

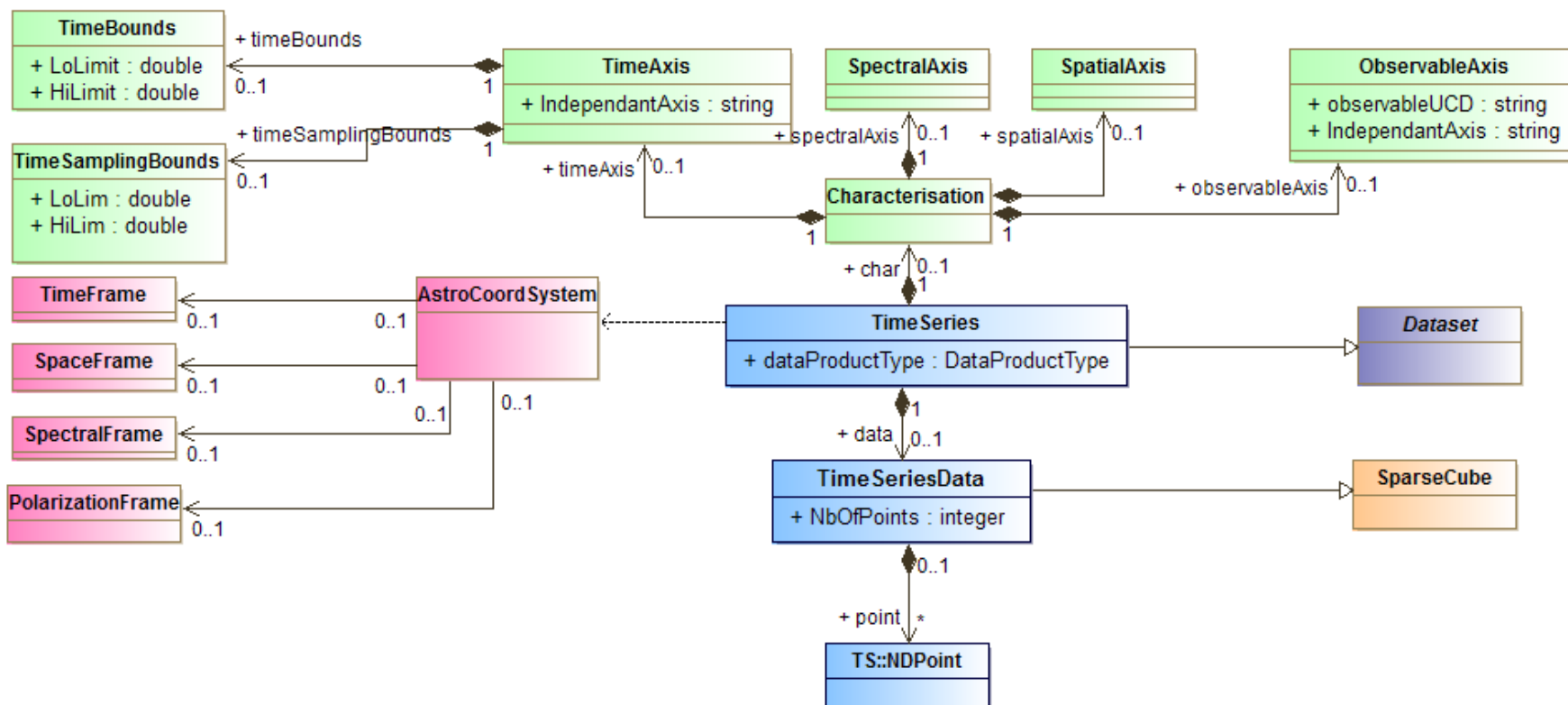
TimeSeries Data serialization: full-utype approach



F.Bonnarel (CDS)

