Das2 server + Autoplot Client *Adaptative resolution access for Times series*

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Needs

- Large time series datasets are available in solar system sciences

- **Time series** of a parameter (e.g., a light-curve), of a vector (e.g., in-situ magnetic field vector), of spectra (e.g., radio astronomy), of images (movies)

- Long term observation, high resolution…
  ➔ **need of adaptative temporal resolution access**

A solution:
das2 server + Autoplot client

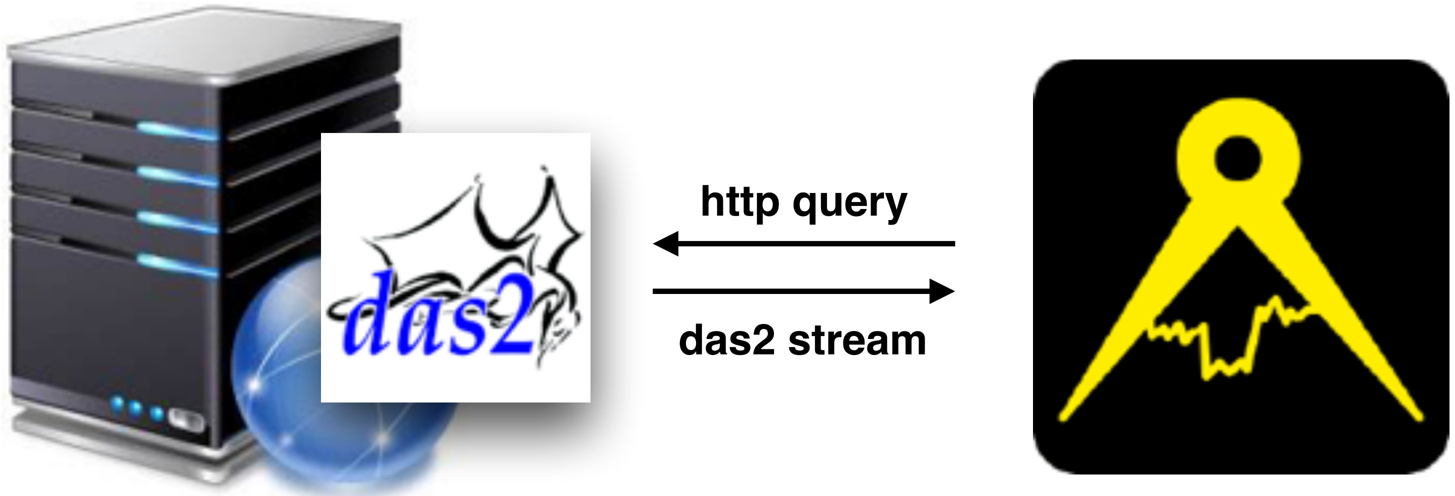
- Das2 is a python-based server running as a CGI on Apache.
  Das2 can serve data in various heliophysics data streaming formats: das2stream, Qstream and HAPI.

- Autoplot is a Java application for time series and spectrograms visualization tool for space sciences.
  Autoplot can access many webservices and files format of the heliophysics community, including those served by das2.

- Both have strong heritage, a user community, and responsive developer team.

- They are developed at Univ. Iowa (Sapce physics group)

