

VO technologies in CASSIS

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CASSIS

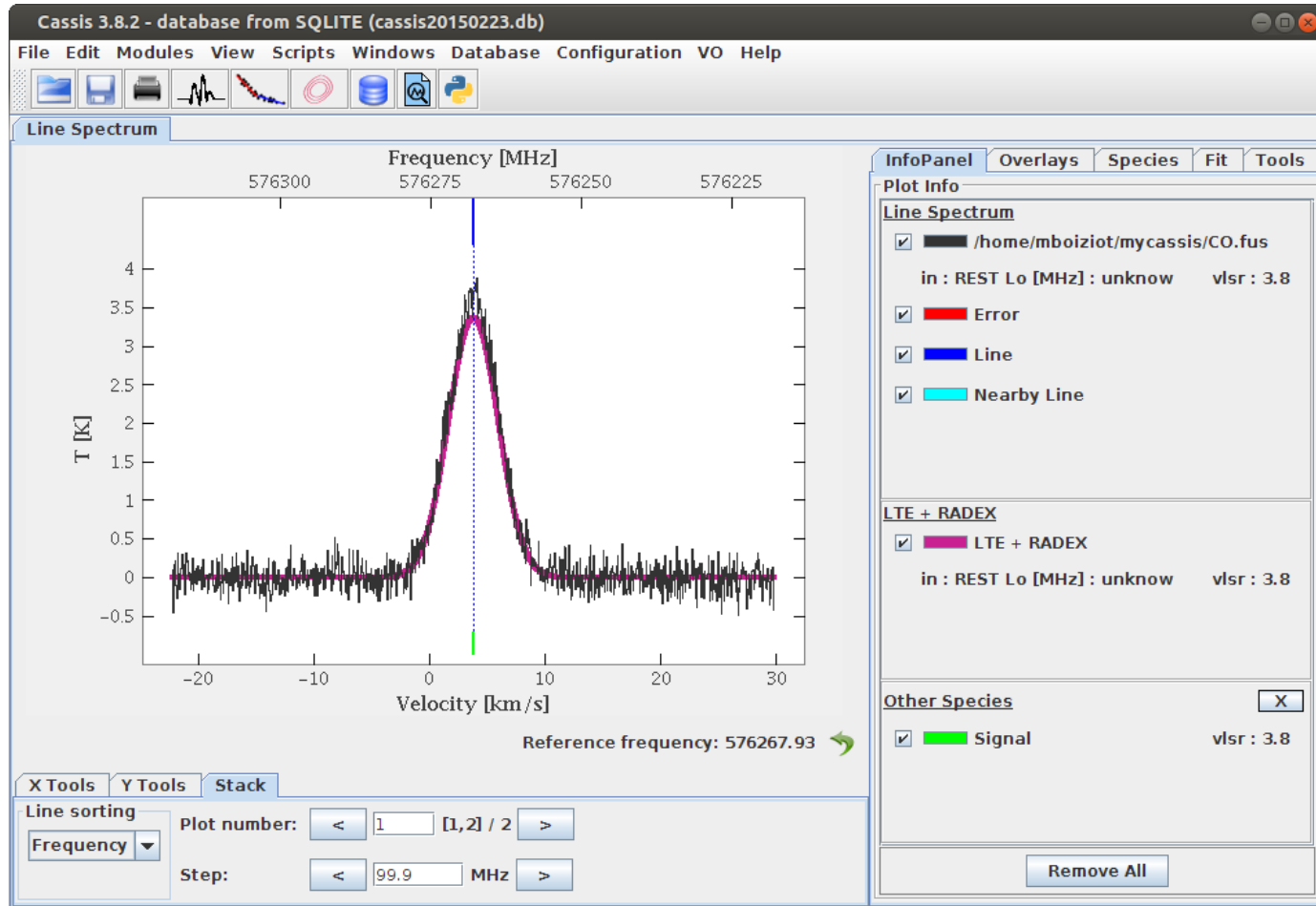
Centre d'Analyse Scientifique de Spectres Instrumentaux et Synthétiques

<http://cassis.irap.omp.eu>

- Spectrum Analyser developed at IRAP since 2005
- Developed in Java
- VO friendly
- Features: line identification (large datasets), synthetic spectra, scripting (Jython)

Why CASSIS ?

