



'Sampling Coverage Observations' (aka CSML) for Meteorology

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Overview

History, status, value proposition

ISO 19156 (Observations and
Measurements)

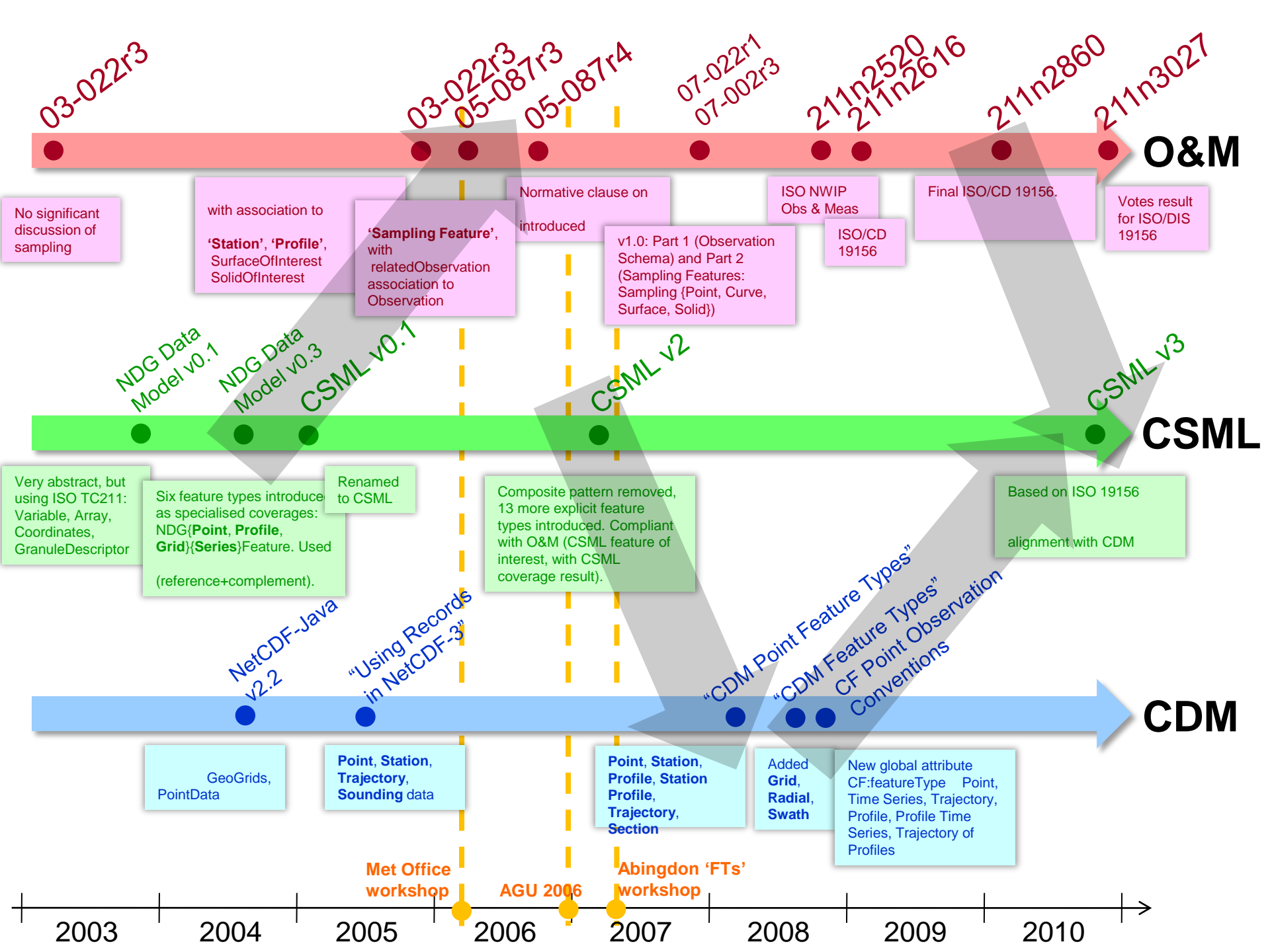
Spatial Sampling Features

Discrete Coverage Observation

Sampling Coverage Observation

CSML v3





Current status

ISO/DIS 19156 vote just completed (8-Nov-2010)

approved with 100%

CF point observation conventions and
NetCDF Common Data Model

fairly stable with respect to identified

by December 2010 TC (Sydney)



Convergence value proposition

NetCDF/CF provides widely-used
community-governed **encoding format**
for observational met/ocean data

