

# Simple Cone Search time extension Space-Time Search (and other TimeSeries friends)

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Ada Nebot

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M. Louys, L. Michel, F-X Pineau, M. Demleitner,  
D. Durand, M. Molinaro, D. Morris



CENTRE DE DONNÉES  
ASTRONOMIQUES DE STRASBOURG

# □ Finding and building Time Series

- Goal:
  - Select sources with time information
  - Build Time Series on the fly from the result table

# □ Cone Search time extension

- Goal:
  - **Select sources with time information**
  - Build Time Series on the fly from the result table
- Solution?
  - ➔ Add a **time range** parameter to **ConeSearch** (ConeSearch extension?)
    - Proposed parameters:
      - DATE\_INTERVAL = MJD\_min MJD\_max**
    - Do we fix the frame?
      - SCS has it the frame fixed to ICRS, **fix to TCB**
    - Find data with time values within those two dates
      - Result a VOTable with **TIMESYS**
    - If you have several columns with time values?
      - ucd = time.\*;meta.main**

# □ Cone Search time extension

- Cone search has a fixed radius around a certain position in the sky.
- What if location of the sky isn't as simple?  
e.g. Gravitational Wave localisation area.

## 1. Possible solutions in SCS:

- Relax POSITION parameters in SCS? (I rather not)
- POSITION=allsky?

ok, feasible, but, is this useful? you know when but not where...

# □ Space Time Search

- Cone search has a fixed radius around a certain position in the sky.
- What if location of the sky isn't as simple?  
e.g. Gravitational Wave localisation area

## 2. Possible alternative solution outside of SCS:

- Extend search to take **regions** into account (search data by MOC).
    - Note: LIGO/Virgo already using MOCs
  - Extend search to take **space and time regions** into account (search data by ST-MOC)
    - ST-MOC doesn't give you the data, but it helps find it extremely fast
    - See presentation and demo by M. Baumann
- ➡ Towards a **SpaceTimeSearch** protocol?

# □ How to build time series on the fly

- Goal:
  - Select sources with time information
  - **Build Time Series on the fly from the result table**
- From response of the SCS or STS (or TAP) build a time series:
- **Solution? (this is not DAL...it's Apps)**
  - **Data providers:** annotate time following TIMESYS in VOTable1.4 (description of scale, position, offset)
  - **Clients:** bring times to the same frame when possible.
    - In case of unknown scale or ref position:
      - Add systematic error
      - User awareness: e.g. Send a warning e.g. “unknown ref. position times might be off by more than 1000 seconds”
  - **Problem:** missing knowledge of data type / content (RVs, mags,...)
    - → let the user explore data and choose
    - → solve it by a client

# □ How to build time series on the fly

- From response of the SCS or STS or TAP build a time series:
  - Sometimes Time Series are distributed as associated data via **datalink**
  - Sometimes Time Series are distributed as associated data via **Obscore**
- **Problem:** how to find time series in those cases and understand their content.
- **Question:** how do you use or plan to use datalink?
  - As I understand, datalink can be used for associating:
    - tabular data
    - image - several images ?
    - spectrum - several spectra
    - Basically used for collections of things of same structure
  - Is this true / is this already the case?

# □ Datalink content?

- Need to **find there is datalink** in the table
  - What is the **content of the datalink** or url?
    - If a client wants to preselect on the basis of content:
      - e.g. I want photometry only
      - e.g. I would like spectra
      - e.g. I'm looking for images only
      - e.g. Give me all
- ➡ **Need for a standard tag to content?**
- “content\_type” ? No, that’s for the format
  - “semantics” ? That’s the place, could we add specific terms?

e.g. timeseries-images, timeseries-radialvelocities, timeseries-lightcurve, timeseries-spectra

# □ Obscure content?

- Need to **find there are time series** data in the table
    - dataproduct\_type=**'timeseries'**
  - What is the content of datatype?
    - If a client wants to preselect on the basis of content:
      - e.g. I want photometry only
      - e.g. I would like spectra
      - e.g. I'm looking for images only
- ➡ **Need for a standard tag to content?**
- “dataproduct\_subtype” That's the place, could we add specific terms?
  - There are alternative solutions...

# □ Obscure content?

- Select time series of photometry:  
where `dataprodect_type='timeseries'` and `o_ucd LIKE 'phot.%'`
- Select time series of radial velocities:  
where `dataprodect_type='timeseries'` and `o_ucd LIKE 'spect.doppler%'`
- Select time series of images:  
where `dataprodect_type='cube'` and `s_xel1>1` and `s_xel2>1` and `t_xel>1`
- Select time series of spectra:  
where `dataprodect_type='cube'` and `em_xel>1` and `t_xel>1`

**It works, but using “`dataprodect_subtype`” seems easier**

**Since the vocabulary will be defined for `datalink`, why not reusing it here?**

# □ Obscure content?

➔ **Proposal:** Define and use same vocabulary for “dataprodect\_subtype” in Obscore as for “semantics” in datalink:

e.g. timeseries of images

**Obscore:** dataprodect\_type = timeseries, dataprodect\_subtupe=images

**Datalink:** semantincs = timeseries-images

e.g. light curves

**Obscore:** dataprodect\_type = timeseries, dataprodect\_subtupe=lightcurve

**Datalink:** semantincs = timeseries-lighcurve

e.g. timeseries of spectra

**Obscore:** dataprodect\_type = timeseries, dataprodect\_subtupe=lightcurve

**Datalink:** semantincs = timeseries-lighcurve

# □ How to proceed?

- Proposed next steps and questions:
  1. **Extend SCS to DATE\_INTERVAL.** PyVO implementation?
  2. **Create** a new protocol **SpaceTimeSearch** to query by stmoc?
  3. For **Datalink** (“semantics”) and **Obscore** (“dataprodut\_subtype”) **define** and use common **vocabulary** for specification of data content. We need something now.