform noise signature, platform synchronization, and platform manufacture date, etc.			
<u>Metadata name</u>	<u>Definition</u>	<u>Data type</u>	<u>Units</u>	<u>Authority</u>
glider_name	Name of the glider that was used to collect passive acoustic data.	S		
glider_id	ID number of the glider, if it exists	S		
acoustic_sampling_start_date	Start data of acoustic data collection in ISO 8601 format including local time zone. For example, a local time of 18:00 on the 24th of October 2008 would be represented as 2008-10-24T08:00:00Z+10 (local).			

<u>Metadata name</u>	<u>Definition</u>	<u>Data type</u>	<u>Units</u>	<u>Authority</u>
platform_detail	Free field provide detailed description of the platform, include number of sensors, array directivity in housing, array geometry, array beamwidth, platform noise signature, platform synchronization, and platform manufacture date, etc.			
drifting_buoy_name	Name of the drifting buoy that was used to collect passive acoustic data.	S		
drifting_buoy_id	ID number of the drifting buoy, if it exists	S		
acoustic_sampling_start_date	Start data of acoustic data collection in ISO 8601 format including local time zone. For example, a local time of 18:00 on the 24th of October 2008 would be represented as 2008-10-24T08:00:00Z+10 (local).			
platform_detail	Free field provide detailed description of the platform, include tow speed (for towed hydrophone or hydrophone array), number of sensors, array directivity in housing, array geometry, array beamwidth, platform noise signature, platform synchronization, and platform manufacture date, etc.			
moored_buoy_name	Name of the moored buoy that was used to collect passive acoustic data.	S		
moored_buoy_id	ID number of the moored buoy, if it exists	S		

<u>Metadata name</u>	<u>Definition</u>	<u>Data type</u>	<u>Units</u>	<u>Authority</u>
acoustic_sampling_start_date	Start data of acoustic data collection in ISO 8601 format including local time zone. For example, a local time of 18:00 on the 24th of October 2008 would be represented as 2008-10-24T08:00:00Z+10 (local).			
platform_detail	Free field provide detailed description of the platform, include tow speed (for towed hydrophone or hydrophone array), number of sensors, array directivity in housing, array geometry, array beamwidth, platform noise signature, platform synchronization, and platform manufacture date, etc.			
suspended_platform_name	Name of the suspended platform that was used to collect passive acoustic data.	S		
suspended_platform_id	ID number of the suspended platform, if it exists	S		
acoustic_sampling_start_date	Start data of acoustic data collection in ISO 8601 format including local time zone. For example, a local time of 18:00 on the 24th of October 2008 would be represented as 2008-10-24T08:00:00Z+10 (local).			

<u>Metadata name</u>	<u>Definition</u>	<u>Data type</u>	<u>Units</u>	<u>Authority</u>
platform_detail	Free field provide detailed description of the platform, include tow speed (for towed hydrophone or hydrophone array), number of sensors, array directivity in housing, array geometry, array beamwidth, platform noise signature, platform synchronization, and platform manufacture date, etc.			
bottom_mounted_platform_name	Name of the bottom-mounted platform that was used to collect passive acoustic data.	S		
bottom_mounted_platform_id	ID number of the bottom-mounted platform, if it exists	S		
acoustic_sampling_start_date	Start data of acoustic data collection in ISO 8601 format including local time zone. For example, a local time of 18:00 on the 24th of October 2008 would be represented as 2008-10-24T08:00:00Z+10 (local).			
platform_detail	Free field provide detailed description of the platform, include tow speed (for towed hydrophone or hydrophone array), number of sensors, array directivity in housing, array geometry, array beamwidth, platform noise signature, platform synchronization, and platform manufacture date, etc.			

Category III: Recording Equipment (sensor, pre-amplifier, A/D converter, additional signal conditioning)

<u>Metadata name</u>	<u>Definition</u>	<u>Data type</u>	<u>Units</u>	<u>Authority</u>
hydrophone_type	pressure sensor or vector sensor	S		
hydrophone_id	ID number of the hydrophone if it exists			
hydrophone_maker_model	Maker or manufacture of the hydrophone that was used to collect passive acoustic data			
hydrophone_sensitivity	Sensitivity of hydrophone and calibration method	N		
calibration_date				
other_info	List noise floor, directivity, and resonance frequency of hydrophone	N		
preamplifier_id	ID number of the pre-amplifier if it exists			
preamplifier_maker_model	Maker or manufacture of the preamplifier that was used to collect passive acoustic data			
preamplifier_gain	For pre-amplifier, A/D converter, and signal conditioning only	N		
other_info	Other info related to the pre-amplifier, such as noise floor, low- and high-pass filter specification, etc., if available.			
AD_converter_id	ID number of the AD converter if it exists			

<u>Metadata name</u>	<u>Definition</u>	<u>Data type</u>	<u>Units</u>	<u>Authority</u>
AD_converter_maker_model				
sample_rate				
other_info	Additional info related to the AD converter, such as gain, noise floor, and bit rate, etc.			
recorder_type	analogue vs. digital recorder	S		
recorder_id	ID number of the recorder if it exists			
recorder_maker_model	Maker or manufacture of the recorder that was used to collect passive acoustic data			
recorder_gain	Signal gain of the recorder	N		
other_info	Additional info related to the recorder, such as noise floor, etc.			
additional_signal_con_type	Types of additional signal conditioning device, if available	S		
device_id	ID number of the instrument if it exists			
device_maker_model	Maker or manufacture of the device that was used to collect passive acoustic data			
device_function	Functionality of the device			
other_info	Additional info related to the device, such as signal gain, noise floor, etc.	N		

