CASSIS as a spectroscopy tool for VESPA

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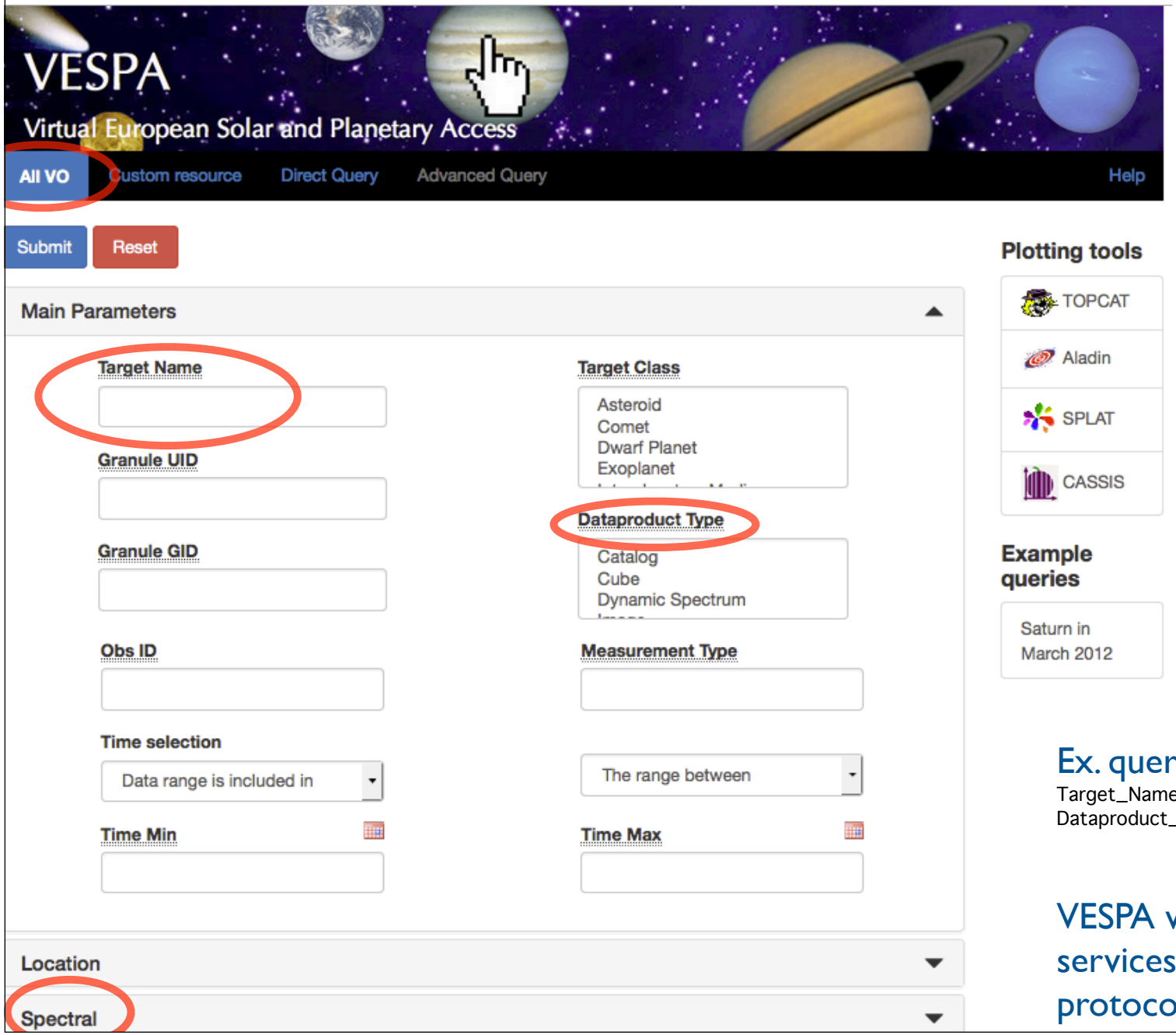
EUROPLANET

PADC
Paris Astronomical Data Centre

Go to VESPA portal

http://vespa.obspm.fr



Click "Submit" to search public data services, or first enter query parameters

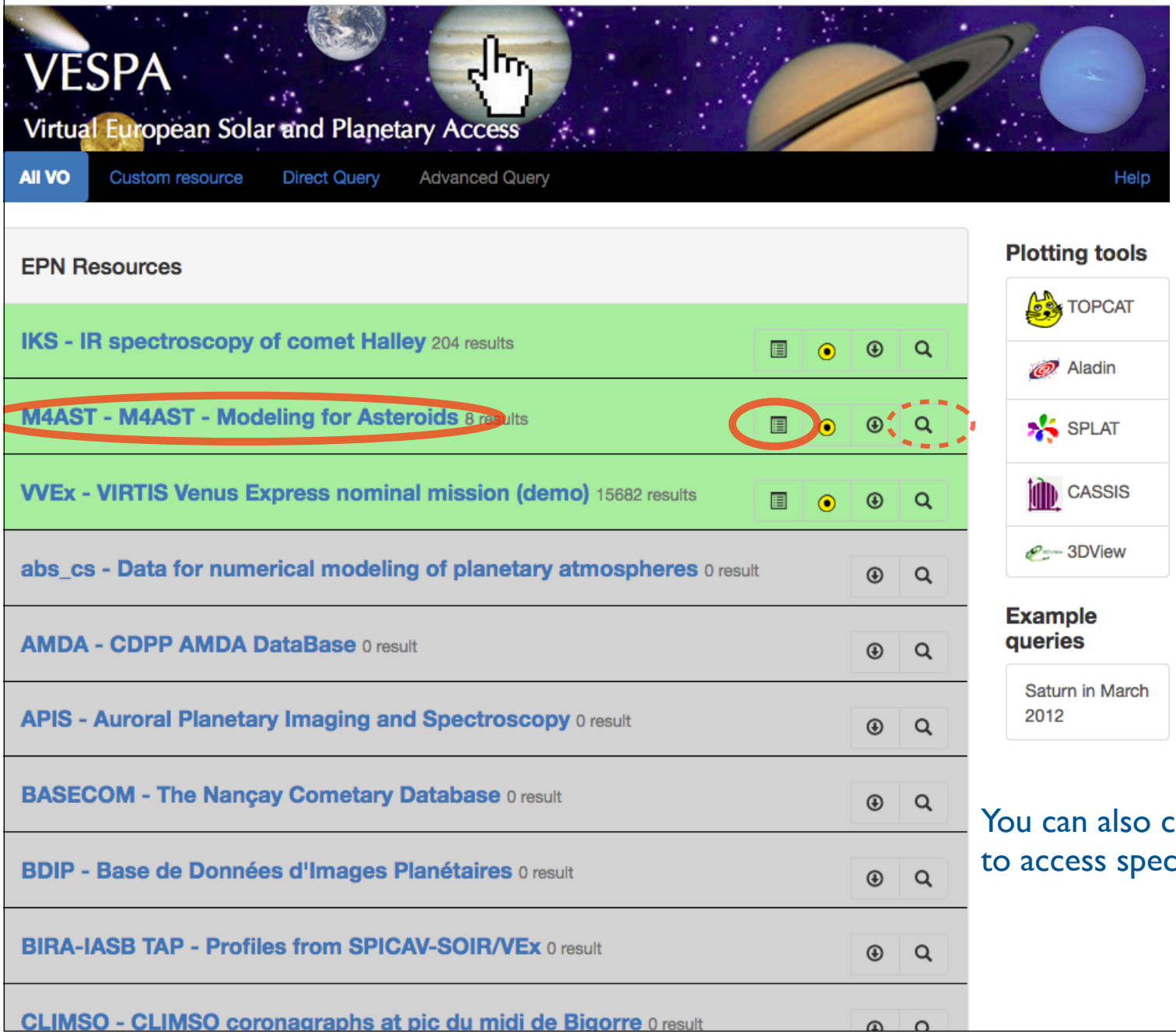
Ex. query parameters:

Target_Name = Jupiter or Ceres or Lutetia
Dataproduct_type = spectrum

VESPA will search all public data services which use the EPN-TAP protocol

Service results

http://vespa.obspm.fr



On line M4ast, click the "Display results" icon to get result list from this service

You can also click "Advanced query form" to access specific parameters (local time…)

