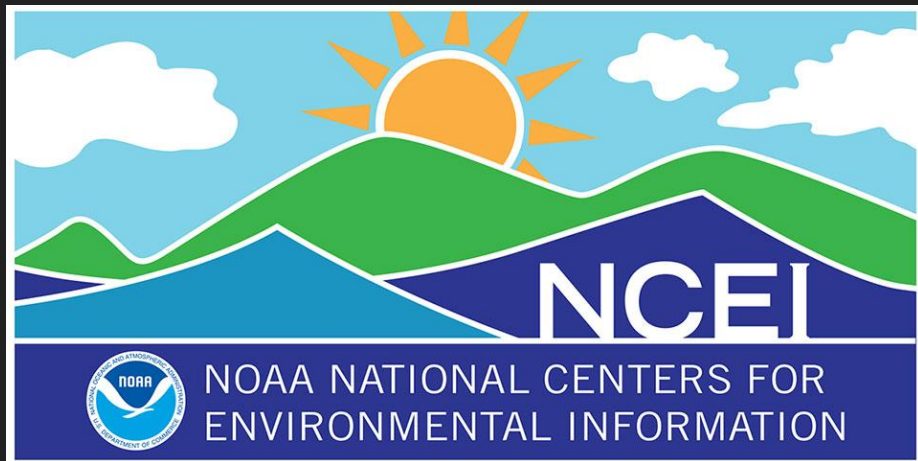


Applying Linked Data Principles to Static ISO Documents

Adam Shepherd, Technical Director
BCO-DMO



How do we enable static metadata records
to evolve over time with new knowledge?

Example: Measuring "Photosynthetic Rate"

Dataset Name ▲	Brief Description	Project	PI-Supplied Parameter Name
Host-symbiont reinfections	Symbiont removed and anemone reinfected with one of two strains of Symbiodinium	AnemoneOA	photo_output_symb
Imaging Pulse Amplitude Modulator Fluorometer Data	Imaging Pulse Amplitude Modulator Fluorometer Data	Resilient Acerv	mYield
Photosynthesis parameters - Rosario and Varadero	Photosynthetic parameters - Rosario and Varadero 2016 and 2017	Varadero Reef	alpha, Pmax_n, Pmax_g
Photosynthesis-Irradiance curve (P-E)	Photosynthesis-Irradiance curve	Varadero Reef	Slope_O2_prod, Rate_O2_prod
Photosynthetic and calcification rates	Photosynthetic and calcification rates of <i>Pleurochrysis carterae</i>	OA_Copes_Coccoliths	photo_rate, photoRate_LDcycle, photoRate_cellDensity_ugC, photoRate_cellDensity_pmolC
respiration and photosynthesis II	Biomass-normalized dark respiration and net photosynthesis rates in coral and algae as a function of pCO ₂ where LEDR (light-enhanced dark respiration) was measured	OA coral adaptation	photosynthesis
<i>Thalassiosira pseudonana</i> cyclostata	<i>Thalassiosira pseudonana</i> cyclostata experimental results	Stressors on Marine Phytoplankton	PI

- Definition added in May 2016
- Found in 7 Datasets
- 1st Dataset published May 2016
- Definition changed June 2016

<https://www.bco-dmo.org/parameter/648663>

Updating "Photosynthetic Rate"

Photosynthesis is a process by which plants and other organisms use light energy and chlorophyll to convert water, carbon dioxide, and minerals into oxygen and energy-rich organic compounds.