- More info:
  - http://das2.org
  - http://autoplot.org



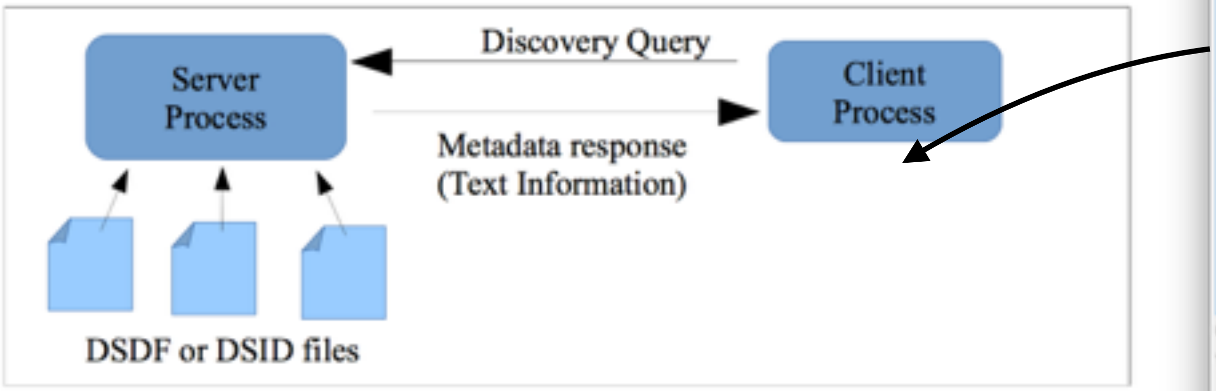
http query

das2 stream

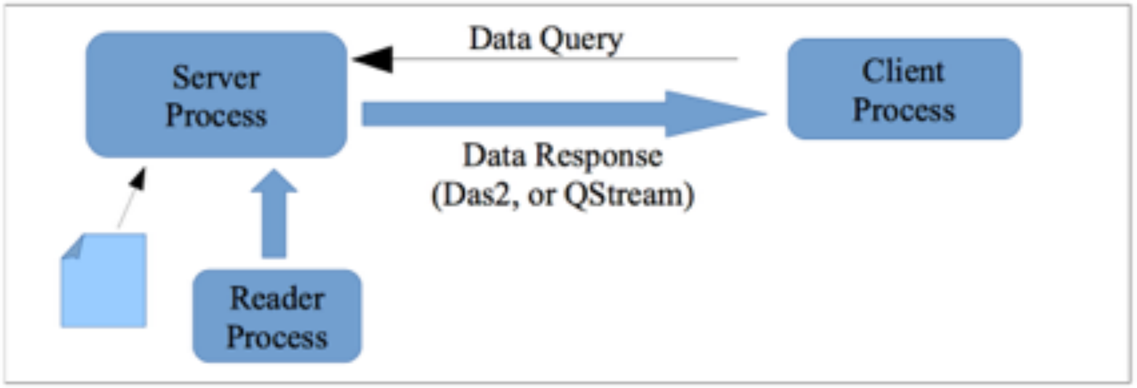
https://das2server.obs-nancay.fr/das2/server