Query results

Result is a list of files matching the query

Results in service M4AST

how 10 entries

Column visibility | Show all | Hide all

Select All in current page | Reset Selection

granule_uid	dataproduct_type	target_name	time_min (d)	time_max (d)	access_url	granule_gid	obs_id
Zeissia_19920114_697_00_nativ	spectrum	Zeissia	1992-01-14T00:00:00.000	1992-01-14T00:00:00.000	http://cardamine.imc...	native	Zeissia_19920114_697_00_obs
Zeissia_19920114_697_00	spectrum	Zeissia	1992-01-14T00:00:00.000	1992-01-14T00:00:00.000	http://voparis-srv-p...	formatted	Zeissia_19920114_697_00_obs
Zao_20001026_262_00_nativ	spectrum	Zao	2000-10-26T00:00:00.000	2000-10-26T00:00:00.000	http://cardamine.imc...	native	Zao_20001026_262_00_obs
Zao_20001026_262_00	spectrum	Zao	2000-10-26T00:00:00.000	2000-10-26T00:00:00.000	http://voparis-srv-p...	formatted	Zao_20001026_262_00_obs
Wesson_19911028_697_00_nativ	spectrum	Wesson	1991-10-28T00:00:00.000	1991-10-28T00:00:00.000	http://cardamine.imc...	native	Wesson_19911028_697_00_obs
Wesson_19911028_697_00	spectrum	Wesson	1991-10-28T00:00:00.000	1991-10-28T00:00:00.000	http://voparis-srv-p...	formatted	Wesson_19911028_697_00_obs
Viv_19911028_697_00_nativ	spectrum	Viv	1991-10-28T00:00:00.000	1991-10-28T00:00:00.000	http://cardamine.imc...	native	Viv_19911028_697_00_obs
Viv_19911028_697_00	spectrum	Viv	1991-10-28T00:00:00.000	1991-10-28T00:00:00.000	http://voparis-srv-p...	formatted	Viv_19911028_697_00_obs
Vihuri_19911213_697_00_nativ	spectrum	Vihuri	1991-12-13T00:00:00.000	1991-12-13T00:00:00.000	http://cardamine.imc...	native	Vihuri_19911213_697_00_obs
Vihuri_19911213_697_00	spectrum	Vihuri	1991-12-13T00:00:00.000	1991-12-13T00:00:00.000	http://voparis-srv-p...	formatted	Vihuri_19911213_697_00_obs

howing 1 to 10 of 940 entries 1 row selected

Data Selection | Metadata Selection | All Data | All Metadata | Footprints

Plotting tools

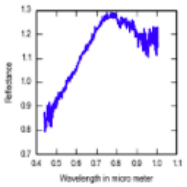
TOPCAT
Aladin
SPLAT
CASSIS
3DView

Example queries

Saturn in March 2012

Click "Show all" to see other parameters

Hover the mouse over the table to see thumbnails



Click to select one or more lines & click "Data selection" / Download to retrieve data files
[or click "All metadata" / Send table to send complete table to TOPCAT]

Visualising results

Launch VO tools either from buttons or from your system

Results in service M4AST

how 10 entries

Column visibility | Show all | Hide all

Select All in current page | Reset Selection

granule_uid	dataproduct_type	target_name	time_min (d)	time_max (d)	access_url	granule_gid	obs_id
Zeissia_19920114_697_00_nativ	spectrum	Zeissia	1992-01-14T00:00:00.000	1992-01-14T00:00:00.000	http://cardamine.imc...	native	Zeissia_19920114_697_00_obs
Zeissia_19920114_697_00	spectrum	Zeissia	1992-01-14T00:00:00.000	1992-01-14T00:00:00.000	http://voparis-srv-p...	formatted	Zeissia_19920114_697_00_obs
Zao_20001026_262_00_nativ	spectrum	Zao	2000-10-26T00:00:00.000	2000-10-26T00:00:00.000	http://cardamine.imc...	native	Zao_20001026_262_00_obs
Zao_20001026_262_00	spectrum	Zao	2000-10-26T00:00:00.000	2000-10-26T00:00:00.000	http://voparis-srv-p...	formatted	Zao_20001026_262_00_obs
Wesson_19911028_697_00_nativ	spectrum	Wesson	1991-10-28T00:00:00.000	1991-10-28T00:00:00.000	http://cardamine.imc...	native	Wesson_19911028_697_00_obs
Wesson_19911028_697_00	spectrum	Wesson	1991-10-28T00:00:00.000	1991-10-28T00:00:00.000	http://voparis-srv-p...	formatted	Wesson_19911028_697_00_obs
Viv_19911028_697_00_nativ	spectrum	Viv	1991-10-28T00:00:00.000	1991-10-28T00:00:00.000	http://cardamine.imc...	native	Viv_19911028_697_00_obs
Viv_19911028_697_00	spectrum	Viv	1991-10-28T00:00:00.000	1991-10-28T00:00:00.000	http://voparis-srv-p...	formatted	Viv_19911028_697_00_obs
Vihuri_19911213_697_00_nativ	spectrum	Vihuri	1991-12-13T00:00:00.000	1991-12-13T00:00:00.000	http://cardamine.imc...	native	Vihuri_19911213_697_00_obs
Vihuri_19911213_697_00	spectrum	Vihuri	1991-12-13T00:00:00.000	1991-12-13T00:00:00.000	http://voparis-srv-p...	formatted	Vihuri_19911213_697_00_obs

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Data Selection | Metadata Selection | All Data | All Metadata | Footprints

Plotting tools

TOPCAT

Aladin

SPLAT

CASSIS

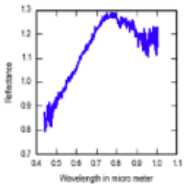
3DView

Example queries

Saturn in March 2012

CASSIS is the tool of choice for spectra

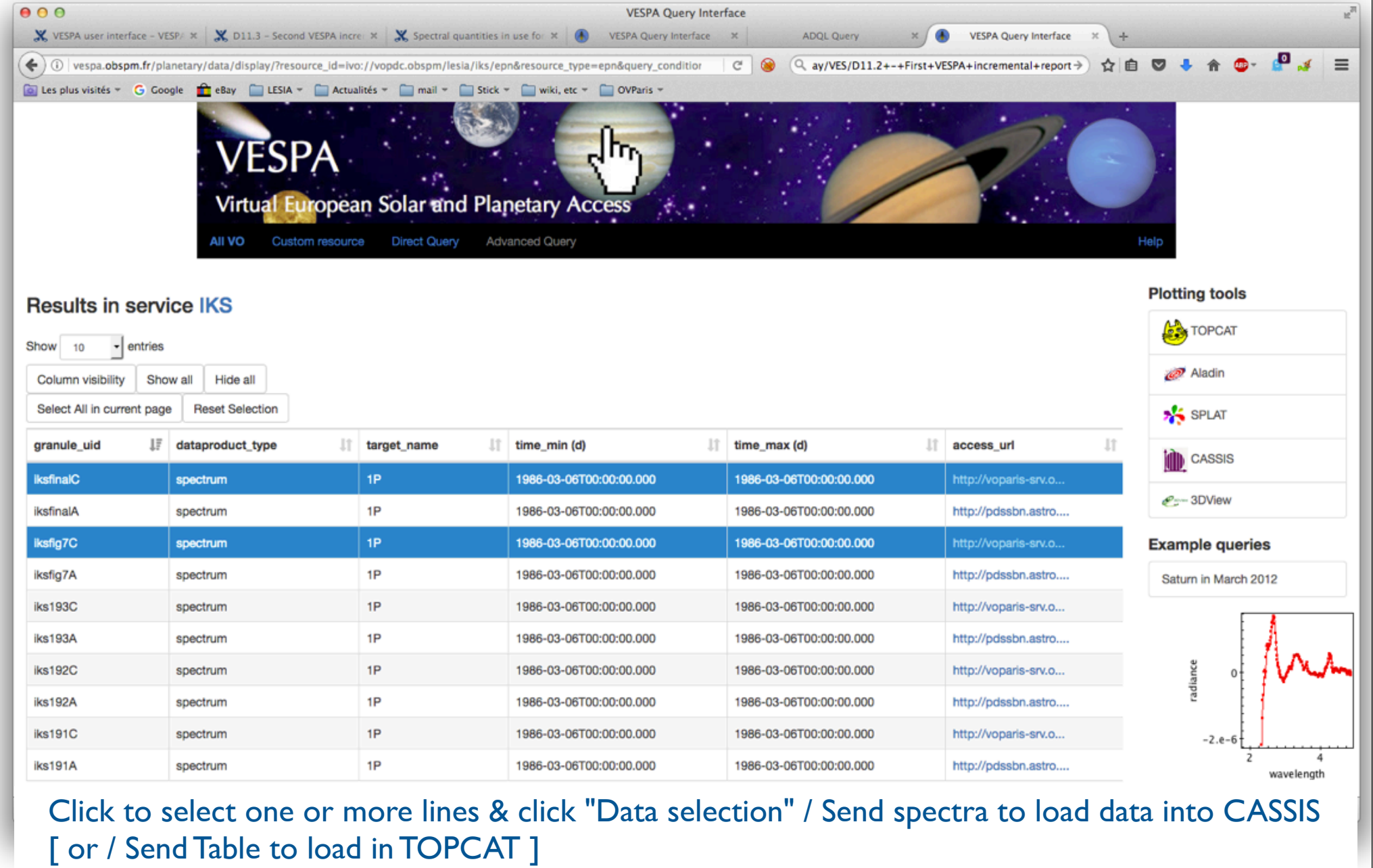
TOPCAT is an all-purpose tool for tables



