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Ministry for the
Environment
Manatū Mō Te Taiao



koordinates

A common model for scientific observations and samples

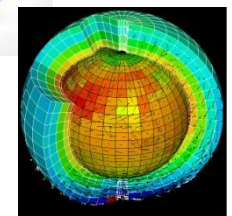
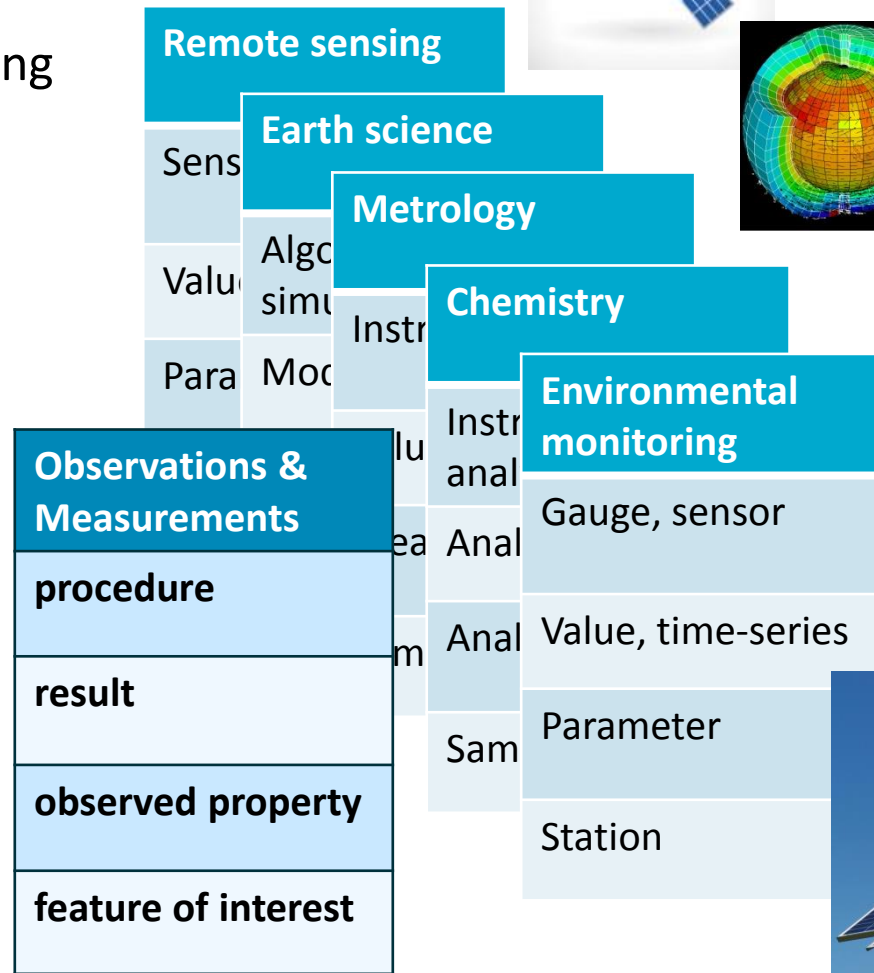
Environmental Data Summit
105th OGC Technical Committee
Palmerston North, New Zealand
Simon Cox
06 December 2017

