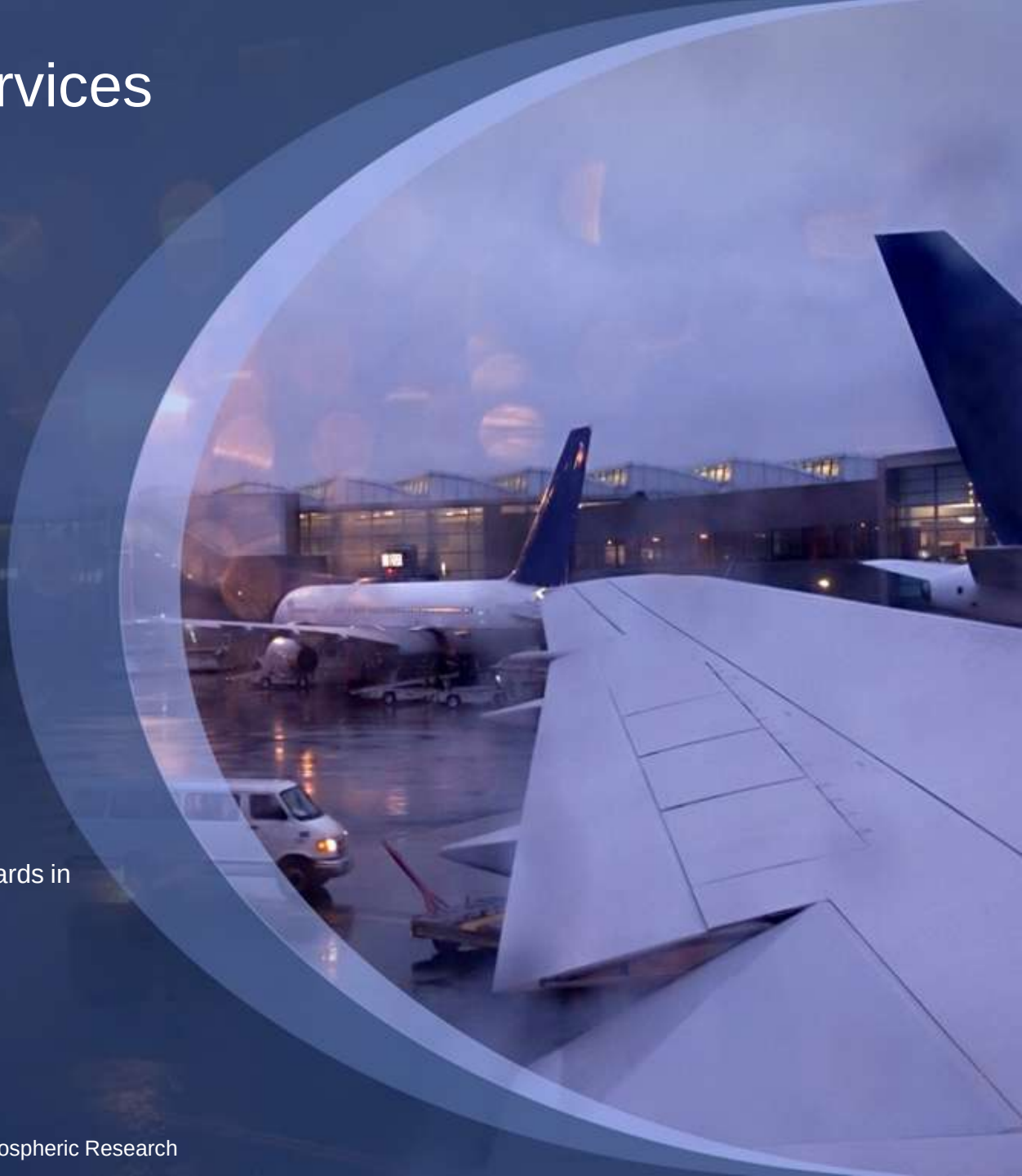
Web Coverage Services and MET Data



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Briefing to 3rd Workshop on OGC/GIS Standards in Meteorology
15 Nov 2010
National Center for Atmospheric Research
Boulder, CO

Overview

- N-Dimensional Data (forecast times)
- NetCDF 4/CF, GRIB2
- Vertical levels (pressure, flight levels, MSL vs AGL)
- Distributed, formal UoM definitions
- Re-gridding and Re-projection
- Publish/Subscribe (notification and filtered data push)
- Metadata issues
- Aircraft and underwater corridor retrieval
- SOAP delivery (SOAP with attachments, MTOM, multi-part MIME, etc.)
- WCS 1.1 and WCS 2.0

N-Dimensional Data

"A coverage domain consists … of **up to three spatial dimensions** as well as **a temporal dimension**."