ISO 19156 provides TC211-compatible
conceptual model for observations

growing SWE implementation community

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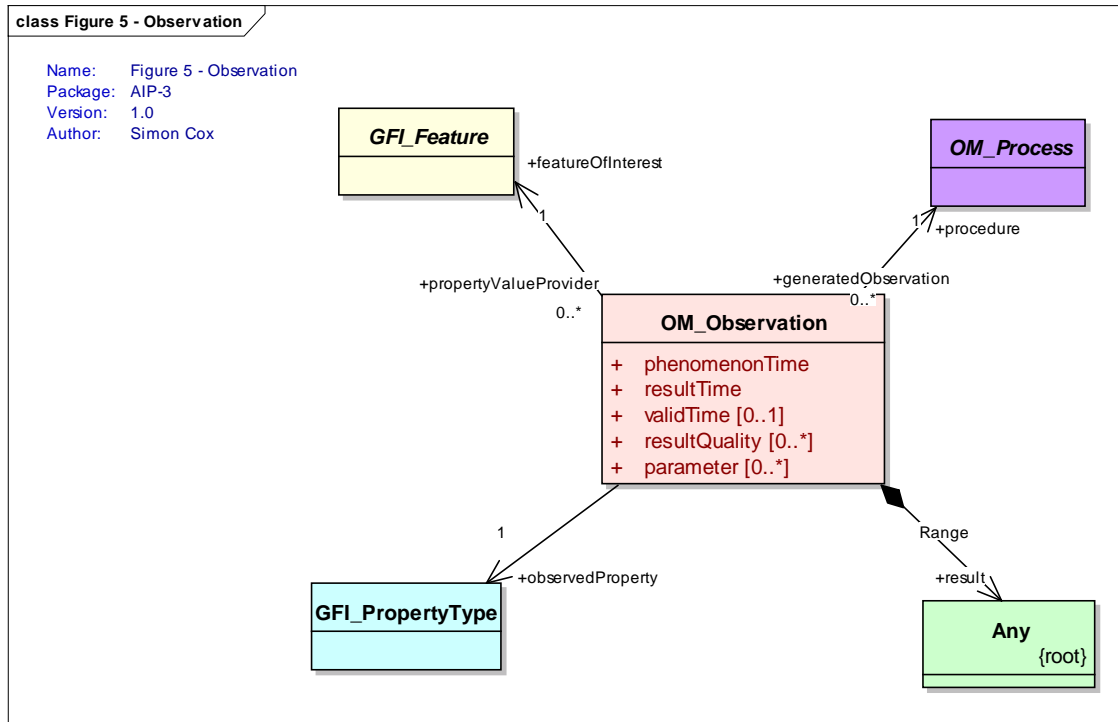
CSML provides a bridge between them



ISO/DIS 19156

Basic Observation model

An **observation** is an event that estimates an **observed property** of a **feature of interest**, using a **procedure**, and generating a **result**