CASSIS as a spectrum visualizer in VESPA

In service IKS, select iksfinal and iksfig7 spectra in VOtable format

Or use "granule_gid = corrected" in the query

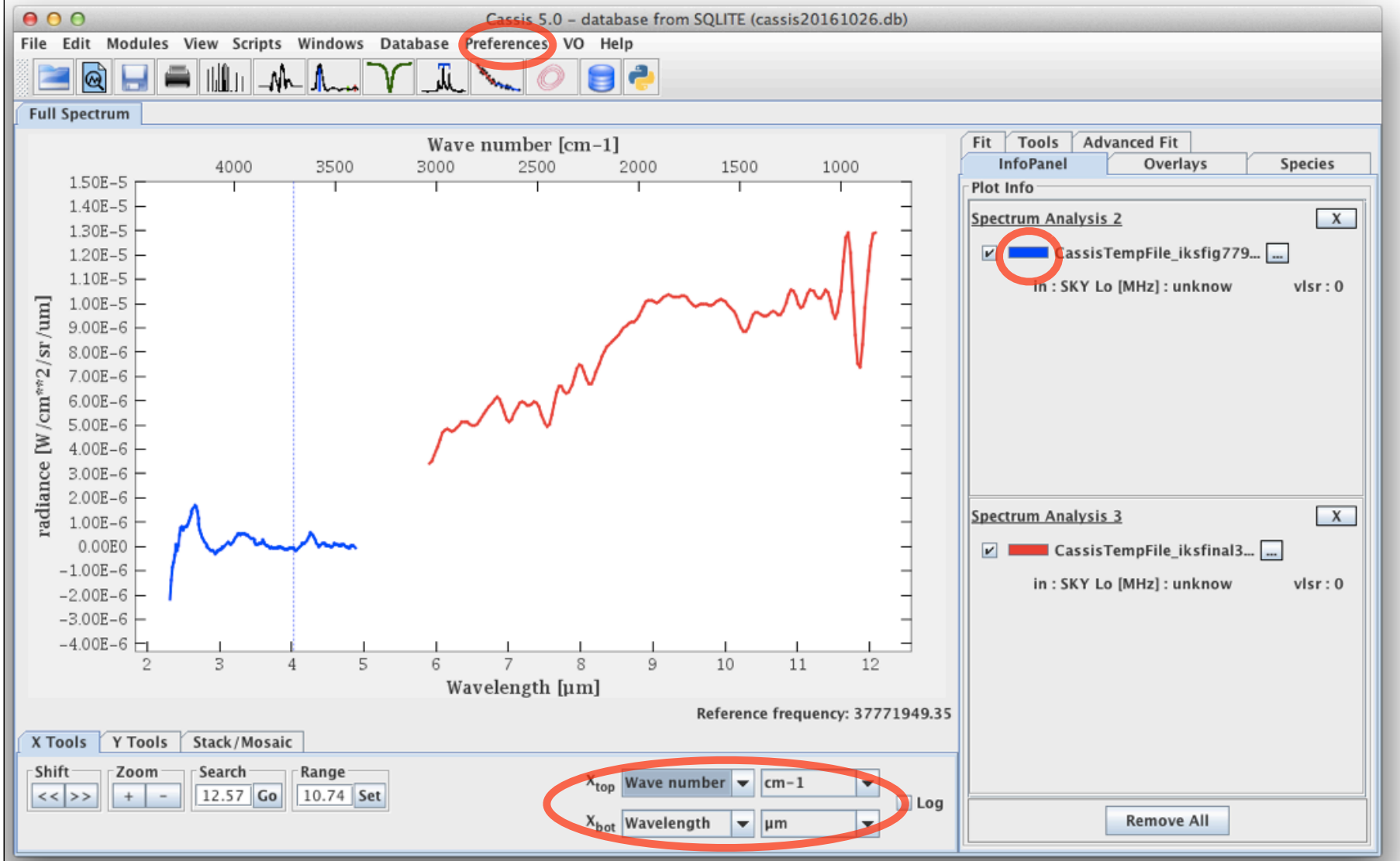


Click to select one or more lines & click "Data selection" / Send spectra to load data into CASSIS

[or / Send Table to load in TOPCAT]

CASSIS as a visualizer

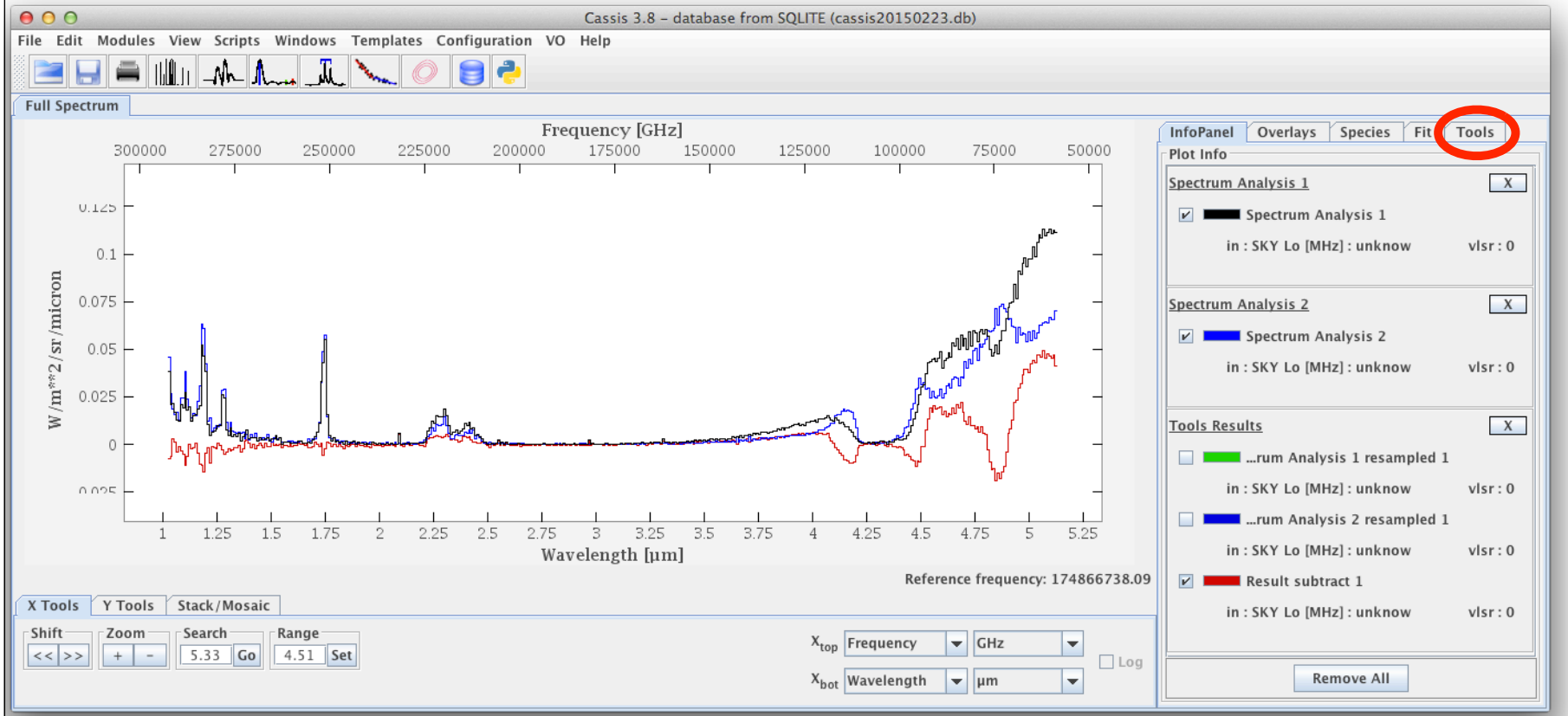
CASSIS receives spectra from search interface, can overplot selections



In Preferences > General set "Force direct opening" to True (this will bypass dialogues)
Adjust color and line style in the panel under the color box
Change units and navigate with lower panel buttons

