

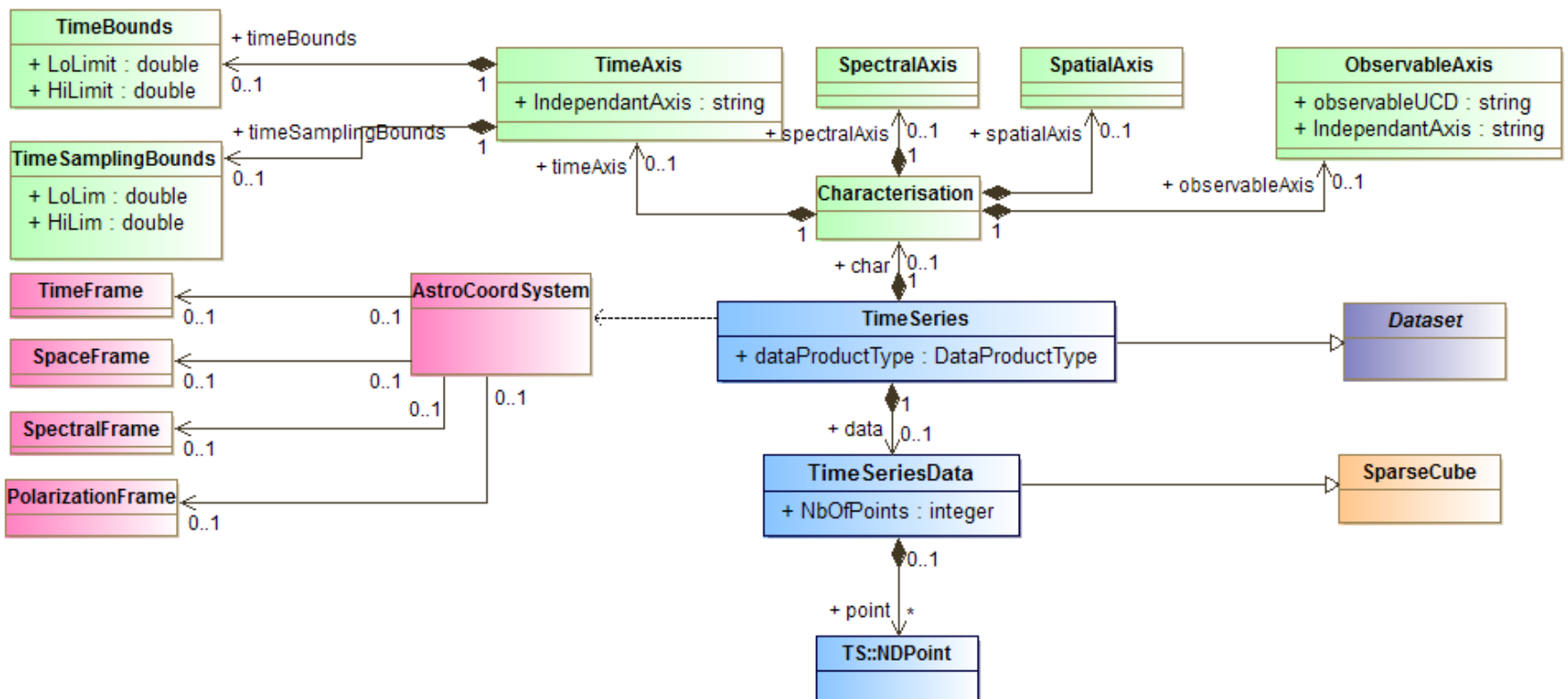
TimeSeries Data serialization: full-utype approach



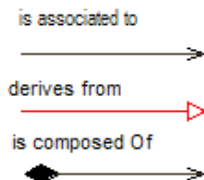
F.Bonnarel (CDS)

acknowledges extensive discussions with Ada Nebot, Mireille Louys,
Laurent Michel , Marco Molinaro, Mark Cresitello, Jiri Nadvornik and
the VizieR team

