

# Implementation of TAP and other VO protocols into CASSIS

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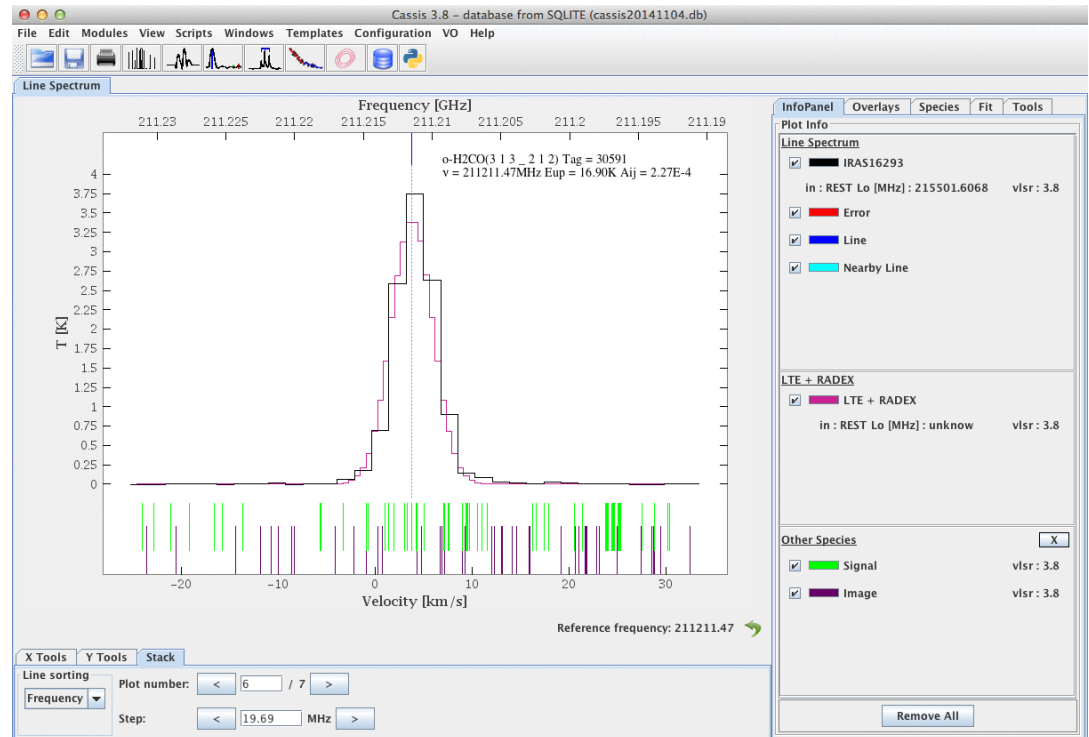


# Summary

- CASSIS : what for ?
- VO protocols in CASSIS :
  - Implementation of TAP
  - Prototype of Datalink acces
  - Improvement of VAMDC access
- Futures features
- Next release

- **Visualize, treat and analyze observed spectra using chemical species, models and other synthetic or observed spectra**

An example of the line analysis tool: inspecting o-H<sub>2</sub>CO lines in the observed spectrum (black) overlaid with an LTE model (pink)

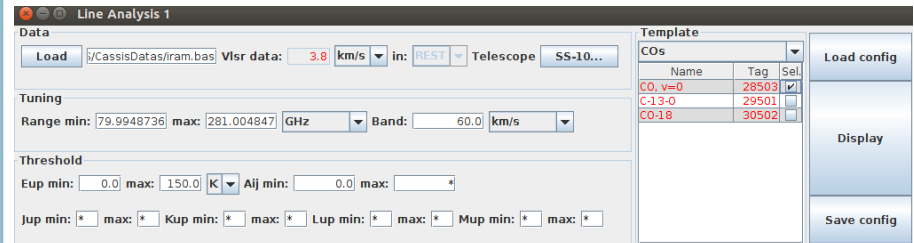


- Independent module to read the metadata and the data of spectra
  - Many formats : VOTable, Fits, ASCII, CLASS from GILDAS,...
  - Single or multiple spectra
  - From SSAP, SAMP, data file, ...
  - Possibility to **choose the column and the unit of the data**