Visualization and arithmetics in CASSIS

CASSIS can overplot a selection of spectra and manipulate them



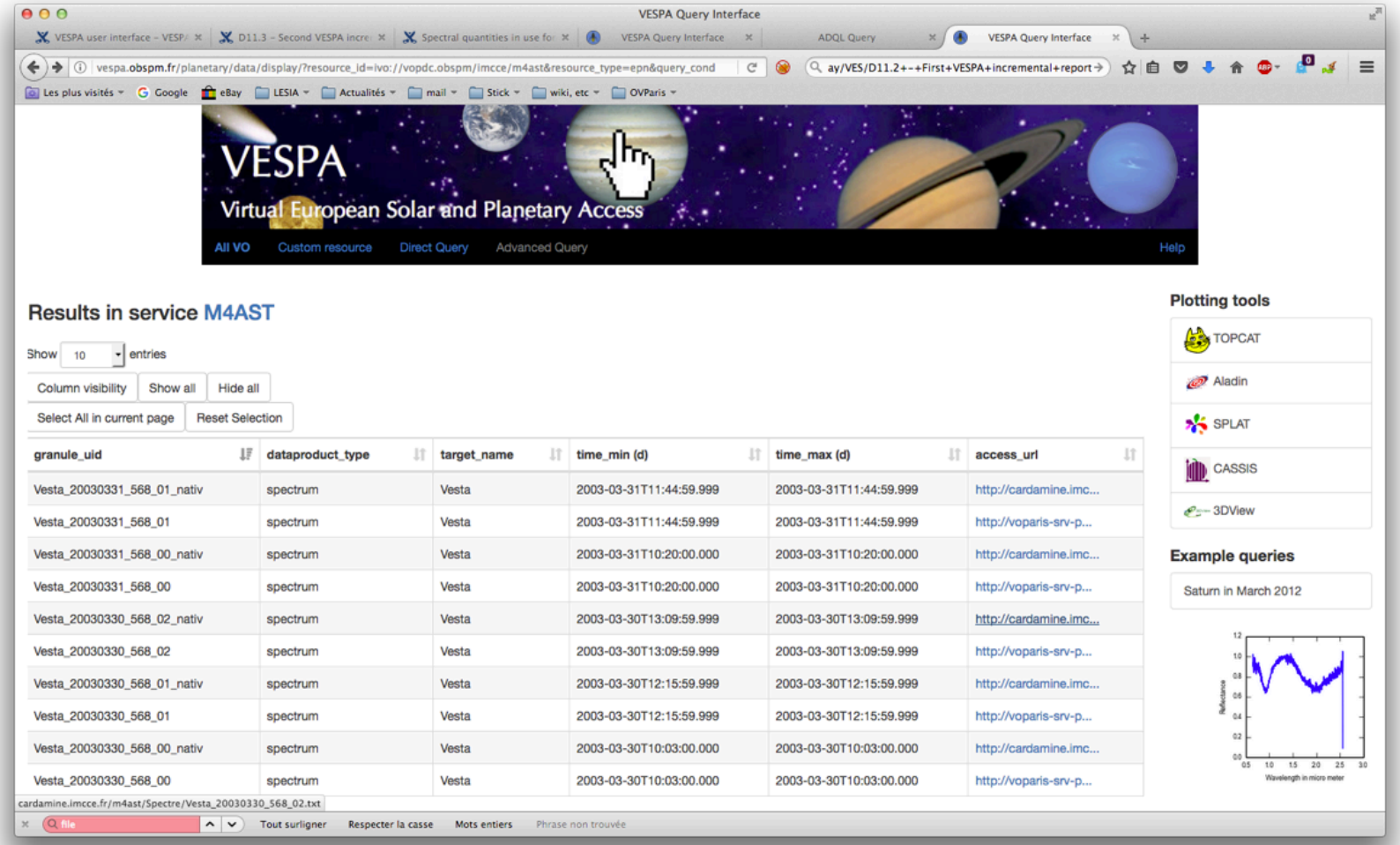
Press "shift" to see level at mouse location
Left click or "Comm"-drag to set plotting region
"Alt"-drag to select a region (used in "Fit" tab)
"Alt"-click to set markers (& remove them in InfoPanel)
Mouse-wheel to zoom in/out

Click the "Tools" tab to combine spectra
Spectra are resampled to a common wvl vector on the fly
The "Species" tab accesses line databases (most of them related to the ISM)
Also includes LTE and RADEX modeling

Spectral comparisons from different services

In VESPA, ask for spectra of asteroid Vesta and look in M4ast result page:

Use "target_name = vesta" & "granule_gid = formatted" in the query



Select prefered results visually from thumbnails

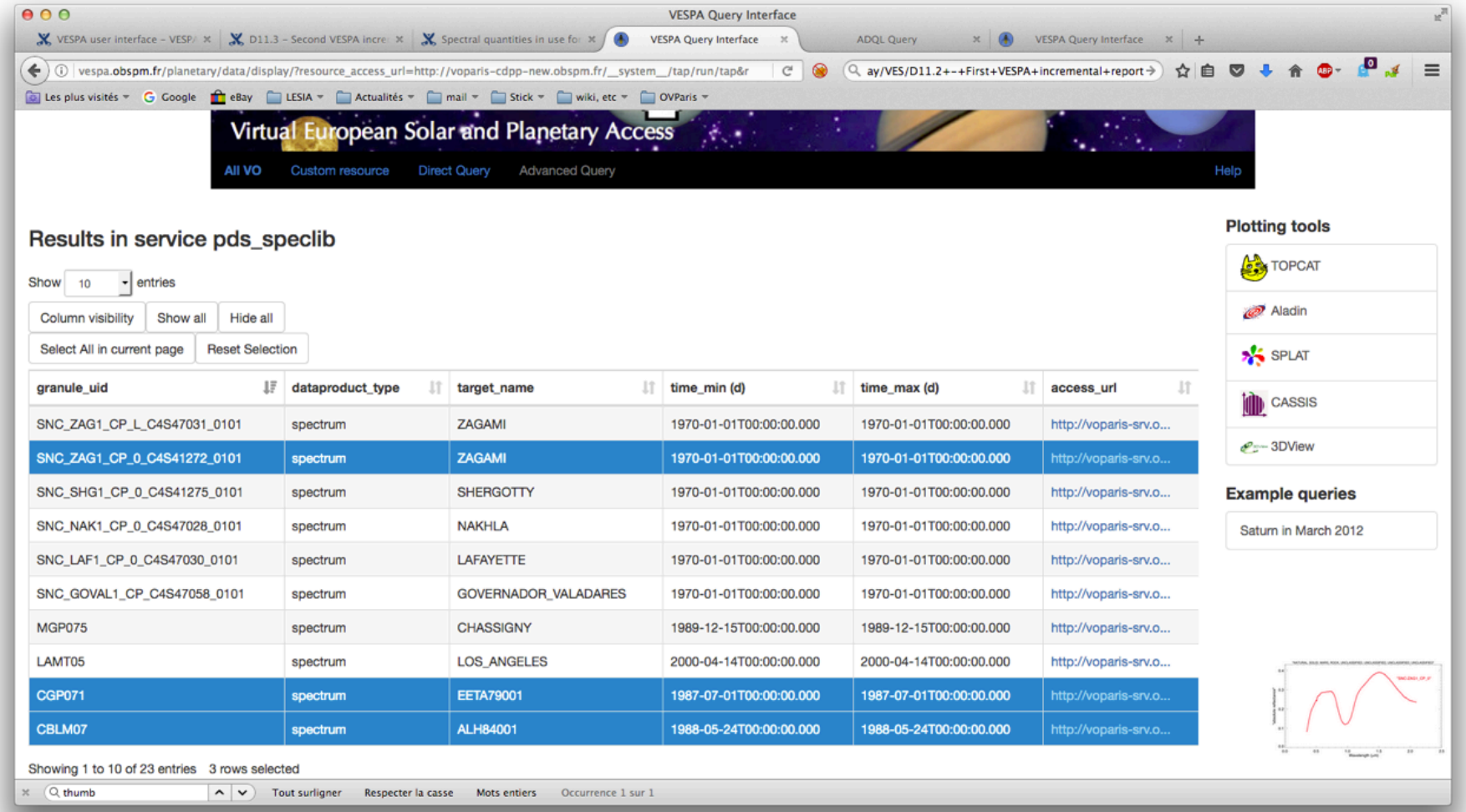
Pick-up VOtable versions (if not already selected in the query)

& send as spectra

Spectral comparisons from different services

In VESPA, ask for spectra of SNC meteorites and look in pds_speclib result page:

Use "granule_gid=natural_meteorite_rock" in the query

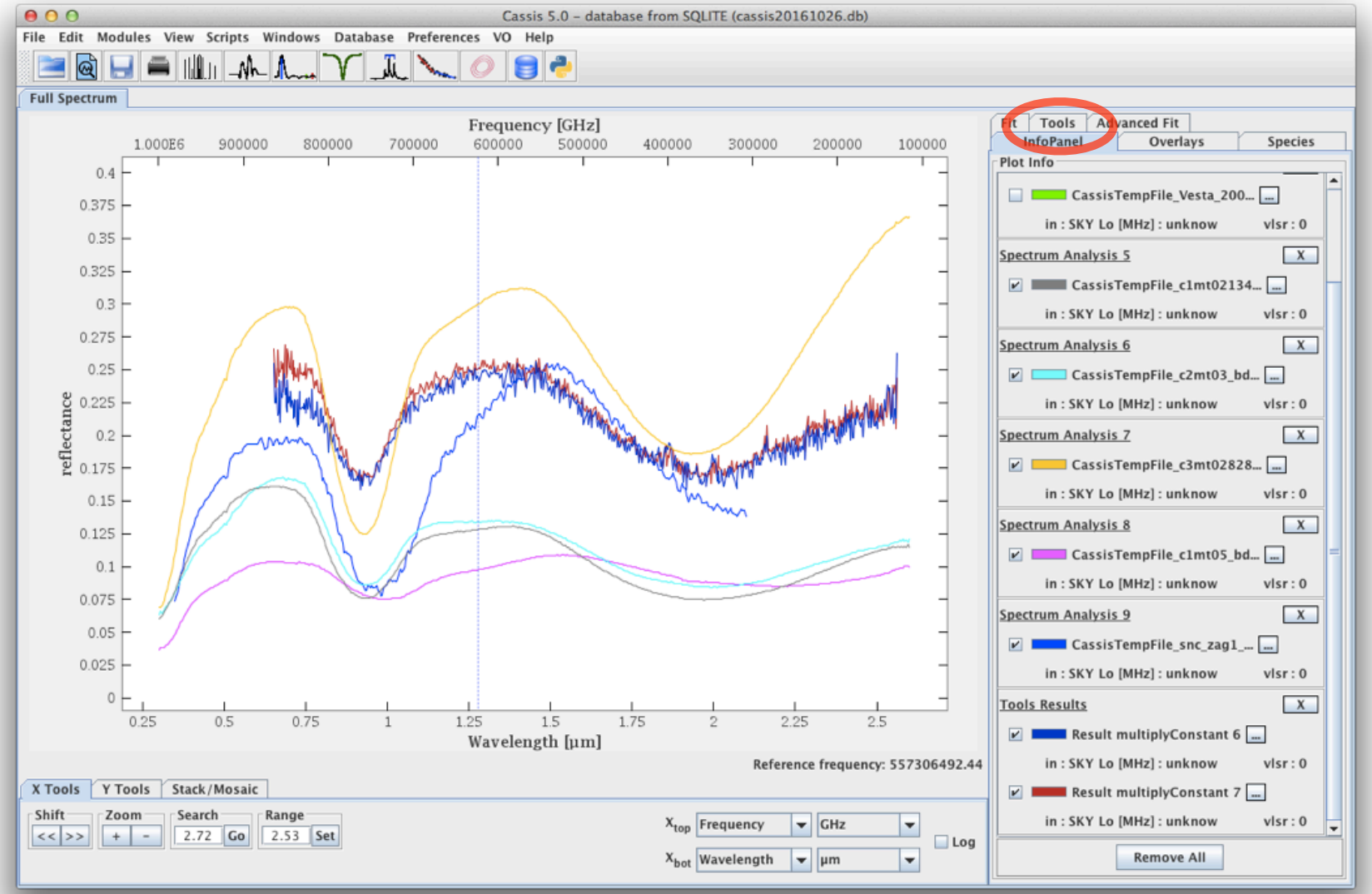


Select prefered results visually from thumbnails & send as spectra

Spectral comparisons from different services

All spectra will plot immediately in the same window

Spectral axis units will be converted if needed



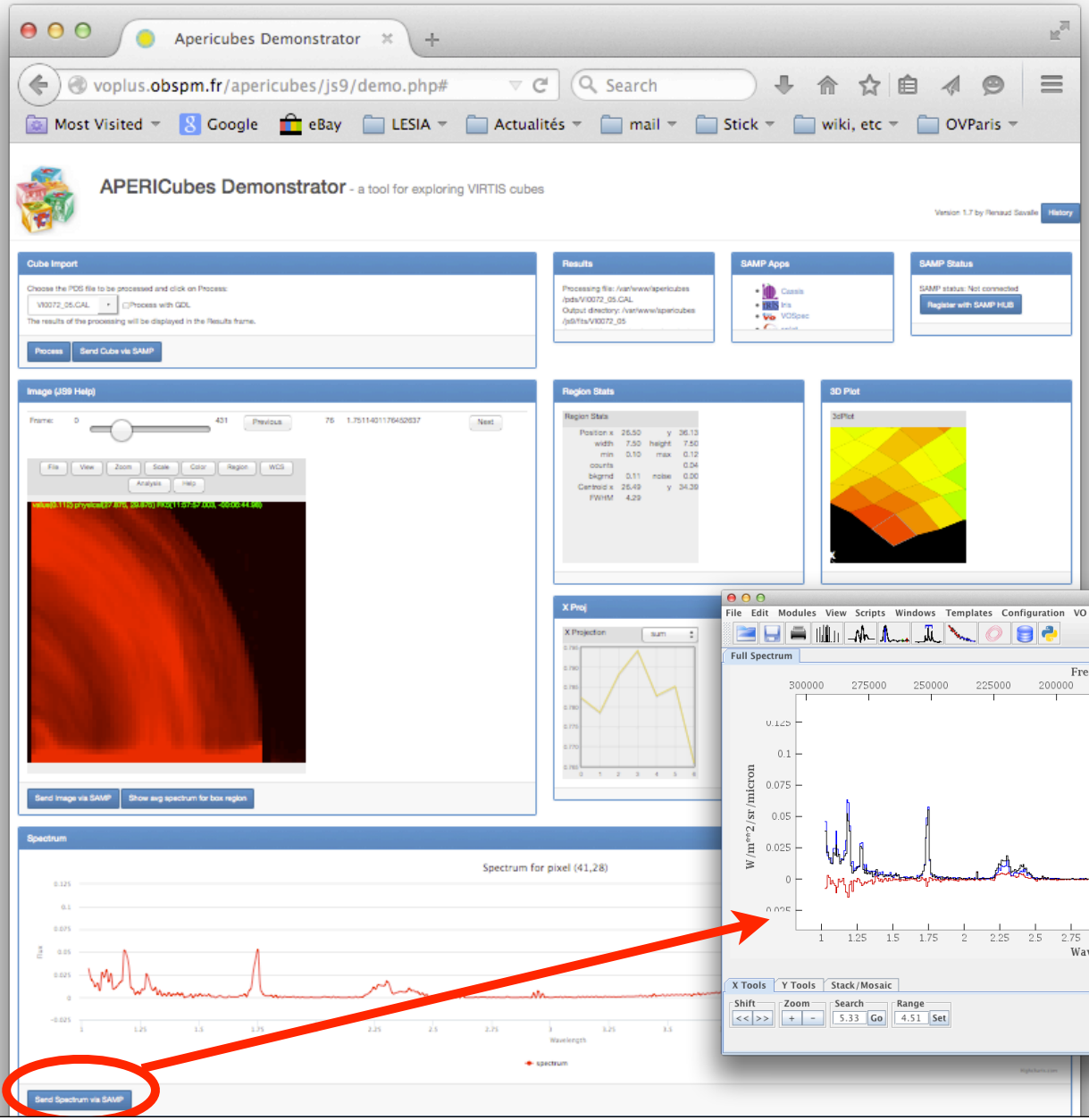
Use Tools tab to scale flux axis (multiply M4ast spectra by 0.25)

Scaling is required, as Vesta spectra are provided as normalized I/F, and SNC spectra as reflectance factor

