VO technologies in CASSIS

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On behalf of the CASSIS team

IRAP – OV-GSO

CASSIS

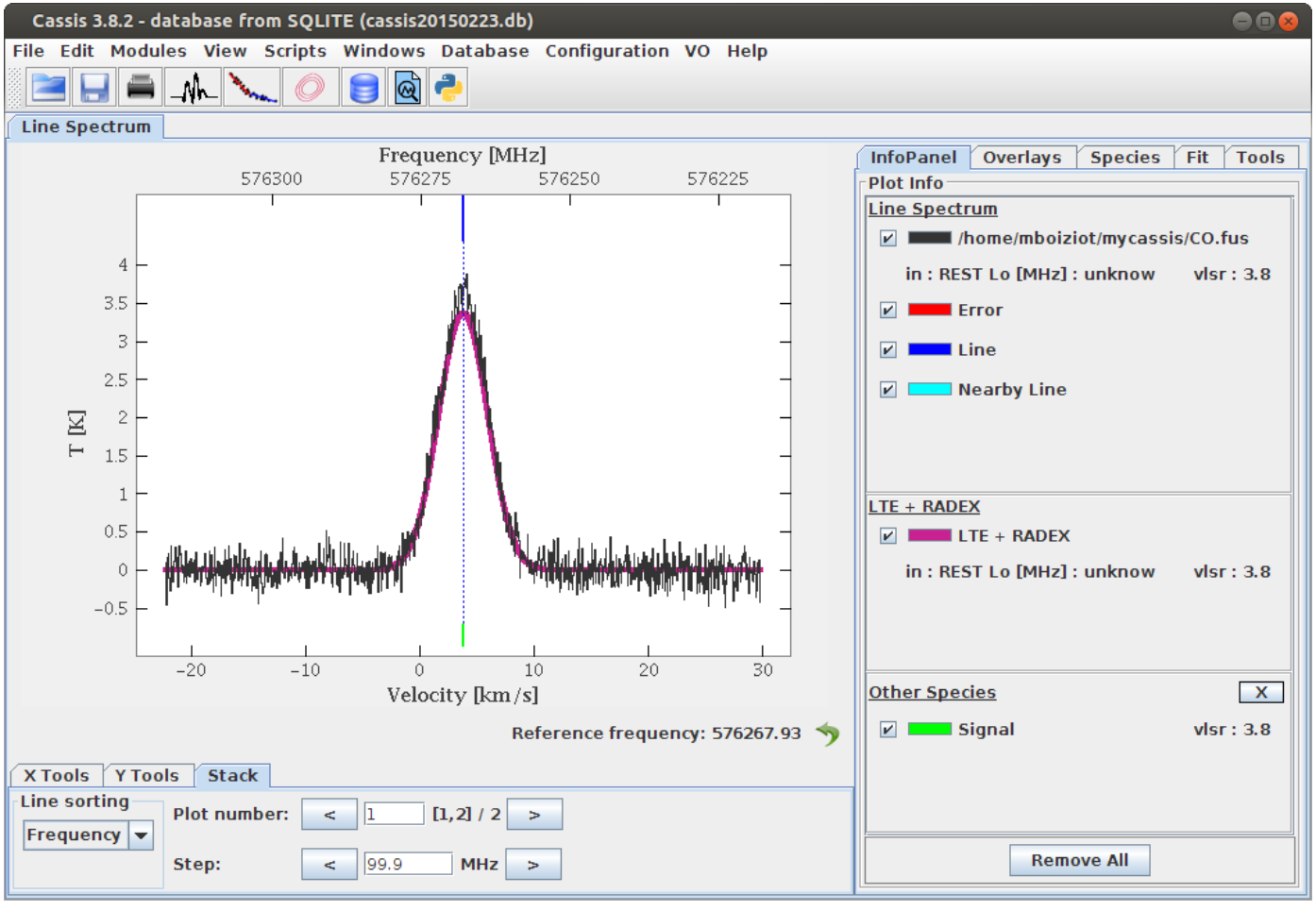
Centre d'Analyse Scientifique de Spectres Instrumentaux et Synthétiques

http://cassis.irap.omp.eu

- Spectrum Analyser developed at IRAP since 2005
- Developped 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...)