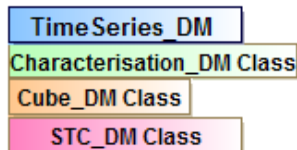




Legend

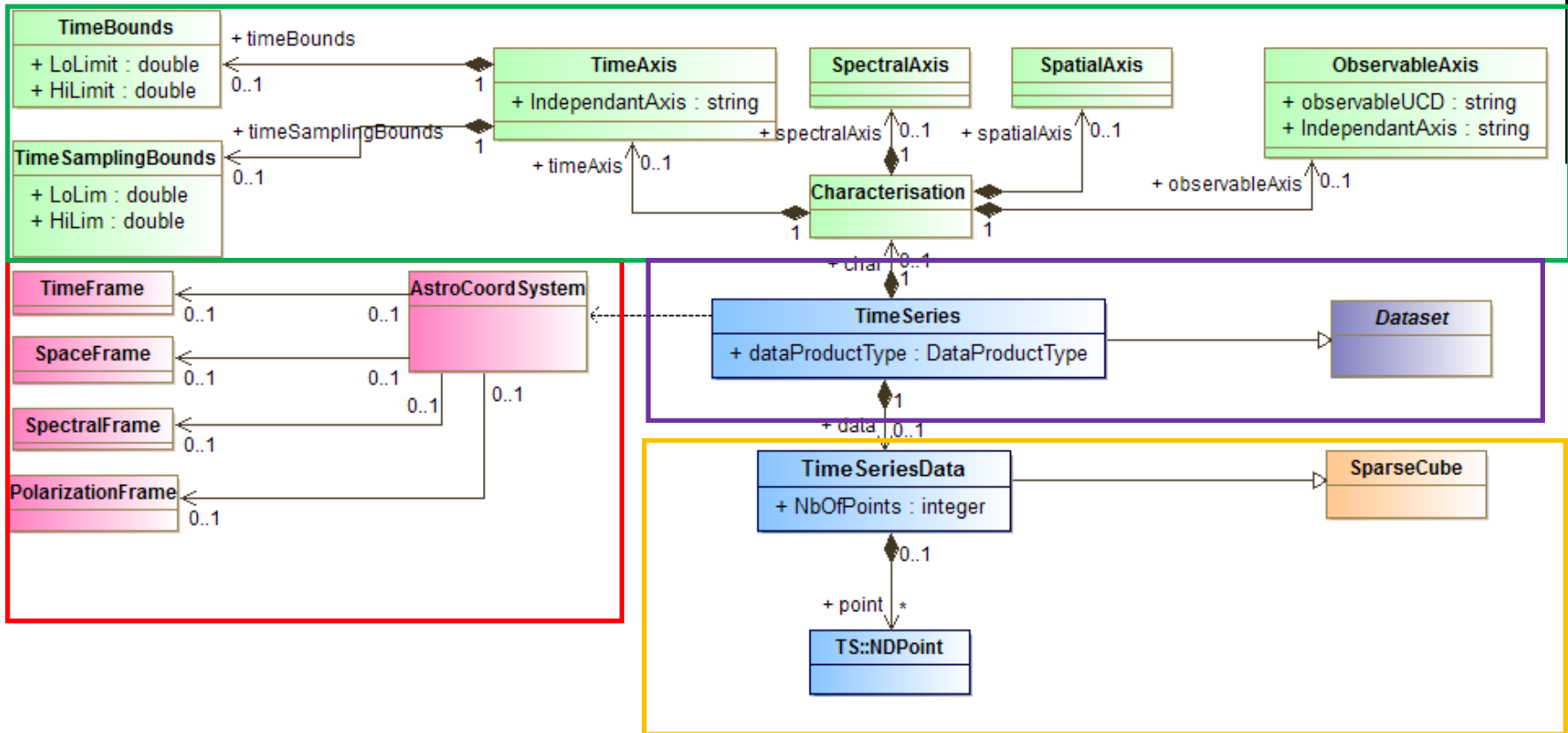


Color code for classes

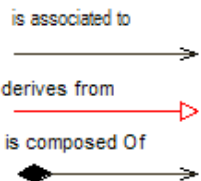


□ Question (and first answer):

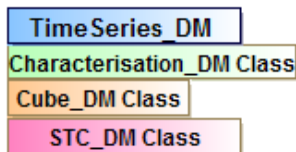
- Can we map this in a simple relational model ?
- Yes by simplification of all the 1 to 1 relationships and references (seen as attributes) : choice of « root » classes.
- In these conditions it's possible to write a « voservice tableset » with four tables and simple foreign keys to mimic ref/id in VOTABLE
- Columns are defined with their metadata (datatype, arraysize, unit, ucd, utype)



