EML 2.2

LTER IMC - 2018-04-09

Summary

Backward compatible

- Adding support for
  - Data Papers
  - Semantics

- Improved
  - Taxonomy
  - Units

Data Papers

Goal: Datasets can become first-class research objects

- Additional elements, eg
  - Introduction
  - Getting Started
  - Acknowledgements
  - License
  - Structured Funding
  - Literature cited section (alternative: bib tex)
- TextType formatting is a choice of
  - Doctype
  - Markdown

Examples - EML

```
<funding>
    <para>Funding is from a grant from the National Science Foundation.</para>
</funding>
<award>
    <funderName>National Science Foundation</funderName>
    <funderIdentifier>https://doi.org/10.13039/00000001</funderIdentifier>
    <awardNumber>1546024</awardNumber>
    <title>Scientia Arctica: A Knowledge Archive for Discovery and Reproducible Science in
    <awardUrl>https://www.nsf.gov/awardsearch/showAward?AWD_ID=1546024</awardUrl>
</award>
```

```
<licensed>
    <licenseName>Apache License 2.0</licenseName>
    <url>https://spdx.org/licenses/Apache-2.0.html</url>
    <identifier>Apache-2.0</identifier>
</licensed>
```

Examples - EML

```
<abstract>
    <markdown>
        This is the data paper abstract.

        Sample equation:

        $$\left( x + a \right)^{n} = \sum_{k = 0}^{n}{\left( \frac{n}{k} \right)x^{k}a^{n - k}}$$

    </markdown>
</abstract>
```

```
<gettingStarted>
    <markdown>
        Some intro text in the getting started, then break into subsections.  Note that th
        of markdown text defines the starting column for all subsequent indenting.

        ## Level 2 heading

        We use a level 2 heading because Level 1 would be at the same level as
        the main sections of the paper.

        ## Another level 2 heading
        With some information.
    </markdown>
</gettingStarted>
```

Semantics

Goal: Tagging with external vocabularies

- Initially at these nodes
  - Dataset
  - Keyword
  - Attribute
- Flexible enough for other elements, e.g.
  - Creator (foaf)

Examples - External Dictionaries

CF Conventions:

```
▼ <entry id="latitude">
      <canonical_units> degree_north </canonical_units>
      <grib />
      <amip> latitude </amip>
   ▼ <description>
         Latitude is positive northward; its units of degree_north (or equivalent) indicate this explicitly. In a latitude
         defined with respect to a rotated North Pole, the standard name of grid_latitude should be used instead of latitu
         is positive in the grid-northward direction, but its units should be plain degree.
      </description>
   </entry>
```

Darwin Core:

Term Name: decimalLatitude	
Identifier:	http://rs.tdwg.org/dwc/terms/decimalLatitude
Class:	http://purl.org/dc/terms/Location
Definition:	The geographic latitude (in decimal degrees, using the spatial reference system given in geodeticDatum) of the geographic center of a the Equator, negative values are south of it. Legal values lie between -90 and 90, inclusive.
Comment:	Example: "-41.0983423". For discussion see http://terms.tdwg.org/wiki/dwc:decimalLatitude
Details:	decimalLatitude
Term Name: decimalLongitude	

The Ecosystem Ontology

Jump To: [   ]

Details Visualization Notes (0) Class Mappings (0)

- Fluorescence_measurementType
- **Flux Measurement Type**
  - Carbon Dioxide Flux
    - Carbon Dioxide Diffusion Flux
    - Oceanic Carbon Dioxide Flux
  - Carbon Flux
  - Methane Flux
  - Momentum Flux
  - Net Assimilation Rate Flux
  - Net Primary Production Biomass Flux
  - Radiative flux
    - Ground Heat Flux
    - Latent Heat Flux
    - Latent Heat MOV
    - Net Longwave Radiation MOV
    - Net Shortwave Radiation MOV
    - Sensible Heat MOV
    - Surface Incident Longwave Radiation MOV
    - Surface Incident Shortwave Radiation MOV
  - Specific Flux
- Linear Measurement Type
- Mass Density Measurement Type
- Mass Measurement Type
- Pressure Measurement Type
- Proportion Measurement Type
- Temperature Measurement Type
- Temporal Measurement Type
- Temporal Rate Measurement Type
- Volume Measurement Type
- Volumetric Density Measurement Type
- Measurement Value
- Observation