Analyzing spectral cubes with APERICubes & CASSIS

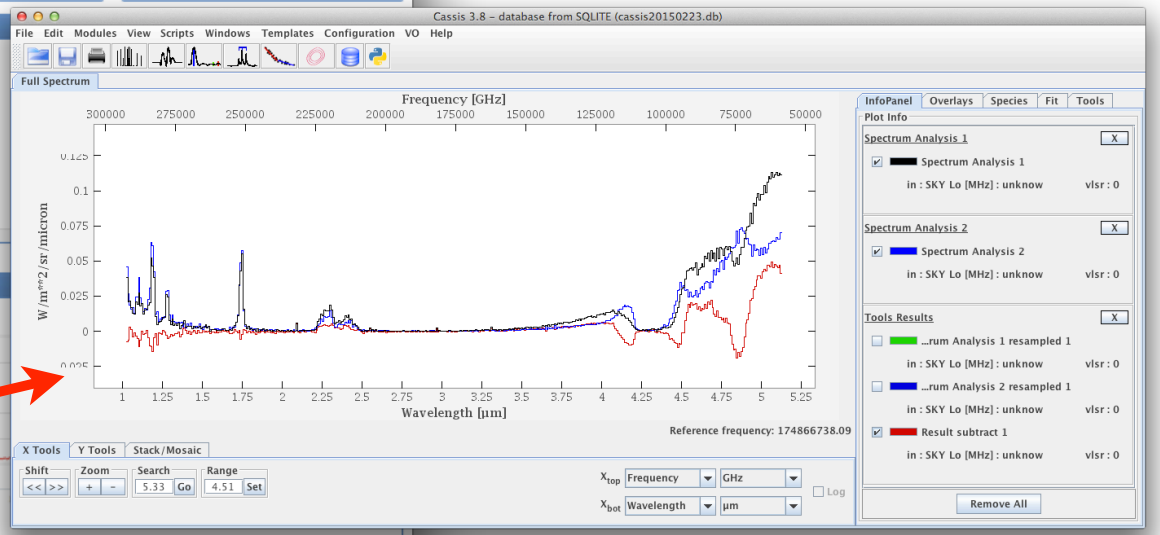
APERICubes is a PDS spectral cube viewer for the VIRTIS instrument

see Tuto_TopCat_VEx for details - http://voplus.obspm.fr/apericubes/js9/demo.php



Extract a spectrum and click on the "Send spectrum via SAMP" button (this can be averaged in a region of interest)

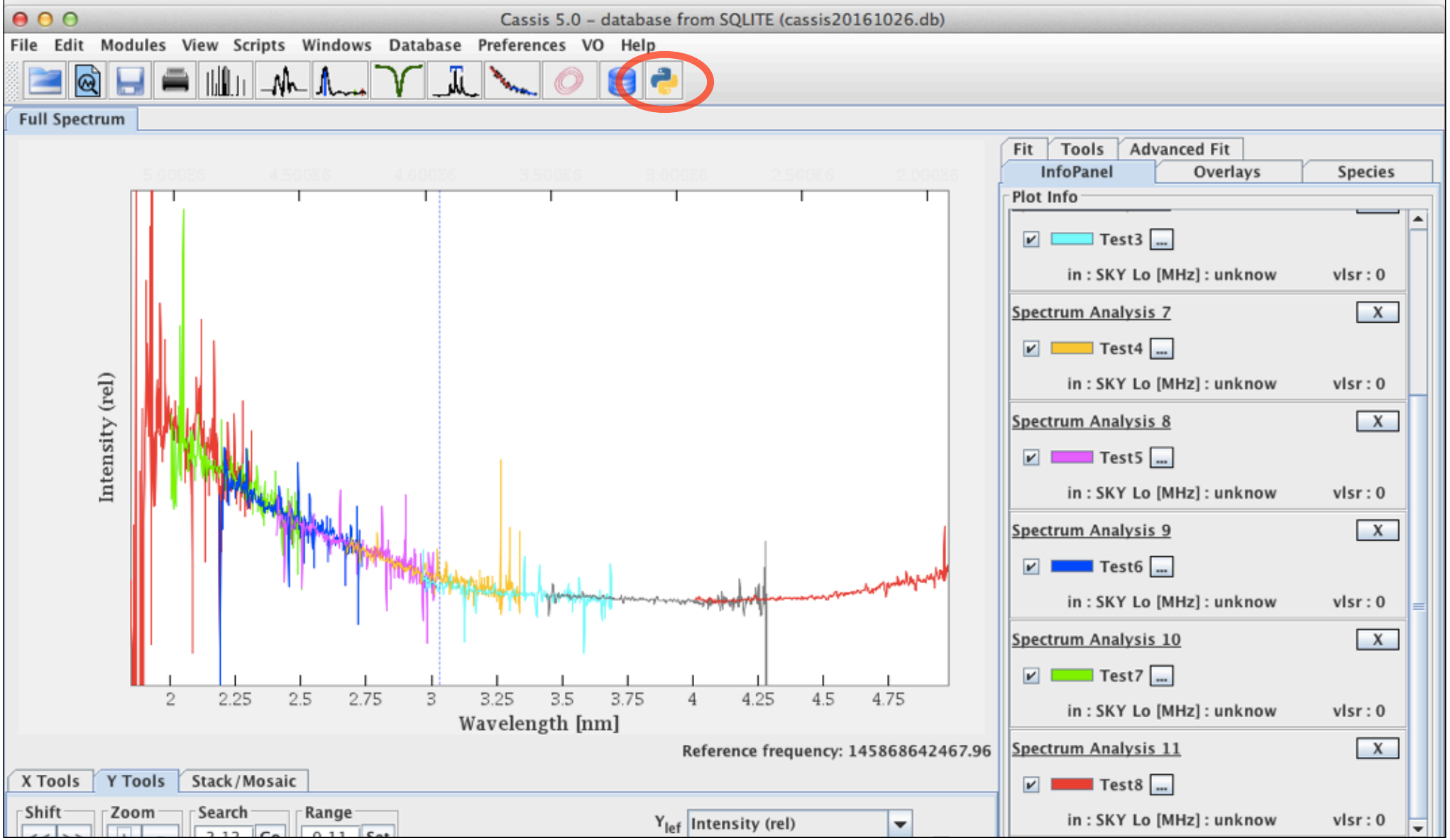
The spectrum extracted from the cube will be sent to CASSIS (as well as TOPCAT, SpecView, etc) for further analysis



Special uses in CASSIS

With adequate script CASSIS can plot spectral segments independently

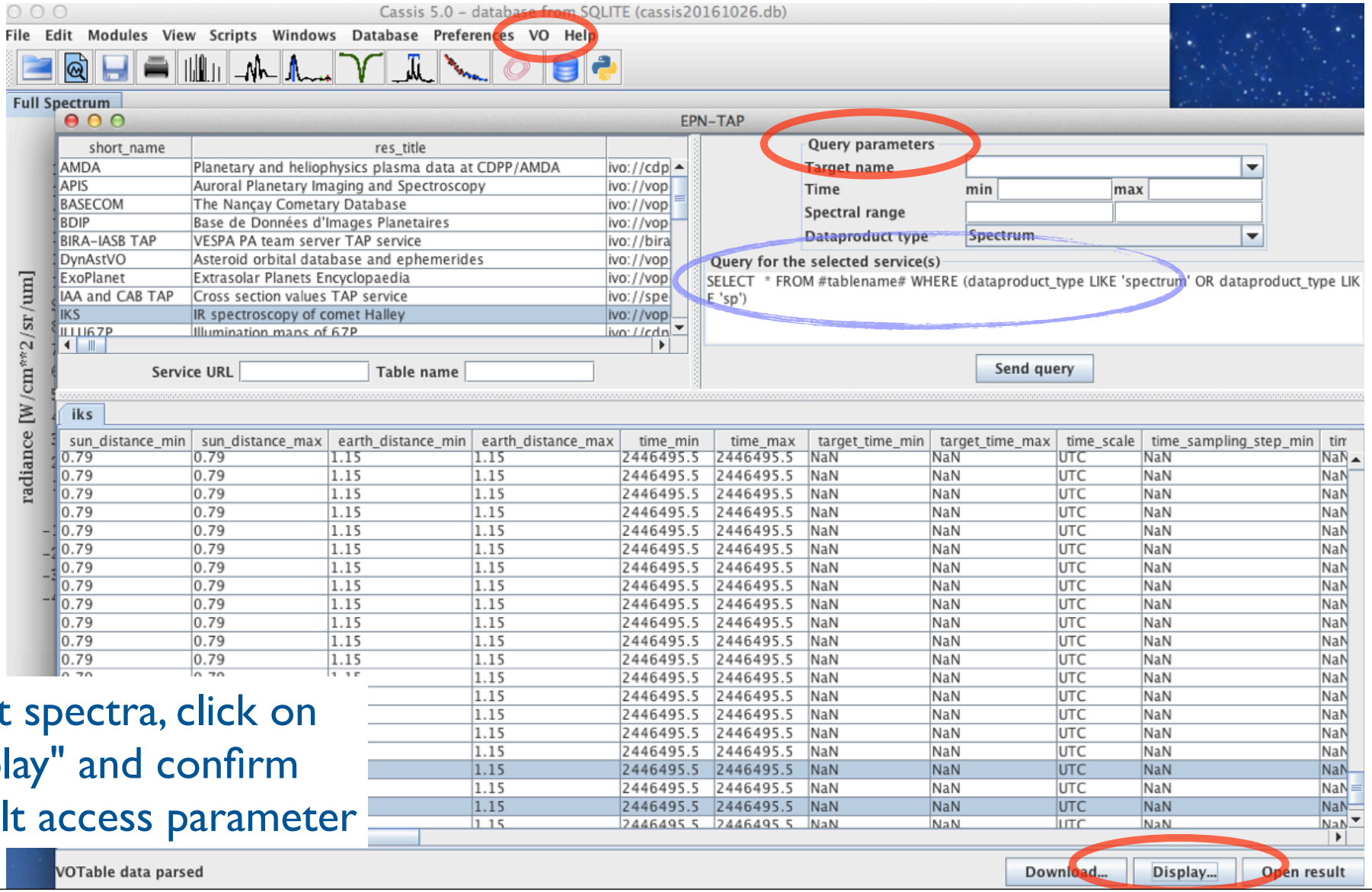
In this case, 8 overlapping spectral orders from VIRTIS-H/Rosetta in the same file
(the default is to merge overlaping regions)