ISO 19115 XML Template for NOAA Passive Acoustic Recordings

```
<!--<gmd:metadataStandardName>
<gco:CharacterString>METADATA CONVENTION FOR IOOS PASSIVE ACOUSTIC
RECORDINGS
</gco:CharacterString>
<!--\- version 1.0 2013/08/13 Shane Guan (NMFS, Silver Spring, MD),
Hassan Moustahfid (US IOOS, Silver Spring, MD) and Anna Milan (NOAA NGDC,
Boulder, CO), Jacqueline Mize (NOAA NCDDC, Stennis, MS)-->

<?xml-stylesheet type="text/css"
href="http://www.ngdc.noaa.gov/metadata/published/views/ISO.css"?>
<gmi:MI_Metadata xmlns:gmi="http://www.isotc211.org/2005/gmi"
xmlns:gmd="http://www.isotc211.org/2005/gmd"
xmlns:gco="http://www.isotc211.org/2005/gco" xmlns:xlink="http://www.w3.org/1999/xlink"
xmlns:gml="http://www.opengis.net/gml/3.2" xmlns:srv="http://www.isotc211.org/2005/srv"
xmlns:gmw="http://www.isotc211.org/2005/gmw"
xmlns:gss="http://www.isotc211.org/2005/gss" xmlns:gsr="http://www.isotc211.org/2005/gsr"
xmlns:gts="http://www.isotc211.org/2005/gts"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://www.isotc211.org/2005/gmi
http://www.ngdc.noaa.gov/metadata/published/xsd/schema.xsd">
<gmd:fileIdentifier>
<gco:CharacterString>project_ID</gco:CharacterString>
</gmd:fileIdentifier>
<gmd:language>
<gco:CharacterString>eng; USA</gco:CharacterString>
</gmd:language>
<gmd:contact>
<gmd:CI_ResponsibleParty>
<gmd:individualName>
<gco:CharacterString>template</gco:CharacterString>
</gmd:individualName>
<gmd:organisationName>
<gco:CharacterString>template</gco:CharacterString>
</gmd:organisationName>
<gmd:positionName>
<gco:CharacterString>template</gco:CharacterString>
</gmd:positionName>
<gmd:contactInfo>
<gmd:CI_Contact>
<gmd:phone>
<gmd:CI_Telephone>
<gmd:voice>
<gco:CharacterString>template</gco:CharacterString>
```

```

    </gmd:voice>
    <gmd:facsimile>
      <gco:CharacterString>template</gco:CharacterString>
    </gmd:facsimile>
  </gmd:CI_Telephone>
</gmd:phone>
<gmd:address>
  <gmd:CI_Address>
    <gmd:deliveryPoint>
      <gco:CharacterString>template</gco:CharacterString>
    </gmd:deliveryPoint>
    <gmd:city>
      <gco:CharacterString>template</gco:CharacterString>
    </gmd:city>
    <gmd:administrativeArea>
      <gco:CharacterString>template</gco:CharacterString>
    </gmd:administrativeArea>
    <gmd:postalCode>
      <gco:CharacterString>template</gco:CharacterString>
    </gmd:postalCode>
    <gmd:country>
      <gco:CharacterString>template</gco:CharacterString>
    </gmd:country>
    <gmd:electronicMailAddress>
      <gco:CharacterString>template</gco:CharacterString>
    </gmd:electronicMailAddress>
  </gmd:CI_Address>
</gmd:address>
<gmd:hoursOfService>
  <gco:CharacterString>template</gco:CharacterString>
</gmd:hoursOfService>
<gmd:contactInstructions>
  <gco:CharacterString>template</gco:CharacterString>
</gmd:contactInstructions>
</gmd:CI_Contact>
</gmd:contactInfo>
<gmd:role>
  <gmd:CI_RoleCode
codeList="http://www.ngdc.noaa.gov/metadata/published/xsd/schema/resources/Codelist/gmxCo
delists.xml#CI_RoleCode" codeListValue="code">code</gmd:CI_RoleCode>
  </gmd:role>
</gmd:CI_ResponsibleParty>
</gmd:contact>
<gmd:dateStamp>
  <gco:Date>2013-08-28</gco:Date>
</gmd:dateStamp>

```

```

<gmd:metadataStandardName>
  <gco:CharacterString>ISO 19115-2 Geographic Information - Metadata - Part 2: Extensions
for Imagery and Gridded Data</gco:CharacterString>
</gmd:metadataStandardName>
<gmd:metadataStandardVersion>
  <gco:CharacterString>ISO 19115-2:2009(E)</gco:CharacterString>
</gmd:metadataStandardVersion>
<!--insert spatial information if needed as example below details-->
<gmd:referenceSystemInfo>
<gmd:MD_ReferenceSystem uuid="895cc120-95ed-11e0-aa80-0800200c9a66">
  <gmd:referenceSystemIdentifier>
    <gmd:RS_Identifier>
      <gmd:authority>
        <gmd:CI_Citation>
          <gmd:title>
            <gco:CharacterString>WGS 84 / World Mercator</gco:CharacterString>
          </gmd:title>
          <gmd:date>
            <gmd:CI_Date>
              <gmd:date>
                <gco:Date>2006-06-02</gco:Date>
              </gmd:date>
              <gmd:dateType>
                <gmd:CI_DateTypeCode
codeList="http://www.isotc211.org/2005/resources/Codelist/gmxCodetlists.xml#CI_DateTypeCo
de" codeListValue="revision">revision</gmd:CI_DateTypeCode>
              </gmd:dateType>
            </gmd:CI_Date>
          </gmd:date>
        <gmd:citedResponsibleParty>
          <gmd:CI_ResponsibleParty>
            <gmd:contactInfo>
              <gmd:CI_Contact>
                <gmd:onlineResource>
                  <gmd:CI_OnlineResource>
                    <gmd:linkage>
                      <gmd:URL>
                        http://www.epsg-registry.org/export.htm?gml=urn:ogc:def:crs:EPSG::3395
                      </gmd:URL>
                    </gmd:linkage>
                  </gmd:CI_OnlineResource>
                </gmd:onlineResource>
              </gmd:CI_Contact>
            </gmd:contactInfo>
            <gmd:role>
              <gmd:CI_RoleCode

```

```

codeList="http://www.isotc211.org/2005/resources/Codelist/gmxCodelists.xml#CI_RoleCode"
codeListValue="resourceProvider" codeSpace="001">resourceProvider</gmd:CI_RoleCode>
  </gmd:role>
  </gmd:CI_ResponsibleParty>
  </gmd:citedResponsibleParty>
  </gmd:CI_Citation>
  </gmd:authority>
  </gmd:code>
  <gco:CharacterString>urn:ogc:def:crs:EPSG::3395</gco:CharacterString>
  </gmd:code>
  </gmd:RS_Identifier>
  </gmd:referenceSystemIdentifier>
  </gmd:MD_ReferenceSystem>
</gmd:referenceSystemInfo>
  <gmd:identificationInfo>
  <gmd:MD_DataIdentification>
  <gmd:citation>
  <gmd:CI_Citation>
  <gmd:title>
  <gco:CharacterString>project_name</gco:CharacterString>
  </gmd:title>
  <gmd:date>
  <gmd:CI_Date>
  <gmd:date>
  <gco>Date>9999-01-01</gco>Date>
  </gmd:date>
  <gmd:dateType>
  <gmd:CI_DateTypeCode
codeList="http://www.ngdc.noaa.gov/metadata/published/xsd/schema/resources/Codelist/gmxCo
delists.xml#CI_DateTypeCode" codeListValue="creation">creation</gmd:CI_DateTypeCode>
  </gmd:dateType>
  </gmd:CI_Date>
  </gmd:date>
  <!-- last_data_update -->
  <gmd:date>
  <gmd:CI_Date>
  <gmd:date>
  <gco>Date>9999-01-01</gco>Date>
  </gmd:date>
  <gmd:dateType>
  <gmd:CI_DateTypeCode
codeList="http://www.ngdc.noaa.gov/metadata/published/xsd/schema/resources/Codelist/gmxCo
delists.xml#CI_DateTypeCode" codeListValue="revision">revision</gmd:CI_DateTypeCode>
  </gmd:dateType>
  </gmd:CI_Date>
  </gmd:date>