Outline

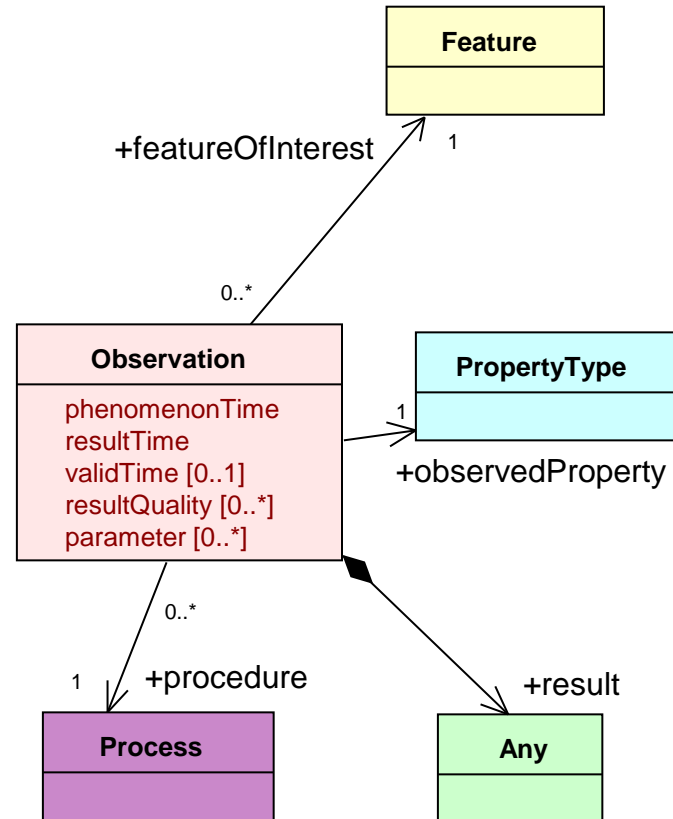
- Motivation for a common observation model
- Standard and variants
- Samples
- Adoption

Motivation for a common model

- Integrated analysis and modelling
- Discovery & data integration a significant challenge
- **Standard vocabulary**
~~Many private contracts~~
 one public agreement!



Observations & Measurements



An **Observation** is an action

whose **result** is an estimate of the value of some **property** of the **feature-of-interest** that applied at the stated **phenomenon-time**, obtained using a specified **procedure**, completed at the recorded **result-time**

OGC and ISO 19156:2011(E)

Open Geospatial Consortium

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OGC Abstract Specification

Geographic information — Observations and measurements

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INTERNATIONAL
STANDARD

ISO
19156

First edition
2011-12-15

**Geographic information — Observations
and measurements**

Information géographique — Observations et mesures

Open Geospatial Consortium

Consortium

Consortium



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INSPIRE



ELSEVIER

Environment

Volume 1

Observations Data Model 2 for spatially discrete Earth data

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Show more

<https://doi.org/10.1016/j.envsoft.2016.01.010>

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Semantic Sensor Network Ontology



W3C Recommendation 19 October 2017

This version:

<https://www.w3.org/TR/2017/REC-vocab-ssn-20171019/>

Latest published version:

<https://www.w3.org/TR/vocab-ssn/>

Latest editor's draft:

<https://w3c.github.io/sdw/ssn/>

Implementation report:

<https://w3c.github.io/sdw/ssn-usage/>

Previous version:

<https://www.w3.org/TR/2017/PR-vocab-ssn-20170907/>

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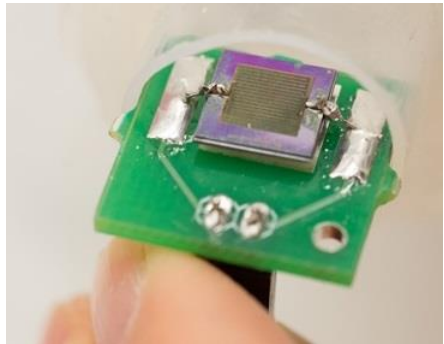
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- [GitHub](#)
- [Issues](#)