CASSIS as a VO search tool

Select EPN-TAP under the VO menu to access VESPA-compliant data services

The ADQL query is filled automatically from exposed parameter fields, but can be edited manually
You can select several services (Comm-click) in the left list to query them together
An SSA client is also available for more general astronomy services (SSA protocol)

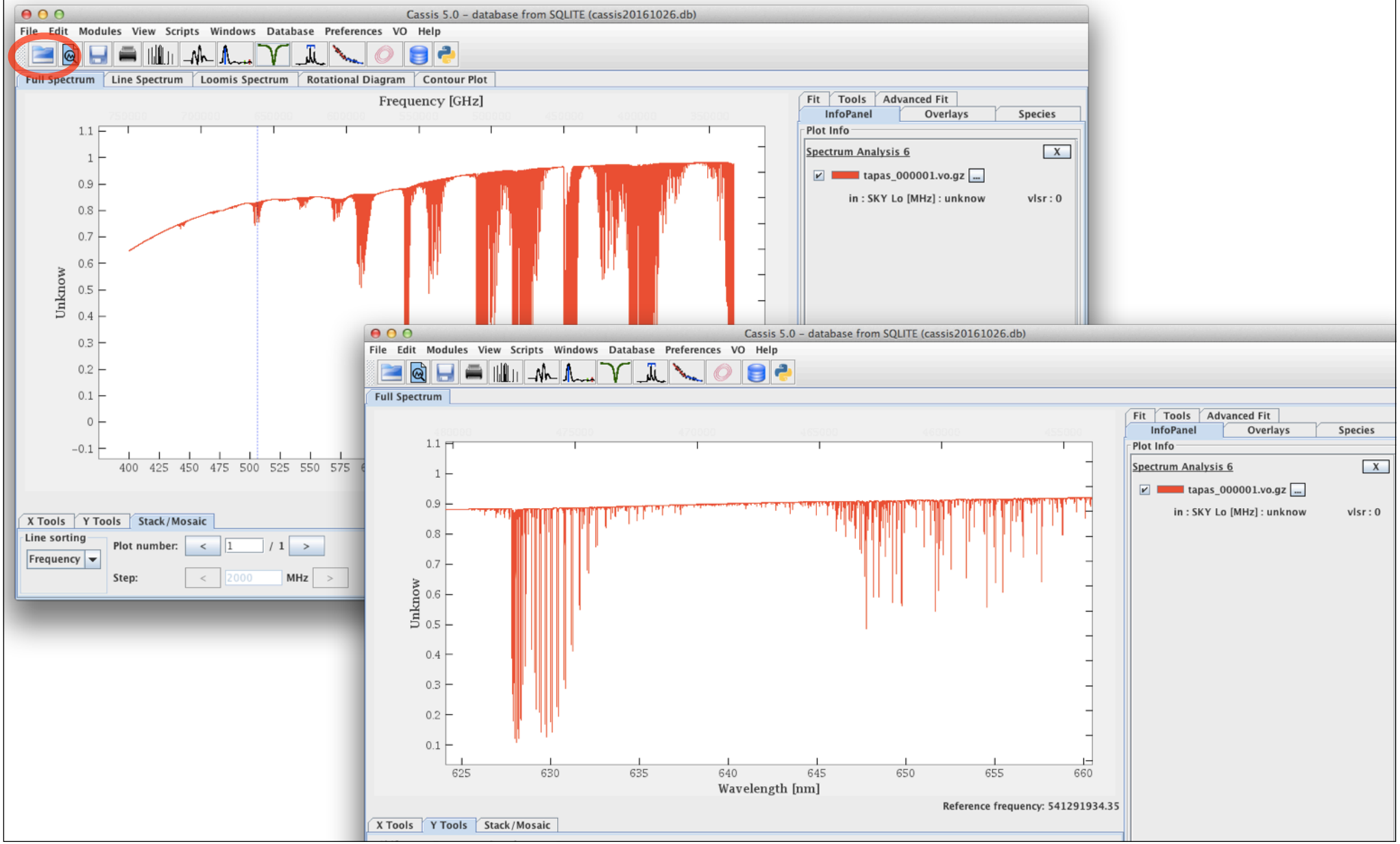


Select spectra, click on "Display" and confirm default access parameter

Use with external (not VO) services

Get a simulated Earth atmosphere transmission spectrum from TAPAS

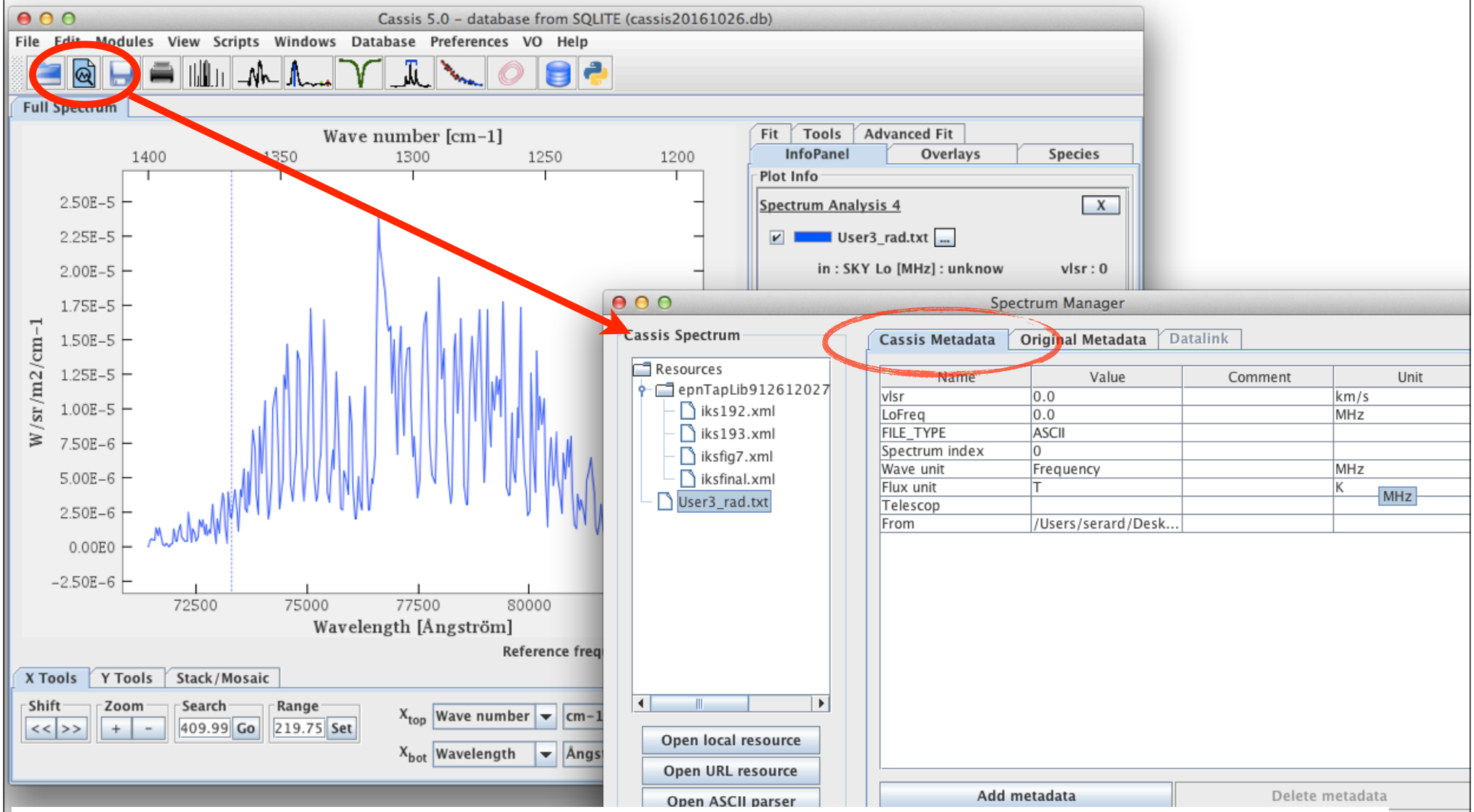
http://www.pole-ether.fr/tapas/ (requires registration) - ask for a VOTable output, open it in CASSIS