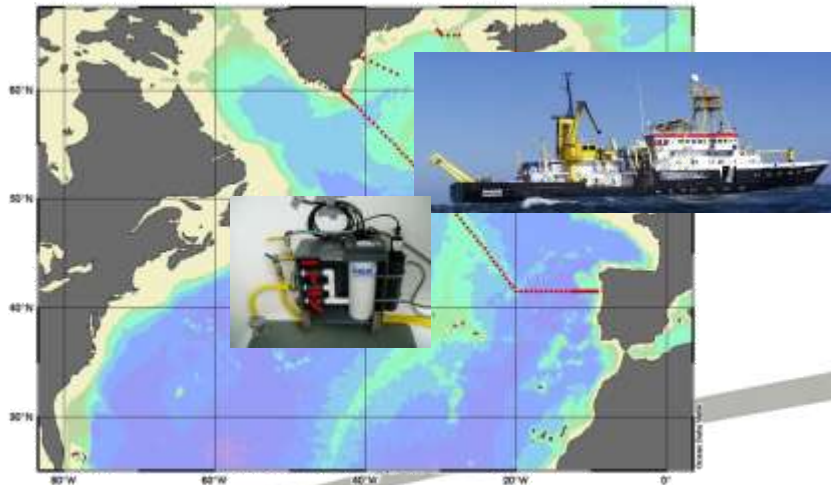
Example: marine observation

O&M

Feature-of-interest
observed Property
Procedure
result

Marine observation

Atlantic cruise track
temperature
thermosalinograph
19.2°C



Example: air quality

O&M

Feature-of-interest
observed Property
Procedure
result

Air quality

Urban monitoring station
CO₂
FTIR
450 ppm

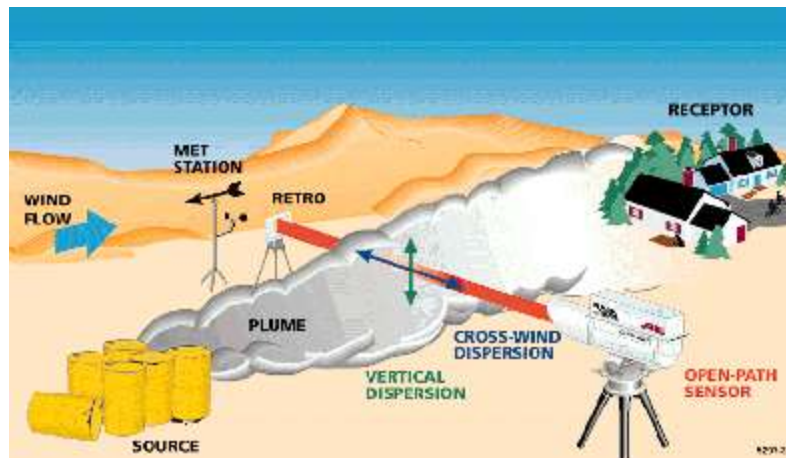


Image courtesy

<http://www.atmosfera.unam.mx>



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Two specialisations

1. Where an observation is *sampling* the environment
2. Where the observation result is a *field* some spatiotemporal domain



Spatial Sampling Feature

A radiosonde does not measure temperature of the whole atmosphere, but a *sampling profile* through the atmosphere

Likewise, a set of CTD casts measures a *sampled section* of salinity through the

and have no significant function outside of their role in the observation process. ... A sampling feature is intended to

(ISO/DIS 19156 §8.1.2)



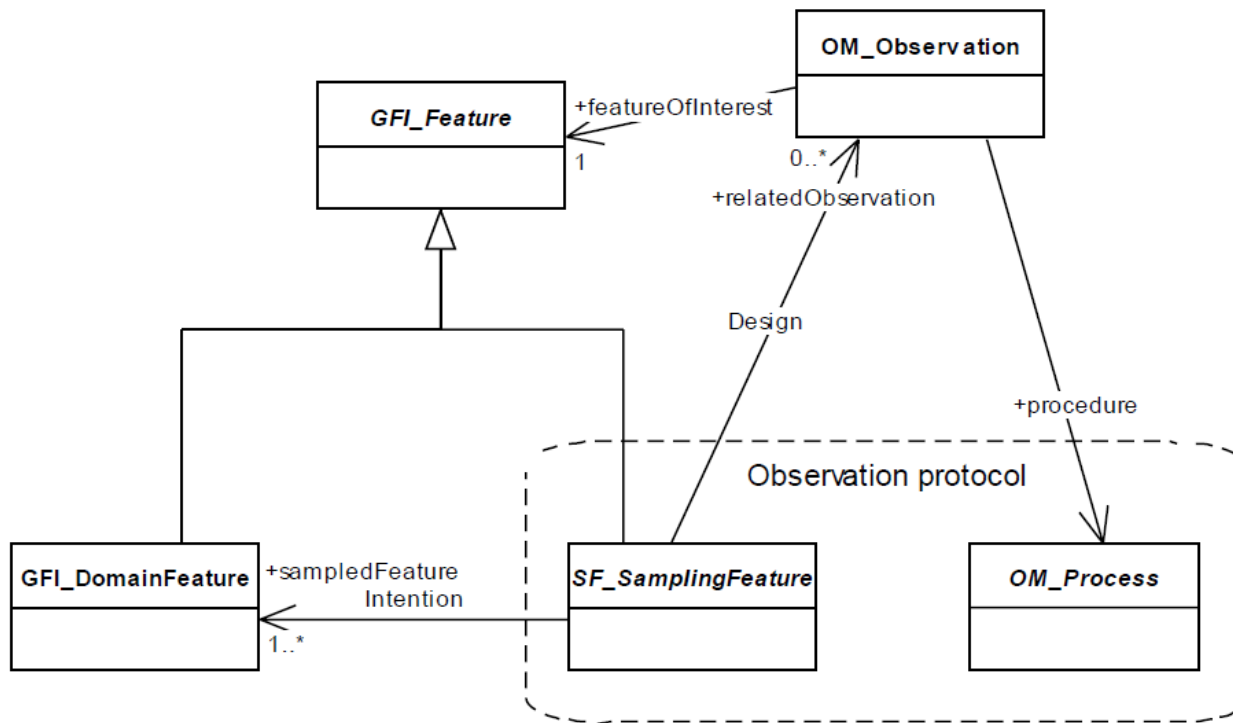
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Spatial Sampling Feature