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



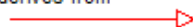


Legend

is associated to



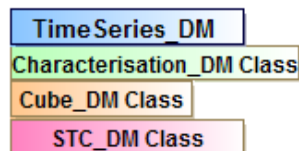
derives from



is composed Of

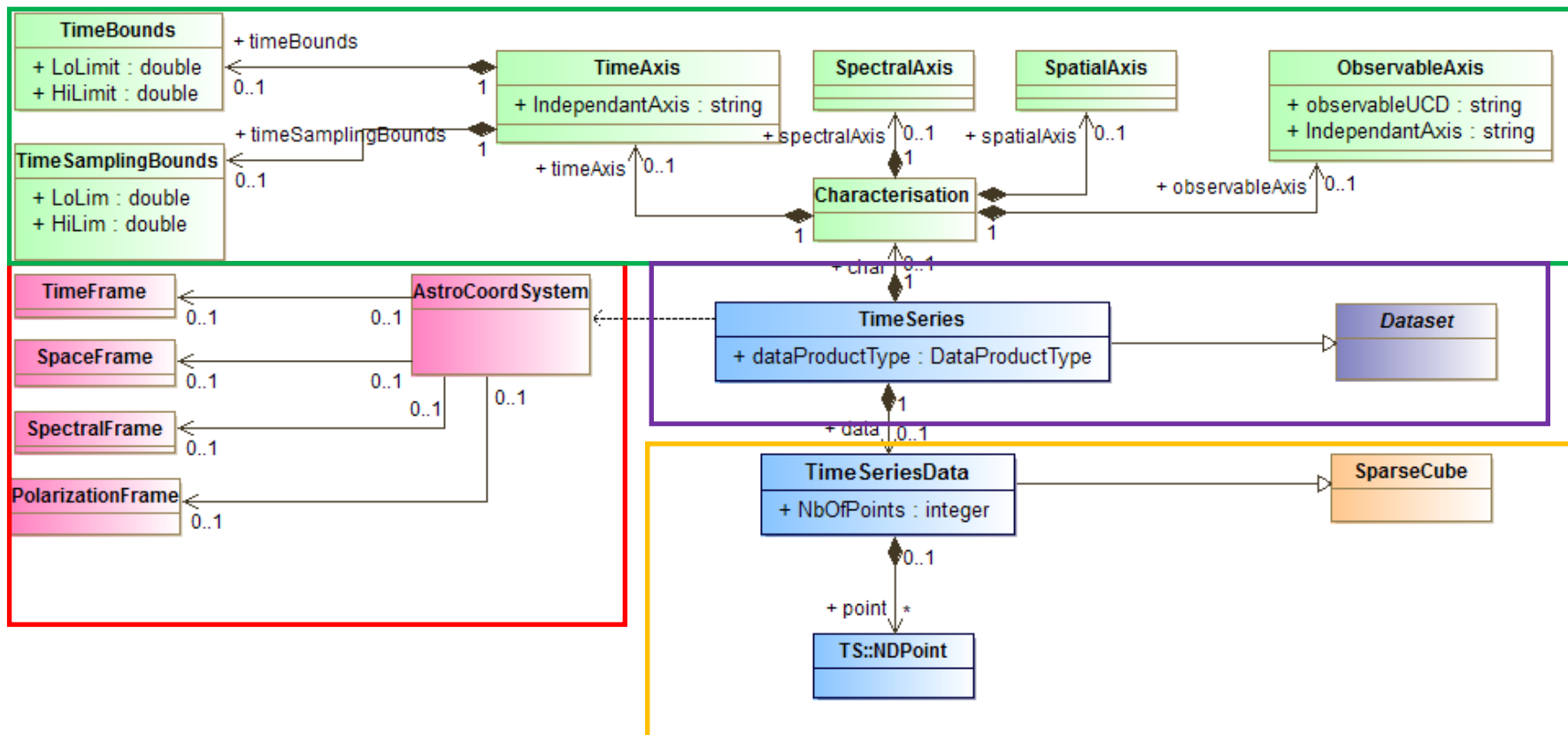


Color code for classes

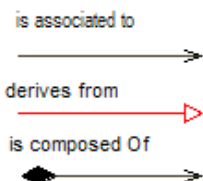


□ Question (and first answer):

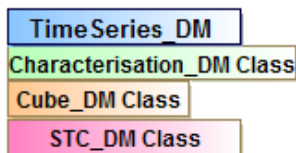
- Can we map this in a simple relational model ?
- Yes by simplification of all the 1 to 1 relationships and references (seen as attributes) : choice of « root » classes.
- In these conditions it's possible to write a « voservice tableset » with four tables and simple foreign keys to mimic ref/id in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