```

```

    </gmd:CI_Citation>
  </gmd:citation>
  <gmd:abstract>
    <gco:CharacterString>project_abstract</gco:CharacterString>
  </gmd:abstract>
  <gmd:purpose>
    <gco:CharacterString>project_purpose</gco:CharacterString>
  </gmd:purpose>
  <gmd:credit>
    <gco:CharacterString>data_acknowledgement</gco:CharacterString>
  </gmd:credit>
  <gmd:pointOfContact>
    <gmd:CI_ResponsibleParty>
      <gmd:individualName>
        <gco:CharacterString>principal_investigator</gco:CharacterString>
      </gmd:individualName>
      <gmd:organisationName>
        <gco:CharacterString>organization</gco:CharacterString>
      </gmd:organisationName>
      <gmd:positionName>
        <gco:CharacterString>principal_investigator_position</gco:CharacterString>
      </gmd:positionName>
      <gmd:contactInfo>
        <gmd:CI_Contact>
          <gmd:phone>
            <gmd:CI_Telephone>
              <gmd:voice>
                <gco:CharacterString>principal_investigator_phone</gco:CharacterString>
              </gmd:voice>
              <gmd:facsimile>
                <gco:CharacterString>principal_investigator_fax</gco:CharacterString>
              </gmd:facsimile>
            </gmd:CI_Telephone>
          </gmd:phone>
          <gmd:address>
            <gmd:CI_Address>
              <gmd:city>
                <gco:CharacterString>principal_investigator_city</gco:CharacterString>
              </gmd:city>
              <gmd:administrativeArea>
                <gco:CharacterString>principal_investigator_state</gco:CharacterString>
              </gmd:administrativeArea>
              <gmd:postalCode>
                <gco:CharacterString>principal_investigator_zip</gco:CharacterString>
              </gmd:postalCode>
              <gmd:country>

```

```

        <gco:CharacterString>principal_investigator_country</gco:CharacterString>
    </gmd:country>
    <gmd:electronicMailAddress>
        <gco:CharacterString>principal_investigator_address</gco:CharacterString>
    </gmd:electronicMailAddress>
    </gmd:CI_Address>
</gmd:address>
<gmd:hoursOfService>
    <gco:CharacterString>template</gco:CharacterString>
</gmd:hoursOfService>
<gmd:contactInstructions>
    <gco:CharacterString>contact_instruction</gco:CharacterString>
</gmd:contactInstructions>
</gmd:CI_Contact>
</gmd:contactInfo>
<gmd:role>
    <gmd:CI_RoleCode
codeList="http://www.ngdc.noaa.gov/metadata/published/xsd/schema/resources/Codelist/gmxCo
delists.xml#CI_RoleCode"
codeListValue="principalInvestigator">principalInvestigator</gmd:CI_RoleCode>
    </gmd:role>
</gmd:CI_ResponsibleParty>
</gmd:pointOfContact>
<gmd:resourceMaintenance>
    <gmd:MD_MaintenanceInformation>
        <gmd:maintenanceAndUpdateFrequency>
            <!-- data_update_frequency will need to conform to the codelist values -->
            <gmd:MD_MaintenanceFrequencyCode
codeList="http://www.ngdc.noaa.gov/metadata/published/xsd/schema/resources/Codelist/gmxCo
delists.xml#MD_MaintenanceFrequencyCode"
codeListValue="code">data_update_frequency</gmd:MD_MaintenanceFrequencyCode>
        </gmd:maintenanceAndUpdateFrequency>
        <gmd:dateOfNextUpdate>
            <gco:Date>9999-01-01</gco:Date>
        </gmd:dateOfNextUpdate>
        <gmd:maintenanceNote>
            <gco:CharacterString>data_update_note</gco:CharacterString>
        </gmd:maintenanceNote>
    </gmd:contact>
    <gmd:CI_ResponsibleParty>
        <gmd:individualName>
            <gco:CharacterString>data_center_contact_name</gco:CharacterString>
        </gmd:individualName>
        <gmd:organisationName>
            <gco:CharacterString>data_center</gco:CharacterString>
        </gmd:organisationName>

```



```

<gmd:positionName>
  <gco:CharacterString>data_center_contact_position</gco:CharacterString>
</gmd:positionName>
<gmd:contactInfo>
  <gmd:CI_Contact>
    <gmd:phone>
      <gmd:CI_Telephone>
        <gmd:voice>
          <gco:CharacterString>data_center_phone</gco:CharacterString>
        </gmd:voice>
        <gmd:facsimile>
          <gco:CharacterString>data_center_fax</gco:CharacterString>
        </gmd:facsimile>
      </gmd:CI_Telephone>
    </gmd:phone>
    <gmd:address>
      <gmd:CI_Address>
        <gmd:deliveryPoint>
          <gco:CharacterString>template</gco:CharacterString>
        </gmd:deliveryPoint>
        <gmd:city>
          <gco:CharacterString>data_center_city</gco:CharacterString>
        </gmd:city>
        <gmd:administrativeArea>
          <gco:CharacterString>data_center_state</gco:CharacterString>
        </gmd:administrativeArea>
        <gmd:postalCode>
          <gco:CharacterString>data_center_zip</gco:CharacterString>
        </gmd:postalCode>
        <gmd:country>
          <gco:CharacterString>data_center_country</gco:CharacterString>
        </gmd:country>
        <gmd:electronicMailAddress>
          <gco:CharacterString>data_center_address</gco:CharacterString>
        </gmd:electronicMailAddress>
      </gmd:CI_Address>
    </gmd:address>
    <gmd:onlineResource>
      <gmd:CI_OnlineResource>
        <gmd:linkage>
          <gmd:URL>data_center_website</gmd:URL>
        </gmd:linkage>
      </gmd:CI_OnlineResource>
    </gmd:onlineResource>
    <gmd:hoursOfService>
      <gco:CharacterString>data_center_hours</gco:CharacterString>

```

```

        </gmd:hoursOfService>
        <gmd:contactInstructions>
            <gco:CharacterString>contact_instruction_data_center</gco:CharacterString>
        </gmd:contactInstructions>
    </gmd:CI_Contact>
</gmd:contactInfo>
<gmd:role>
    <gmd:CI_RoleCode
codeList="http://www.ngdc.noaa.gov/metadata/published/xsd/schema/resources/Codelist/gmxCo
delists.xml#CI_RoleCode" codeListValue="code">code</gmd:CI_RoleCode>
    </gmd:role>
</gmd:CI_ResponsibleParty>
</gmd:contact>
</gmd:MD_MaintenanceInformation>
</gmd:resourceMaintenance>
<gmd:resourceFormat>
    <gmd:MD_Format>
        <gmd:name>
            <gco:CharacterString>data_type</gco:CharacterString>
        </gmd:name>
        <gmd:version>
            <gco:CharacterString>data_file_version</gco:CharacterString>
        </gmd:version>
        <gmd:specification>
            <gco:CharacterString>data_file_name</gco:CharacterString>
        </gmd:specification>
        <gmd:fileDecompressionTechnique>
            <gco:CharacterString>compression_technique</gco:CharacterString>
        </gmd:fileDecompressionTechnique>
    </gmd:MD_Format>
</gmd:resourceFormat>
<!-- ARE THERE CONTROLLED VOCABULARIES TO REPRESENT THESE
VALUES? -->
<gmd:descriptiveKeywords>
    <gmd:MD_Keywords>
        <gmd:keyword>
            <gco:CharacterString>ambient_noise</gco:CharacterString>
        </gmd:keyword>
        <gmd:keyword>
            <gco:CharacterString>animal_sound</gco:CharacterString>
        </gmd:keyword>
        <gmd:keyword>
            <gco:CharacterString>anthropogenic_noise</gco:CharacterString>
        </gmd:keyword>
        <!--add type of keyword-->
    </gmd:type>