-ISO 19123-2005

Would like to represent forecast runs as up to 5-dimensional:

1. X
2. Y
3. Z (if any)
4. Valid time
5. Forecast run offset (from valid time)

except…

"A feature is an abstraction of a **real world** phenomenon."

-ISO 19101

N-Dimensional Data

Can be addressed by putting forecast dimension into the range (among other alternatives)

NetCDF 4/CF and GRIB 2

There are no NetCDF 4 or GRIB 2 encoding specifications

But…

the CF-NetCDF SWG is working on NC3

Vertical Levels

- Feet above ground level
- Metres above mean sea level
- Flight levels
- Pressure levels

If **N**=number of distinct vertical units,
And **M**=number of distinct projected (2D) coordinate systems

You have M*N coordinate systems
(Good luck finding EPSG codes)

Therefore, custom CRS definitions are required

Distributed Units of Measure

- Feet above ground level
- Metres above mean sea level
- Flight levels
- Pressure levels
- Celsius
- …

http://faa.gov/uom/distance/m
http://weather.noaa.gov/uom/pressure/mb

OR

Custom GML
…but no WCS section except the generic “anyType:Metadata”

Re-gridding and Re-projection

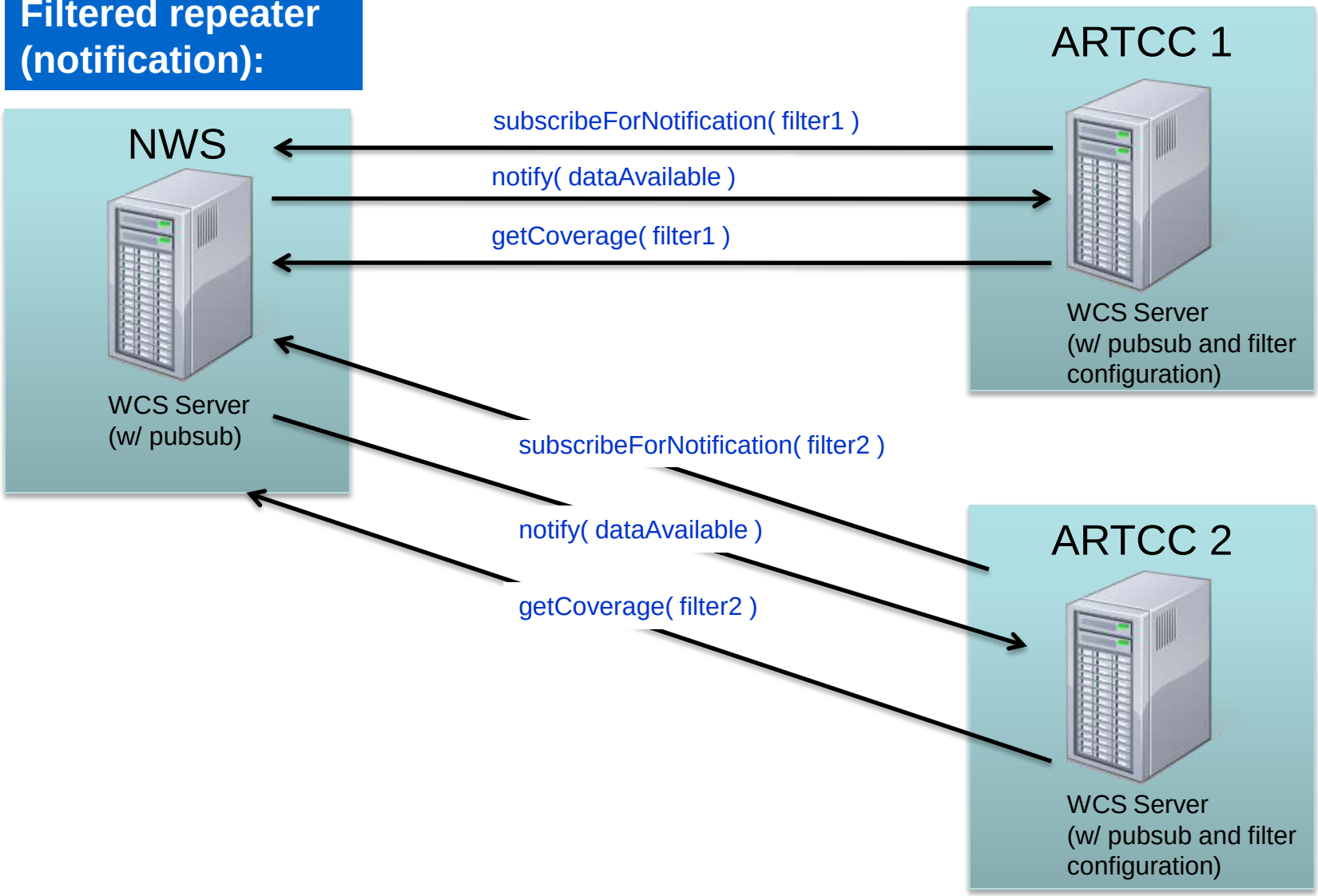
Differing grid resolutions are essential for efficiency
(**Note:** each is a different CRS!)
Re-projection is an activity that is conveniently centralized

