Time Series Cube DM Workshop

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Outline

1. Why Cube

2. Time Series Cube structure

3. Use cases supported

4. Workshop

Sparse Cube

- *"Sparse data are commonly used for higher-dimensional cubes, and are frequently sparse along one or more axes. For example, a multi-band image has 7 data at only a few given spectral coordinates, (each corresponding to a spectral bandpass). A spectral (or velocity) data cube may contain data for a number of widely spaced spectral bands, each of which may differ in the spectral resolution and number of channels.* **A time cube likewise may contain data, either individual points, or time series, arbitrarily spaced along the time axis with time regions where no data was taken.** *A multiobject spectral data cube may be sparse in the spatial plane. Event data can be considered a data cube which is sparse in all measurement axes."(N-Dimensional Cube Model)*
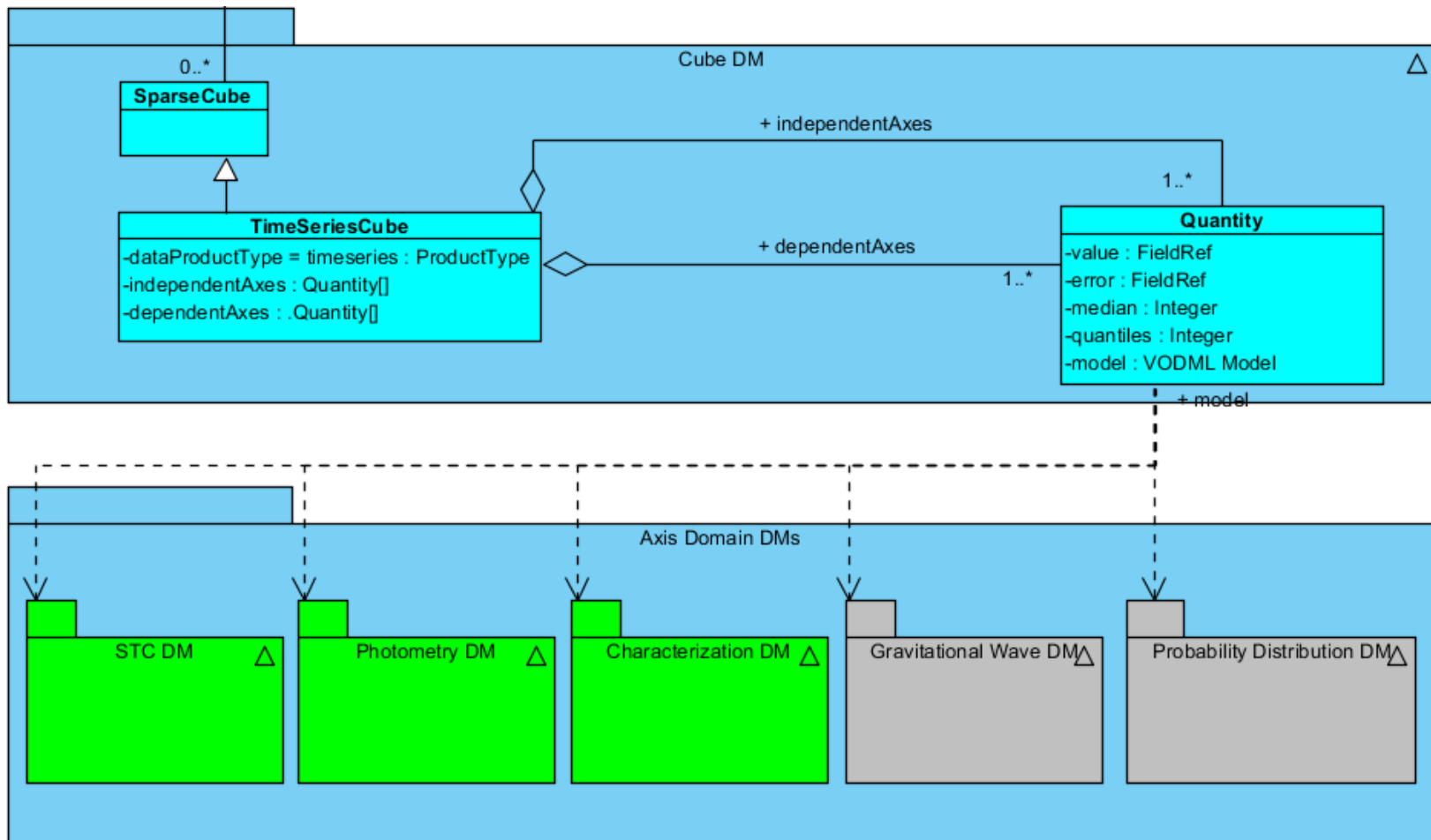
Sparse Cube DM