- Display spectra, whatever the x- and y-axis unit
- Manipulate (re-sampling, average, operations...)
- Analyse (fitting, line identification, model...)



Display and Analyse

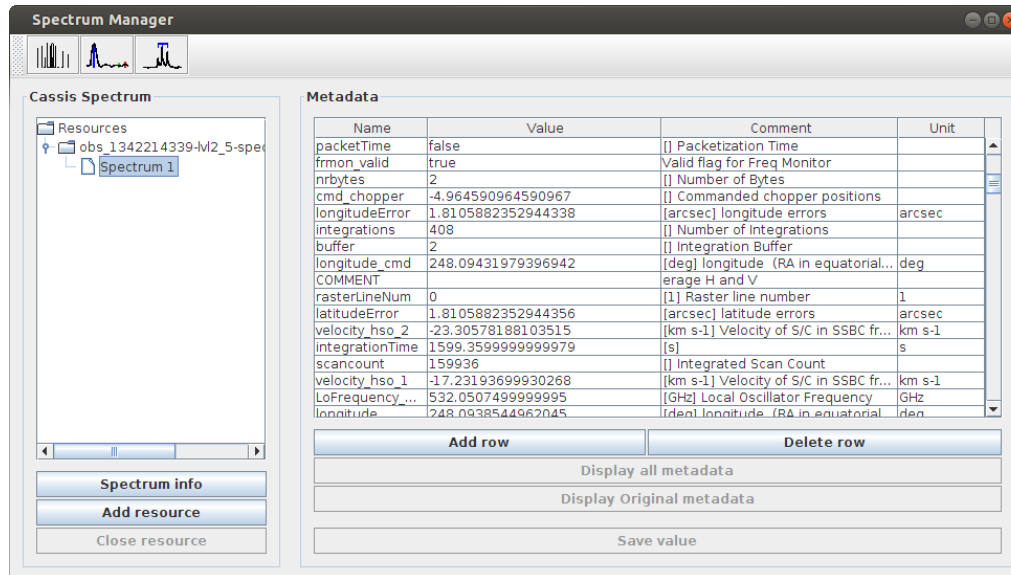
Basically, we need two things for that in CASSIS:

- A spectrum
- A species database

That's nice! The VO have what we need!

Spectra reading

- In the next version:
 - A new spectrum reader module
 - A lot of new fits file format readable



The screenshot shows the 'Spectrum Manager' window. On the left, a tree view shows 'Resources' containing 'obs_1342214339-1v2_5-spect' and 'Spectrum 1'. Below the tree are buttons for 'Spectrum info', 'Add resource', and 'Close resource'. The main area is titled 'Metadata' and contains a table with the following data:

Name	Value	Comment	Unit
packetTime	false	[] Packetization Time	
frmon_valid	true	Valid flag for Freq Monitor	
nbytes	2	[] Number of Bytes	
cmd_chopper	-4.964590964590967	[] Commanded chopper positions	
longitudeError	1.8105882352944338	[arcsec] longitude errors	arcsec
integrations	408	[] Number of integrations	
buffer	2	[] integration Buffer	
longitude_cmd	248.09431979396942	[deg] longitude (RA in equatorial...	deg
COMMENT		erage H and V	
rasterLineNum	0	[1] Raster line number	1
latitudeError	1.8105882352944356	[arcsec] latitude errors	arcsec
velocity_hso_2	-23.30578188103515	[km s-1] Velocity of S/C in SSBC fr...	km s-1
integrationTime	1599.3599999999979	[s]	s
scancount	159936	[] Integrated Scan Count	
velocity_hso_1	-17.23193699930268	[km s-1] Velocity of S/C in SSBC fr...	km s-1
LoFrequency_...	532.0507499999995	[GHz] Local Oscillator Frequency	GHz
longitude	248.0938544962045	[deg] longitude (RA in equatorial...	deg

Below the table are buttons for 'Add row', 'Delete row', 'Display all metadata', 'Display Original metadata', and 'Save value'.