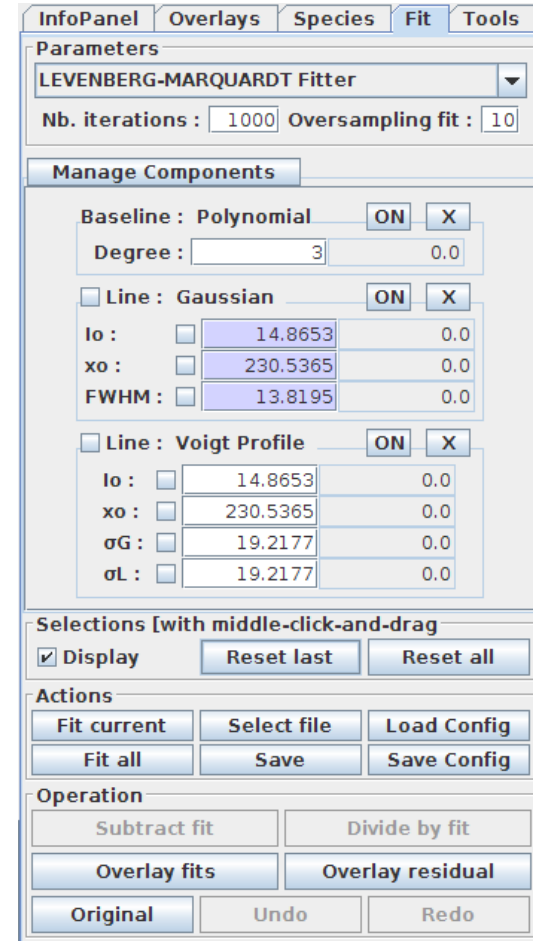
The screenshot shows the 'Spectrum Manager' window with the 'Cassis Metadata' tab selected. The left pane shows a tree view of resources, with 'Spectrum 1' selected under 'o5d602010\_1D.fits'. The main pane displays a table of metadata with columns for Name, Value, Comment, and Unit.

Name	Value	Comment	Unit
SIMPLE	true	Written by IDL: Fri...	
BITPIX	-32	Number of bits pe...	
NAXIS	1	Number of data a...	
NAXIS1	1024		
DATE	2014-07-25T00:0...	Creation UTC (CCC...	
EXTEND	true	File contains 3 ext...	
SOURCE	APIS database	<a href="http://lesia.obspm...">http://lesia.obspm...</a>	
PUBLISHE	LESIA, Observatoir...		
CONTACT	laurent.lamy(at)o...		
TARGET1	Ganymede	Primary target	
HEMIS1		Primary visible he...	
HEMIS2		Secondary visible ...	
TARGET2		Secondary target	
EXTEN1	extracted 1D spe...	Average of the 10...	
EXTEN2	extracted 1D spe...	Average of the 50...	
EXTEN3	extracted 1D spe...	Average of all spe...	
CRPIX1	512	Reference pixel	
CRVAL1	1416.82	Value of the refer...	
CD1_1	0.584	Spectral resolutio...	
BUNIT	R/Angstrom	Spectrum unit	
CUNIT1	Angstrom	Wavelength unit	
WAVECAL	STSci	Wavelength calibr...	
TELESCOP	HST	Telescope	
INSTRUM	STIS	Instrument	
OBSTYPE	SPECTROSCOPIC	Observing type	

- Multiple ways to visualize
  - Simple or mosaic spectra
  - Overlay of spectra and lines
  - Spectrum cut to a frequency/wavelength range
  - Spectrum cut around a line



- Module to fit a curve with multiple components :
  - Gaussian
  - Lorentzian
  - Polynomial baseline, ...
  -
- Tools to
  - Subtract spectrum to another
  - Add spectrum to another
  - Oversample, ...
- Jython module to do all the treatment you want !