Based on UoM and projected CRS parameterization, custom CRS definitions are critical

WCS has two problems:
- Advertising the (infinite) projection capabilities
- Client-provided CRS definitions in requests

Publish/Subscribe

Filtered repeater (notification):



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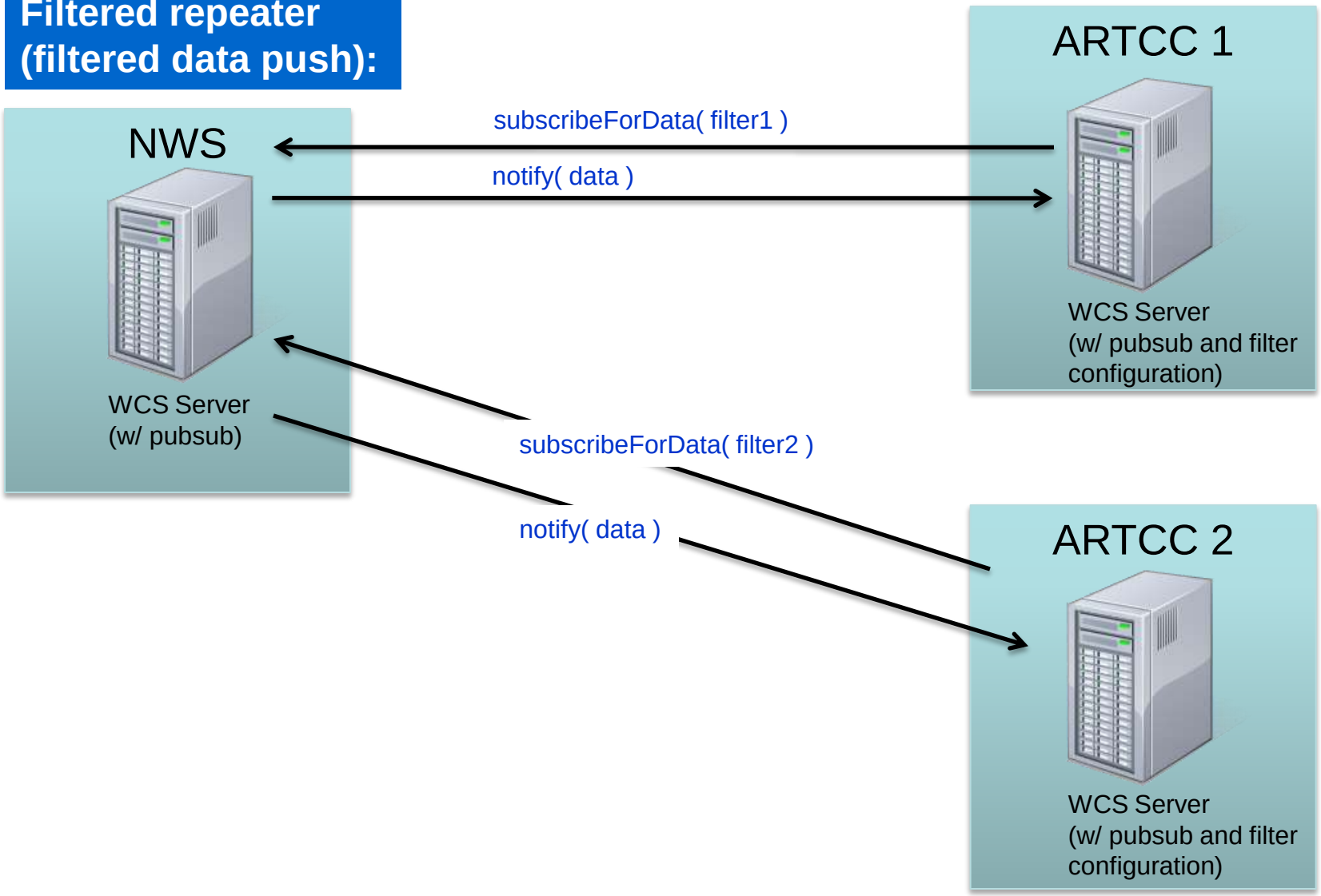