Sensing

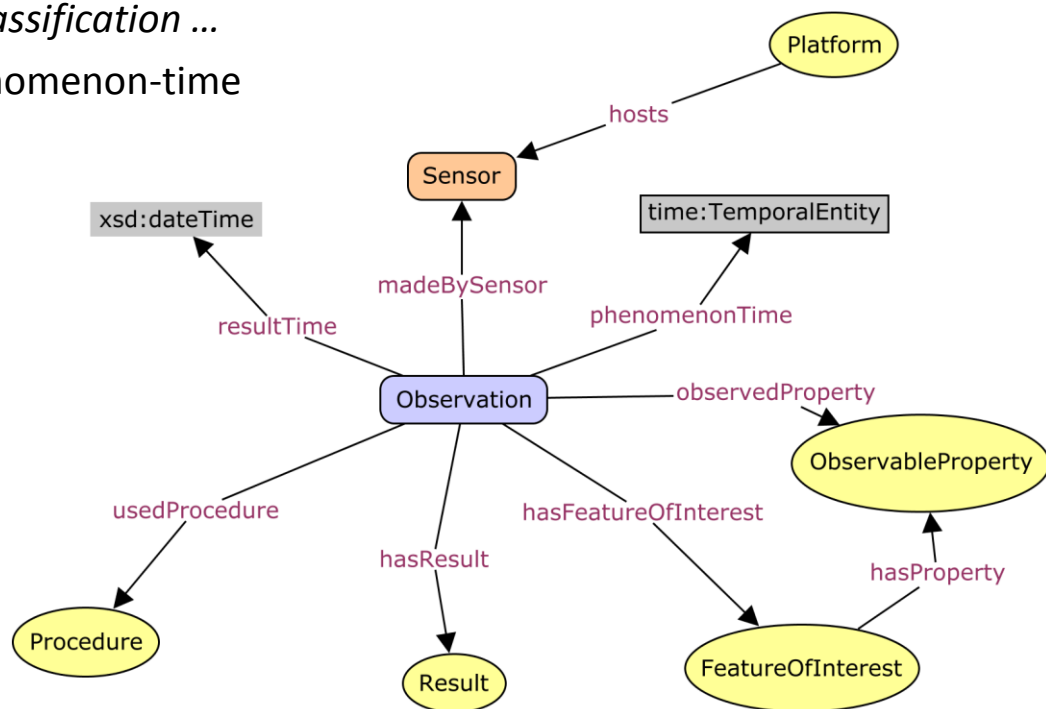


SOSA Observation – key elements of O&M

- Observation = ‘Act of observation’
- many types of result: *number, image, classification ...*
- result-time may be different to the phenomenon-time
- procedure, sensor, feature-of-interest

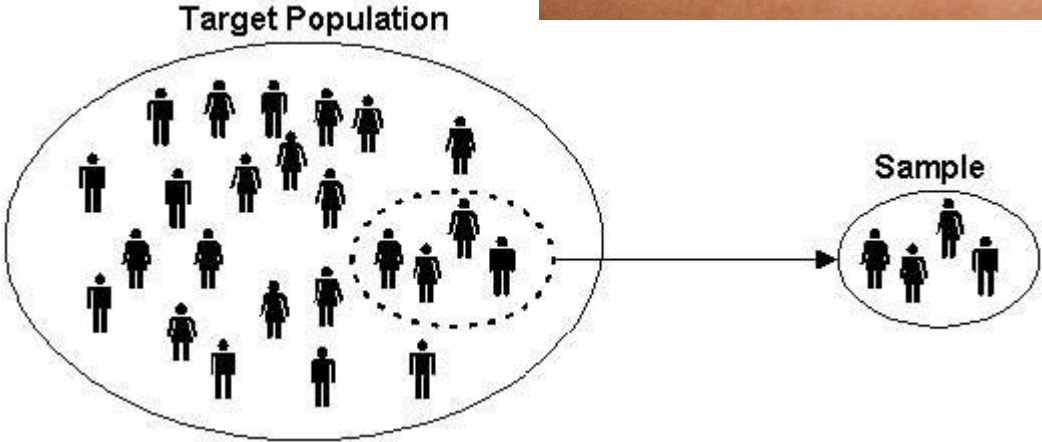
Scope

- In situ observations
- Remote sensing
- Ex-situ (laboratory) observations
- Numerical models/simulations
- Forecasts
- Interpretations, classifications