- **Models to produce synthetic spectra and compare with observed spectra**
- **Use of atomic and molecular databases with SQLite connection and **VAMDC\*** protocols to identify lines**  
(**SLAP** also but no provider ...)



\*Virtual Atomic and Molecular Database Center

- Development of a independent module in EuroPlanet H2020 with CDPP team
  - **RegTAP** to query the registry
  - **EPN-TAP** to retrieve the spectra
  
- Possibility to use the RegTAP in SSA module

The screenshot shows the EPN-TAP web interface. At the top, there is a table listing various services with columns for 'short\_name', 'res\_title', and 'ivo://'. Below this is a 'Query parameters' section with fields for 'Target name' (set to 'Jupiter'), 'Time' (min and max), 'Spectral range', and 'Dataproduct type' (set to 'Spectrum'). A 'Send query' button is visible.

Below the query parameters, there is a section for 'Query for the selected service(s)' with a SQL query: `SELECT DISTINCT TOP 20 * FROM #tablename# WHERE target_name LIKE 'Jupiter' AND (dataproduct_type LIKE 'spectrum' OR dataproduct_type LIKE 'sp')`.

The main part of the screenshot is a table titled 'apis' showing the results of the query. The table has columns: resource\_type, dataset\_id, index, dataproduct\_type, target\_name, target\_class, time\_min, time\_max, and time\_sampling\_s. The data shows multiple entries for Jupiter, with resource types including 'granule', 'processed\_data', and '1D spectra'.

resource_type	dataset_id	index	dataproduct_type	target_name	target_class	time_min	time_max	time_sampling_s
granule	original_data	241801	sp	Jupiter	planet	2451930.03441074	2451930.03996573	NaN
granule	processed_data	233702	sp	Jupiter	planet	2451399.05861358	2451399.06092858	NaN
granule	1D spectra	236906	sp	Jupiter	planet	2451893.0146509	2451893.02194478	NaN
granule	processed_data	245902	sp	Jupiter	planet	2451930.17913296	2451930.18214242	NaN
granule	1D spectra	742606	sp	Jupiter	planet	2456659.90307796	2456659.90539297	NaN
granule	processed_data	704602	sp	Jupiter	planet	2456666.46240685	2456666.49166842	NaN
granule	1D spectra	241106	sp	Jupiter	planet	2451923.2070263	2451923.21258152	NaN
granule	original_data	245301	sp	Jupiter	planet	2451923.4779637	2451923.48386608	NaN
granule	original_data	244001	sp	Jupiter	planet	2451931.44394778	2451931.44695724	NaN
granule	original_data	241901	sp	Jupiter	planet	2451930.04532481	2451930.05087878	NaN
granule	processed_data	226602	sp	Jupiter	planet	2450632.83272566	2450632.84893154	NaN
granule	processed_data	750502	sp	Jupiter	planet	2456309.09027777	2456309.11953933	NaN
granule	processed_data	239002	sp	Jupiter	planet	2451896.9599635	2451896.96644512	NaN

At the bottom of the screenshot, there are buttons for 'Download...', 'Display...', and 'Open result'.