Photosynthesis is one of the mechanisms responsible for Primary Production. The methods used to estimate rate of photosynthesis vary widely as do the units of measurement, **although estimates of photosynthesis are often reported as micromol CO₂ m⁻² s⁻¹ or some variation of that.**

I took out this part: "although estimates of photosynthesis are often reported as micromol CO₂ m⁻² s⁻¹ or some variation of that". CO₂ is not a product of photosynthesis so when you measure photosynthesis you are not measuring CO₂. You are measuring C or O₂ usually. - mda, 6/13/2016

A compilation of dissolved noble gas and N₂/Ar ratio measurements collected from 1999-2016 in locations spanning the globe

Observations and Measurements		
Fair Name List		
Parameter	Description	Units
1000000	Number of non-zero elements for each column in the matrix	int64
11111111	A long recording of the 1000000 number values that occurred in the matrix, by columns (not rows). The matrix was 1000000 rows by 1000000 columns.	int64
500000	The amount of the matrix in memory (bytes)	int64
10000000	The length of the shortest sequence of bits. Negative values indicate that the sequence does not exist.	int64
100000	Number of bits that the matrix can store in a column in the least significant bit.	int64
1000000000	Number of bits that the matrix can store in a column in the most significant bit.	int64
10000000000	Number of bits that the matrix can store in a column in the second significant bit.	int64
100000000000	Number of bits that the matrix can store in a column in the third significant bit.	int64
1000000000000	Number of bits that the matrix can store in a column in the fourth significant bit.	int64
10000000000000	Number of bits that the matrix can store in a column in the fifth significant bit.	int64
100000000000000	Number of bits that the matrix can store in a column in the sixth significant bit.	int64
1000000000000000	Number of bits that the matrix can store in a column in the seventh significant bit.	int64
10000000000000000	Number of bits that the matrix can store in a column in the eighth significant bit.	int64
100000000000000000	Number of bits that the matrix can store in a column in the ninth significant bit.	int64
1000000000000000000	Number of bits that the matrix can store in a column in the tenth significant bit.	int64
10000000000000000000	Number of bits that the matrix can store in a column in the eleventh significant bit.	int64
100000000000000000000	Number of bits that the matrix can store in a column in the twelfth significant bit.	int64
1000000000000000000000	Number of bits that the matrix can store in a column in the thirteenth significant bit.	int64
10000000000000000000000	Number of bits that the matrix can store in a column in the fourteenth significant bit.	int64
100000000000000000000000	Number of bits that the matrix can store in a column in the fifteenth significant bit.	int64
1000000000000000000000000	Number of bits that the matrix can store in a column in the sixteenth significant bit.	int64
10000000000000000000000000	Number of bits that the matrix can store in a column in the seventeenth significant bit.	int64
100000000000000000000000000	Number of bits that the matrix can store in a column in the eighteenth significant bit.	int64
1000000000000000000000000000	Number of bits that the matrix can store in a column in the nineteenth significant bit.	int64
10000000000000000000000000000	Number of bits that the matrix can store in a column in the twentieth significant bit.	int64
100000000000000000000000000000	Number of bits that the matrix can store in a column in the twenty-first significant bit.	int64
1000000000000000000000000000000	Number of bits that the matrix can store in a column in the twenty-second significant bit.	int64
10000000000000000000000000000000	Number of bits that the matrix can store in a column in the twenty-third significant bit.	int64
100000000000000000000000000000000	Number of bits that the matrix can store in a column in the twenty-fourth significant bit.	int64
1000000000000000000000000000000000	Number of bits that the matrix can store in a column in the twenty-fifth significant bit.	int64
10000000000000000000000000000000000	Number of bits that the matrix can store in a column in the twenty-sixth significant bit.	int64
100000000000000000000000000000000000	Number of bits that the matrix can store in a column in the twenty-seventh significant bit.	int64