Any action whose result is an *estimate* of a property value

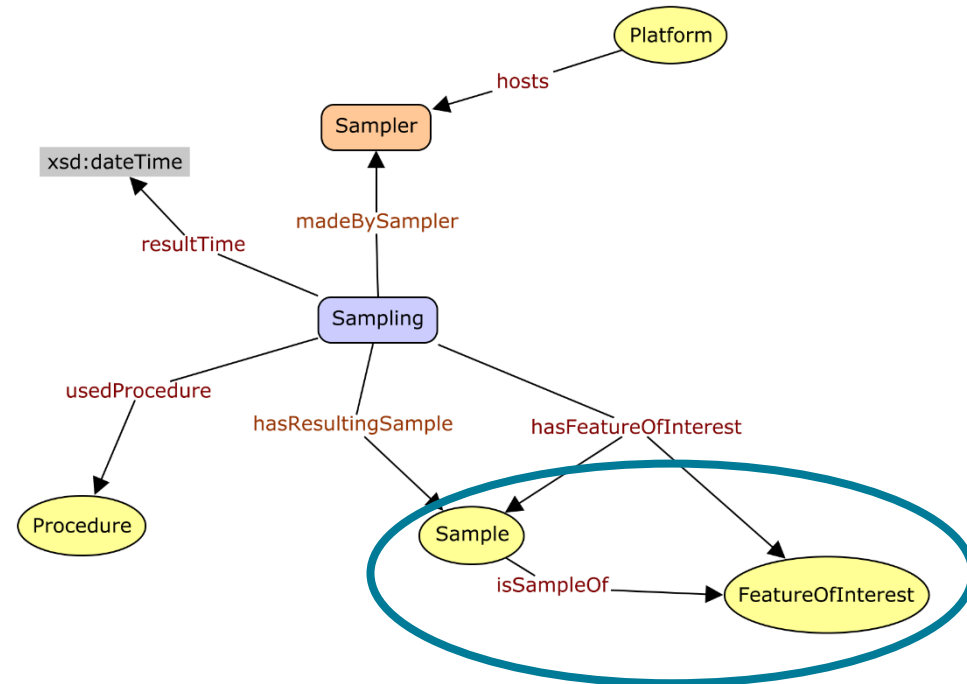
Sampling



SOSA Sample: a cross-domain definition

A 'sample' is a thing or subset which is intended to be representative of a larger thing or set ...

... created or selected for the purpose of making observations to determine the value of one or more properties, traits or qualities of the larger thing



The essential property of a sample is the 'is-sample-of' relationship with the larger thing.

Types of sample

A **material sample or specimen** is typically selected to allow ex-situ observations



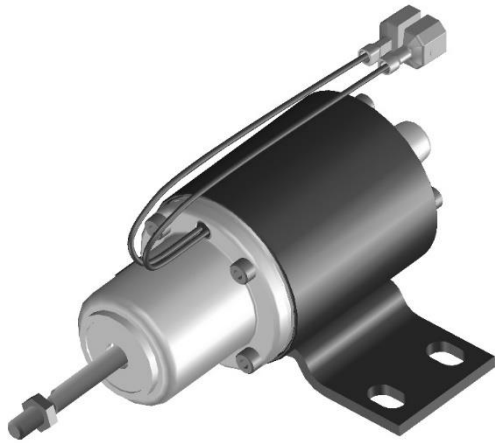
A **statistical sample or subset** is a specified number of individuals from a population



A **spatio-temporal sample** may have the same dimension but a smaller extent than the thing which it represents,
or a lower topologic dimension than the thing which it represents