Legend



Color code for classes

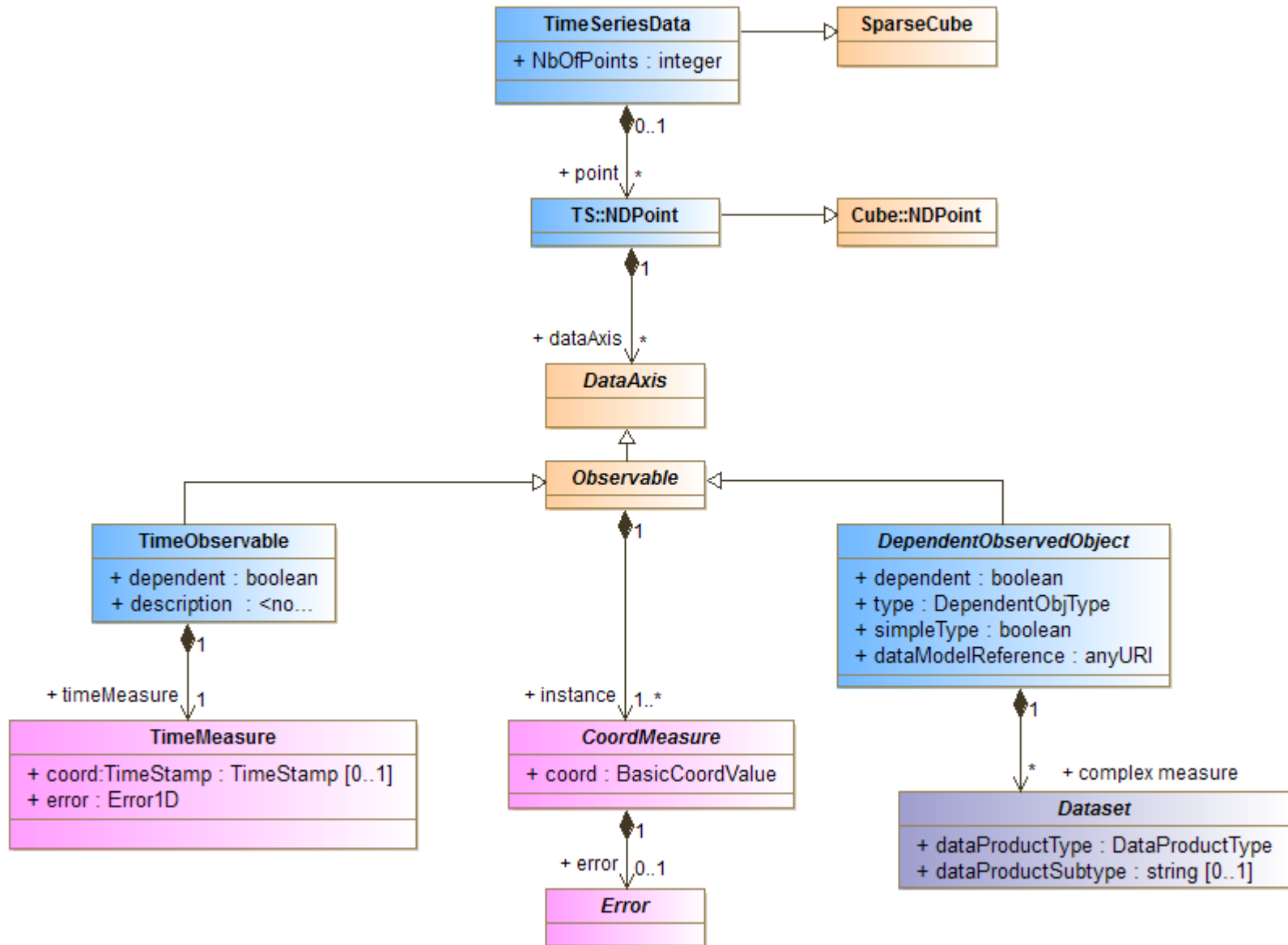


Purple : TimeSeries – Dataset

Green : characterisation

Pink : Coord Systems

Yellow : (TimeSeries)Data



TimeSeries – voservice table set

```
Most Visited Getting Started http://voiture.g-vo.org...
<data type xsi:type="vot:TADataType">VARCHAR</data type>
<utype>ts:Observation.observationID</utype>
</column>
<column>
<name>TimeScale</name>
<data type xsi:type="vot:TADataType">VARCHAR</data type>
<ucd>time.scale</ucd>
<utype>coord:coordsys.TimeFrame.TimeScale</utype>
</column>
<column>
<name>refpositionT</name>
<data type xsi:type="vot:TADataType" arraysize="2">DOUBLE</data type>
<ucd>pos.eq</ucd>
<utype>coord:coordsys.TimeFrame.refPosition</utype>
</column>
<column>
<name>SpaceRefFrame</name>
<data type xsi:type="vot:TADataType">VARCHAR</data type>
<ucd>pos.frame</ucd>
<utype>coord:coordsys.SpaceFrame.spaceRefFrame</utype>
</column>
<column>
<name>refPositionS</name>
<data type xsi:type="vot:TADataType" arraysize="2">DOUBLE</data type>
<ucd>pos.eq</ucd>
<utype>coord:coordsys.SpaceFrame.refPosition</utype>
</column>
<column>
<name>wavelength</name>
<data type xsi:type="vot:TADataType">DOUBLE</data type>
<ucd>em.wl</ucd>
<utype>photdm:PhotometryFilter.SpectralAxis.Coverage.Location.Value
</utype>
</column>
<column>
<name>filter</name>
<data type xsi:type="vot:TADataType">VARCHAR</data type>
<ucd>instr.filter</ucd>
<utype>photdm:PhotometryFilter.identifier</utype>
</column>
</table>
<table type="output">
<name>TimeSeriesData</name>
<description>instanceof TimeSeries Data Class</description>
<column>
<name>pubDID</name>
<data type xsi:type="vot:TADataType">VARCHAR</data type>
<utype>ts:Observation.observationID</utype>
</column>
<column>
<name>JD</name>
<data type xsi:type="vot:TADataType">DOUBLE</data type>
<ucd>time.obs.exposure</ucd>
<utype>
ts:TimeSeriesData.NDPoint.TimeObservable.TimeMeasure.MJD
</utype>
</column>
<column>
<name>MAGV</name>
<data type xsi:type="vot:TADataType">DOUBLE</data type>
<ucd>phot.flux</ucd>
<utype>
ts:TimeSeriesData.NDPoint.dependantObservedObject.CoordMeasure.PhotometryPoint
</utype>
</column>
</table>
/schema>
osi:tableset>
```

TimeFrame
SpaceFrame
Phot System
Data table

Link to The tableset definitions



Look at dummy examples in VOTable

From the tableset to VOTABLES

- Use the ucd, datatype and unit as they are
- Utypes also given by the tableset.
- Relationship to vodml : see my talk yesterday in DM for a possible solution
- Otherwise defined in the TS datamodel document
- Don't pay too much attention to the current utype « string » construction.
 - Can evolve
 - Has to be stored properly somewhere anyway

TimeSeries - DATA SET Metadata

```
<?xml version="1.0" encoding="UTF-8"?>
- <VOTABLE version="1.2" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xmlns="http://www.ivoa.net/xml/VOTable/v1.2">
  - <RESOURCE type="results">
    - <TABLE>
      <!-- This table is the head element TimeSeries. It hooks char, coordsys and TimesSeries data -->
      - <GROUP utype="ts:TimeSeries" ID="ndgnsolidgdea">
        <DESCRIPTION>This is generic dataset metadata</DESCRIPTION>
        <!-- These two Params seem to be useless because we know a TimeSeries derives from SparseCube which itself derives from cube. type and subtype don't
        exist in DataSetMetadata <PARAM name="subtype" utype="ts:TimeSeries.subtype" xtype="ivoa:string" datatype="char" arraysize="*" value="sparsecube"/>
        <PARAM name="type" utype="ts:TimeSeries.type" xtype="ivoa:string" datatype="char" arraysize="*" value="cube" /> -->
        <PARAM utype="ts:TimeSeries.dataProductType" value="timeseries" arraysize="*" datatype="char" xtype="ivoa:string" name="productType"/>
        <PARAM utype="ts:TimeSeries.calibLevel" value="1" arraysize="*" datatype="int" xtype="ivoa:integer" name="calibLevel"/>
      - <GROUP utype="ts:TimeSeries.dataId" ID="ndgnsolommsa" name="dataId">
        <DESCRIPTION>This is dataID metadata</DESCRIPTION>
        <PARAM utype="ts:TimeSeries.observation.observationID" ID="pubDID" value="TestTimeSeries" arraysize="*" datatype="char" name="pubDID"/>
        <PARAM utype="ts:TimeSeries.dataID.creator" value="Jiri Nadvornik" arraysize="*" datatype="char" xtype="ivoa:string" name="creator"/>
        <!-- we can only have a single creator. Others should be contributors -->
        <PARAM utype="ts:TimeSeries.dataID.contributor" value="Markus Demleitner" arraysize="*" datatype="char" xtype="ivoa:string"
        name="contributor"/>
      </GROUP>
      <PARAM utype="ts:TimeSeries.coordsys" value="reference" arraysize="*" datatype="char" name="CoordinateSystem" ref="coosys"/>
      <PARAM utype="ts:TimeSeries.char" value="reference" arraysize="*" datatype="char" name="Characterisation" ref="char"/>
      <PARAM utype="ts:TimeSeries.TimeSeriesData" value="reference" arraysize="*" datatype="char" name="TimeSeriesData" ref="data"/>
    </GROUP>
  </TABLE>
  + <TABLE ID="char">
  + <TABLE ID="coosys">
  + <TABLE ID="data">
</RESOURCE>
</VOTABLE>
```