1000000000000000000000000000000000000	Number of bits that the matrix can store in a column in the twenty-eighth significant bit.	int64
10000000000000000000000000000000000000	Number of bits that the matrix can store in a column in the twenty-ninth significant bit.	int64
100000000000000000000000000000000000000	Number of bits that the matrix can store in a column in the thirtieth significant bit.	int64
1000000000000000000000000000000000000000	Number of bits that the matrix can store in a column in the thirty-first significant bit.	int64
100	Number of bits that the matrix can store in a column in the thirty-second significant bit.	int64
1000	Number of bits that the matrix can store in a column in the thirty-third significant bit.	int64
100	Number of bits that the matrix can store in a column in the thirty-fourth significant bit.	int64
1000	Number of bits that the matrix can store in a column in the thirty-fifth significant bit.	int64
100	Number of bits that the matrix can store in a column in the thirty-sixth significant bit.	int64
1000	Number of bits that the matrix can store in a column in the thirty-seventh significant bit.	int64
100	Number of bits that the matrix can store in a column in the thirty-eighth significant bit.	int64
1000	Number of bits that the matrix can store in a column in the thirty-ninth significant bit.	int64
100	Number of bits that the matrix can store in a column in the fortieth significant bit.	int64
1000	Number of bits that the matrix can store in a column in the forty-first significant bit.	int64
100	Number of bits that the matrix can store in a column in the forty-second significant bit.	int64
1000	Number of bits that the matrix can store in a column in the forty-third significant bit.	int64
100	Number of bits that the matrix can store in a column in the forty-fourth significant bit.	int64
1000	Number of bits that the matrix can store in a column in the forty-fifth significant bit.	int64
100	Number of bits that the matrix can store in a column in the forty-sixth significant bit.	int64
1000	Number of bits that the matrix can store in a column in the forty-seventh significant bit.	int64
100	Number of bits that the matrix can store in a column in the forty-eighth significant bit.	int64
1000	Number of bits that the matrix can store in a column in the forty-ninth significant bit.	int64
100	Number of bits that the matrix can store in a column in the fiftieth significant bit.	int64
1000	Number of bits that the matrix can store in a column in the fifty-first significant bit.	int64
100	Number of bits that the matrix can store in a column in the fifty-second significant bit.	int64
1000	Number of bits that the matrix can store in a column in the fifty-third significant bit.	int64
100	Number of bits that the matrix can store in a column in the fifty-fourth significant bit.	int64
1000	Number of bits that the matrix can store in a column in the fifty-fifth significant bit.	int64
100	Number of bits that the matrix can store in a column in the fifty-sixth significant bit.	int64
1000	Number of bits that the matrix can store in a column in the fifty-seventh significant bit.	int64
100	Number of bits that the matrix can store in a column in the fifty-eighth significant bit.	int64
1000	Number of bits that the matrix can store in a column in the fifty-ninth significant bit.	int64
100	Number of bits that the matrix can store in a column in the sixtieth significant bit.	int64
1000	Number of bits that the matrix can store in a column in the sixty-first significant bit.	int64
100	Number of bits that the matrix can store in a column in the sixty-second significant bit.	int64
1000	Number of bits that the matrix can store in a column in the sixty-third significant bit.	int64
100	Number of bits that the matrix can store in a column in the sixty-fourth significant bit.	int64
1000	Number of bits that the matrix can store in a column in the sixty-fifth significant bit.	int64
100	Number of bits that the matrix can store in a column in the sixty-sixth significant bit.	int64
1000	Number of bits that the matrix can store in a column in the sixty-seventh significant bit.	int64
100	Number of bits that the matrix can store in a column in the sixty-eighth significant bit.	int64
1000	Number of bits that the matrix can store in a column in the sixty-ninth significant bit.	int64
100	Number of bits that the matrix can store in a column in the seventieth significant bit.	int64
1000	Number of bits that the matrix can store in a column in the seventy-first significant bit.	int64