Legend



Color code for classes

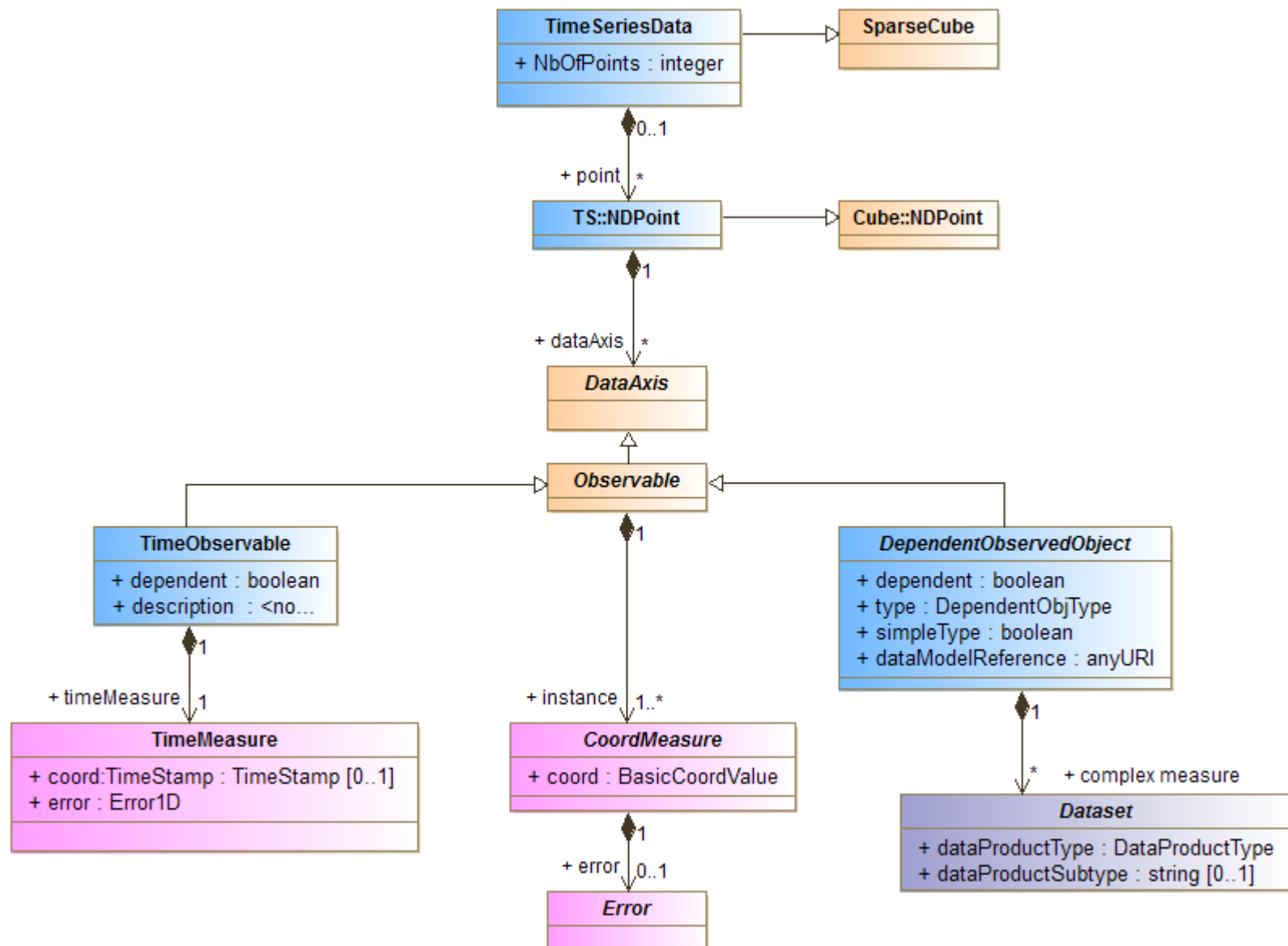


Purple : TimeSeries – Dataset

Green : characterisation

Pink : Coord Systems

Yellow : (TimeSeries)Data



TimeSeries – voservice table set

```

Most Visited Getting Started http://voide.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>
</table>

```

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 Timeseries 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="coordsys"/>
      <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="coordsys">
  + <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="flt" 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

TOPCAT

File Views Graphics Joins Windows VO Interop Help

Table List

- 1: SDSS_J080434.20+510349.2_VizieR_complete_utypes....
- 2: SDSS_J080434.20+510349.2_VizieR_complete_utypes....
- 3: SDSS_J080434.20+510349.2_VizieR_complete_utypes....
- 4: SDSS_J080434.20+510349.2_VizieR_complete_utypes....