□ Characterisation metadata

```
<?xml version="1.0" encoding="UTF-8"?>
- <VOTABLE version="1.2" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xmlns="http://www.ivoa.net/xml/VOTable/v1.2">
  - <RESOURCE type="results">
    + <TABLE>
      - <TABLE ID="char">
        <!-- This is the characterisation of the whole TimeSeries. It replaces Jiri's quantity and gavers "statistics" -->
        - <GROUP utype="cha:Char" name="characterisation">
          <PARAM utype="cha:Char.SpatialAxis.Location.Coord.SpatialValue2D[0]" value="12.9" datatype="float" name="SpatLocationRA" unit="deg"
            ucd="pos.eq.ra"/>
          <PARAM utype="cha:Char.SpatialAxis.Location.Coord.SpatialValue2D[1]" value="-72.9" datatype="float" name="SpatLocationDEC" unit="deg"
            ucd="pos.eq.dec"/>
          <PARAM utype="cha:Char.SpatialAxis.Bounds.limits.LoLim2.SpatialValue2D[0]" value="12.5" datatype="float" name="SpatBoundsMinRA" unit="deg"
            ucd="pos.eq.ra;stat.min"/>
          <PARAM utype="cha:Char.SpatialAxis.Bounds.limits.LoLim2.SpatialValue2D[1]" value="-73.3" datatype="float" name="SpatBoundsMinDEC" unit="deg"
            ucd="pos.eq.dec;stat.min"/>
          <PARAM utype="cha:Char.SpatialAxis.Bounds.limits.HiLim2.SpatialValue2D[0]" value="13.2" datatype="float" name="SpatBoundsMaxRA" unit="deg"
            ucd="pos.eq.ra;stat.max"/>
          <PARAM utype="cha:Char.SpatialAxis.Bounds.limits.HiLim2.SpatialValue2D[1]" value="-72.6" datatype="float" name="SpatBoundsMaxDEC" unit="deg"
            ucd="pos.eq.dec;stat.max"/>
          <PARAM utype="cha:Char.SpatialAxis.Bounds.CharBox.Size2[0]" value="0.7" datatype="float" name="SpatBoundsSizeRA" unit="deg"
            ucd="pos.eq.ra;stat.length"/>
          <PARAM utype="cha:Char.SpatialAxis.Bounds.CharBox.Size2[1]" value="0.7" datatype="float" name="SpatBoundsSizeDEC" unit="deg"
            ucd="pos.eq.dec;stat.length"/>
        </GROUP>
      </TABLE>
      + <TABLE ID="coosys">
      + <TABLE ID="data">
    </RESOURCE>
  </VOTABLE>
```

Coordinate system metadata

```
<?xml version="1.0" encoding="UTF-8"?>
- <VOTABLE version="1.2" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xmlns="http://www.ivoa.net/xml/VOTable/v1.2">
  - <RESOURCE type="results">
    + <TABLE>
    + <TABLE ID="char">
    - <TABLE ID="coosys">
      <!-- This is the coordinate system of the whole TimeSeries. Photometry was integrated as a FFrame (could also be outside). Frames are referred from the data
      FIELDS -->
    - <GROUP utype="coord:coordsys" name="coordsys">
      - <GROUP utype="coord:coordsys.TimeFrame" ID="tif" name="TimeFrame" ucd="time">
        <PARAM utype="coord:coordsys.TimeFrame.TimeScale" value="TT" arraysize="*" datatype="char" name="TimeScale" ucd="time"/>
        <PARAM utype="coord:coordsys.TimeFrame.refPosition" value="TOPOCENTER" arraysize="*" datatype="char" name="refPosition" ucd="pos"/>
      </GROUP>
      - <GROUP utype="coord:coordsys.SpaceFrame" ID="posf">
        <PARAM utype="coord:coordsys.SpaceFrame.spaceRefFrame" value="ICRS" arraysize="*" datatype="char" name="SpaceRefFrame" ucd="pos"/>
        <PARAM utype="coord:coordsys.SpaceFrame.refPosition" value="TOPOCENTER" arraysize="*" datatype="char" name="refPosition" ucd="pos"/>
      </GROUP>
    </GROUP>
    - <GROUP utype="photdm:PhotometryFilter" ID="phot" name="Phot" ucd="phot">
      <DESCRIPTION>The SED group is made of 4 columns: mean frequency, flux, flux error, and filter designation</DESCRIPTION>
      <PARAM utype="photdm:PhotometryFilter.SpectralAxis.Coverage.Location.Value" ID="wl" value="450" datatype="float" name="wavelength"
      unit="nm"/>
      <PARAM utype="photdm:PhotometryFilter.identifier" ID="fit" value="Johnson_B" arraysize="*" datatype="char" name="filter"/>
    </GROUP>
  </TABLE>
  + <TABLE ID="data">
</RESOURCE>
</VOTABLE>
```

Data section

```
- <GROUP utype="ts:TimeSeriesData" name="TimeSeriesData">
  <FIELDref utype="ts:TimeSeriesData.NDPoint.TimeObservable.TimeMeasure.MJD" ref="HJD"/>
  - <GROUP name="spatial">
    <FIELDref utype="ts:TimeSeriesData.NDPoint.dependantObservedObject.Position2D.SpatialValue2D[0]" ref="raj2000"/>
    <FIELDref utype="ts:TimeSeriesData.NDPoint.dependantObservedObject.Position2D.SpatialValue2D[1]" ref="dej2000"/>
  </GROUP>
  - <GROUP name="Flux">
    <FIELDref utype="ts:TimeSeriesData.NDPoint.dependantObservedObject.CoordMeasure.PhotometryPoint" ref="FLX"/>
    <FIELDref utype="ts:TimeSeriesData.NDPoint.dependantObservedObject.CoordMeasure.PhotometryPointError" ref="FLXERR"/>
  </GROUP>
  - <GROUP>
    <FIELDref utype="ts:TimeSeriesData.NDPoint.dependantObservedObject.CoordMeasure.PhotometryPoint" ref="MAG"/>
    <FIELDref utype="ts:TimeSeriesData.NDPoint.dependantObservedObject.CoordMeasure.PhotometryPointError" ref="MAGERR"/>
  </GROUP>
</GROUP>
- <FIELD ID="HJD" datatype="double" name="HJD" ref="tif" unit="d" ucd="time;obs.exposure">
  <DESCRIPTION>Epoch at midpoint of observation in heliocentric modified julian date</DESCRIPTION>
</FIELD>
- <FIELD ID="raj2000" datatype="double" name="raj2000" ref="posf" unit="deg" ucd="pos.eq.ra">
  <DESCRIPTION>Observed RA of the object</DESCRIPTION>
</FIELD>
- <FIELD ID="dej2000" datatype="double" name="dej2000" ref="posf" unit="deg" ucd="pos.eq.dec">
  <DESCRIPTION>Observed declination of the object</DESCRIPTION>
</FIELD>
- <FIELD ID="FLX" datatype="float" name="FLX" ref="phot" unit="erg/s/cm2/std" ucd="phot.flux">
  <DESCRIPTION>Photon Flux</DESCRIPTION>
</FIELD>
+ <FIELD ID="FLXERR" datatype="float" name="FLXERR" ref="phot" unit="erg/s/cm2/std" ucd="stat.error;phot.flux">
- <FIELD ID="MAG" datatype="float" name="MAG" ref="phot" unit="mag" ucd="phot.mag">
  <DESCRIPTION>Magnitude of the object</DESCRIPTION>
</FIELD>
- <FIELD ID="MAGERR" datatype="float" name="MAGERR" ref="phot" unit="mag" ucd="stat.error;phot.mag">
  <DESCRIPTION>Error of the magnitude</DESCRIPTION>
</FIELD>
- <DATA>
  - <TABLEDATA>
```