100	Number of bits that the matrix can store in a column in the seventy-second significant bit.	int64
1000	Number of bits that the matrix can store in a column in the seventy-third significant bit.	int64
100	Number of bits that the matrix can store in a column in the seventy-fourth significant bit.	int64
1000	Number of bits that the matrix can store in a column in the seventy-fifth significant bit.	int64
100	Number of bits that the matrix can store in a column in the seventy-sixth significant bit.	int64
1000	Number of bits that the matrix can store in a column in the seventy-seventh significant bit.	int64
100	Number of bits that the matrix can store in a column in the seventy-eighth significant bit.	int64
1000	Number of bits that the matrix can store in a column in the seventy-ninth significant bit.	int64
100	Number of bits that the matrix can store in a column in the eightieth significant bit.	int64
1000	Number of bits that the matrix can store in a column in the eighty-first significant bit.	int64
100	Number of bits that the matrix can store in a column in the eighty-second significant bit.	int64
1000	Number of bits that the matrix can store in a column in the eighty-third significant bit.	int64
100	Number of bits that the matrix can store in a column in the eighty-fourth significant bit.	int64
1000	Number of bits that the matrix can store in a column in the eighty-fifth significant bit.	int64
100	Number of bits that the matrix can store in a column in the eighty-sixth significant bit.	int64
1000	Number of bits that the matrix can store in a column in the eighty-seventh significant bit.	int64
100	Number of bits that the matrix can store in a column in the eighty-eighth significant bit.	int64
1000	Number of bits that the matrix can store in a column in the eighty-ninth significant bit.	int64
100	Number of bits that the matrix can store in a column in the ninetieth significant bit.	int64
1000	Number of bits that the matrix can store in a column in the ninety-first significant bit.	int64
100	Number of bits that the matrix can store in a column in the ninety-second significant bit.	int64
1000	Number of bits that the matrix can store in a column in the ninety-third significant bit.	int64
100	Number of bits that the matrix can store in a column in the ninety-fourth significant bit.	int64
1000	Number of bits that the matrix can store in a column in the ninety-fifth significant bit.	int64
100	Number of bits that the matrix can store in a column in the ninety-sixth significant bit.	int64
1000	Number of bits that the matrix can store in a column in the ninety-seventh significant bit.	int64
100	Number of bits that the matrix can store in a column in the ninety-eighth significant bit.	int64
1000	Number of bits that the matrix can store in a column in the ninety-ninth significant bit.	int64
100	Number of bits that the matrix can store in a column in the one hundred significant bit.	int64
1000	Number of bits that the matrix can store in a column in the one hundred and first significant bit.	int64
100	Number of bits that the matrix can store in a column in the one hundred and second significant bit.	int64
1000	Number of bits that the matrix can store in a column in the one hundred and third significant bit.	int64
100	Number of bits that the matrix can store in a column in the one hundred and fourth significant bit.	int64
1000	Number of bits that the matrix can store in a column in the one hundred and fifth significant bit.	int64
100	Number of bits that the matrix can store in a column in the one hundred and sixth significant bit.	int64
1000	Number of bits that the matrix can store in a column in the one hundred and seventh significant bit.	int64
1000	Number of bits that the matrix can store in a column in the one hundred and eighth significant bit.	int64
1000	Number of bits that the matrix can store in a column in the one hundred and ninth significant bit.	int64
1000	Number of bits that the matrix can store in a column in the one hundred and tenth significant bit.	int64
1000	Number of bits that the matrix can store in a column in the one hundred and eleventh significant bit.	int64
1000	Number of bits that the matrix can store in a column in the one hundred and twelfth significant bit.	int64
1000	Number of bits that the matrix can store in a column in the one hundred and thirteenth significant bit.	int64
1000	Number of bits that the matrix can store in a column in the one hundred and fourteenth significant bit.	int64
10000		