The spectra: SSAP

- A standalone Java module to do that
- Allow to get a large range/type of spectra
- Easily compare data from different instruments

The spectra: SSA

Simple Spectral Access (SSA)

Registry & Services selection
 Registry:

6dF DR3 Simple Spectra Access
 A High-Resolution Stellar Library for Evolutionary P...
 Allard, COND 2000
 Allard, DUSTY 2000
 Allard, NextGen
 AXIS-XMS Optical Spectra
 Be Stars Spectra database

Request
 Global Parameters
 Object name:
 RA: DEC:
 SIZE:
 BAND:
 TIME:
 FORMAT:

Optional Parameters

Use	Name	Value
<input type="checkbox"/>	CreationType	
<input type="checkbox"/>	Creator	
<input type="checkbox"/>	CREATORID	
<input type="checkbox"/>	DataModel	
<input type="checkbox"/>	DatasetType	
<input type="checkbox"/>	DIRECTACCESS	
<input type="checkbox"/>	DISPERSION	
<input type="checkbox"/>	DISPLAY	
<input type="checkbox"/>	Email	
<input type="checkbox"/>	feh	
<input type="checkbox"/>	feh_max	
<input type="checkbox"/>	feh_min	

Query

Results

NOVA WR35a x mlqso bidi ssa x FEROS SSAP x califa ssa x Flash/Heros SSAP x F/H Orders SSAP x theossa x SubaruHDS x
 Polarbase SSAP x HST Spectra x POLLUX SSAP x TBL Narval x HEROS OND x ISO SSAP x TLUSTY BSTAR2006 x HPOL x
 ELODIE x castor x FUSE x HST STIS Spectra x HFA x NOVA HD 165052 x HST.GHR Spectra x HEROS OND CUTOUT x IUE x

Index	Title	DataLength	TargetPos	FluxAxisName	SpectralAxisName	SpectralAxisUnit	FluxAxisUnit	spectralsi	fluxs
1	aldebaran_narval_05oct10_int_Fast_I_001.tbl.fits	214150	68.9802,16.5093	FLUX_NOR	AWAV	nm	dimensionless	1E-9 L	1
2	aldebaran_narval_05oct10_int_Fast_I_002.tbl.fits	214150	68.9802,16.5093	FLUX_NOR	AWAV	nm	dimensionless	1E-9 L	1
3	aldebaran_narval_05oct10_int_Fast_I_003.tbl.fits	214150	68.9802,16.5093	FLUX_NOR	AWAV	nm	dimensionless	1E-9 L	1
4	aldebaran_narval_05oct10_int_Fast_I_004.tbl.fits	214150	68.9802,16.5093	FLUX_NOR	AWAV	nm	dimensionless	1E-9 L	1
5	aldebaran_narval_05oct10_int_Fast_I_005.tbl.fits	214150	68.9802,16.5093	FLUX_NOR	AWAV	nm	dimensionless	1E-9 L	1
6	aldebaran_narval_05oct10_int_Fast_I_006.tbl.fits	214150	68.9802,16.5093	FLUX_NOR	AWAV	nm	dimensionless	1E-9 L	1
7	aldebaran_narval_05oct10_int_Fast_I_007.tbl.fits	214150	68.9802,16.5093	FLUX_NOR	AWAV	nm	dimensionless	1E-9 L	1
8	aldebaran_narval_05oct10_int_Fast_I_008.tbl.fits	214150	68.9802,16.5093	FLUX_NOR	AWAV	nm	dimensionless	1E-9 L	1
9	aldebaran_narval_05oct10_int_Fast_I_009.tbl.fits	214150	68.9802,16.5093	FLUX_NOR	AWAV	nm	dimensionless	1E-9 L	1

The spectra: SAMP

- Use JSAMP from Mark Taylor
(<http://www.star.bristol.ac.uk/~mbt/jsamp/>)
 - Easy to implement
 - Work well!
- Send and receive spectra from other VO applications
 - Usefull to get spectra from other kind of data with a specific application (cube...)