□ SDSS case

- Check the example and load it into TOPCAT
- One single « dependant » measurement. Easy
- All important Metadata are there
 - NB : strange single row TABLE for general metadata only for visualisation with current tools only)

SDSS case

The image shows a screenshot of the TOPCAT software interface, which is used for astronomical data analysis. The interface is divided into several panels:

- Table List:** Shows a list of tables, with the first four being SDSS_J080434.20+510349.2_VizieR_complete_utypes....
- Current Table Properties:** Displays details for the selected table, including its label, location, name, number of rows (11,293), and columns (2).
- Table Browser for 4:** Shows a list of data points with columns for JD (Julian Date) and MAGV (Magnitude in V-band).
- Plot:** Displays a scatter plot of MAGV versus JD/d, showing a distribution of points with a central dip.
- Table Browser for 1:** Shows dataset metadata with columns for productType, calibrLe..., pubDID, creator, contributor, and Target.
- Table Browser for 2:** Shows characterization data with columns for spatial location, time, and photometric properties.
- Table Browser for 3:** Shows coordinate frames and photometry filter information, including UCD (Uniform Column Definition) and UType (Uniform Type).

Annotations in blue text highlight specific sections:

- Dataset metadata:** Points to the Table Browser for 1.
- Characterisation:** Points to the Table Browser for 2.
- Data section : values and plot:** Points to the Table Browser for 4 and the Plot window.
- Coordinate frames + Photometry filter : values and ucd + utypes:** Points to the Table Browser for 3.

Dataset metadata

Characterisation

Data section :
values and
plot

Coordinate frames + Photometry filter : values
and ucd + utypes

Table Browser for 4: SDSS_J080434.20+510349.2_VizieR_complete_utypes....

	JD	MAGV
1	2,454083E6	17,086
2	2,454083E6	17,088
3	2,454083E6	17,086
4	2,454083E6	17,126
5	2,454083E6	17,099
6	2,454083E6	17,043
7	2,454083E6	17,065
8	2,454083E6	17,033
9	2,454083E6	17,059
10	2,454083E6	17,017
11	2,454083E6	17,061
12	2,454083E6	17,01
13	2,454083E6	17,048
14	2,454083E6	17,007
15	2,454083E6	16,965
16	2,454083E6	16,96
17	2,454083E6	16,934
18	2,454083E6	16,93
19	2,454083E6	16,923
20	2,454083E6	16,944
21	2,454083E6	16,962
22	2,454083E6	17,024
23	2,454083E6	17,012
24	2,454083E6	17,048
25	2,454083E6	17,066
26	2,454083E6	17,062
27	2,454083E6	17,052
28	2,454083E6	17,052
29	2,454083E6	17,058
30	2,454083E6	17,043
31	2,454083E6	17,076
32	2,454083E6	17,067

Table Browser for 1: SDSS_J080434.20+510349.2_VizieR_complete_utypes....

	productType	calibrLe...	pubDID	creator	contributor	Target
1	timeSeries	1	TestTimeSeries	Zharikov	CDS VizieR	SDSS J080434.20+510349.2

Table Browser for 2: SDSS_J080434.20+510349.2_VizieR_complete_utypes....

	SpatLocati...	SpatLocati...	SpatBoun...	SpatBoun...	t_min	t_max	t_mean	t_exp_time	t_resolution	delta_t_min	delta_t_max	em_min	em_min
1	121,143	51,0637	0,000278	0,000278	2,45408E6	2,45413E6	2,45410E6	3,7	0,04	0,002	0,01	5,00000E-7	7,00000E-7

Table Browser for 3: SDSS_J080434.20+510349.2_VizieR_complete_utypes....

	TimeSc...	refPositionT	Space...	refPositionS	wavelength	filter
1	TT	BARYCENTER	ICRS	BARYCENTER	545,	Johnson_V

Table Columns for 3: SDSS_J080434.20+510349.2_VizieR_complete_utypes....

	UCD	Utype	Datatype	VOTable ID
0	ix			
1	time	ts:coordsys.TimeFrame.TimeScale	char	TimeScale
2	pos	ts:coordsys.TimeFrame.refPosition	char	refPositionT
3	pos	ts:coordsys.SpaceFrame.spaceRefFrame	char	SpaceRefFrame
4	pos	ts:coordsys.SpaceFrame.refPosition	char	refPositionS
5		hotdm:PhotometryFilter.SpectralAxis.Coverage.Location.Value	float	wl
6		photdm:PhotometryFilter.identifier	char	fit

□ Beta Lyrae case

- Check the example and load it into TOPCAT
 - No change for Metadata
 - There are « dependant » Times. The utype says
 - It's dependant
 - It's a time
 - Several colors : relationships to « Frames » (or Photometric filters) managed by reference.
- > link to be followed by tools

Beta Lyrae case

File Views Graphics Joins Windows VO Inter Window Columns Display Help

Table List
 5: BetaLyr_Vizier_comple...
 6: BetaLyr_Vizier_comple...
 7: BetaLyr_Vizier_comple...
 8: BetaLyr_Vizier_comple...

Current Table Properties
 Label: B
 Location: h
 Name: B
 Rows: 3
 Columns: 1
 Sort Order: A
 Row Subset: A
 Activation Action:

Table Columns for 8: BetaLyr_Vizier_comple_otypes.xml-4

Visible	Name	ID	Class	Units	Description	UCD	Utype	Datatype
<input type="checkbox"/>	0	Index	\$0	Long	Table row index			
<input checked="" type="checkbox"/>	1	Name	\$1	String	Star name (1)	meta.id:meta.main		
<input checked="" type="checkbox"/>	2	JDJ	\$2	Double	? Julian date for J band	time.epoch	ts:TimeSeriesData.NDPoint.TimeObservable.TimeMeasure_JD	char
<input checked="" type="checkbox"/>	3	Jmag	\$3	Float	? J magnitude	phot.mag:em:IR.J	ts:TimeSeriesData.NDPoint.dependantObservedObject.CoordMeasure.PhotometryPoint	double
<input checked="" type="checkbox"/>	4	e_Jmag	\$4	Float	? rms uncertainty on Jmag	stat.error:phot.mag:em:IR.J	ts:TimeSeriesData.NDPoint.dependantObservedObject.CoordMeasure.PhotometryPoint.Error	float
<input checked="" type="checkbox"/>	5	JDH	\$5	Double	? Julian date for H band	time.epoch	ts:TimeSeriesData.NDPoint.dependantObservedObject.TimeMeasure_JD	double
<input checked="" type="checkbox"/>	6	Hmag	\$6	Float	? H magnitude	phot.mag:em:IR.H	ts:TimeSeriesData.NDPoint.dependantObservedObject.CoordMeasure.PhotometryPoint	float
<input checked="" type="checkbox"/>	7	e_Hmag	\$7	Float	? rms uncertainty on Hmag	stat.error:phot.mag:em:IR.H	ts:TimeSeriesData.NDPoint.dependantObservedObject.CoordMeasure.PhotometryPoint.Error	float
<input checked="" type="checkbox"/>	8	JDK	\$8	Double	? Julian date for K band	time.epoch	ts:TimeSeriesData.NDPoint.dependantObservedObject.TimeMeasure_JD	double
<input checked="" type="checkbox"/>	9	Kmag	\$9	Float	? K magnitude	phot.mag:em:IR.K	ts:TimeSeriesData.NDPoint.dependantObservedObject.CoordMeasure.PhotometryPoint	float
<input checked="" type="checkbox"/>	10	e_Kmag	\$10	Float	? rms uncertainty on Kmag	stat.error:phot.mag:em:IR.K	ts:TimeSeriesData.NDPoint.dependantObservedObject.CoordMeasure.PhotometryPoint.error	float
<input checked="" type="checkbox"/>	11	JDL	\$11	Double	? Julian date for L band	time.epoch	ts:TimeSeriesData.NDPoint.dependantObservedObject.TimeMeasure_JD	double
<input checked="" type="checkbox"/>	12	Lmag	\$12	Float	? L magnitude	phot.mag:em:IR.3-4um	ts:TimeSeriesData.NDPoint.dependantObservedObject.CoordMeasure.PhotometryPoint	float
<input checked="" type="checkbox"/>	13	u_Lmag	\$13	Character	Uncertainty flag on Lmag	meta.code.error	ts:TimeSeriesData.NDPoint.dependantObservedObject.CoordMeasure.PhotometryPoint.errorCode	char
<input checked="" type="checkbox"/>	14	e_Lmag	\$14	Float	? rms uncertainty on Lmag	stat.error:phot.mag:em:IR.3-4um	ts:TimeSeriesData.NDPoint.dependantObservedObject.CoordMeasure.PhotometryPoint.error	float
<input checked="" type="checkbox"/>	15	JDM	\$15	Double	? Julian date for M band	time.epoch	ts:TimeSeriesData.NDPoint.dependantObservedObject.TimeMeasure_JD	double
<input checked="" type="checkbox"/>	16	Mmag	\$16	Float	? M magnitude	phot.mag:em:IR.4-8um	ts:TimeSeriesData.NDPoint.dependantObservedObject.CoordMeasure.PhotometryPoint	float
<input checked="" type="checkbox"/>	17	u_Mmag	\$17	Character	Uncertainty flag on Mmag	meta.code.error	ts:TimeSeriesData.NDPoint.dependantObservedObject.CoordMeasure.PhotometryPoint.errorCode	char

TOPCAT(5): Table Browser

Window Subsets Help

Table Browser for 5: BetaLyr_Vizier_comple_otypes.xml

productType	calibLe...	pubDID	creator	contributor	Target
1	timeSeries	1	TestTimeSeries	Shenavrin	CDS Vizier Beta Lyr

Dataset metadata

TOPCAT(6): Table Browser

Window Subsets Help

Table Browser for 6: BetaLyr_Vizier_comple_otypes.xml-2

SpatLocati...	SpatLocati...	SpatBoun...	SpatBoun...	t_min	t_max	t_mean	t_exp_time	t_resolution...
1	282, 52	33, 3627	0, 000278	0, 000278	2, 45278E6	2, 45349E6	0, 04	0, 002

Characterisation

TOPCAT(7): Table Browser

Window Subsets Help

Table Browser for 7: BetaLyr_Vizier_comple_otypes.xml-3

TimeSc...	refPositionT	Space...	refPositionS	wavelength	filter	wavelength	filter	wavelength	filter	wavelength	filter	wavelength	filter	
1	TT	BARYCENTER	ICRS	BARYCENTER	1250,	J_BAND	1650,	H_BAND	2200,	K_BAND	3500,	L_BAND	4800,	M_BAND