Defining properties of a Sampling Feature:

there is usually one or more *related observations*

there is, by definition, a *sampled feature*



Examples of Sampling Features

Specimen

physical sample

Spatial sampling features

Station

Profile

Section



Discrete Coverage Observation

These are observations of some property which varies over a feature

temperature varies through the *atmosphere*

salinity varies within the *ocean*

The result of the observation will also be a function

Different to e.g.:

measuring the *mass* of a *banana*

or the *height* of a *tree*

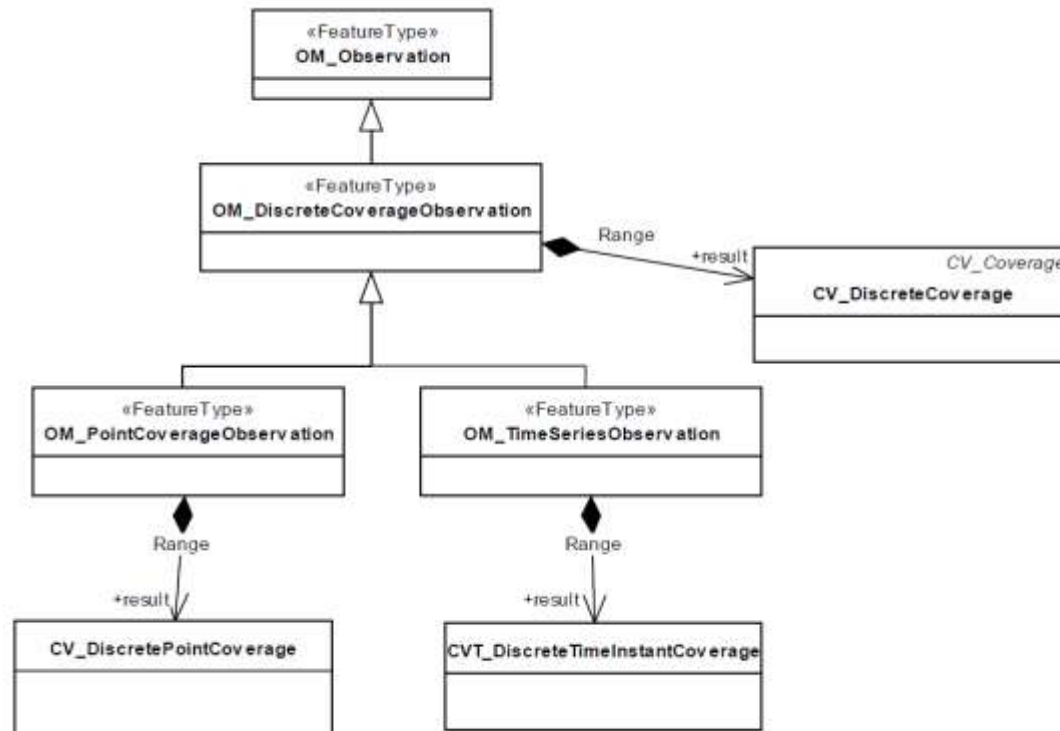


Discrete Coverage Observation

Important subtypes

Time-series at a point

Set of discrete points at a time



Bringing it together

In ***most*** observational cases of interest in met/ocean, we:

sample some property (in time and/or space)

with a result which ***varies*** over the sampling domain

Thus we need a ***Sampling Coverage Observation***



Sampling Coverage Observation

Definition:

Observation *feature-of-interest* is a *Spatial Sampling Feature*

Observation *result* is a *coverage*

Consistency constraints:

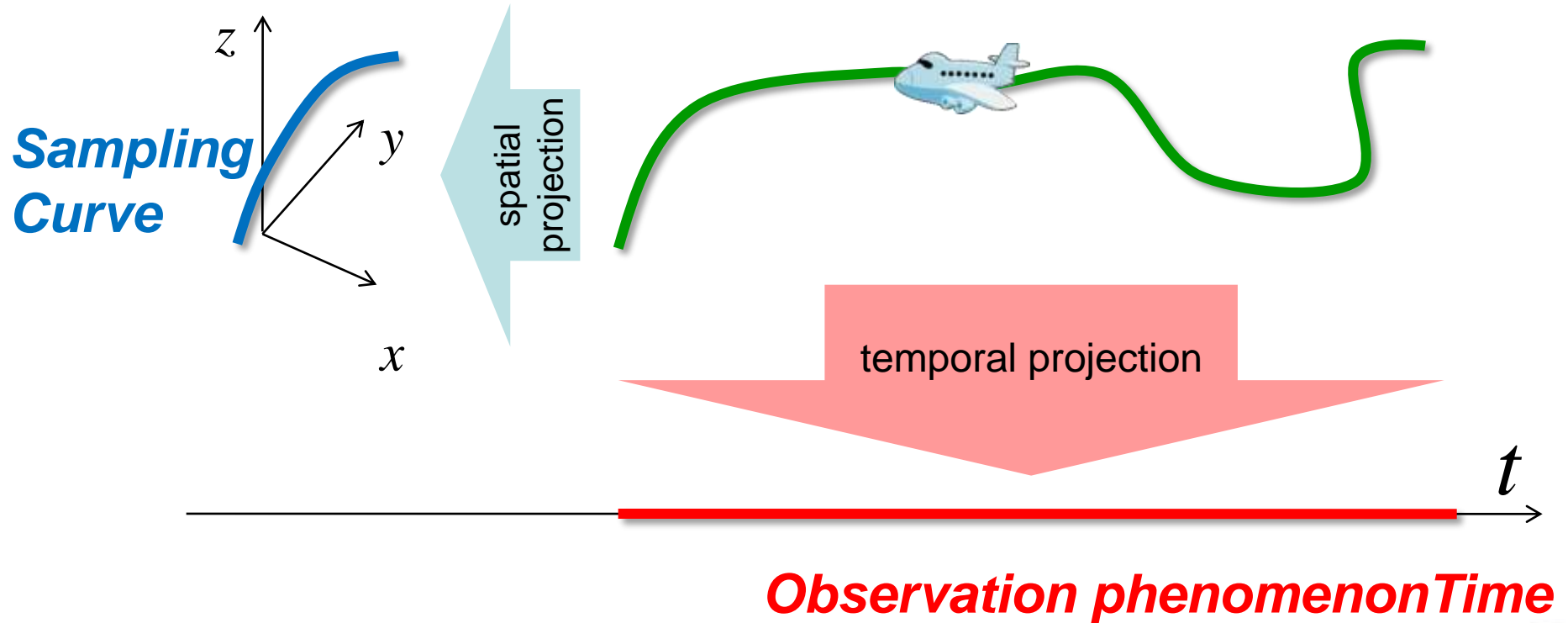
observed property is consistent with *range type* of
(coverage) result

shape of sampling feature contains *spatial elements* of
coverage domain

Observation *phenomenon time* contains *temporal elements*
of coverage domain



Sampling Coverage Observation



CSML v3

We need to specialise this general pattern for specific cases of interest

This is the basis of CSML v3

Aim is convergence with CDM




CSML v3

CSML	CF/CDM
Point	Point
PointSeries	StationTimeSeries
Trajectory	Trajectory
Profile	Profile
ProfileSeries	StationProfile

CSML	CF/CDM
Swath	Swath
ScanningRadar	StationaryRadialSweep
Section	Collection of Profiles
Grid	Grid (single time)
GridSeries	Grid


Profile	
based on	SF_SamplingCurve
phenomenonTime	TM_Instant
coverage result	CV_DiscreteGridPointCoverage
grid dimension	one
external CRS	four (x-y-z-t)
alignment	z-axis



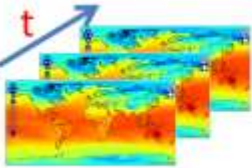
An observation of some parameter along a vertical

PointSeries	
based on	SF_SamplingPoint
phenomenonTime	TM_Period
coverage result	CVT_DiscreteTimeInstantCoverage

A time-series of single datum observations at a fixed location. E.g. Tidegauge, buoy, weather station




GridSeries	
based on	SF_SamplingSolid
phenomenonTime	TM_Period
coverage result	CV_DiscreteGridPointCoverage
grid dimension	four
external CRS	four (x-y-z-t)
alignment	-



Time-series of gridded parameter fields. E.g. Numerical weather prediction model

ProfileSeries	
based on	SF_SamplingCurve
phenomenonTime	TM_Period
coverage result	CV_DiscreteGridPointCoverage
grid dimension	two
external CRS	four (x-y-z-t)
alignment	z-, t- axes



Time-series of profiles on fixed vertical levels at a fixed location. E.g. vertical radar timeseries

Examples:

CSML v3

Next steps:

Best Practice paper for discussion by
December OGC TC (Sydney)

Under governance of MO.DWG

Re-use and extension for specialised
applications





Questions?