Current Table Properties

Label: SDSS_J080434.20+510349.2_VizieR_complete_utypes....

Location: /home/bonnarel/Documents/OV/TimeDomainDir/VOLUTE/time-se

Name: TimeSeriesData

Rows: 11 293

Columns: 2

Sort Order:

Row Subset: All

Activation Action: (no action) ☐ Broadcast Row

SAMP

Messages: Clients:

103 / 3540 M

TOPCAT(1): Table Browser

Window Subsets Help

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

productType	calibLe...	pubID	creator	contributor	Target
1	timeSeries	1	TestTimeSeries	Zhanikov	CDS VizieR SDSS J080434.20+510349.2

Dataset metadata

TOPCAT(2): Table Browser

Window Subsets Help

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_max
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

Characterisation

TOPCAT(3): Table Browser

Window Subsets Help

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

Coordinate frames + Photometry filter : values and ucd + utypes

TOPCAT(4): Table Browser

Window Subsets Help

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

Data section : values and plot

Plot Export Help

Position: Select Count: 11 293 / 11 293

TOPCAT(5): Table Browser

Window Columns Display Help

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

	UCD	Utype	Datatype	VOTable ID
0	x			
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		photdm:PhotometryFilter.SpectralAxis.Coverage.Location.Value	float	wl
6		photdm:PhotometryFilter.Identifier	char	flt

□ 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: 17
Sort Order: A
Row Subset: A
Activation Action:

Table Columns for 8: BetaLyr_Vizier_comple_utypes.xml-4

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

Table Browser for 6: BetaLyr_Vizier_comple_utypes.xml

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

Dataset metadata

Table Browser for 6: BetaLyr_Vizier_comple_utypes.xml-2

SpatLocati...	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

Characterisation

Table Browser for 7: BetaLyr_Vizier_comple_utypes.xml-3

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

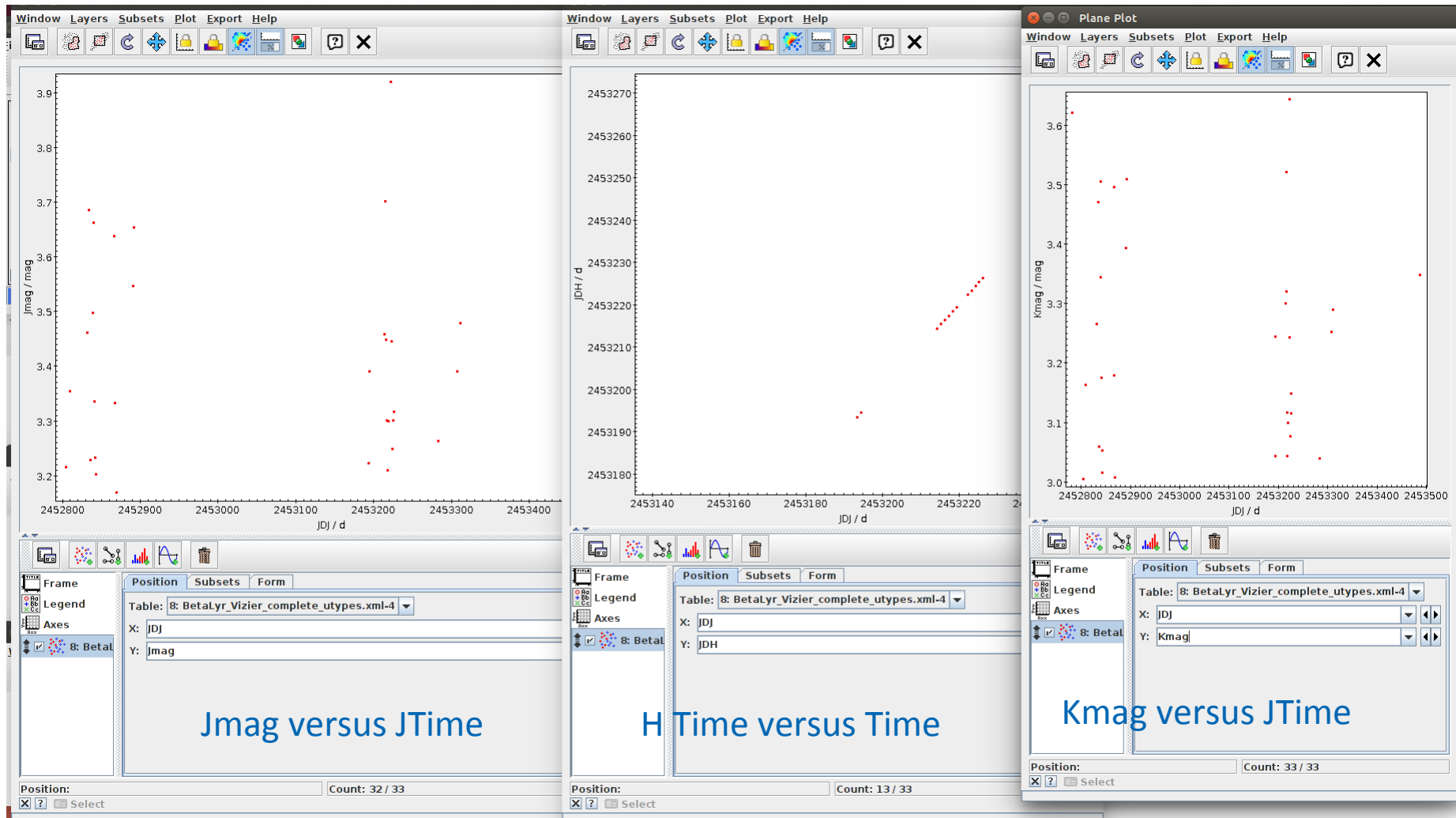
Coordinate frames + Photometry filter

Table Browser for 8: BetaLyr_Vizier_comple_utypes.xml-4

JD	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
2	2, 452804E6	3, 215	0, 005	2, 452804E6	3, 145	0, 005	2, 452804E6	3, 005	0, 005	2, 452804E6
3	2, 452809E6	3, 354	0, 008	2, 452809E6	3, 308	0, 006	2, 452809E6	3, 164	0, 005	2, 452809E6
4	2, 452832E6	3, 461	0, 004	2, 452832E6	3, 393	0, 006	2, 452832E6	3, 266	0, 008	2, 452832E6
5	2, 452834E6	3, 685	0, 003	2, 452834E6	3, 605	0, 006	2, 452834E6	3, 471	0, 005	2, 452834E6
6	2, 452836E6	3, 228	0, 006	2, 452836E6	3, 168	0, 007	2, 452836E6	3, 06	0, 007	2, 452836E6
7	2, 452839E6	3, 498	0, 004	2, 452839E6	3, 456	0, 004	2, 452839E6	3, 344	0, 003	2, 452839E6
8	2, 452840E6	3, 663	0, 004	2, 452840E6	3, 622	0, 007	2, 452840E6	3, 506	0, 005	2, 452840E6
9	2, 452841E6	3, 335	0, 003	2, 452841E6	3, 276	0, 004	2, 452841E6	3, 176	0, 002	2, 452841E6
10	2, 452842E6	3, 233	0, 007	2, 452842E6	3, 144	0, 004	2, 452842E6	3, 053	0, 005	2, 452842E6
11	2, 452843E6	3, 202	0, 005	2, 452843E6	3, 117	0, 008	2, 452843E6	3, 016	0, 003	2, 452843E6
12	2, 452866E6	3, 638	0, 003	2, 452866E6	3, 597	0, 005	2, 452866E6	3, 496	0, 002	2, 452866E6
13	2, 452867E6	3, 332	0, 003	2, 452867E6	3, 294	0, 005	2, 452867E6	3, 18	0, 003	2, 452867E6
14	2, 452869E6	3, 169	0, 001	2, 452869E6	3, 11	0, 007	2, 452869E6	3, 007	0, 003	2, 452869E6