```

```

        <gmd:MD_KeywordTypeCode
codeList="http://www.isotc211.org/2005/resources/Codelist/gmxCodelists.xml#MD_KeywordT
ypeCode" codeListValue="theme" codeSpace="005">theme</gmd:MD_KeywordTypeCode>
    </gmd:type>
    <!--add name of thesaurus that these values come from...if none or user defined use
citation as below-->
    <gmd:thesaurusName>
        <gmd:CI_Citation>
            <gmd:title>
                <gco:CharacterString>None</gco:CharacterString>
            </gmd:title>
            <gmd:date gco:nilReason="unknown"/>
        </gmd:CI_Citation>
    </gmd:thesaurusName>
</gmd:MD_Keywords>
</gmd:descriptiveKeywords>
<!-- HOW ARE THESE VALUES DETERMINED? -->
<gmd:descriptiveKeywords>
    <gmd:MD_Keywords>
        <gmd:keyword>
            <!-- GET A LIST OF LOCATION KEYWORDS FROM GCMD -->
            <gco:CharacterString>Pacific_Ocean</gco:CharacterString>
        </gmd:keyword>
        <gmd:keyword>
            <gco:CharacterString>Atlantic_Ocean</gco:CharacterString>
        </gmd:keyword>
        <gmd:keyword>
            <gco:CharacterString>Arctic_Ocean</gco:CharacterString>
        </gmd:keyword>
        <gmd:keyword>
            <gco:CharacterString>Indian_Ocean</gco:CharacterString>
        </gmd:keyword>
    </gmd:MD_Keywords>
    <gmd:type>
        <gmd:MD_KeywordTypeCode
codeList="http://www.ngdc.noaa.gov/metadata/published/xsd/schema/resources/Codelist/gmxCo
delists.xml#MD_KeywordTypeCode"
codeListValue="place">place</gmd:MD_KeywordTypeCode>
    </gmd:type>
</gmd:MD_Keywords>
</gmd:descriptiveKeywords>
<!-- WOULD IT BE ALL OF THESE VALUES OR SOME? -->
<gmd:descriptiveKeywords>
    <gmd:MD_Keywords>
        <gmd:keyword>
            <gco:CharacterString>vessel</gco:CharacterString>
        </gmd:keyword>

```

```

<gmd:keyword>
  <gco:CharacterString>glider</gco:CharacterString>
</gmd:keyword>
<gmd:keyword>
  <gco:CharacterString>drifting_buoy</gco:CharacterString>
</gmd:keyword>
<gmd:keyword>
  <gco:CharacterString>moored_buoy</gco:CharacterString>
</gmd:keyword>
<gmd:keyword>
  <gco:CharacterString>bottom_mounted</gco:CharacterString>
</gmd:keyword>
<gmd:type>
  <gmd:MD_KeywordTypeCode
codeList="http://www.ngdc.noaa.gov/metadata/published/xsd/schema/resources/Codelist/gmxCo
delists.xml#MD_KeywordTypeCode"
codeListValue="platform">platform</gmd:MD_KeywordTypeCode>
  </gmd:type>
</gmd:MD_Keywords>
</gmd:descriptiveKeywords>
<gmd:descriptiveKeywords>
  <gmd:MD_Keywords>
    <gmd:keyword>
      <gco:CharacterString>hydrophone_pressure_sensor</gco:CharacterString>
    </gmd:keyword>
    <gmd:keyword>
      <gco:CharacterString>hydrophone_vector_sensor</gco:CharacterString>
    </gmd:keyword>
    <gmd:keyword>
      <gco:CharacterString>preamplifier</gco:CharacterString>
    </gmd:keyword>
    <gmd:keyword>
      <gco:CharacterString>AD_converter</gco:CharacterString>
    </gmd:keyword>
    <gmd:keyword>
      <gco:CharacterString>recorder_analogue</gco:CharacterString>
    </gmd:keyword>
    <gmd:keyword>
      <gco:CharacterString>recorder_digital</gco:CharacterString>
    </gmd:keyword>
    <gmd:keyword>
      <gco:CharacterString>other_signal_conditioning</gco:CharacterString>
    </gmd:keyword>
  </gmd:type>
  <gmd:MD_KeywordTypeCode
codeList="http://www.ngdc.noaa.gov/metadata/published/xsd/schema/resources/Codelist/gmxCo

```

```

delists.xml#MD_KeywordTypeCode"
codeListValue="instrument">instrument</gmd:MD_KeywordTypeCode>
  </gmd:type>

  </gmd:MD_Keywords>
</gmd:descriptiveKeywords>

<gmd:descriptiveKeywords>
  <gmd:MD_Keywords>
    <gmd:keyword>
      <gco:CharacterString>NOAA Northeast Fisheries Science Center</gco:CharacterString>
    </gmd:keyword>
    <gmd:keyword>
      <gco:CharacterString>NOAA Southeast Fisheries Science Center</gco:CharacterString>
    </gmd:keyword>
    <gmd:keyword>
      <gco:CharacterString>NOAA Northwest Fisheries Science
Center</gco:CharacterString>
    </gmd:keyword>
    <gmd:keyword>
      <gco:CharacterString>NOAA Southwest Fisheries Science
Center</gco:CharacterString>
    </gmd:keyword>
    <gmd:keyword>
      <gco:CharacterString>NOAA Alaska Fisheries Science Center</gco:CharacterString>
    </gmd:keyword>
    <gmd:keyword>
      <gco:CharacterString>NOAA Pacific Islands Fisheries Science
Center</gco:CharacterString>
    </gmd:keyword>
  </gmd:MD_Keywords>
  <gmd:MD_KeywordTypeCode
codeList="http://www.ngdc.noaa.gov/metadata/published/xsd/schema/resources/Codelist/gmxCo
delists.xml#MD_KeywordTypeCode"
codeListValue="dataCenter">dataCenter</gmd:MD_KeywordTypeCode>
  </gmd:type>
  </gmd:MD_Keywords>
</gmd:descriptiveKeywords>
<gmd:resourceConstraints>
  <gmd:MD_Constraints>
    <gmd:useLimitation>
      <gco:CharacterString>data_restriction</gco:CharacterString>
    </gmd:useLimitation>
  </gmd:MD_Constraints>
</gmd:resourceConstraints>
<gmd:language>

```

```

    <gco:CharacterString>eng; USA</gco:CharacterString>
  </gmd:language>

  <gmd:topicCategory>
    <gmd:MD_TopicCategoryCode>oceans</gmd:MD_TopicCategoryCode>
  </gmd:topicCategory>

  <gmd:extent>
    <gmd:EX_Extent id="boundingExtent">
      <gmd:description>
        <gco:CharacterString>project_area_description</gco:CharacterString>
      </gmd:description>
      <gmd:geographicElement>
        <gmd:EX_GeographicBoundingBox>
          <gmd:westBoundLongitude>

            <gco:Decimal>-180</gco:Decimal>
          </gmd:westBoundLongitude>
          <gmd:eastBoundLongitude>

            <gco:Decimal>180</gco:Decimal>
          </gmd:eastBoundLongitude>
          <gmd:southBoundLatitude>

            <gco:Decimal>-90</gco:Decimal>
          </gmd:southBoundLatitude>
          <gmd:northBoundLatitude>

            <gco:Decimal>90</gco:Decimal>
          </gmd:northBoundLatitude>
        </gmd:EX_GeographicBoundingBox>
      </gmd:geographicElement>
      <gmd:temporalElement>
        <gmd:EX_TemporalExtent id="boundingTemporalExtent">
          <gmd:extent>
            <gml:TimePeriod gml:id="ID072">
              <!-- project_start_date-->
              <gml:beginPosition>9999-01-01</gml:beginPosition>
              <!-- project_end_date-->
              <gml:endPosition>9999-01-01</gml:endPosition>
            </gml:TimePeriod>
          </gmd:extent>
        </gmd:EX_TemporalExtent>
      </gmd:temporalElement>
      <gmd:verticalElement>
        <gmd:EX_VerticalExtent>