Cassis 3.8.2 - database from SQLITE (cassis20150223.db)
File Edit Modules View Scripts Windows Database Configuration VO Help
Line Spectrum
Frequency [MHz]
576300 576275 576250 576225
T [K]
Velocity [km/s]
Reference frequency: 576267.93
X Tools Y Tools Stack
Line sorting
Frequency
Plot number: < 1 [1,2] / 2 >
Step: < 99.9 MHz >
InfoPanel Overlays Species Fit Tools
Plot Info
Line Spectrum
/home/mboiziot/mycassis/CO.fus
in : REST Lo [MHz] : unknow vlsr : 3.8
Error
Line
Nearby Line
LTE + RADEX
LTE + RADEX
in : REST Lo [MHz] : unknow vlsr : 3.8
Other Species
X
Signal vlsr : 3.8
Remove All

Display and Analyse

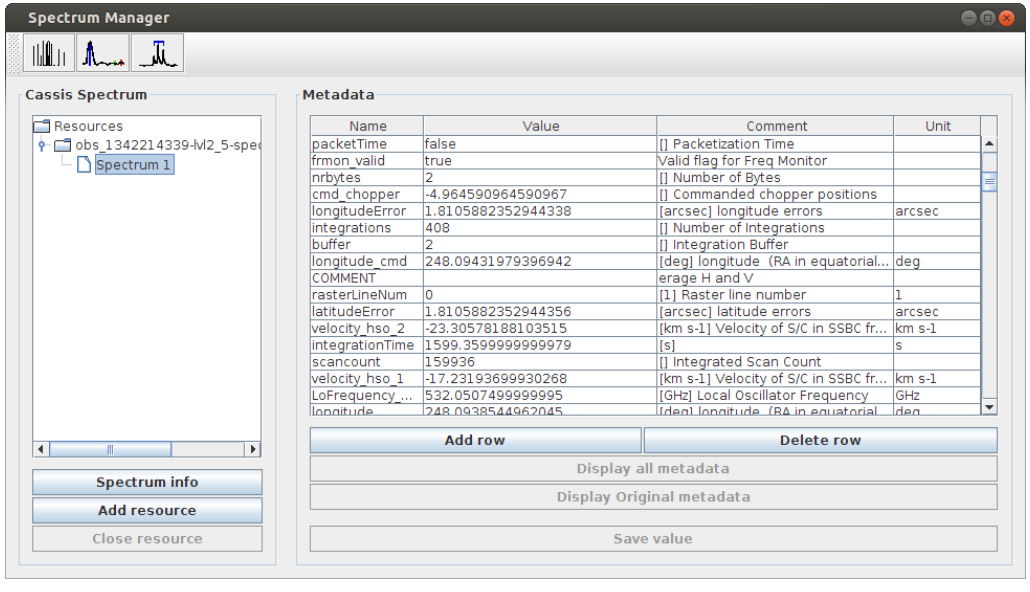
Basically, we needs two things for that in CASSIS:

- A spectrum
- A species database

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

Spectra reading

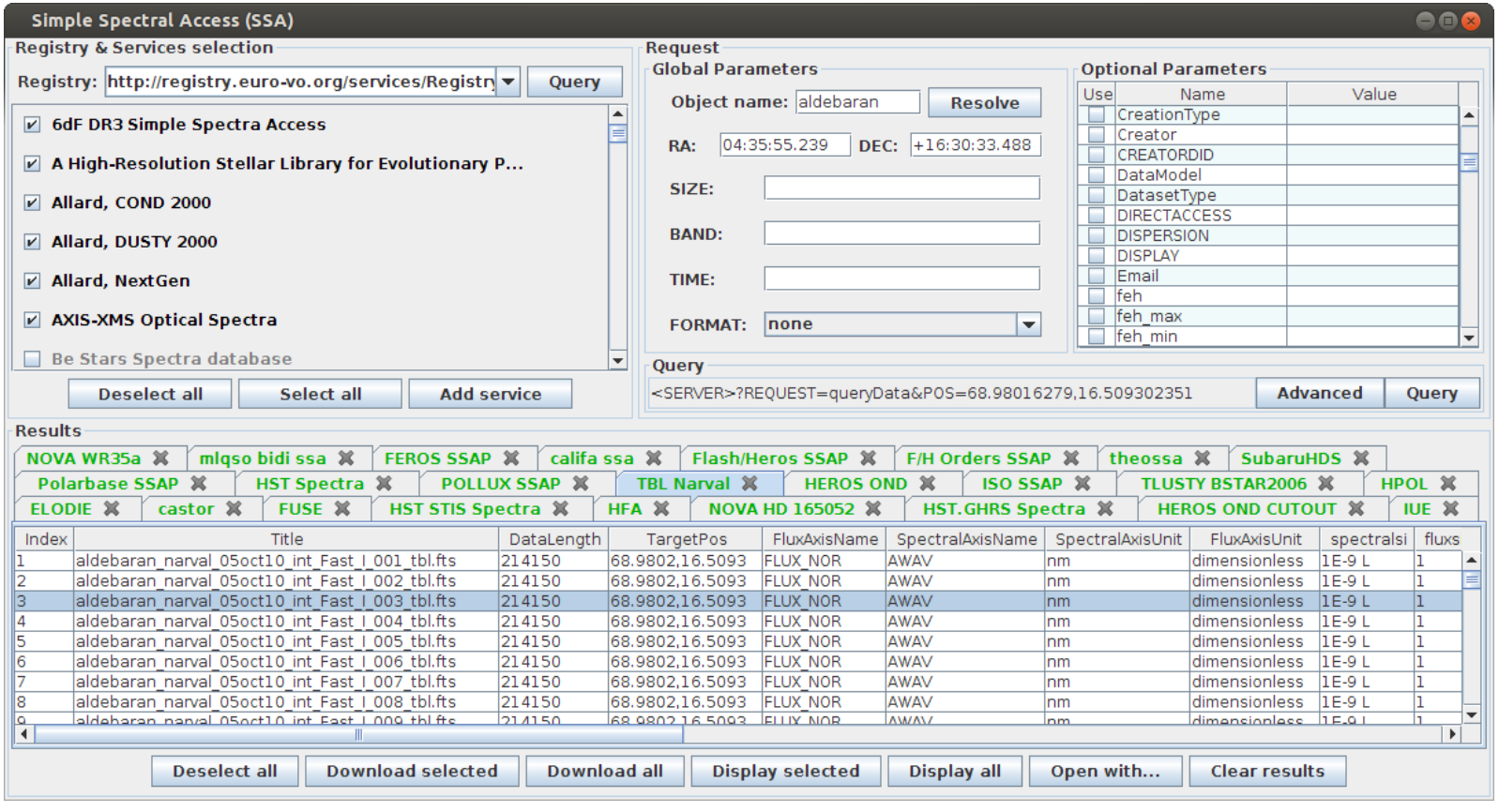
- In the next version:
  - A new spectrum reader module
  - A lot of new fits file format readable



The spectra: SSAP

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

The spectra: SSA



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!)