Coordinate frames + Photometry filter

TOPCAT(8): Table Browser

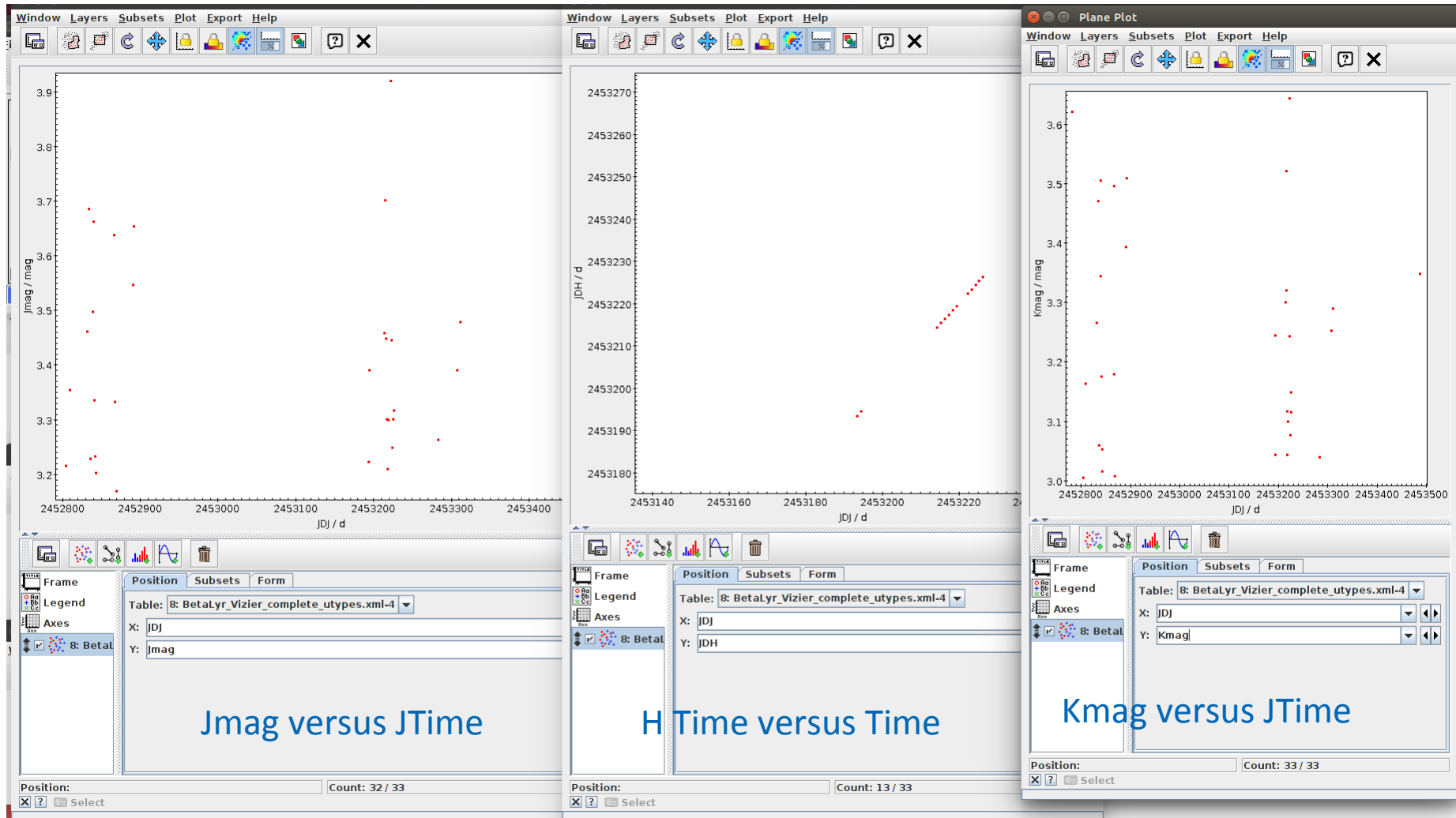
Window Subsets Help

Table Browser for 8: BetaLyr_Vizier_comple_otypes.xml-4

	JDJ	Jmag	e_Jmag	JDH	Hmag	e_Hmag	JDK	Kmag	e_Kmag	JDL	Lmag
1	2, 452782E6			2, 452782E6	3, 577	0, 012	2, 452782E6	3, 621	0, 022	2, 452782E6	3, 316
2	2, 452804E6	3, 215	0, 005	2, 452804E6	3, 145	0, 005	2, 452804E6	3, 005	0, 005	2, 452804E6	2, 747
3	2, 452809E6	3, 354	0, 008	2, 452809E6	3, 508	0, 006	2, 452809E6	3, 164	0, 005	2, 452809E6	2, 877
4	2, 452832E6	3, 461	0, 004	2, 452832E6	3, 393	0, 006	2, 452832E6	3, 266	0, 008	2, 452832E6	3, 018
5	2, 452834E6	3, 685	0, 003	2, 452834E6	3, 605	0, 006	2, 452834E6	3, 471	0, 005	2, 452834E6	3, 165
6	2, 452836E6	3, 228	0, 006	2, 452836E6	3, 168	0, 007	2, 452836E6	3, 06	0, 007	2, 452836E6	2, 785
7	2, 452839E6	3, 498	0, 004	2, 452839E6	3, 456	0, 004	2, 452839E6	3, 344	0, 003	2, 452839E6	3, 073
8	2, 452840E6	3, 663	0, 004	2, 452840E6	3, 622	0, 007	2, 452840E6	3, 506	0, 005	2, 452840E6	3, 257
9	2, 452841E6	3, 335	0, 003	2, 452841E6	3, 276	0, 004	2, 452841E6	3, 176	0, 002	2, 452841E6	2, 916
10	2, 452842E6	3, 233	0, 007	2, 452842E6	3, 144	0, 004	2, 452842E6	3, 053	0, 005	2, 452842E6	2, 769
11	2, 452843E6	3, 202	0, 005	2, 452843E6	3, 117	0, 008	2, 452843E6	3, 016	0, 003	2, 452843E6	2, 75
12	2, 452866E6	3, 638	0, 003	2, 452866E6	3, 597	0, 005	2, 452866E6	3, 496	0, 002	2, 452866E6	3, 238
13	2, 452867E6	3, 332	0, 003	2, 452867E6	3, 294	0, 005	2, 452867E6	3, 18	0, 003	2, 452867E6	2, 949
14	2, 452869E6	3, 169	0, 001	2, 452869E6	3, 11	0, 007	2, 452869E6	3, 007	0, 003	2, 452869E6	2, 763
				3, 519	0, 006	2, 452891E6	3, 394	0, 005	2, 452891E6	3, 172	
				3, 599	0, 005	2, 452892E6	3, 51	0, 002	2, 452892E6	3, 249	
				3, 152	0, 005	2, 453193E6	3, 043	0, 004	2, 453193E6	2, 81	
				3, 333	0, 01	2, 453194E6	3, 244	0, 01	2, 453194E6	3, 016	
				3, 394	0, 007	2, 453214E6	3, 3	0, 006	2, 453214E6	3, 087	
				3, 647	0, 009	2, 453215E6	3, 522	0, 01	2, 453215E6	3, 274	
				3, 383	0, 009	2, 453216E6	3, 32	0, 005	2, 453216E6	2, 973	
				3, 236	0, 005	2, 453217E6	3, 117	0, 013	2, 453217E6	2, 834	
				3, 171	0, 006	2, 453218E6	3, 043	0, 011	2, 453218E6	2, 812	
				3, 207	0, 008	2, 453219E6	3, 1	0, 009	2, 453219E6	2, 85	
				3, 822	0, 01	2, 453222E6	3, 644	0, 008	2, 453222E6	3, 322	

Data section : values and ucd/utypes

Beta Lyrae case



□ GAPS case

- Check the example and load it into TOPCAT
- Dependant time and dependant quantities are separated from time but poorly defined
- Because
 - No specific measurement « role »
 - No Frame attached
 - No ucd to give an hint of the nature
 - ->Look at the « description » to know what it is
- We are actually missing a detailed model

GAPS case: data : values, ucd/utypes and plots.