Field	Value
Preferred Name	Flux Measurement Type
Synonyms	Flow Measurement Type
Definitions	the rate of transfer of a substance or energy across a given surface In transport phenomena (heat transfer, mass transfer and fluid dynamics), flux is defined as the rate of flow of a property per unit area, which has the dimensions [quantity]·[time]−1·[area]−1.[Bird et al, 1960] The area is of the surface the property is flowing "through" or "across". For example, the magnitude of a river's current, i.e. the amount of water that flows through a cross−section of the river each second, or the amount of sunlight that lands on a patch of ground each second, are kinds of flux.
ID	http://purl.dataone.org/odo/ECSO_00000514
description	The study of transport phenomena concerns the exchange of mass, energy, and momentum between observed and studied systems. Fundamental analyses in all three subfields are often grounded in the simple principle that the sum total of the quantities being studied must be conserved by the system and its environment.
description_Source	https://en.wikipedia.org/wiki/Transport_phenomena
alternative label	Flow Measurement Type
definition	the rate of transfer of a substance or energy across a given surface In transport phenomena (heat transfer, mass transfer and fluid dynamics), flux is defined as the rate of flow of a property per unit area, which has the dimensions [quantity]·[time]−1·[area]−1.[Bird et al, 1960] The area is of the surface the property is flowing "through" or "across". For example, the magnitude of a river's current, i.e. the amount of water that flows through a cross−section of the river each second, or the amount of sunlight that lands on a patch of ground each second, are kinds of flux.
definition_Contributor	Margaret O'Brien, orcid.org/0000-0002-1693-8322
definition_Source	https://en.wikipedia.org/wiki/Flux, Bird, R. Byron; Stewart, Warren E.; Lightfoot, Edwin N. (1960). Transport Phenomena. Wiley. ISBN 0−471−07392−X.
preferred label	Flux Measurement Type

Examples - EML

```
<attribute>
  <attributeName>decimalLatitude</attributeName>
  <attributeLabel>Latitude</attributeLabel>
  <attributeDefinition>Site latitude</attributeDefinition>
  ...
  <annotation>
    <propertyURI label="Property">http://www.w3.org/1999/02/22-rdf-syntax-ns#Property</propertyURI>
    <valueURI label="Decimal Latitude">http://rs.tdwg.org/dwc/terms/decimalLatitude/</valueURI>
  </annotation>
  <annotation>
    <propertyURI label="Property">http://www.w3.org/1999/02/22-rdf-syntax-ns#Property</propertyURI>
    <valueURI label="Latitude">http://cfconventions.org/Data/cf-standard-names/50/src/cf-standard-name-table.xml#latitude</va
  </annotation>
</attribute>
```

Dataset: https://portal.edirepository.org/nis/metadataviewer?packageid=edi.140.1

Examples - EML

```xml
<attribute id="column02">
  <attributeName>flux</attributeName>
  <attributeLabel>CO2 Flux</attributeLabel>
  <attributeDefinition>CO2 Flux collected at 27 meters above ground</attributeDefinition>
  ...
  <annotation>
    <propertyURI label="measurementType">http://purl.dataone.org/odo/measurementType</propertyURI>
    <valueURI label="CO2 flux measurement">http://purl.dataone.org/odo/ECSO_00000536/</valueURI>
  </annotation>
</attribute>
```

Dataset: https://portal.edirepository.org/nis/mapbrowse?packageid=knb-lter-fce.1134.4

Taxonomy

Goal: external ids in taxonomicClassifiaction

In progress.

See https://github.com/NCEAS/eml/issues/141

Units

Goals

- Easy to find and list
- Consistently described
- Simplify conversions

- Unit names
  - Preferred list with consistent format/spelling
  - non-preferred are deprecated, but available
- UnitTypes - Container for dimensions
  - Renaming is likely, dimensions won't change
  - Reassigned units deprecated (ie, become non-preferred)
- Unit conversions
  - Recommending udunits package
  - Udunits synonym included
- Candidates from
  - LTER
  - Arctic Data Center

Example - EML Unit Dictionary

EML 2.1 standard unit = "cubicMeter"

EML 2.2

```
<stmml:unit unitType="volume" id="cubicMeter" name="cubicMeter"
    deprecatedInFavorOf="meterCubed">
    <stmml:description>cubic meter</stmml:description>
</stmml:unit>


<stmml:unit unitType="volume" id="meterCubed" name="meterCubed"
udunitSynonym="m^3"/>
```

TO DO

Documentation

Primer for semantic annotation

XSLT rendering

For more info! https://waffle.io/NCEAS/eml