```

```

<gmd:minimumValue>
  <!--      <gco:Real>minimum_sensor_depth</gco:Real>-->
  <gco:Real>99</gco:Real>
  <!--      <gco:Real>minimum_sensor_depth</gco:Real>-->
</gmd:minimumValue>
<gmd:maximumValue>
  <!--      <gco:Real>maximum_sensor_depth</gco:Real>-->
  <gco:Real>99</gco:Real>
  <!--      <gco:Real>maximum_sensor_depth</gco:Real>-->
</gmd:maximumValue>
<!-- WHAT ARE THE VERTICAL REFERENCES USUALLY USED? WILL THIS
INFO BE AVAILABLE TO POPULATE THE METADATA RECORD? -->
<gmd:verticalCRS>
  <gml:VerticalCRS gml:id="ID384">
    <gml:description>template</gml:description>
    <gml:identifier codeSpace="template">template</gml:identifier>
    <gml:name>template</gml:name>
    <gml:remarks>template</gml:remarks>
    <gml:scope>template</gml:scope>
    <gml:verticalCS>
      <gml:VerticalCS gml:id="ID058">
        <gml:description>template</gml:description>
        <gml:identifier codeSpace="template">template</gml:identifier>
        <gml:name>template</gml:name>
        <gml:remarks>template</gml:remarks>
        <gml:axis>
          <gml:CoordinateSystemAxis uom="template" gml:id="ID060">
            <gml:description>template</gml:description>
            <gml:identifier codeSpace="template">template</gml:identifier>
            <gml:name>template</gml:name>
            <gml:remarks>template</gml:remarks>
            <gml:axisAbbrev>template</gml:axisAbbrev>
            <gml:axisDirection codeSpace="template">template</gml:axisDirection>
            <gml:minimumValue>99</gml:minimumValue>
            <gml:maximumValue>99</gml:maximumValue>
            <gml:rangeMeaning codeSpace="template">template</gml:rangeMeaning>
          </gml:CoordinateSystemAxis>
        </gml:axis>
      </gml:VerticalCS>
    </gml:verticalCS>
    <gml:verticalDatum>
      <gml:VerticalDatum gml:id="ID062">
        <gml:metaDataProperty>
          <gml:GenericMetaData/>
        </gml:metaDataProperty>
        <!--<gml:description>template</gml:description>-->
      </gml:VerticalDatum>
    </gml:verticalDatum>
  </gml:VerticalCRS>
</gmd:verticalCRS>

```

```

        <!--<gml:descriptionReference/>-->
        <gml:identifier codeSpace="template">template</gml:identifier>
        <!--<gml:name>template</gml:name>-->
        <!--<gml:remarks>template</gml:remarks>-->
        <gml:scope>template</gml:scope>
    </gml:VerticalDatum>
    </gml:verticalDatum>
    </gml:VerticalCRS>
    </gmd:verticalCRS>
    </gmd:EX_VericalExtent>
    </gmd:verticalElement>
    </gmd:EX_Extent>
    </gmd:extent>
    <gmd:supplementalInformation>
        <gco:CharacterString>supplemental_info</gco:CharacterString>
    </gmd:supplementalInformation>
    </gmd:MD_DataIdentification>
    </gmd:identificationInfo>
    <gmi:acquisitionInformation>
    <gmi:MI_AcquisitionInformation>
        <!-- VESSEL -->
        <gmi:platform>
            <!-- vessel_name,acoustic_sampling_start_date-->
            <gmi:MI_Platform>
                <gmi:identifier>
                <gmd:MD_Identifier>
                <gmd:code>
                <gco:CharacterString>vessel_id</gco:CharacterString>
                </gmd:code>
                </gmd:MD_Identifier>
            </gmi:identifier>
            <gmi:description>
                <gco:CharacterString>platform_detail</gco:CharacterString>
            </gmi:description>
            <!-- HYDROPHONE -->
            <gmi:instrument>
                <!-- TO DO: PUT THIS INFO IN CONTENTINFO SECTION:
hydrophone_maker_model,calibration_date,hydrophone_sensitivity,hydrophone_id,other_info --
>
                <gmi:MI_Instrument>
                <gmi:identifier>
                <gmd:MD_Identifier>
                <gmd:code>
                <gco:CharacterString>hydrophone_id</gco:CharacterString>
                </gmd:code>
                </gmd:MD_Identifier>

```



```

    </gmi:identifier>
    <gmi:type>
      <gco:CharacterString>hydrophone_type</gco:CharacterString>
    </gmi:type>
    <gmi:description>

<gco:CharacterString>hydrophone_maker_model,calibration_date,hydrophone_sensitivity,hydro
phone_id,other_info</gco:CharacterString>
    </gmi:description>
    </gmi:MI_Instrument>
  </gmi:instrument>
  <!-- PREAMPLIFIER -->
  <gmi:instrument>
    <gmi:MI_Instrument>
      <gmi:identifier>
        <gmd:MD_Identifier>
          <gmd:code>
            <gco:CharacterString>preamplifier_id</gco:CharacterString>
          </gmd:code>
        </gmd:MD_Identifier>
      </gmi:identifier>
      <gmi:type>
        <gco:CharacterString>preamplifier_maker_model</gco:CharacterString>
      </gmi:type>
      <gmi:description>
        <gco:CharacterString>preamplifier_gain, other_info</gco:CharacterString>
      </gmi:description>
    </gmi:MI_Instrument>
  </gmi:instrument>
  <!-- CONVERTER -->
  <gmi:instrument>
    <!-- AD_converter_maker_model,sample_rate,AD_converter_id,other_info-->
    <gmi:MI_Instrument>
      <gmi:identifier>
        <gmd:MD_Identifier>
          <gmd:code>
            <gco:CharacterString>AD_converter_id</gco:CharacterString>
          </gmd:code>
        </gmd:MD_Identifier>
      </gmi:identifier>
      <gmi:type>
        <gco:CharacterString>AD_converter_maker_model</gco:CharacterString>
      </gmi:type>
      <gmi:description>
        <gco:CharacterString>sample_rate,other_info </gco:CharacterString>
      </gmi:description>
    </gmi:MI_Instrument>
  </gmi:instrument>

```

```

    </gmi:MI_Instrument>
  </gmi:instrument>
  <!-- RECORDER -->
  <gmi:instrument>
    <!--recorder_maker_model-->
    <gmi:MI_Instrument>
      <gmi:identifier>
        <gmd:MD_Identifier>
          <gmd:code>
            <gco:CharacterString>recorder_id</gco:CharacterString>
          </gmd:code>
        </gmd:MD_Identifier>
      </gmi:identifier>
      <gmi:type>
        <gco:CharacterString>recorder_type</gco:CharacterString>
      </gmi:type>
      <gmi:description>
        <gco:CharacterString>recorder_gain, other_info</gco:CharacterString>
      </gmi:description>
    </gmi:MI_Instrument>
  </gmi:instrument>
  <!-- DEVICE -->
  <gmi:instrument>
    <!--
      device_maker_model
      device_function
      other_info
      additional_signal_con_type
    -->
    <gmi:MI_Instrument>
      <gmi:identifier>
        <gmd:MD_Identifier>
          <gmd:code>
            <gco:CharacterString>device_id</gco:CharacterString>
          </gmd:code>
        </gmd:MD_Identifier>
      </gmi:identifier>
      <gmi:type/>
      <gmi:description>
        <gco:CharacterString>device_maker_model, device_function, other_info,
additional_signal_con_type</gco:CharacterString>
      </gmi:description>
    </gmi:MI_Instrument>
  </gmi:instrument>

</gmi:MI_Platform>