Actuation

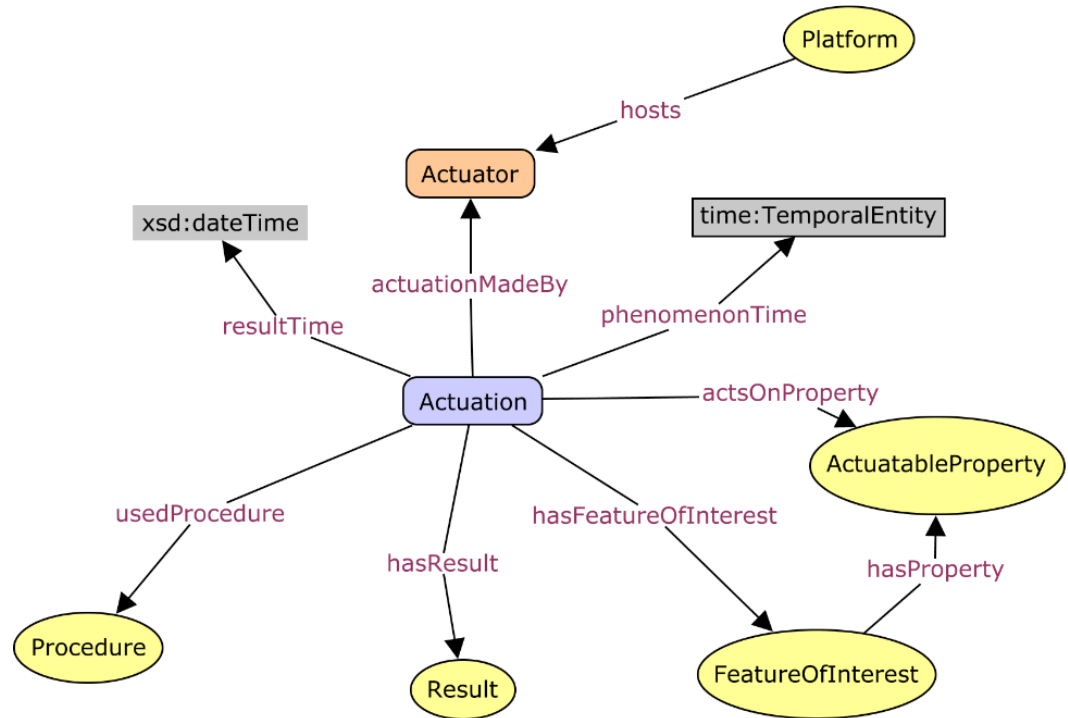


SOSA – Actuation – change the state of the world

Act of actuation changes a property of a feature

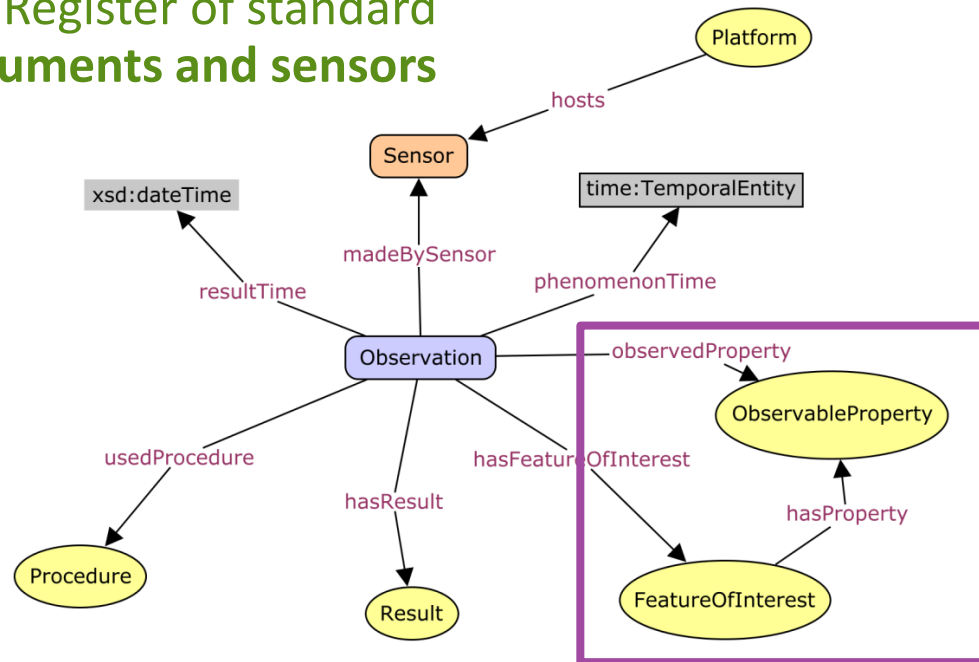
e.g. opens a window, turns on a light