Capabilities and Metadata

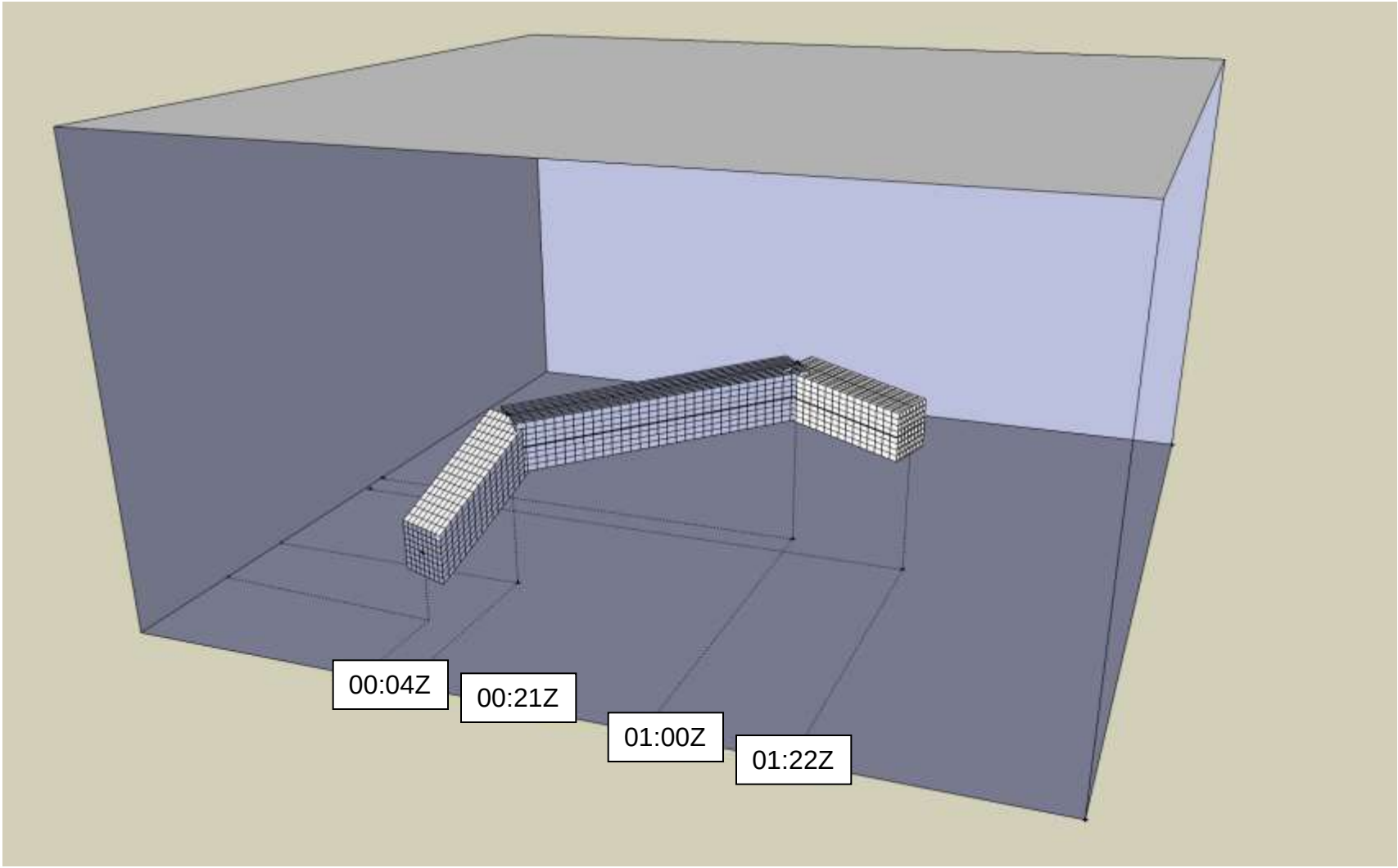
Do you want to efficiently:

- List available data times for a 1-minute dataset?
- Advertise hundreds of coverages?
- Import WCS metadata into a catalog/registry?

Filtering is needed (i.e., describeCoverage() with a time range of interest)

ISO needs to be improved to reflect missing OGC service metadata

Trajectories/Corridors



SOAP-based Delivery

At least three options;
- SOAP with attachments
- MTOM
- Multi-part MIME

All three are mentioned in CF-NetCDF documents

SOAP with Attachments

Does not require schema changes

MTOM

SwA-based, except it does require schema changes

Multipart MIME

WCS XML part and binary part

And of course…

WCS 1.0
Simple, straightforward, missing features

WCS 1.1
Significantly more complicated, more functional

WCS 2.0
New modular specification, most (useful) components not yet developed, not heavily tested/tried yet