- Can describe any time series axes.

- Is flexible

- Is extensible

Time Series Cube DM
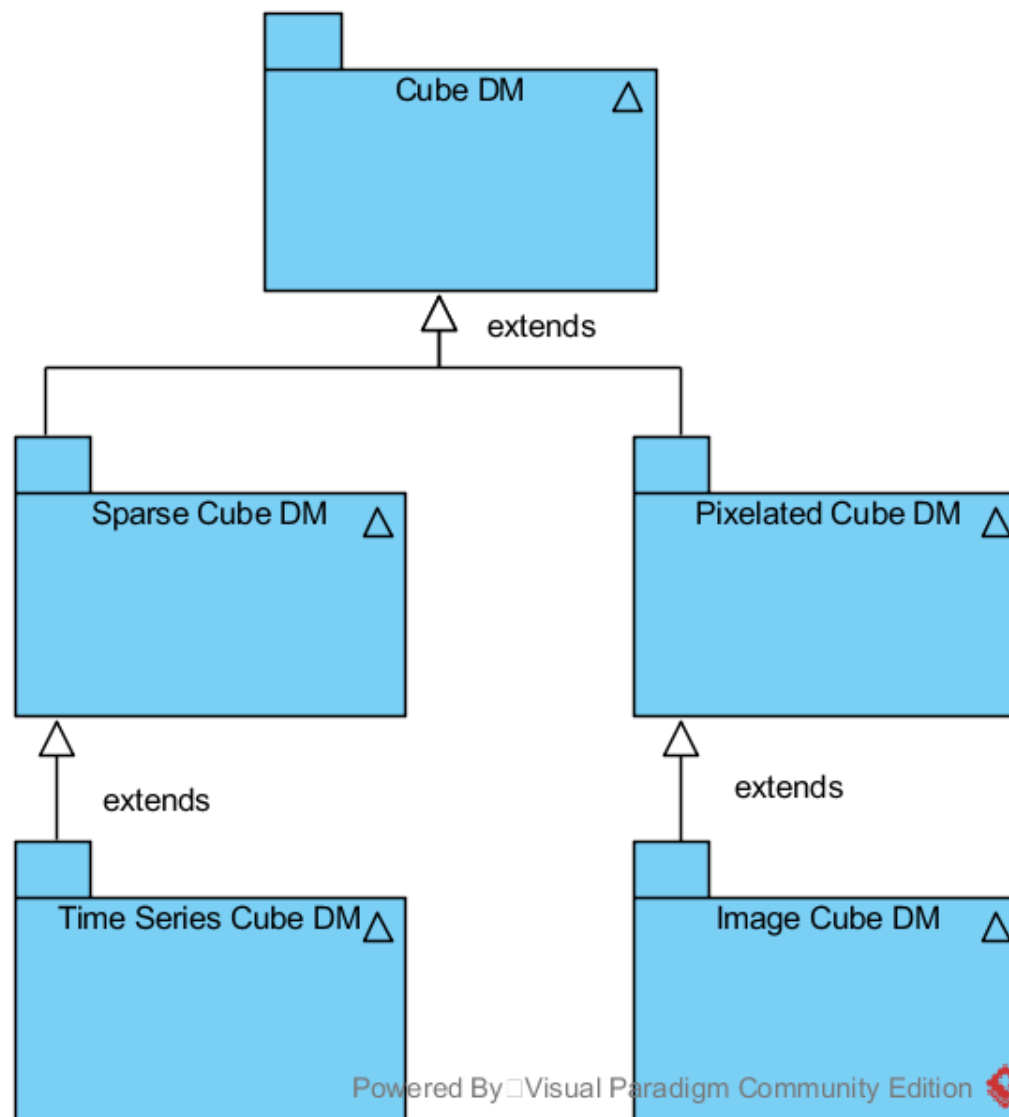
Time Series Cube UML