Jython

- Possibility for an advanced user to access to all operations in CASSIS
- It then allow to :
 - You can read any file
 - You can use any database type

The database

- File (CDMS/JPL)
- SQLite (provided database)
- VO Databases
 - VAMDC
 - SLAP
- Anything (Jython!)

Database: VAMDC & SLAP

- VAMDC
 - Allow line identification
 - Allow to get collisions files for modelisation (RADEX)
 - Caution: all database does not have all needed information for CASSIS
- SLAP
 - Too limited protocol? (Ex : no way to know the species in a database)
 - Where are the providers?

VO Database: too slow

- Développement of a standalone Java database module
 - Allow to create a SQLite database from:
 - SLAP
 - VAMDC
 - Others types (File, SQLite...)
 - Allow to filter species and transitions

CASSIS database module

Database Creation

CDM5_VAMDC X Add database

Tag	Name of specie	Eup min	Eup max	Aij min	Aij max	Freq min	Freq max	Number of transitions	Selected
3501	HD (v=0,1)	128.380391841470...	9476.786455164187	4.76307533106E-8	7.80565464439E-5	2559396.8511	2.76570175533E7	20	<input checked="" type="checkbox"/>
13502	CH (v=0)	0.15729657790019...	4767.713594495014	2.31863209384E-13	21.7073158621	701.677	1.42891551346E7	385	<input checked="" type="checkbox"/>
14501	CH2 (v=0)	112.530261165063...	2714.23994580752...	6.76918516128E-10	0.684947514848	57795.9595	1.30684641479E7	1400	<input checked="" type="checkbox"/>
15501	NH (v=0)	45.42661398517832	7763.225561563333	1.5278242116E-11	48.9083908774	946380.79	1.6488902126E7	1948	<input checked="" type="checkbox"/>
16501	NH2 (v=0)	45.7166421755689...	4369.527412334373	9.88221664687E-11	43.6572241937	8749.7253	1.82074855053E7	18513	<input checked="" type="checkbox"/>
16502	ND (v=0)	23.6118836731794...	3802.227570552378	8.43211500451E-8	7.09887522656	491907.567	8669055.3116	2020	<input checked="" type="checkbox"/>
17501	OH+ (v=0)	43.63318495446388	4844.304857995068	2.07817002216E-5	65.1718074608	909045.2	1.31706587227E7	209	<input checked="" type="checkbox"/>
19505	O-18-H+ (v=0)	43.32265236088051	704.1324238149921	4.16180807556E-4	3.04823241455	902574.5853	4944258.5496	75	<input checked="" type="checkbox"/>
18501	NH2D (v=0)	15.9730795022784...	4170.374564787114	5.4613957069E-14	9.56131047585	500.0139	1.01399839143E7	5066	<input checked="" type="checkbox"/>
19501	NHD2 (v=0)	16.10224317244655	4280.510314819474	2.53317054812E-12	6.96529105345	557.0223	9234490.1022	6525	<input checked="" type="checkbox"/>
20501	ND3 (v=0)	11.9710382597297...	3579.315151931501	6.21969516936E-13	3.4732069228	860.9526	7298137.8546	808	<input checked="" type="checkbox"/>
24501	NaH (v=0)	13.9113618837021...	4322.945302239956	3.95228791107E-4	75.1450907926	289862.798	6646000.3256	172	<input checked="" type="checkbox"/>
65511	CaCCH (v=0)	0.32496376189567...	1607.86991817123...	1.63100511785E-8	0.0233310488968	6771.0772	667647.4126	198	<input checked="" type="checkbox"/>
25502	MgH (v=0)	16.4762401769962...	2207.99552097450...	1.64982048452E-5	1.39060011531	342997.763	5332288.3869	96	<input checked="" type="checkbox"/>