```

```

</gmi:platform>
<!-- GLIDER -->
<gmi:platform>
  <!--
    glider_name,
    acoustic_sampling_start_date,
  -->
  <gmi:MI_Platform>
    <gmi:identifier>
      <gmd:MD_Identifier>
        <gmd:code>
          <gco:CharacterString>glider_id</gco:CharacterString>
        </gmd:code>
      </gmd:MD_Identifier>
    </gmi:identifier>
    <gmi:description>
      <gco:CharacterString>platform_detail</gco:CharacterString>
    </gmi:description>
    <!-- HYDROPHONE -->
    <gmi:instrument>
      <!-- TO DO: PUT THIS INFO IN CONTENTINFO SECTION:
hydrophone_maker_model,calibration_date,hydrophone_sensitivity,hydrophone_id,other_info --
>
      <gmi:MI_Instrument>
        <gmi:identifier>
          <gmd:MD_Identifier>
            <gmd:code>
              <gco:CharacterString>hydrophone_id</gco:CharacterString>
            </gmd:code>
          </gmd:MD_Identifier>
        </gmi:identifier>
        <gmi:type>
          <gco:CharacterString>hydrophone_type</gco:CharacterString>
        </gmi:type>
        <gmi:description>
          <gco:CharacterString>hydrophone_maker_model,calibration_date,hydrophone_sensitivity,hydro
phone_id,other_info</gco:CharacterString>
        </gmi:description>
      </gmi:MI_Instrument>
    </gmi:instrument>
    <!-- PREAMPLIFIER -->
    <gmi:instrument>
      <gmi:MI_Instrument>
        <gmi:identifier>
          <gmd:MD_Identifier>

```

```

    <gmd:code>
      <gco:CharacterString>preamplifier_id</gco:CharacterString>
    </gmd:code>
  </gmd:MD_Identifier>
</gmi:identifier>
<gmi:type>
  <gco:CharacterString>preamplifier_maker_model</gco:CharacterString>
</gmi:type>
<gmi:description>
  <gco:CharacterString>preamplifier_gain, other_info</gco:CharacterString>
</gmi:description>
</gmi:MI_Instrument>
</gmi:instrument>
<!-- CONVERTER -->
<gmi:instrument>
  <!-- AD_converter_maker_model,sample_rate,AD_converter_id,other_info-->
  <gmi:MI_Instrument>
    <gmi:identifier>
      <gmd:MD_Identifier>
        <gmd:code>
          <gco:CharacterString>AD_converter_id</gco:CharacterString>
        </gmd:code>
      </gmd:MD_Identifier>
    </gmi:identifier>
    <gmi:type>
      <gco:CharacterString>AD_converter_maker_model</gco:CharacterString>
    </gmi:type>
    <gmi:description>
      <gco:CharacterString>sample_rate,other_info </gco:CharacterString>
    </gmi:description>
  </gmi:MI_Instrument>
</gmi:instrument>
<!-- RECORDER -->
<gmi:instrument>
  <!--recorder_maker_model-->
  <gmi:MI_Instrument>
    <gmi:identifier>
      <gmd:MD_Identifier>
        <gmd:code>
          <gco:CharacterString>recorder_id</gco:CharacterString>
        </gmd:code>
      </gmd:MD_Identifier>
    </gmi:identifier>
    <gmi:type>
      <gco:CharacterString>recorder_type</gco:CharacterString>
    </gmi:type>

```

```

    <gmi:description>
      <gco:CharacterString>recorder_gain, other_info</gco:CharacterString>
    </gmi:description>
  </gmi:MI_Instrument>
</gmi:instrument>
<!-- DEVICE -->
<gmi:instrument>
  <!--
    device_maker_model
    device_function
    other_info
    additional_signal_con_type
  -->
  <gmi:MI_Instrument>
    <gmi:identifier>
      <gmd:MD_Identifier>
        <gmd:code>
          <gco:CharacterString>device_id</gco:CharacterString>
        </gmd:code>
      </gmd:MD_Identifier>
    </gmi:identifier>
    <gmi:type/>
    <gmi:description>
      <gco:CharacterString>device_maker_model, device_function, other_info,
additional_signal_con_type</gco:CharacterString>
    </gmi:description>
  </gmi:MI_Instrument>
</gmi:instrument>
</gmi:MI_Platform>
</gmi:platform>
<!-- DRIFTING BUOY -->
<gmi:platform>
  <!--drifting_buoy_name,
  acoustic_sampling_start_date-->
  <gmi:MI_Platform>
    <gmi:identifier>
      <gmd:MD_Identifier>
        <gmd:code>
          <gco:CharacterString>drifting_buoy_id</gco:CharacterString>
        </gmd:code>
      </gmd:MD_Identifier>
    </gmi:identifier>
    <gmi:description>
      <gco:CharacterString>platform_detail</gco:CharacterString>
    </gmi:description>
  <!-- HYDROPHONE -->

```

```

    <gmi:instrument>
      <!-- TO DO: PUT THIS INFO IN CONTENTINFO SECTION:
hydrophone_maker_model,calibration_date,hydrophone_sensitivity,hydrophone_id,other_info --
>
      <gmi:MI_Instrument>
        <gmi:identifier>
          <gmd:MD_Identifier>
            <gmd:code>
              <gco:CharacterString>hydrophone_id</gco:CharacterString>
            </gmd:code>
          </gmd:MD_Identifier>
        </gmi:identifier>
        <gmi:type>
          <gco:CharacterString>hydrophone_type</gco:CharacterString>
        </gmi:type>
        <gmi:description>
          <gco:CharacterString>hydrophone_maker_model,calibration_date,hydrophone_sensitivity,hydro
phone_id,other_info</gco:CharacterString>
        </gmi:description>
      </gmi:MI_Instrument>
    </gmi:instrument>
    <!-- PREAMPLIFIER -->
    <gmi:instrument>
      <gmi:MI_Instrument>
        <gmi:identifier>
          <gmd:MD_Identifier>
            <gmd:code>
              <gco:CharacterString>preamplifier_id</gco:CharacterString>
            </gmd:code>
          </gmd:MD_Identifier>
        </gmi:identifier>
        <gmi:type>
          <gco:CharacterString>preamplifier_maker_model</gco:CharacterString>
        </gmi:type>
        <gmi:description>
          <gco:CharacterString>preamplifier_gain, other_info</gco:CharacterString>
        </gmi:description>
      </gmi:MI_Instrument>
    </gmi:instrument>
    <!-- CONVERTER -->
    <gmi:instrument>
      <!-- AD_converter_maker_model,sample_rate,AD_converter_id,other_info-->
      <gmi:MI_Instrument>
        <gmi:identifier>
          <gmd:MD_Identifier>