View/Open

data_global-noble-gases.tsv (1.120Mb)

 ISO19115-2.xml (338.3Kb)

 [Field_names.pdf \(29.75Kb\)](#)

 Global_Hammeetal2019.mat (400.0Kb)

 Readme_Hammeetal2019.txt

(20.55Kb)

 Dataset_description.pdf (197.0Kb)

Date _____

2018-08-24

Author

Hamme, Roberta C. Jenkins, William J. 

Citable URI

<https://hdl.handle.net/1912/10538>

Date Created

2018-08-13

Location

North Atlantic

Eastern Tropical Pacific - Transect from Peru to Tahiti

Oxygen minimum zone; East Pacific Rise

Global oceans

westlimit: -159.9952; southlimit: -68.1081; eastlimit: 178.9985; northlimit: 78.9988

DOI


10.1575/1912/bco-dmo.744563


Inert gases dissolved in the ocean are powerful tracers of the impact of physical processes on gases, particularly air-sea gas exchange (by both diffusive and bubble-mediated processes), temperature change, atmospheric pressure variation, mixing between different water masses, and ice processes. We have compiled a global ocean database of dissolved neon, argon, and krypton measurements, supplemented by helium, xenon, and nitrogen/argon (N₂/Ar) ratios in some locations. Samples were collected on board multiple research cruises spanning the period 1999 through 2016 and analyzed by mass spectrometry at four different shore-based laboratories (University of Victoria, Woods Hole Oceanographic Institution, University of Washington, and Scripps Institution of Oceanography). For a complete list of measurements, refer to the supplemental document 'Field_names.pdf', and a full dataset description is included in

[illegible]

- data_global-noble-gases.txt (1.120Mb)
- ISO19115-2.xml (338.3Kb)
- Field_names.pdf (29.75Kb)
- Global_Hammeetal2019.mat (400.0Kb)
- Readme_Hammeetal2019.txt (20.55Kb)
- Dataset_description.pdf (197.0Kb)

2018-08-24

Hamme, Roberta C. 

Jenkins, William J. 

<https://hdl.handle.net/1912/10538>

2018-08-13

North Atlantic

Eastern Tropical Pacific - Transect from Peru to Tahiti

Oxygen minimum zone; East Pacific Rise

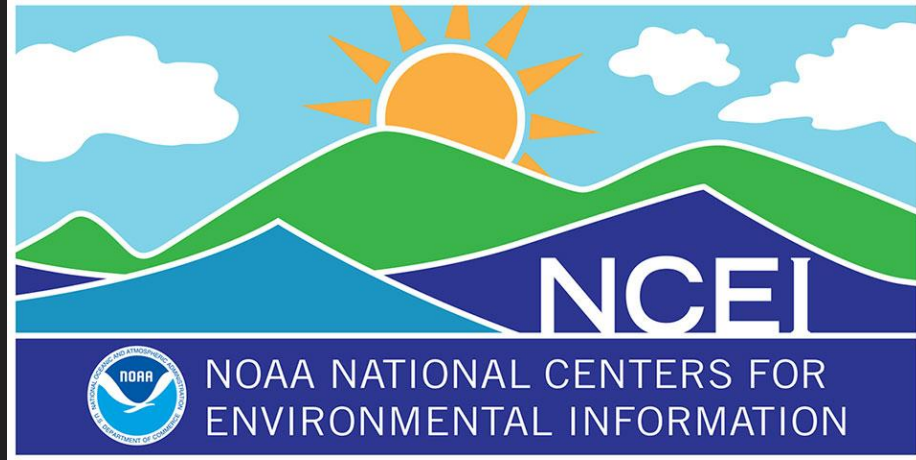
Global oceans

westlimit: -159.9952; southlimit: -68.1081; eastlimit: 178.9985; northlimit: 78.9988

10.1575/1912/bco-dmo.744563

Inert gases dissolved in the ocean are powerful tracers of the impact of physical processes on gases, particularly air-sea gas exchange (by both diffusive and bubble-mediated processes), temperature change, atmospheric pressure variation, mixing between different water masses, and ice processes. We have compiled a global ocean database of dissolved neon, argon, and krypton measurements, supplemented by helium, xenon, and nitrogen/argon (N₂/Ar) ratios in some locations. Samples were collected on board multiple research cruises spanning the period 1999 through 2016 and analyzed by mass spectrometry at four different shore-based laboratories (University of Victoria, Woods Hole Oceanographic Institution, University of Washington, and Scripps Institution of Oceanography). For a complete list of measurements, refer to the supplemental document 'Field_names.pdf', and a full dataset description is included in the supplemental document 'Dataset_description.pdf'. The data are available for public use.