Time Series Cube UML

- Through Time Series Cube class I can find the axes of the cube

- From there we can go to the metadata about the data (distribution of values) in an axis stored in the Quantity class

- From there we can go to the information (the physical meaning of the data) metadata stored in already existing models (STC, Phot DM) or potentially to new models without the need to change Cube DM

Separation of Data vs. Information
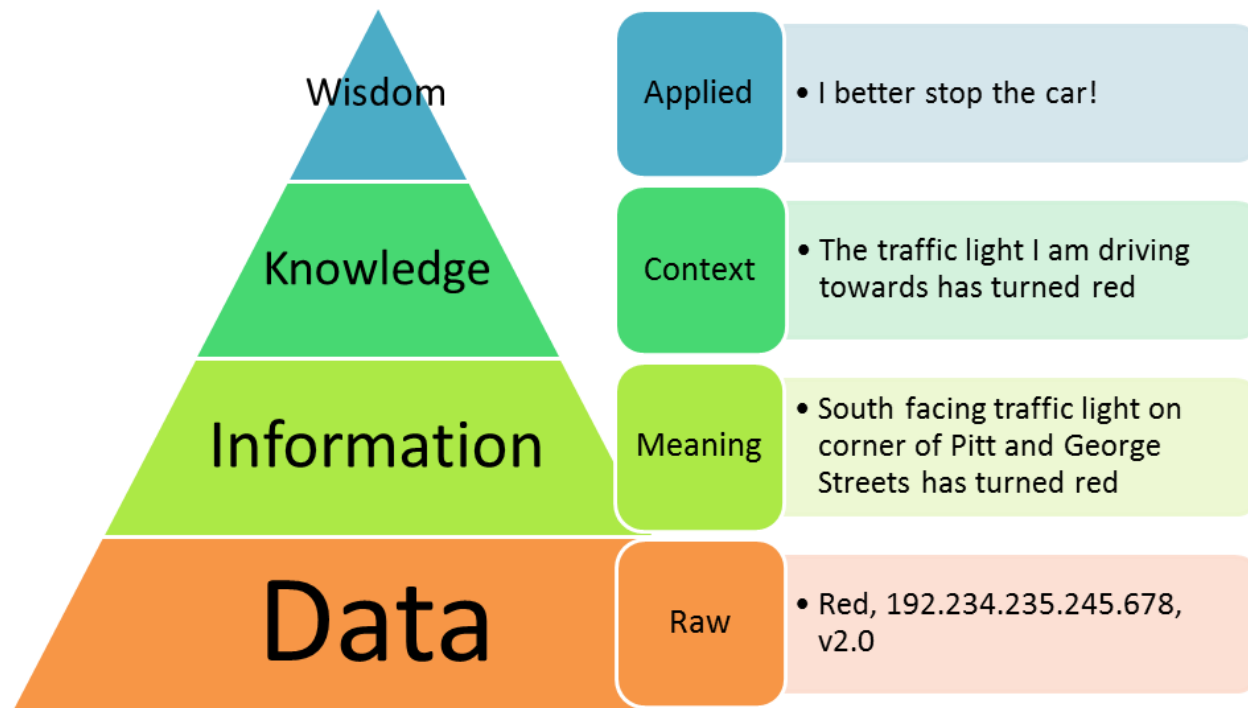
Data + information = God Object

Separation of Data vs. Information

- Describing context (information layer) for any possible data in the Cube DM will create a god object

- Cube DM can still describe information about its axes (data layer) without needing to know every physical domain model

- Changes to physical domain models (STC, Phot DM, Provenance) won't require Cube DM to change