```

```

    <gmd:code>
      <gco:CharacterString>AD_converter_id</gco:CharacterString>
    </gmd:code>
  </gmd:MD_Identifier>
</gmi:identifier>
<gmi:type>
  <gco:CharacterString>AD_converter_maker_model</gco:CharacterString>
</gmi:type>
<gmi:description>
  <gco:CharacterString>sample_rate,other_info </gco:CharacterString>
</gmi:description>
</gmi:MI_Instrument>
</gmi:instrument>
<!-- RECORDER -->
<gmi:instrument>
  <!--recorder_maker_model-->
  <gmi:MI_Instrument>
    <gmi:identifier>
      <gmd:MD_Identifier>
        <gmd:code>
          <gco:CharacterString>recorder_id</gco:CharacterString>
        </gmd:code>
      </gmd:MD_Identifier>
    </gmi:identifier>
    <gmi:type>
      <gco:CharacterString>recorder_type</gco:CharacterString>
    </gmi:type>
    <gmi:description>
      <gco:CharacterString>recorder_gain, other_info</gco:CharacterString>
    </gmi:description>
  </gmi:MI_Instrument>
</gmi:instrument>
<!-- DEVICE -->
<gmi:instrument>
  <!--
    device_maker_model
    device_function
    other_info
    additional_signal_con_type
  -->
  <gmi:MI_Instrument>
    <gmi:identifier>
      <gmd:MD_Identifier>
        <gmd:code>
          <gco:CharacterString>device_id</gco:CharacterString>
        </gmd:code>

```

```

        </gmd:MD_Identifier>
        </gmi:identifier>
        <gmi:type/>
        <gmi:description>
            <gco:CharacterString>device_maker_model, device_function, other_info,
additional_signal_con_type</gco:CharacterString>
        </gmi:description>
        </gmi:MI_Instrument>
        </gmi:instrument>
        </gmi:MI_Platform>
        </gmi:platform>
        <gmi:platform>
            <!--moored_buoy_name
acoustic_sampling_start_date-->
            <gmi:MI_Platform>
                <gmi:identifier>
                <gmd:MD_Identifier>
                <gmd:code>
                <gco:CharacterString>moored_buoy_id</gco:CharacterString>
                </gmd:code>
                </gmd:MD_Identifier>
            </gmi:identifier>
            <gmi:description>
                <gco:CharacterString>platform_detail</gco:CharacterString>
            </gmi:description>
            <!-- HYDROPHONE -->
            <gmi:instrument>
                <!-- TO DO: PUT THIS INFO IN CONTENTINFO SECTION:
hydrophone_maker_model,calibration_date,hydrophone_sensitivity,hydrophone_id,other_info --
>
                <gmi:MI_Instrument>
                    <gmi:identifier>
                    <gmd:MD_Identifier>
                    <gmd:code>
                    <gco:CharacterString>hydrophone_id</gco:CharacterString>
                    </gmd:code>
                    </gmd:MD_Identifier>
                </gmi:identifier>
                <gmi:type>
                <gco:CharacterString>hydrophone_type</gco:CharacterString>
                </gmi:type>
                <gmi:description>

                <gco:CharacterString>hydrophone_maker_model,calibration_date,hydrophone_sensitivity,hydro
phone_id,other_info</gco:CharacterString>
                </gmi:description>

```



```

    </gmi:MI_Instrument>
</gmi:instrument>
<!-- PREAMPLIFIER -->
<gmi:instrument>
  <gmi:MI_Instrument>
    <gmi:identifier>
      <gmd:MD_Identifier>
        <gmd:code>
          <gco:CharacterString>preamplifier_id</gco:CharacterString>
        </gmd:code>
      </gmd:MD_Identifier>
    </gmi:identifier>
    <gmi:type>
      <gco:CharacterString>preamplifier_maker_model</gco:CharacterString>
    </gmi:type>
    <gmi:description>
      <gco:CharacterString>preamplifier_gain, other_info</gco:CharacterString>
    </gmi:description>
  </gmi:MI_Instrument>
</gmi:instrument>
<!-- CONVERTER -->
<gmi:instrument>
  <!-- AD_converter_maker_model,sample_rate,AD_converter_id,other_info-->
  <gmi:MI_Instrument>
    <gmi:identifier>
      <gmd:MD_Identifier>
        <gmd:code>
          <gco:CharacterString>AD_converter_id</gco:CharacterString>
        </gmd:code>
      </gmd:MD_Identifier>
    </gmi:identifier>
    <gmi:type>
      <gco:CharacterString>AD_converter_maker_model</gco:CharacterString>
    </gmi:type>
    <gmi:description>
      <gco:CharacterString>sample_rate,other_info </gco:CharacterString>
    </gmi:description>
  </gmi:MI_Instrument>
</gmi:instrument>
<!-- RECORDER -->
<gmi:instrument>
  <!--recorder_maker_model-->
  <gmi:MI_Instrument>
    <gmi:identifier>
      <gmd:MD_Identifier>
        <gmd:code>

```

```

        <gco:CharacterString>recorder_id</gco:CharacterString>
    </gmd:code>
    </gmd:MD_Identifier>
</gmi:identifier>
<gmi:type>
    <gco:CharacterString>recorder_type</gco:CharacterString>
</gmi:type>
<gmi:description>
    <gco:CharacterString>recorder_gain, other_info</gco:CharacterString>
</gmi:description>
</gmi:MI_Instrument>
</gmi:instrument>
<!-- DEVICE -->
<gmi:instrument>
    <!--
        device_maker_model
        device_function
        other_info
        additional_signal_con_type
    -->
    <gmi:MI_Instrument>
    <gmi:identifier>
        <gmd:MD_Identifier>
        <gmd:code>
            <gco:CharacterString>device_id</gco:CharacterString>
        </gmd:code>
        </gmd:MD_Identifier>
    </gmi:identifier>
    <gmi:type/>
    <gmi:description>
        <gco:CharacterString>device_maker_model, device_function, other_info,
additional_signal_con_type</gco:CharacterString>
    </gmi:description>
    </gmi:MI_Instrument>
</gmi:instrument>
</gmi:MI_Platform>
</gmi:platform>
<gmi:platform>
    <!--suspended_platform_name,acoustic_sampling_start_date-->
    <gmi:MI_Platform>
    <gmi:identifier>
        <gmd:MD_Identifier>
        <gmd:code>
            <gco:CharacterString>suspended_platform_id</gco:CharacterString>
        </gmd:code>
        </gmd:MD_Identifier>

```

```

</gmi:identifier>
<gmi:description>
  <gco:CharacterString>platform_detail</gco:CharacterString>
</gmi:description>
<!-- HYDROPHONE -->
<gmi:instrument>
  <!-- TO DO: PUT THIS INFO IN CONTENTINFO SECTION:
hydrophone_maker_model,calibration_date,hydrophone_sensitivity,hydrophone_id,other_info --
>
  <gmi:MI_Instrument>
    <gmi:identifier>
      <gmd:MD_Identifier>
        <gmd:code>
          <gco:CharacterString>hydrophone_id</gco:CharacterString>
        </gmd:code>
      </gmd:MD_Identifier>
    </gmi:identifier>
    <gmi:type>
      <gco:CharacterString>hydrophone_type</gco:CharacterString>
    </gmi:type>
    <gmi:description>
      <gco:CharacterString>hydrophone_maker_model,calibration_date,hydrophone_sensitivity,hydro
phone_id,other_info</gco:CharacterString>
    </gmi:description>
  </gmi:MI_Instrument>
</gmi:instrument>
<!-- PREAMPLIFIER -->
<gmi:instrument>
  <gmi:MI_Instrument>
    <gmi:identifier>
      <gmd:MD_Identifier>
        <gmd:code>
          <gco:CharacterString>preamplifier_id</gco:CharacterString>
        </gmd:code>
      </gmd:MD_Identifier>
    </gmi:identifier>
    <gmi:type>
      <gco:CharacterString>preamplifier_maker_model</gco:CharacterString>
    </gmi:type>
    <gmi:description>
      <gco:CharacterString>preamplifier_gain, other_info</gco:CharacterString>
    </gmi:description>
  </gmi:MI_Instrument>
</gmi:instrument>
<!-- CONVERTER -->