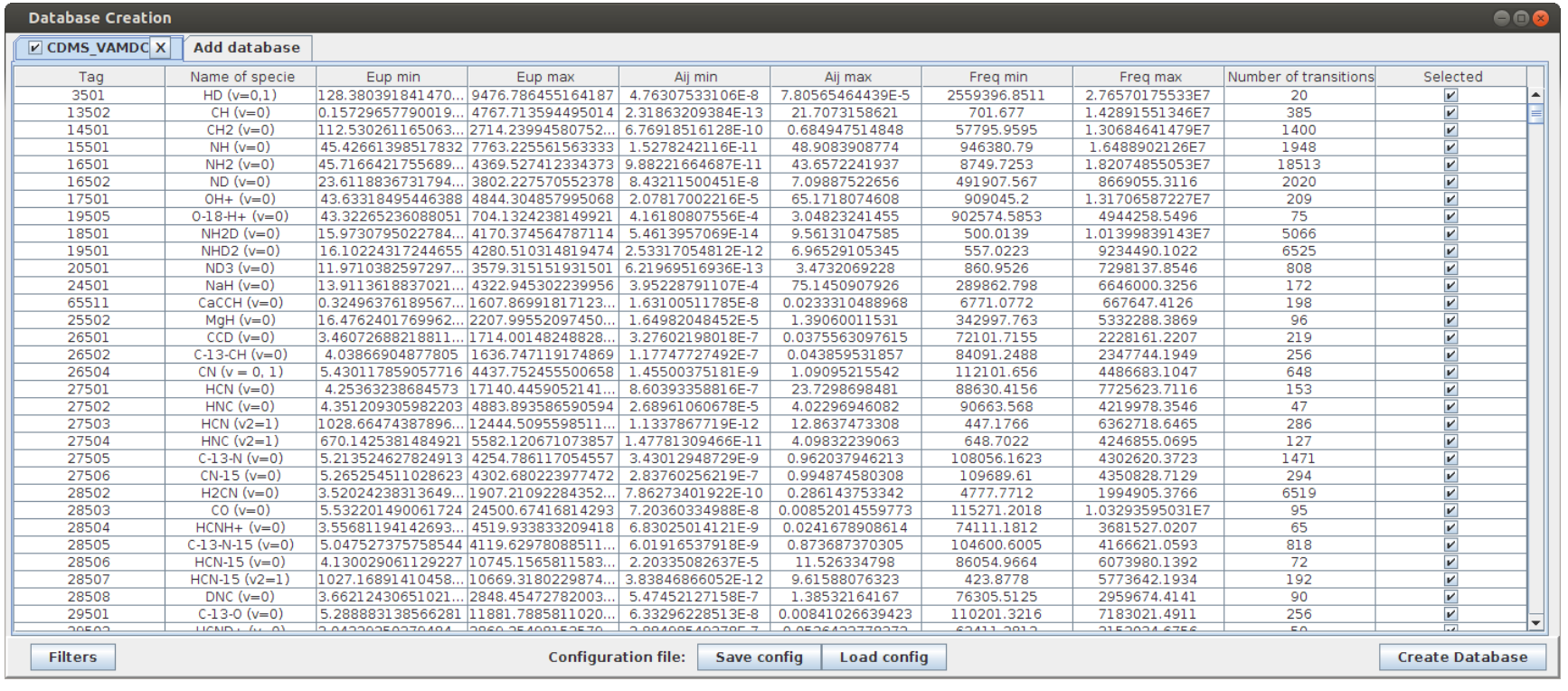
Database: VAMDC & SLAP

- 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

- Developpement 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



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	☑
13502	CH (v=0)	0.15729657790019...	4767.713594495014	2.31863209384E-13	21.7073158621	701.677	1.42891551346E7	385	☑
14501	CH2 (v=0)	112.530261165063...	2714.23994580752...	6.76918516128E-10	0.684947514848	57795.9595	1.30684641479E7	1400	☑
15501	NH (v=0)	45.42661398517832	7763.225561563333	1.5278242116E-11	48.9083908774	946380.79	1.6488902126E7	1948	☑
16501	NH2 (v=0)	45.7166421755689...	4369.527412334373	9.88221664687E-11	43.6572241937	8749.7253	1.82074855053E7	18513	☑
16502	ND (v=0)	23.6118836731794...	3802.227570552378	8.43211500451E-8	7.09887522656	491907.567	8669055.3116	2020	☑
17501	OH+ (v=0)	43.63318495446388	4844.304857995068	2.07817002216E-5	65.1718074608	909045.2	1.31706587227E7	209	☑
19505	O-18-H+ (v=0)	43.32265236088051	704.1324238149921	4.16180807556E-4	3.04823241455	902574.5853	4944258.5496	75	☑
18501	NH2D (v=0)	15.9730795022784...	4170.374564787114	5.4613957069E-14	9.56131047585	500.0139	1.01399839143E7	5066	☑
19501	NHD2 (v=0)	16.10224317244655	4280.510314819474	2.53317054812E-12	6.96529105345	557.0223	9234490.1022	6525	☑
20501	ND3 (v=0)	11.9710382597297...	3579.315151931501	6.21969516936E-13	3.4732069228	860.9526	7298137.8546	808	☑
24501	NaH (v=0)	13.9113618837021...	4322.945302239956	3.95228791107E-4	75.1450907926	289862.798	6646000.3256	172	☑
65511	CaCCH (v=0)	0.32496376189567...	1607.86991817123...	1.63100511785E-8	0.0233310488968	6771.0772	667647.4126	198	☑
25502	MgH (v=0)	16.4762401769962...	2207.99552097450...	1.64982048452E-5	1.39060011531	342997.763	5332288.3869	96	☑
26501	CCD (v=0)	3.46072688218811...	1714.00148248828...	3.27602198018E-7	0.0375563097615	72101.7155	2228161.2207	219	☑