Use with external (not VO) services

Get a Titan atmosphere spectrum from Planetary Spectrum Generator

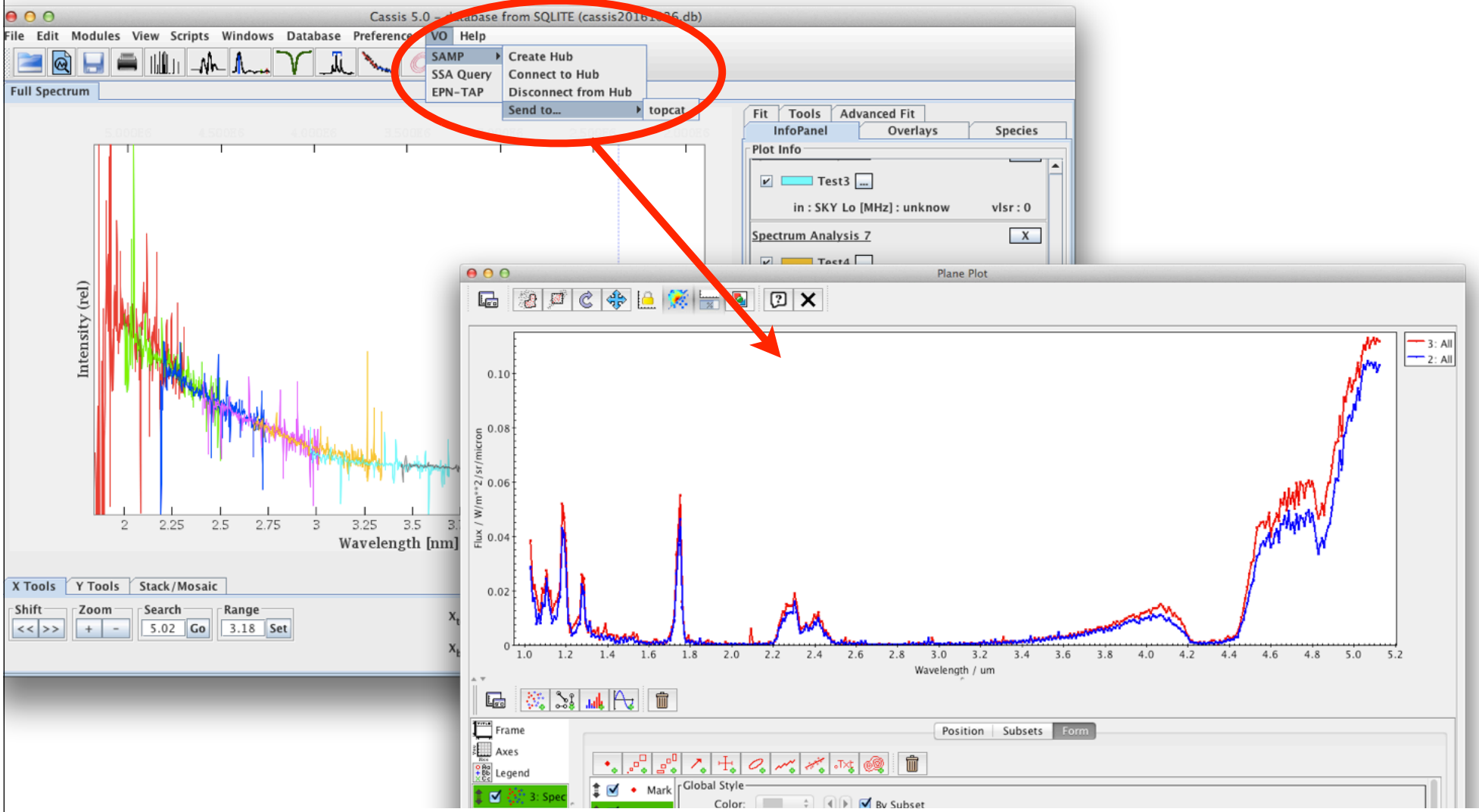
https://ssed.gsfc.nasa.gov/psg/ (requires manual configuration) and retrieve the standard ascii output



Enter correct quantities and units in CASSIS metadata panel

Click SpectrumManager and go to CASSIS metadata tab, fix wave & flux unit lines as provided in the file

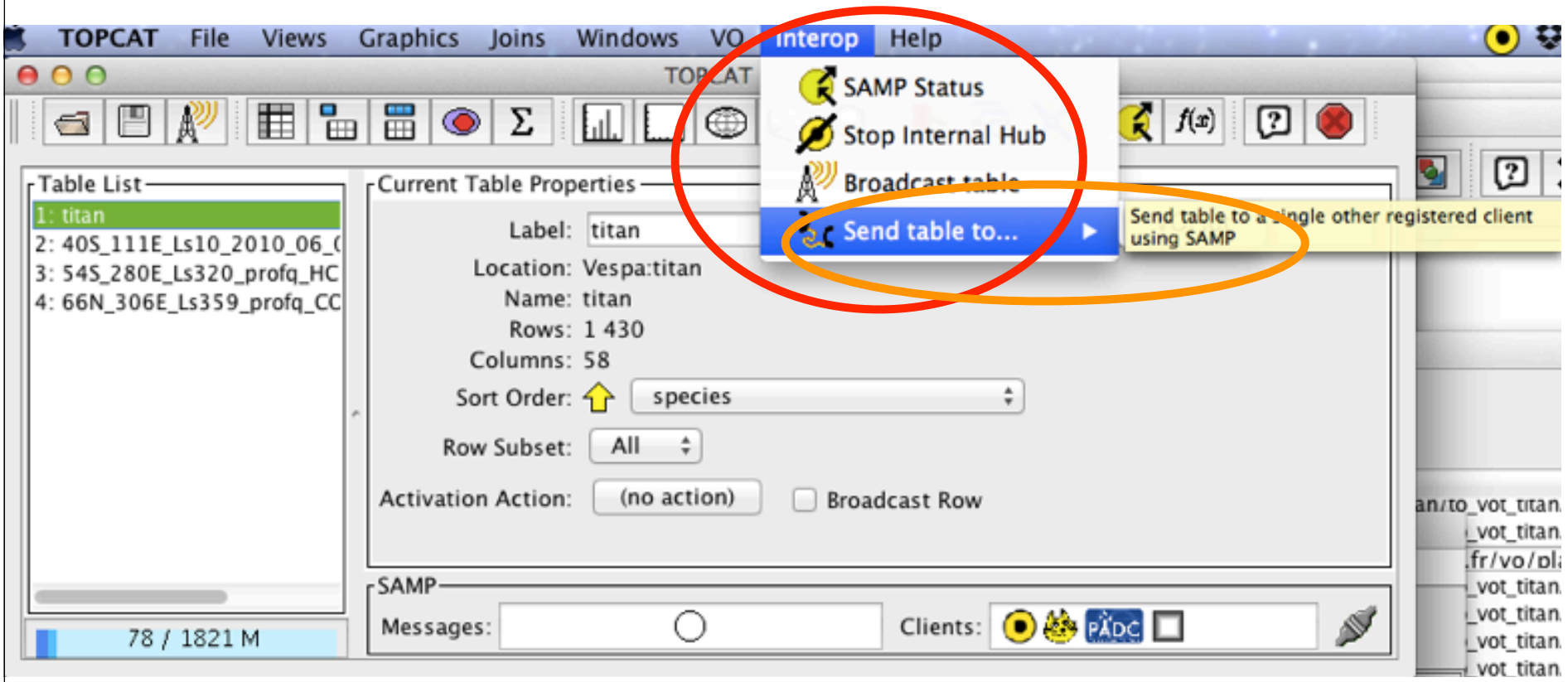
Sending data from CASSIS



With TOPCAT (or SPLAT-VO, VOspec, SpecView, etc) activated, select SAMP > Send to… > topcat in VO menu

In TOPCAT, click on PlanePlot (units may be converted in the process)

Sending data from TOPCAT



Use menu item Interop > Send table to.… in TOPCAT

A table is transmitted to other VO ploting tools

Will open in CASSIS if format is adequate (2 columns with known units)

Going through TOPCAT may help ingesting spectral data that do not enter CASSIS easily

Other relevant tutorials

Tuto_Spectro
EPN-TAP spectroscopy data services in VESPA,
use with various spectral tools

Tuto_TopCat_VEx
Imaging spectroscopy from Venus-Express,
CASSIS interaction with APERICubes

QGIS_plugin
https://github.com/epn-vespa/tutorials/blob/master/vo_qgis_plugin/vo-qgis-plugin.md
Imaging spectroscopy of Mars from CRISM,
sending spectra from TAPhandle or QGIS to CASSIS

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http://www.europlanet-vespa.eu/