Same pattern as Sensing and Sampling



Domain specialization

Register of standard instruments and sensors



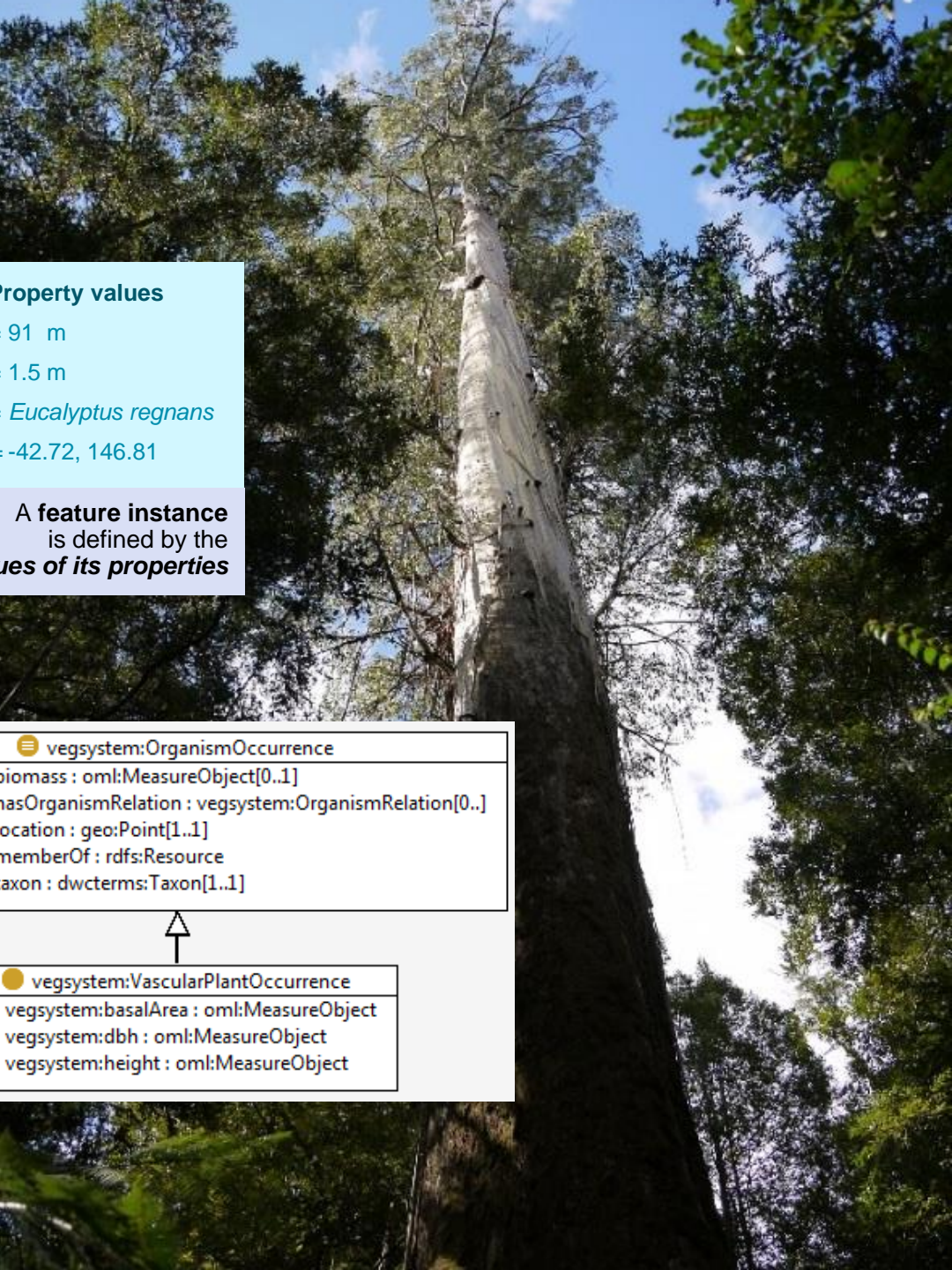
Register of standard **observable-properties**