Data section : values and ucd/utypes

Beta Lyrae case

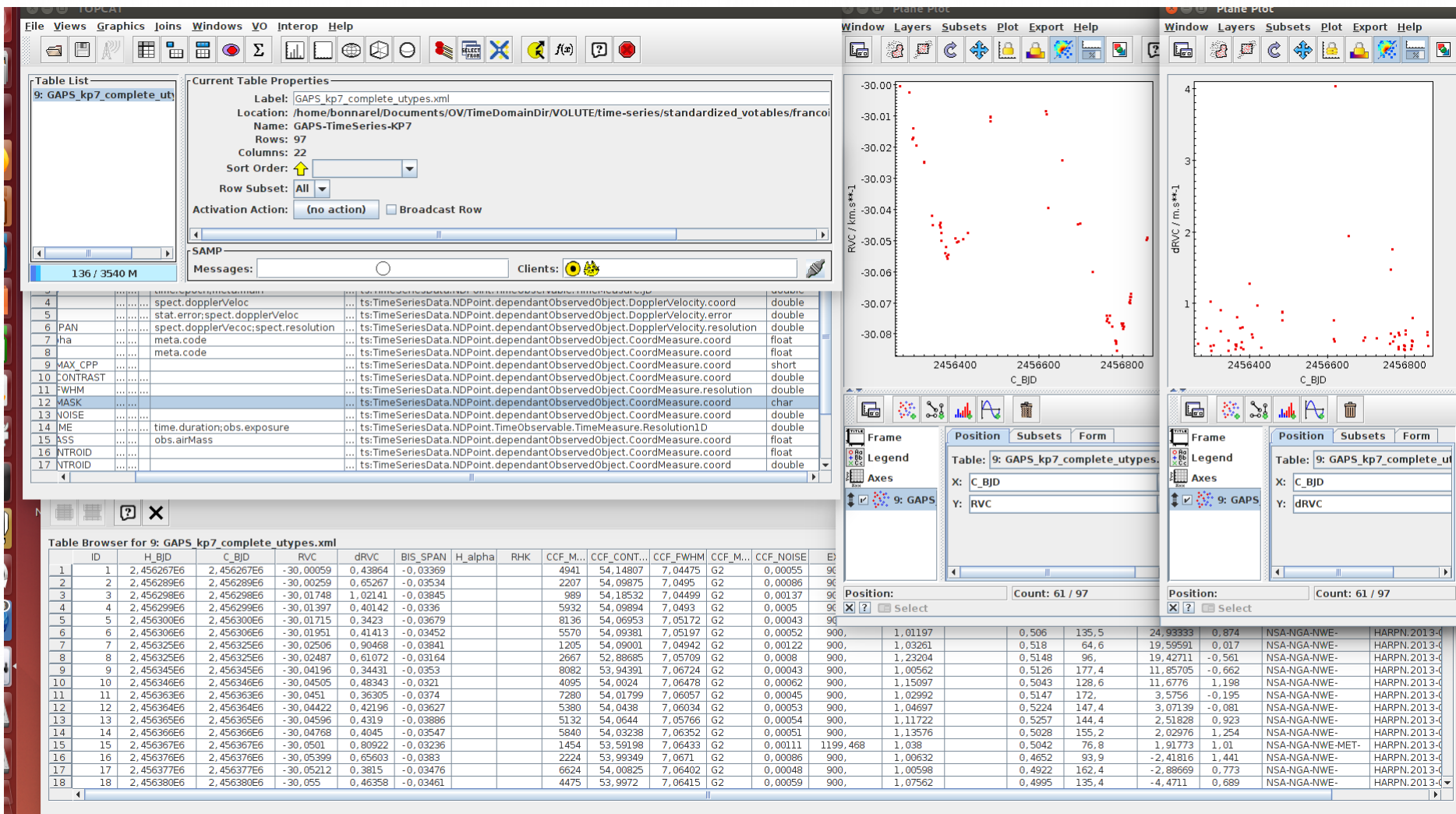


□ GAPS case

- 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



□ 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, which is used for managing and analyzing astronomical data tables. The interface is divided into several panels:

- Table List:** Shows a list of tables. Table 11 is selected.
- Current Table Properties:** Displays details for the selected table (GaiaSample3Tables_complete). It shows 3 rows and 4 columns, with a sort order and row subset set to 'All'.
- Table Browser for 11:** Shows a table with 4 columns: bpObsTime, bpFlux, bpFluxError, and bpMag. The data is as follows:

	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 is as follows:

	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 (Y-axis) versus rpObsTime (X-axis). The plot displays three data points.
- Table Columns:** A table showing the columns for the selected table (12: GaiaSample3Tables_complete_utypesWork.xml-3). The columns are: Visible, Name, \$ID, Class, Units, Description, UCD, and Utype.

	Visible	Name	\$ID	Class	Units	Description	UCD	Utype
0		Index	\$0	Long		Table row index		
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
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
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
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