Static ISO record in the Archive w. old information



old definition of
"photosynthetic rate"

The gmx:Anchor tag

```
<gco:CharacterString>photosynthetic rate</gco:CharacterString>
```

becomes

```
<gmx:Anchor xlink:href="{URL goes here}">photosynthetic rate</gmx:Anchor>
```

Things instead of *Strings*

What is meant by a string

at a single point in time

may change in the future.

Photosynthetic Rate as a "Thing"

It has a label.

"photosynthetic rate"

It has a definition.

"Photosynthesis is a process..."

It can have synonyms.

"photosynthesis"

It can be related
to other things.

URI	http://vocab.nerc.ac.uk/collection/P21/current/MS8092/
Identifier ()	SDN:P21::MS8092
Preferred label (en)	photosynthesis
Alternative label ()	
Definition (en)	Photosynthesis is a process by which plants and other organisms use light energy and chlorophyll compounds. Photosynthesis is one of the mechanisms responsible for Primary Production. The rate of photosynthesis is measured by the rate of oxygen production or the rate of carbon dioxide consumption.
Version Info ()	3
Has Current Version	http://vocab.nerc.ac.uk/collection/P21/current/MS8092/3/
Has Version	http://vocab.nerc.ac.uk/collection/P21/current/MS8092/2/
Has Version	http://vocab.nerc.ac.uk/collection/P21/current/MS8092/1/
PAV Version ()	3
PAV Authored On ()	2016-06-20 12:31:50.0
Deprecated()	false
Broader	http://vocab.nerc.ac.uk/collection/P21/current/MS8687/
Narrower	http://vocab.nerc.ac.uk/collection/P21/current/MS3484/
Narrower	http://vocab.nerc.ac.uk/collection/P21/current/MS10803/
Narrower	http://vocab.nerc.ac.uk/collection/P21/current/MS4551/
Narrower	http://vocab.nerc.ac.uk/collection/P21/current/MS780/
Related	http://vocab.nerc.ac.uk/collection/P21/current/MS11730/
Date ()	2016-06-20 12:31:50.0

Photosynthetic Rate as a "Thing"

All important pieces of information
related to a dataset get an identifier.

<http://lod.bco-dmo.org/id/parameter/648663>

W3C Best Practices for Data on the Web

<https://www.w3.org/TR/dwbp/#bp-summary>

[Best Practice 1](#): Provide metadata

[Best Practice 2](#): Provide descriptive metadata

[Best Practice 3](#): Provide structural metadata

[Best Practice 4](#): Provide data license information

[Best Practice 5](#): Provide data provenance information

[Best Practice 6](#): Provide data quality information

[Best Practice 7](#): Provide a version indicator

[Best Practice 8](#): Provide version history

[Best Practice 9](#): Use persistent URIs as identifiers of datasets

[Best Practice 10](#): Use persistent URIs as identifiers within datasets

[Best Practice 11](#): Assign URIs to dataset versions and series

[Best Practice 12](#): Use machine-readable standardized data formats

[Best Practice 13](#): Use locale-neutral data representations

[Best Practice 14](#): Provide data in multiple formats

[Best Practice 15](#): Reuse vocabularies, preferably standardized ones

[Best Practice 16](#): Choose the right formalization level

[Best Practice 17](#): Provide bulk download

[Best Practice 18](#): Provide Subsets for Large Datasets

[Best Practice 19](#): Use content negotiation for serving data available in multiple formats