Generic utypes for generic measurement axes. Lack of ucd for some axes

The screenshot displays a software interface with several components:

- Table List:** Shows '9: GAPS_kp7_complete_uty' with 97 rows and 22 columns.
- Current Table Properties:**
 - Label: GAPS_kp7_complete_utypes.xml
 - Location: /home/bonnarel/Documents/OV/TimeDomainDir/VOLUTE/time-series/standardized_votables/franco
 - Name: GAPS-TimeSeries-KP7
 - Rows: 97
 - Columns: 22
 - Sort Order: (dropdown)
 - Row Subset: All
 - Activation Action: (no action) Broadcast Row
- Table Browser for 9: GAPS_kp7_complete_utypes.xml:**

ID	H_BJD	C_BJD	RVC	dRVC	BIS_SPAN	H_alpha	RHK	CCF_M...	CCF_CONT...	CCF_FWHM	CCF_M...	CCF_NOISE	E
1	2, 456267E6	2, 456267E6	-30, 00059	0, 43864	-0, 03369			4941	54, 14807	7, 04475	G2	0, 00955	90
2	2, 456289E6	2, 456289E6	-30, 00259	0, 65267	-0, 03534			2207	54, 09875	7, 0495	G2	0, 00986	90
3	2, 456298E6	2, 456298E6	-30, 01748	1, 02141	-0, 03845			989	54, 18532	7, 04499	G2	0, 00137	90
4	2, 456299E6	2, 456299E6	-30, 01397	0, 40142	-0, 0336			5932	54, 09994	7, 0493	G2	0, 0005	90
5	2, 456300E6	2, 456300E6	-30, 01715	0, 3423	-0, 03679			8136	54, 06953	7, 05172	G2	0, 00043	90
6	2, 456306E6	2, 456306E6	-30, 01951	0, 41413	-0, 03452			5570	54, 09381	7, 05197	G2	0, 00052	900
7	2, 456325E6	2, 456325E6	-30, 02506	0, 90468	-0, 03841			1205	54, 09001	7, 04942	G2	0, 00122	900
8	2, 456325E6	2, 456325E6	-30, 02487	0, 61072	-0, 03164			2667	52, 88685	7, 05709	G2	0, 0008	900
9	2, 456345E6	2, 456345E6	-30, 04196	0, 34431	-0, 0353			8082	53, 94391	7, 06724	G2	0, 00043	900
10	2, 456346E6	2, 456346E6	-30, 04505	0, 48343	-0, 0321			4095	54, 0024	7, 06478	G2	0, 00062	900
11	2, 456363E6	2, 456363E6	-30, 0451	0, 36305	-0, 0374			7280	54, 01799	7, 06057	G2	0, 00045	900
12	2, 456364E6	2, 456364E6	-30, 04422	0, 42196	-0, 03627			5380	54, 0438	7, 06034	G2	0, 00053	900
13	2, 456365E6	2, 456365E6	-30, 04596	0, 4319	-0, 03886			5132	54, 0644	7, 05766	G2	0, 00054	900
14	2, 456366E6	2, 456366E6	-30, 04768	0, 4045	-0, 03547			5840	54, 03238	7, 06352	G2	0, 00051	900
15	2, 456367E6	2, 456367E6	-30, 0501	0, 89922	-0, 03236			1454	53, 59198	7, 06433	G2	0, 00111	1199, 468
16	2, 456376E6	2, 456376E6	-30, 05399	0, 65603	-0, 0383			2224	53, 99349	7, 0671	G2	0, 00086	900
17	2, 456377E6	2, 456377E6	-30, 05212	0, 3815	-0, 03476			6624	54, 00825	7, 06402	G2	0, 00048	900
18	2, 456380E6	2, 456380E6	-30, 055	0, 46358	-0, 03461			4475	53, 9972	7, 06415	G2	0, 00059	900
- Plots:** Two scatter plots showing RVC / km.s**1 vs C_BJD and dRVC / m.s**1 vs C_BJD.
- Position Subsets:** Two panels showing '9: GAPS' with X: C_BJD and Y: RVC/dRVC, and a count of 61 / 97.

□ Gaïa case

- Check the example and load it in TOPCAT
- Reference to the appropriate Photometric system for each of the tables
 - → Tools should follow the link and display PARAMS
- Each table is simple

Gaia case : 3 tables, ucd / utype /description and plot

The screenshot displays the TOPCAT software interface with several windows open:

- Table Browser for 11:** Shows a table with 4 columns: bpObsTime, bpFlux, bpFluxError, and bpMag. The data rows are:

	bpObsTime	bpFlux	bpFluxError	bpMag
1	1755, 32986	12450,	0, 009554	15, 136
2	1755, 40386	12333,	0, 009536	15, 1463
3	1785, 31164	12165,	0, 010327	15, 1612
- Table Browser for 12:** Shows a table with 4 columns: rpObsTime, rpFlux, rpFluxError, and rpMag. The data rows are:

	rpObsTime	rpFlux	rpFluxError	rpMag
1	1755, 33	12450,	0, 008448	14, 2963
2	1755, 40395	12333,	0, 00851	14, 2501
3	1785, 31172	12165,	0, 008866	14, 3022
- Plane Plot:** A scatter plot showing rpMag / mag on the y-axis (ranging from 14.25 to 14.30) versus rpObsTime on the x-axis (ranging from 1756 to 1784). Two data points are visible at approximately (1755, 14.29) and (1785, 14.25).
- Table Columns for 12:** A table defining the columns used in the plot:

Visible	Index	Name	ID	Class	Units	Description	UCD	Utype
<input type="checkbox"/>	0	Index	\$0	Long		Table row index		
<input checked="" type="checkbox"/>	1	rpObsTime	\$1	Double	d	Observation time of the RP CCD transit in units of Barycentric JD (in TCB) in days -2 455...	time.epoch	ts:TimeSeriesData.NDPoint.TimeObservable.TimeMeasure.TimeOffset
<input checked="" type="checkbox"/>	2	rpFlux	\$2	Float	e-/s	The integrated RP flux value of the transit. If the RP flux has been rejected or is unavail...	em.opt.B:phot.flux;stat.mean	ts:TimeSeriesData.NDPoint.dependantObservedObject.CoordMeasure.PhotometryPoint
<input checked="" type="checkbox"/>	3	rpFluxError	\$3	Float	e-/s	The error on the RP Flux. If the RP flux has been rejected or is unavailable, this error w...	em.opt.B:phot.flux;stat.error	ts:TimeSeriesData.NDPoint.dependantObservedObject.CoordMeasure.PhotometryPoint.Error
<input checked="" type="checkbox"/>	4	rpMag	\$4	Float	mag	G-band mean magnitude for the field-of-view transit, computed from the fluxGfov field ...	phot.mag	ts:TimeSeriesData.NDPoint.dependantObservedObject.CoordMeasure.PhotometryPoint.

□ Conclusion

- Feasible design
- Miss no important metadata
- More information possible if model is complete
- Data producers : have to create a vos:tableset fitting their data
- Clients and applications : work better if they read all the PARAMS and follow the id/ref connection