```

```

<gmi:instrument>
  <!-- AD_converter_maker_model,sample_rate,AD_converter_id,other_info-->
  <gmi:MI_Instrument>
    <gmi:identifier>
      <gmd:MD_Identifier>
        <gmd:code>
          <gco:CharacterString>AD_converter_id</gco:CharacterString>
        </gmd:code>
      </gmd:MD_Identifier>
    </gmi:identifier>
    <gmi:type>
      <gco:CharacterString>AD_converter_maker_model</gco:CharacterString>
    </gmi:type>
    <gmi:description>
      <gco:CharacterString>sample_rate,other_info </gco:CharacterString>
    </gmi:description>
  </gmi:MI_Instrument>
</gmi:instrument>
<!-- RECORDER -->
<gmi:instrument>
  <!--recorder_maker_model-->
  <gmi:MI_Instrument>
    <gmi:identifier>
      <gmd:MD_Identifier>
        <gmd:code>
          <gco:CharacterString>recorder_id</gco:CharacterString>
        </gmd:code>
      </gmd:MD_Identifier>
    </gmi:identifier>
    <gmi:type>
      <gco:CharacterString>recorder_type</gco:CharacterString>
    </gmi:type>
    <gmi:description>
      <gco:CharacterString>recorder_gain, other_info</gco:CharacterString>
    </gmi:description>
  </gmi:MI_Instrument>
</gmi:instrument>
<!-- DEVICE -->
<gmi:instrument>
  <!--
    device_maker_model
    device_function
    other_info
    additional_signal_con_type
  -->
  <gmi:MI_Instrument>

```

```

    <gmi:identifier>
      <gmd:MD_Identifier>
        <gmd:code>
          <gco:CharacterString>device_id</gco:CharacterString>
        </gmd:code>
      </gmd:MD_Identifier>
    </gmi:identifier>
    <gmi:type/>
    <gmi:description>
      <gco:CharacterString>device_maker_model, device_function, other_info,
additional_signal_con_type</gco:CharacterString>
    </gmi:description>
  </gmi:MI_Instrument>
</gmi:instrument>
</gmi:MI_Platform>
</gmi:platform>
<gmi:platform>
  <!--bottom_mounted_platform_name
acoustic_sampling_start_date-->
  <gmi:MI_Platform>
    <gmi:identifier>
      <gmd:MD_Identifier>
        <gmd:code>
          <gco:CharacterString>bottom_mounted_platform_id</gco:CharacterString>
        </gmd:code>
      </gmd:MD_Identifier>
    </gmi:identifier>
    <gmi:description>
      <gco:CharacterString>platform_detail</gco:CharacterString>
    </gmi:description>
    <!-- HYDROPHONE -->
    <gmi:instrument>
      <!-- TO DO: PUT THIS INFO IN CONTENTINFO SECTION:
hydrophone_maker_model,calibration_date,hydrophone_sensitivity,hydrophone_id,other_info --
>
    <gmi:MI_Instrument>
      <gmi:identifier>
        <gmd:MD_Identifier>
          <gmd:code>
            <gco:CharacterString>hydrophone_id</gco:CharacterString>
          </gmd:code>
        </gmd:MD_Identifier>
      </gmi:identifier>
      <gmi:type>
        <gco:CharacterString>hydrophone_type</gco:CharacterString>
      </gmi:type>

```

```

    <gmi:description>
<gco:CharacterString>hydrophone_maker_model,calibration_date,hydrophone_sensitivity,hydro
phone_id,other_info</gco:CharacterString>
    </gmi:description>
  </gmi:MI_Instrument>
</gmi:instrument>
<!-- PREAMPLIFIER -->
<gmi:instrument>
  <gmi:MI_Instrument>
    <gmi:identifier>
      <gmd:MD_Identifier>
        <gmd:code>
          <gco:CharacterString>preamplifier_id</gco:CharacterString>
        </gmd:code>
      </gmd:MD_Identifier>
    </gmi:identifier>
    <gmi:type>
      <gco:CharacterString>preamplifier_maker_model</gco:CharacterString>
    </gmi:type>
    <gmi:description>
      <gco:CharacterString>preamplifier_gain, other_info</gco:CharacterString>
    </gmi:description>
  </gmi:MI_Instrument>
</gmi:instrument>
<!-- CONVERTER -->
<gmi:instrument>
  <!-- AD_converter_maker_model,sample_rate,AD_converter_id,other_info-->
  <gmi:MI_Instrument>
    <gmi:identifier>
      <gmd:MD_Identifier>
        <gmd:code>
          <gco:CharacterString>AD_converter_id</gco:CharacterString>
        </gmd:code>
      </gmd:MD_Identifier>
    </gmi:identifier>
    <gmi:type>
      <gco:CharacterString>AD_converter_maker_model</gco:CharacterString>
    </gmi:type>
    <gmi:description>
      <gco:CharacterString>sample_rate,other_info </gco:CharacterString>
    </gmi:description>
  </gmi:MI_Instrument>
</gmi:instrument>
<!-- RECORDER -->
<gmi:instrument>

```

```

<!--recorder_maker_model-->
<gmi:MI_Instrument>
  <gmi:identifier>
    <gmd:MD_Identifier>
      <gmd:code>
        <gco:CharacterString>recorder_id</gco:CharacterString>
      </gmd:code>
    </gmd:MD_Identifier>
  </gmi:identifier>
  <gmi:type>
    <gco:CharacterString>recorder_type</gco:CharacterString>
  </gmi:type>
  <gmi:description>
    <gco:CharacterString>recorder_gain, other_info</gco:CharacterString>
  </gmi:description>
</gmi:MI_Instrument>
</gmi:instrument>
<!-- DEVICE -->
<gmi:instrument>
  <!--
    device_maker_model
    device_function
    other_info
    additional_signal_con_type
  -->
  <gmi:MI_Instrument>
    <gmi:identifier>
      <gmd:MD_Identifier>
        <gmd:code>
          <gco:CharacterString>device_id</gco:CharacterString>
        </gmd:code>
      </gmd:MD_Identifier>
    </gmi:identifier>
    <gmi:type/>
    <gmi:description>
      <gco:CharacterString>device_maker_model, device_function, other_info,
additional_signal_con_type</gco:CharacterString>
    </gmi:description>
  </gmi:MI_Instrument>
</gmi:instrument>
</gmi:MI_Platform>
</gmi:platform>
</gmi:MI_AcquisitionInformation>
</gmi:acquisitionInformation>
</gmi:MI_Metadata>

```