[Best Practice 20](#): Provide real-time access

[Best Practice 21](#): Provide data up to date

[Best Practice 22](#): Provide an explanation for data that is not available

[Best Practice 23](#): Make data available through an API

[Best Practice 24](#): Use Web Standards as the foundation of APIs

[Best Practice 25](#): Provide complete documentation for your API

[Best Practice 26](#): Avoid Breaking Changes to Your API

[Best Practice 27](#): Preserve identifiers

[Best Practice 28](#): Assess dataset coverage

[Best Practice 29](#): Gather feedback from data consumers

[Best Practice 30](#): Make feedback available

[Best Practice 31](#): Enrich data by generating new data

[Best Practice 32](#): Provide Complementary Presentations

[Best Practice 33](#): Provide Feedback to the Original Publisher

[Best Practice 34](#): Follow Licensing Terms

[Best Practice 35](#): Cite the Original Publication












Best Practice #10:

Use persistent URIs as identifiers *within* datasets

<https://www.w3.org/TR/dwbp/#identifiersWithinDatasets>

Use persistent URIs as identifiers within datasets

<https://www.w3.org/TR/dwbp/#identifiersWithinDatasets>

<u>Use persistent URIs as identifiers of datasets</u>	 Reuse	 Linkability	 Discoverability	 Interoperability
<u>Use persistent URIs as identifiers within datasets</u>	 Reuse	 Linkability	 Discoverability	 Interoperability
<u>Assign URIs to dataset versions and series</u>	 Reuse	 Discoverability	 Trust	

In a **browser** <https://www.bco-dmo.org/parameter/648663>



Accept: text/html

Accept: application/xml

→ RDF/XML

Supports URL File Extensions:

```
GET http://lod.bco-dmo.org/id/parameter/648663.xml
```

→ RDF/XML

GET http://lod.bco-dmo.org/id/parameter/648663.rdf

→ RDF/XML

The gmx:Anchor tag with URIs

```
<gmx:Anchor xlink:href="http://lod.bco-dmo.org/id/parameter/648663.rdf">...
```


NOAA ISO 19115-2 snapshot of Photosynthetic Rate

```
▼<gmd:keyword>
  <gmx:Anchor xlink:href="http://lod.bco-dmo.org/id/parameter/1617.rdf" xlink:title="Parameter" xlink:actuate="onRequest">net oxygen production</gmx:Anchor>
</gmd:keyword>
▼<gmd:keyword>
  <gmx:Anchor xlink:href="http://lod.bco-dmo.org/id/parameter/1620.rdf" xlink:title="Parameter" xlink:actuate="onRequest">oxygen respiration rates from in situ
incubation</gmx:Anchor>
</gmd:keyword>
▼<gmd:keyword>
  <gmx:Anchor xlink:href="http://lod.bco-dmo.org/id/parameter/648663.rdf" xlink:title="Parameter" xlink:actuate="onRequest">photosynthetic rate</gmx:Anchor>
</gmd:keyword>
▼<gmd:keyword>
  <gmx:Anchor xlink:href="http://lod.bco-dmo.org/id/parameter/1073.rdf" xlink:title="Parameter" xlink:actuate="onRequest">no standard parameter</gmx:Anchor>
</gmd:keyword>
▼<gmd:type>
  <gmd:MD_KeywordTypeCode codeList="http://www.isotc211.org/2005/resources/Codelist/gmxCodeLists.xml#MD_KeywordTypeCode"
codeListValue="featureType">featureType</gmd:MD_KeywordTypeCode>
</gmd:type>
▼<gmd:thesaurusName>
  ▼<gmd:CI_Citation>
    ▼<gmd:title>
      <gco:CharacterString>BCO-DMO Standard Parameters</gco:CharacterString>
    </gmd:title>
  </gmd:CI_Citation>
</gmd:thesaurusName>
```

