

# Exploring Time Series in VizieR



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IVOA interoperability meeting  
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TDIG session

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CENTRE DE DONNÉES  
ASTRONOMIQUES DE STRASBOURG



- 14,600 catalogues
  - 1500+ with timeSerie flag !!



**VizieR Service**

[? VizieR home](#) · [Photometry viewer](#) · [Query VizieR using TAP](#) · [X-match tables](#)

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**Find catalogs among 14454 available**

Clear  Find...

Expand search

**?** *Catalog, author's name, word(s) from title, description, etc. e.g.: AGN, Veron, I/239, or bibcodes...*

▶ **Search for catalogs by column descriptions (UCD)** **?**

▼ **Hide catalogs containing additional data**

time serie  spectrum  images  cube  SED (Spectral Energy Distribution)  none

**Search by Position across 15663 tables**

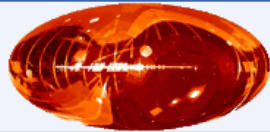
Target Name (resolved by [Sesame](#)) or Position: Clear  J2000  arcmin

Target dimension:  Radius  Box size

[i More about VizieR](#)

~ 1509 matching catalogs

Wavelength	Mission	Astronomy
Radio	AKARI	Abundances
IR	ANS	Ages
optical	ASCA	AGN
UV	BeppoSAX	Associations
EUV	CGRO	Atomic_Data
X-ray	Chandra	Binaries:cataclysmic
Gamma-ray	COBE	Binaries:eclipsing



# □ Goal of this talk

- What's in VizieR, *wrt* time-series ?
- How could this content be exposed to the VO in a standard way ?

# □ What kind of catalogues ?

- Big missions
  - HIPPARCOS & Tycho light curves
  - Kepler (external link)
  - **CoRoT**
  - OGLE, MACHO, EROS
- Variability surveys
- Tables dedicated to (few) individual object
- Solar data
- ...

# □ What kind of time series ?

- **Light curves** ~70 %
- Radial velocities ~23 %
- Eclipse, transit ~9 %
- Polarization, Stokes parameters ~1 %
- Solar data ~1 %
- Other ~5 %
  - Line index, line width, temperature, abundance, magnetic field, ...

Rough  
estimates  
based on  
~200 cats



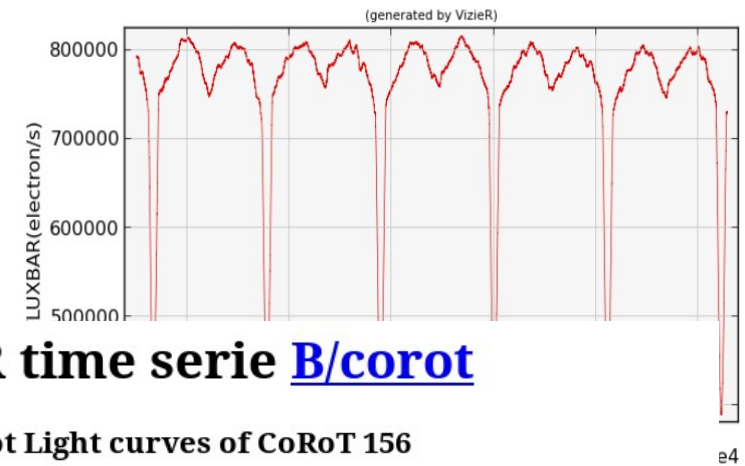
# Custom plots

- CoRoT

<u>Full</u>	<u>RAJ2000</u> "h:m:s"	<u>DEJ2000</u> "d:m:s"	<u>LC</u>	<u>date1</u> s	<u>date2</u> s	<u>CoRoT</u>	<u>Sp</u>
<u>1</u>	06 50 49.92	-00 32 27.2		2007-01-31	2007-04-02	20	F2V
<u>2</u>	06 54 24.72	-01 07 37.1		2007-01-31	2007-04-02	116	A4IV
<u>3</u>	06 55 54.24	-01 35 07.3		2007-01-31	2007-04-02	214	A3
<u>4</u>	06 51 51.84	-02 10 33.7		2007-01-31	2007-04-02	223	F2
<u>5</u>	06 54 36.96	-00 27 09.5		2007-02-03	2007-04-02	83	A2
<u>6</u>	06 54 50.16	-01 04 14.8		2007-02-03	2007-04-02	123	A2
<u>7</u>	06 54 54.72	-01 22 32.8		2007-02-03	2007-04-02	156	B5
<u>8</u>	06 53 02.88	-01 53 01.1		2007-02-06	2007-04-02	187	A0