WaterML, WaterML-WQ

Register of standard **protocols and procedures**

Conceptual model of the application-domain including the **object types (features)**

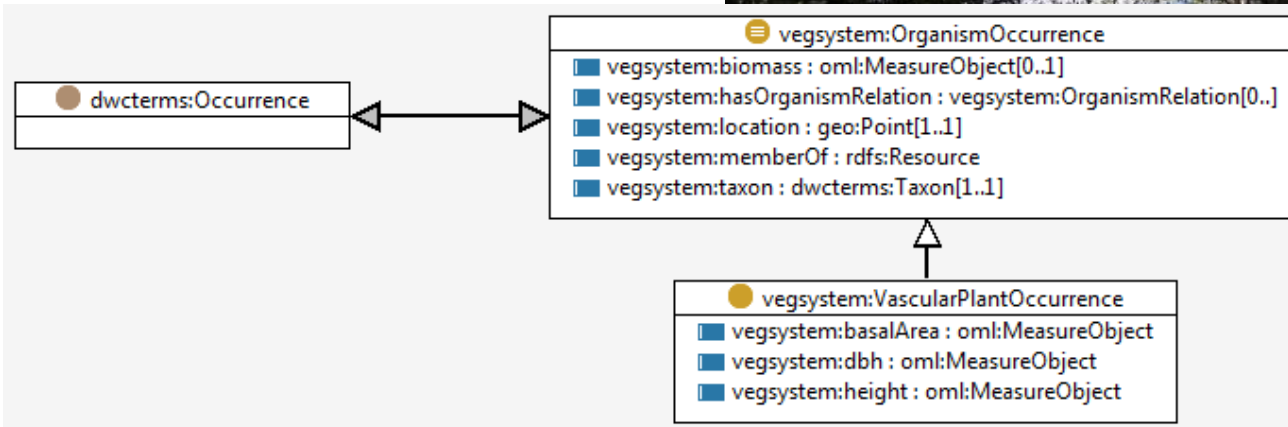
Domain model?



| Feature type | Characteristic properties | Property values |
|--------------------------------|---------------------------|-----------------------------|
| <i>VascularPlantOccurrence</i> | <i>height</i> | = 91 m |
| | <i>dbh</i> | = 1.5 m |
| | <i>taxon</i> | = <i>Eucalyptus regnans</i> |
| | <i>location</i> | = -42.72, 146.81 |

A **feature type** is defined by a set of **characteristic properties**

A **feature instance** is defined by the **values of its properties**





OGC Definitions Service (Beta)