Advantages

- Data cubes without domain models
- Discovery of "pure" cube -> datalink cutout separation from domain models
- Domain-specific clients can still use cube without understanding other domains

Science use Cases for Time Series

- [Use cases - (2012-10-20, Enrique Solano)](#)
- 3 groups of requirements
  - Group A: Combine photometry and light curves of a given object/list of objects in the **same photometric band**
  - Group B: Combine photometry and light curves of a given object/list of objects in **different photometric bands**
  - Group C: Time series **other** than light curves

Light curves (Group A, Group B)

2-d compound coordinate system
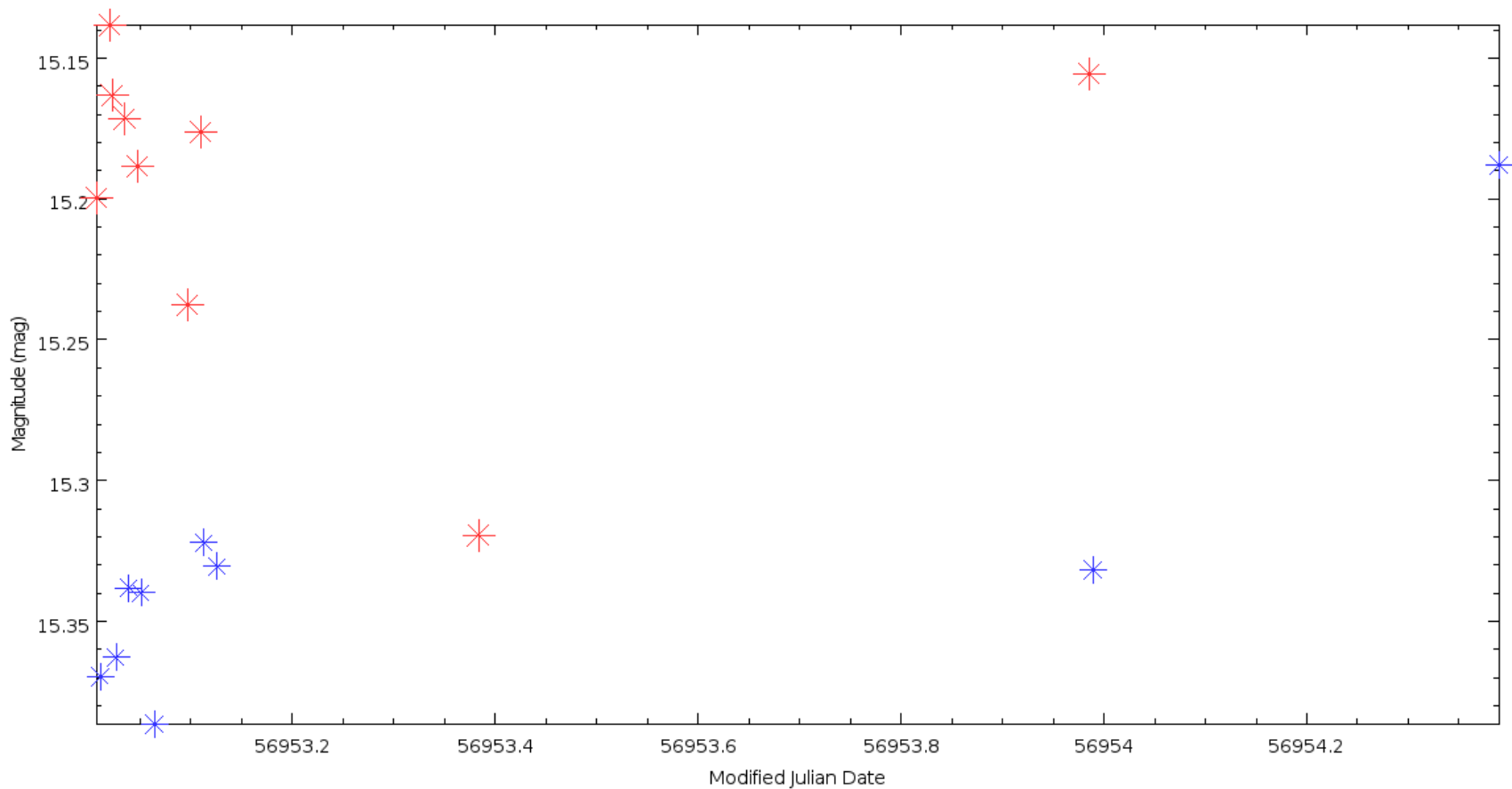
Gravitational wave data (Group C)
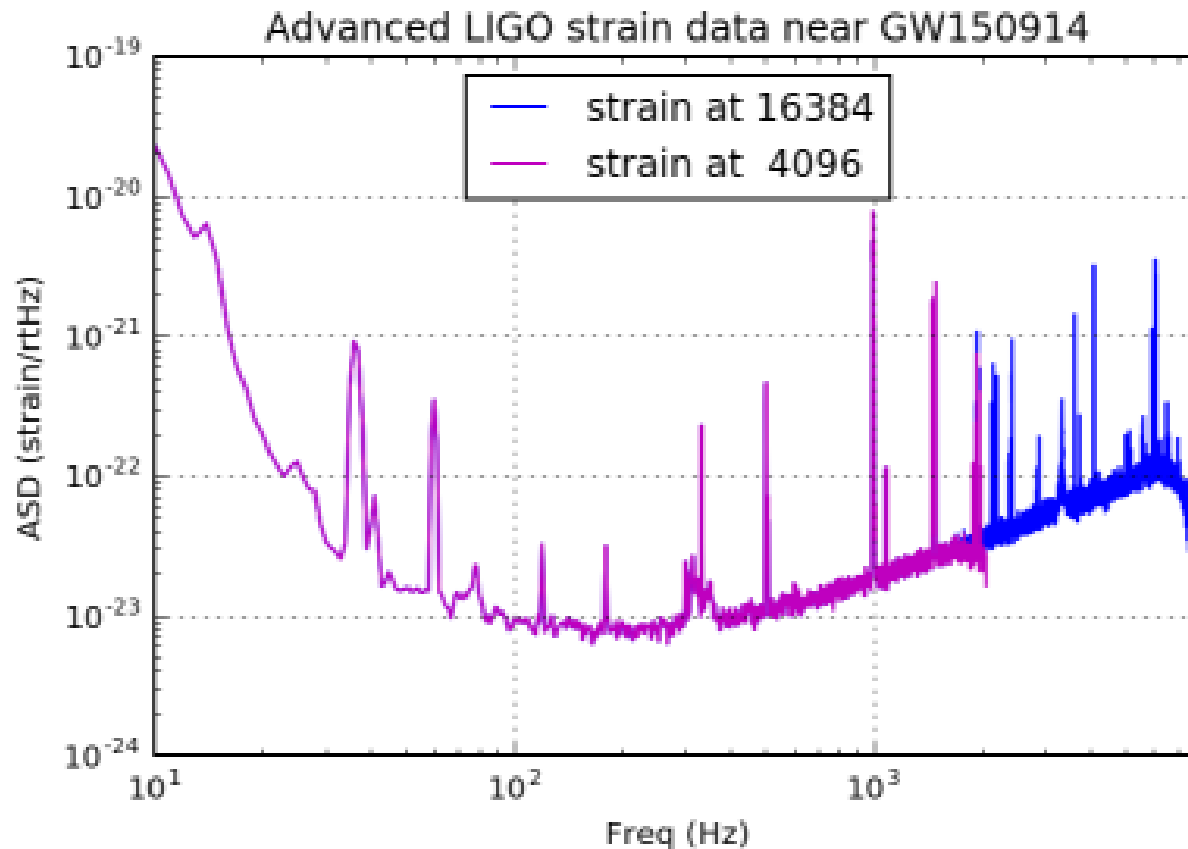
Open Questions

- What to put into Quantity DM
- What do I need to discover about the data cube
- Datalink for cutouts of cubes (time series) seems like the best option

Current status

- [IVOA note](#) on volute repository