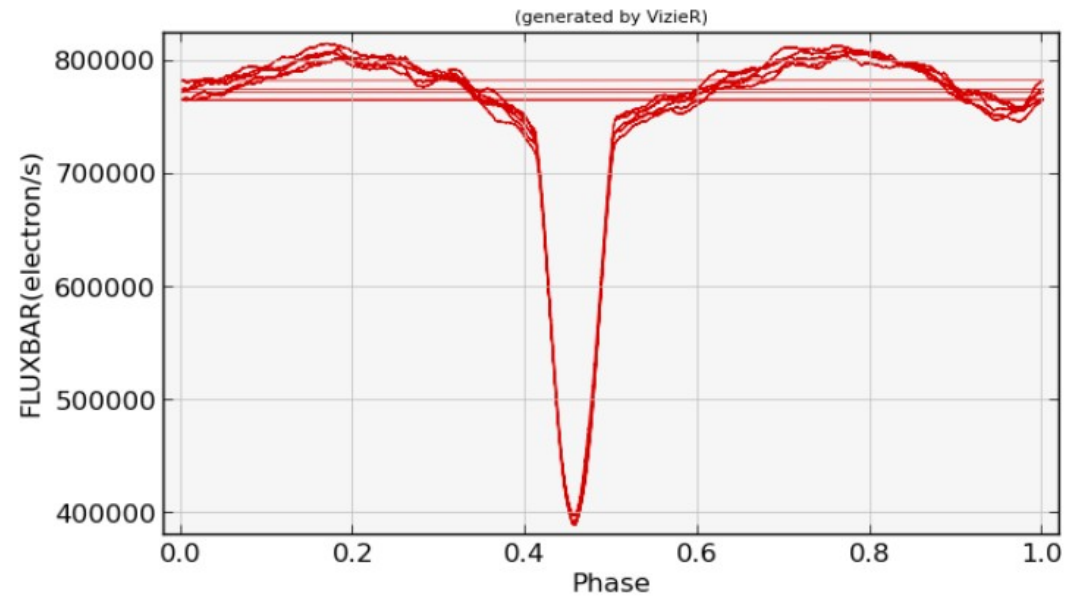
## VizieR time serie B/corot

B/corot Light curves of CoRoT 156



## VizieR time serie B/corot

B/corot Light curves of CoRoT 156



Filters : BAR

Period 11.1130371000

Center

0

Adjust plot :

< X <  Xlog

< Y <  Ylog

# □ Light curves : what parameters ?

- Should be some sort of  $\text{Flux} = f(\text{time})$
- Time :
  - JD, MJD, HJD, JD-xxxxxxx, phase
- Y-axis :
  - Flux
  - Magnitude
  - Differential magnitude
  - Color
  - Counts
  - Relative intensity
  - ...

# □ Catalogue/tables structure

HD 1234

MJD	Vmag
43128.2	12.1
43129.4	11.4
43145.0	12.0
43145.2	12.0

HD 1234

MJD	Vmag	B-V	V-R
43128.2	12.1	0.34	0.13
43129.4	11.4	0.32	0.22
43145.0	12.0	0.34	0.14
43145.2	12.0	0.35	0.16

My Targets

HD	MJD	Vmag
1234	43128.2	12.1
1234	43129.4	11.4
5678	43145.0	12.0
5678	43145.2	12.0

HD	Light Curve
1234	Link → FITS/ASCII
2345	Link → FITS/ASCII
4567	Link → FITS/ASCII
5678	Link → FITS/ASCII

- One table with B,V,R,I
- One table per photometric band
- ...
- ...



# □ Simple(?) time series

- Is it possible to homogenize the output to some simple output format ?
- Which simple output format ?
  - STS SimpleTimeSeries
    - Dedicated XML schema : probably not so simple to implement
    - `<series>`
      - `<elem>`
        - `<time></time>`
        - `<mag></mag>`
      - `</elem>`
    - `</series>`
  - SpectrumDM
    - VOTable serialization : close to existing output
    - Compatible with TAP generation
  - Other ? Be compatible with visualisation/analysis tools !

# □ Simple(?) time series

- In any case, some metadata and mapping will probably have to be added to Vizier
  - 90/10 rule for existing catalogues
  - Keep it easy for new catalogue creation (10 % with time series → ~100 catalogues/year)
- Provide authors with guidelines on standard parameters & needed metadata when submitting catalogue
- Would allow Vizier time series service, similar to photometry tool !
  - Aggregate time series from various catalogues for one same source