process type

<http://www.opengis.net/def/waterml/2.0/processType/>

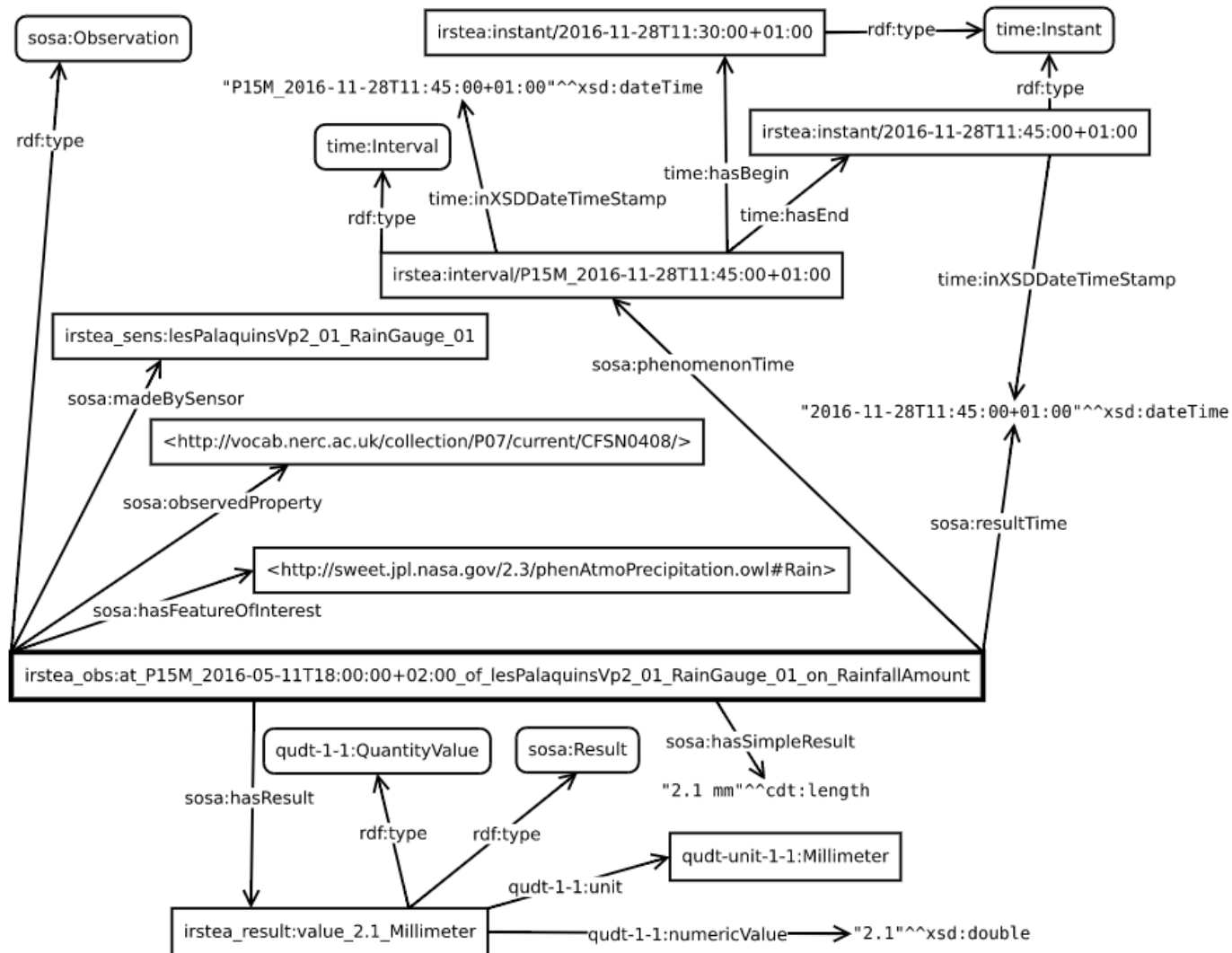
| | | |
|----------------------------|--|--|
| label | WaterML process type | |
| member | <ul style="list-style-type: none"> Algorithm Manual Method Sensor Simulation Unknown | |
| type | <ul style="list-style-type: none"> Resource Collection | |
| is primary topic of | processType | |
| same as | <div style="background-color: #f0f0f0; padding: 2px;">[process-type]</div> <div style="padding: 2px;">same as processType</div> | |
| see also | 2.0 | |
| source | 2.0 | |

O&M adoption

- USGS Water
- INSPIRE / EC Air Quality
- WMO weather
- SeaDataNet ocean observations
- ANZSoilML
- Geoscience Australia IGSN
- ...

Weather data in SOSA from IRSTEA

Observation



Thank you

Land and Water

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