## 1/2

- Collaboration with the synthetic spectra database POLLUX
  - Datalink used to get the Provenance of the spectrum
- Prototype using SSA module to get the votable with 2 resources
  - 1 for the data
  - 1 for the datalink

The screenshot shows the Simple Spectral Access (SSA) interface. On the left, the 'Registry & Services selection' panel shows 'TAPRegExt' as the protocol and 'http://reg.g-vo.org/tap' as the registry. The 'POLLUX Database' is selected. The 'Request' panel has fields for Object name, RA, DEC, SIZE, BAND, TIME, and FORMAT (set to 'none'). The 'Optional Parameters' table is shown below:

Use	Name	Value
<input type="checkbox"/>	logg_max	
<input type="checkbox"/>	logg_min	
<input type="checkbox"/>	MAXREC	
<input type="checkbox"/>	meta_max	
<input type="checkbox"/>	meta_min	
<input type="checkbox"/>	model	
<input type="checkbox"/>	pertinence	
<input checked="" type="checkbox"/>	teff_max	3000
<input checked="" type="checkbox"/>	teff_min	3000
<input type="checkbox"/>	vturb_max	
<input type="checkbox"/>	vturb_min	

The 'Query' field contains: `<SERVER>?REQUEST=queryData&teff_max=3000&teff_min=3000`. An 'Advanced Queries' dialog is open, showing a table with the following data:

Service	Query
POLLUX SSAP	http://pollux.graal.univ-montp2.fr/ssaserver/tsap?REQUEST=queryData&teff_max=3000&teff_min=3000&test=1

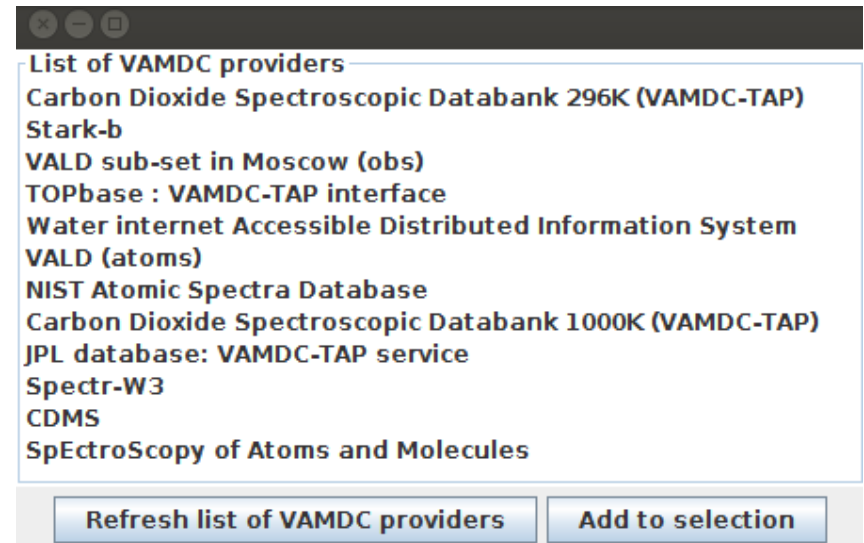


# Improvement of VAMDC access

- In a independent module for 12 VAMDC providers :
  - More than 5000 species
  - Several million of lines

=> Minimum needed

- The name of the specie
- The frequencies of the line



- Development and Integration of a **ObsTAP client** module
- Development and Integration of a **UWS client** module
  - Allow to launch the computation of synthetic spectra from the STOP project (Ivan Zolotukin, Sandrine Bottinelli and co)
  - Allow to launch other spectral models
- Read more types of files containing spectra
- Interface with new chemical species databases

- CASSIS 4.0 beta version  
<http://cassis.irap.omp.eu/?page=beta>
  - Next release 4.0 in a few days  
<http://cassis.irap.omp.eu/?page=installation>
  - Feedback :  
<http://cassis.irap.omp.eu/?page=bugsreport>
- => Tell us what you need !!  
[cassis-team@irap.omp.eu](mailto:cassis-team@irap.omp.eu)

# Links

- CASSIS  
<http://cassis.irap.omp.eu>
- IVOA  
<http://www.ivoa.net>
- VAMDC  
<http://portal.vamdc.org>
- Europlanet-H2020-RI / VESPA  
<https://voparis-confluence.obspm.fr/>
- POLLUX  
<http://npollux.lupm.univ-montp2.fr/DBPollux/PolluxAccesDB>