NOAA ISO 19115-2 snapshot of Photosynthetic Rate

```
▼<gmd:keyword>
  <gmx:Anchor xlink:href="http://lod.bco-dmo.org/id/parameter/1617.rdf" xlink:title="Parameter" xlink:actuate="onRequest">net oxygen production</gmx:Anchor>
</gmd:keyword>
▼<gmd:keyword>
  <gmx:Anchor xlink:href="http://lod.bco-dmo.org/id/parameter/1620.rdf" xlink:title="Parameter" xlink:actuate="onRequest">oxygen respiration rates from in situ
  incubation</gmx:Anchor>
</gmd:keyword>
▼<gmd:keyword>
  <gmx:Anchor xlink:href="http://lod.bco-dmo.org/id/parameter/648663.rdf" xlink:title="Parameter" xlink:actuate="onRequest">photosynthetic rate</gmx:Anchor>
</gmd:keyword>
▼<gmd:keyword>
  <gmx:Anchor xlink:href="http://lod.bco-dmo.org/id/parameter/1073.rdf" xlink:title="Parameter" xlink:actuate="onRequest">no standard parameter</gmx:Anchor>
</gmd:keyword>
▼<gmd:type>
  <gmd:MD_KeywordTypeCode codeList="http://www.isotc211.org/2005/resources/Codelist/gmxCodeLists.xml#MD_KeywordTypeCode"
  codeListValue="featureType">featureType</gmd:MD_KeywordTypeCode>
</gmd:type>
▼<gmd:thesaurusName>
  ▼<gmd:CI_Citation>
    ▼<gmd:title>
      <gco:CharacterString>BCO-DMO Standard Parameters</gco:CharacterString>
    </gmd:title>
  </gmd:CI_Citation>
</gmd:thesaurusName>
```

NOAA ISO 19115-2 snapshot of Photosynthetic Rate

```
▼<gmd:keyword>
  <gmx:Anchor xlink:href="http://lod.bco-dmo.org/id/parameter/1617.rdf" xlink:title="Parameter" xlink:actuate="onRequest">net oxygen production</gmx:Anchor>
</gmd:keyword>
▼<gmd:keyword>
  <gmx:Anchor xlink:href="http://lod.bco-dmo.org/id/parameter/1620.rdf" xlink:title="Parameter" xlink:actuate="onRequest">oxygen respiration rates from in situ
  incubation</gmx:Anchor>
</gmd:keyword>
▼<gmd:keyword>
  <gmx:Anchor xlink:href="http://lod.bco-dmo.org/id/parameter/648663.rdf" xlink:title="Parameter" xlink:actuate="onRequest">photosynthetic rate</gmx:Anchor>
</gmd:keyword>
▼<gmd:keyword>
  <gmx:Anchor xlink:href="http://lod.bco-dmo.org/id/parameter/1073.rdf" xlink:title="Parameter" xlink:actuate="onRequest">no standard parameter</gmx:Anchor>
</gmd:keyword>
▼<gmd:type>
  <gmd:MD_KeywordTypeCode codeList="http://www.isotc211.org/2005/resources/Codelist/gmxCodeLists.xml#MD_KeywordTypeCode"
  codeListValue="featureType">featureType</gmd:MD_KeywordTypeCode>
</gmd:type>
▼<gmd:thesaurusName>
  ▼<gmd:CI_Citation>
    ▼<gmd:title>
      <gco:CharacterString>BCO-DMO Standard Parameters</gco:CharacterString>
    </gmd:title>
  </gmd:CI_Citation>
</gmd:thesaurusName>
```

BCO-DMO Strategy for ISO 19115-2 XML

- Use `<gmx:Anchor>` instead of `<gco:CharacterString>`
(Thing) (String)
- For humans, we use a file extension URL for readability (.rdf)
- For machines, gmx:Anchor requires xlink:href URL resolve to XML
(Content-Type → application/rdf+xml)

<http://lod.bco-dmo.org/id/parameter/648663.rdf>

Questions?

Example ISO record at BCO-DMO:

https://www.bco-dmo.org/dataset/648416/iso/NOAA_ISO-19115-2.xml