26502	C-13-CH (v=0)	4.03866904877805	1636.747119174869	1.17747727492E-7	0.043859531857	84091.2488	2347744.1949	256	☑
26504	CN (v = 0, 1)	5.430117859057716	4437.752455500658	1.45500375181E-9	1.09095215542	112101.656	4486683.1047	648	☑
27501	HCN (v=0)	4.25363238684573	17140.4459052141...	8.60393358816E-7	23.7298698481	88630.4156	7725623.7116	153	☑
27502	HNC (v=0)	4.351209305982203	4883.893586590594	2.68961060678E-5	4.02296946082	90663.568	4219978.3546	47	☑
27503	HCN (v2=1)	1028.66474387896...	12444.5095598511...	1.1337867719E-12	12.8637473308	447.1766	6362718.6465	286	☑
27504	HNC (v2=1)	670.1425381484921	5582.120671073857	1.47781309466E-11	4.09832239063	648.7022	4246855.0695	127	☑
27505	C-13-N (v=0)	5.213524627824913	4254.786117054557	3.43012948729E-9	0.962037946213	108056.1623	4302620.3723	1471	☑
27506	CN-15 (v=0)	5.265254511028623	4302.680223977472	2.83760256219E-7	0.994874580308	109689.61	4350828.7129	294	☑
28502	H2CN (v=0)	3.52024238313649...	1907.21092284352...	7.86273401922E-10	0.286143753342	4777.7712	1994905.3766	6519	☑
28503	CO (v=0)	5.532201490061724	24500.67416814293	7.20360334988E-8	0.00852014559773	115271.2018	1.03293595031E7	95	☑
28504	HCNH+ (v=0)	3.55681194142693...	4519.933833209418	6.83025014121E-9	0.0241678908614	74111.1812	3681527.0207	65	☑
28505	C-13-N-15 (v=0)	5.047527375758544	4119.62978088511...	6.01916537918E-9	0.873687370305	104600.6005	4166621.0593	818	☑
28506	HCN-15 (v=0)	4.130029061129227	10745.1565811583...	2.20335082637E-5	11.526334798	86054.9664	6073980.1392	72	☑
28507	HCN-15 (v2=1)	1027.16891410458...	10669.3180229874...	3.83846866052E-12	9.61588076323	423.8778	5773642.1934	192	☑
28508	DNC (v=0)	3.66212430651021...	2848.45472782003...	5.47452127158E-7	1.38532164167	76305.5125	2959674.4141	90	☑
29501	C-13-O (v=0)	5.288883138566281	11881.7885811020...	6.33296228513E-8	0.00841026639423	110201.3216	7183021.4911	256	☑

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?