26501	CCD (v=0)	3.46072688218811...	1714.00148248828...	3.27602198018E-7	0.0375563097615	72101.7155	2228161.2207	219	<input checked="" type="checkbox"/>
26502	C-13-CH (v=0)	4.03866904877805	1636.747119174869	1.17747727492E-7	0.043859531857	84091.2488	2347744.1949	256	<input checked="" type="checkbox"/>
26504	CN (v = 0, 1)	5.430117859057716	4437.752455500658	1.45500375181E-9	1.09095215542	112101.656	4486683.1047	648	<input checked="" type="checkbox"/>
27501	HCN (v=0)	4.25363238684573	17140.4459052141...	8.60393358816E-7	23.7298698481	88630.4156	7725623.7116	153	<input checked="" type="checkbox"/>
27502	HNC (v=0)	4.351209305982203	4883.893586590594	2.68961060678E-5	4.02296946082	90663.568	4219978.3546	47	<input checked="" type="checkbox"/>
27503	HCN (v2=1)	1028.66474387896...	12444.5095958511...	1.1337867719E-12	12.8637473308	447.1766	6362718.6465	286	<input checked="" type="checkbox"/>
27504	HNC (v2=1)	670.1425381484921	5582.120671073857	1.47781309466E-11	4.09832239063	648.7022	4246855.0695	127	<input checked="" type="checkbox"/>
27505	C-13-N (v=0)	5.213524627824913	4254.786117054557	3.43012948729E-9	0.962037946213	108056.1623	4302620.3723	1471	<input checked="" type="checkbox"/>
27506	CN-15 (v=0)	5.265254511028623	4302.680223977472	2.83760256219E-7	0.994874580308	109689.61	4350828.7129	294	<input checked="" type="checkbox"/>
28502	H2CN (v=0)	3.52024238313649...	1907.21092284352...	7.86273401922E-10	0.286143753342	4777.7712	1994905.3766	6519	<input checked="" type="checkbox"/>
28503	CO (v=0)	5.532201490061724	24500.67416814293	7.20360334988E-8	0.00852014559773	115271.2018	1.03293595031E7	95	<input checked="" type="checkbox"/>
28504	HCNH+ (v=0)	3.55681194142693...	4519.933833209418	6.83025014121E-9	0.0241678908614	74111.1812	3681527.0207	65	<input checked="" type="checkbox"/>
28505	C-13-N-15 (v=0)	5.047527375758544	4119.62978088511...	6.01916537918E-9	0.873687370305	104600.6005	4166621.0593	818	<input checked="" type="checkbox"/>
28506	HCN-15 (v=0)	4.130029061129227	10745.1565811583...	2.20335082637E-5	11.526334798	86054.9664	6073980.1392	72	<input checked="" type="checkbox"/>
28507	HCN-15 (v2=1)	1027.16891410458...	10669.3180229874...	3.83846866052E-12	9.61588076323	423.8778	5773642.1934	192	<input checked="" type="checkbox"/>
28508	DNC (v=0)	3.66212430651021...	2848.45472782003...	5.47452127158E-7	1.38532164167	76305.5125	2959674.4141	90	<input checked="" type="checkbox"/>
29501	C-13-O (v=0)	5.288883138566281	11881.7885811020...	6.33296228513E-8	0.00841026639423	110201.3216	7183021.4911	256	<input checked="" type="checkbox"/>
29502	HCND+ (v=0)	3.04220350370484	3860.254089152670	3.88400540338E-7	0.0526343738932	63411.3813	3153024.6766	50	<input checked="" type="checkbox"/>

Filters Configuration file: Save config Load config Create Database

Upcoming features

- UWS client
 - For STOP project by Ivan Zolotukhin
 - Open to other UWS requests
- EPN-TAP client
 - For europlanet H2020 project
 - Open to general TAP requests
- SSA
 - Use TAP registry



Thanks.

Questions?



Mickaël Boiziot, IVOA Interoperability Meeting, Sydney, 2015