http://autoplot.org

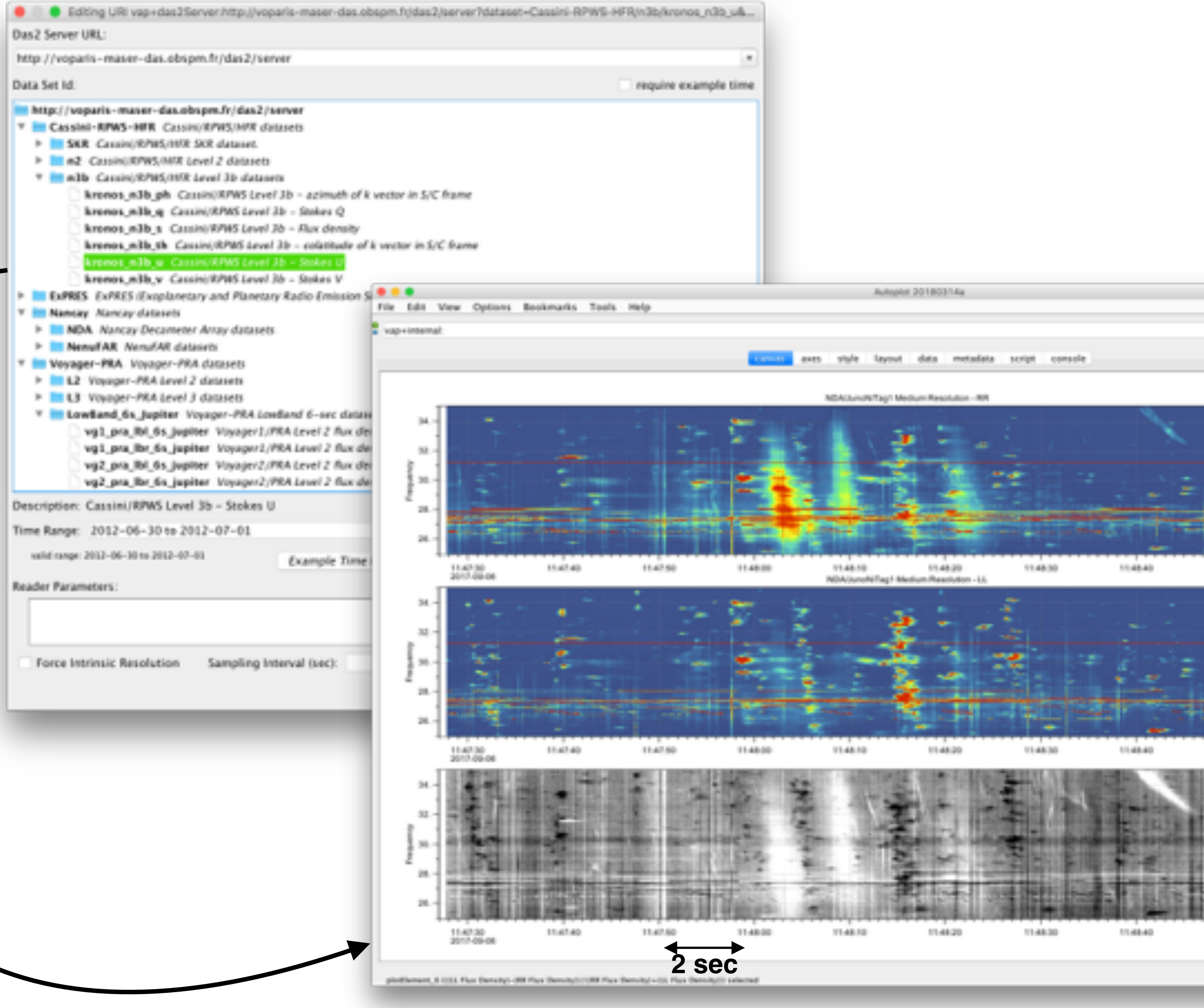
Das2 / Autoplot query process



Discovery Query Information Flow



Data Query Information Flow



Editing URI vap+das2Server:http://voparis-maser-das.obspm.fr/das2/server?dataset=Cassini-RPWS-HFR/n3b/kronos_n3b_u&...

Das2 Server URL: http://voparis-maser-das.obspm.fr/das2/server

Data Set Id: □ require example time

- http://voparis-maser-das.obspm.fr/das2/server
  - Cassini-RPWS-HFR *Cassini/RPWS/HFR datasets*
    - SKR *Cassini/RPWS/HFR SKR dataset.*
    - n2 *Cassini/RPWS/HFR Level 2 datasets*
    - n3b *Cassini/RPWS/HFR Level 3b datasets*
      - kronos_n3b_ph *Cassini/RPWS Level 3b - azimuth of k vector in S/C frame*
      - kronos_n3b_q *Cassini/RPWS Level 3b - Stokes Q*
      - kronos_n3b_s *Cassini/RPWS Level 3b - Flux density*
      - kronos_n3b_th *Cassini/RPWS Level 3b - colatitude of k vector in S/C frame*
      - kronos_n3b_u *Cassini/RPWS Level 3b - Stokes U*
      - kronos_n3b_v *Cassini/RPWS Level 3b - Stokes V*
  - ExPRES *ExPRES (Exoplanetary and Planetary Radio Emission S*
  - Nancay *Nancay datasets*
    - NDA *Nancay Decameter Array datasets*
    - NenufAR *NenufAR datasets*
  - Voyager-PRA *Voyager-PRA datasets*
    - L2 *Voyager-PRA Level 2 datasets*
    - L3 *Voyager-PRA Level 3 datasets*
    - LowBand_6s_Jupiter *Voyager-PRA LowBand 6-sec datase*
      - vg1_pra_lbl_6s_jupiter *Voyager1/PRA Level 2 flux de*
      - vg1_pra_lbr_6s_jupiter *Voyager1/PRA Level 2 flux de*
      - vg2_pra_lbl_6s_jupiter *Voyager2/PRA Level 2 flux de*
      - vg2_pra_lbr_6s_jupiter *Voyager2/PRA Level 2 flux de*

Description: Cassini/RPWS Level 3b - Stokes U

Time Range: 2012-06-30 to 2012-07-01

valid range: 2012-06-30 to 2012-07-01

Reader Parameters:

□ Force Intrinsic Resolution   Sampling Interval (sec):

NDA/JunoN dataset (3TB/day)

- Das2 = **data distribution** system for time series + **on demand resampling** (averaging on the fly).
  HTTP REST Query = data source name + time interval + temporal resolution

Das2 / Autoplot query details

HTTP Query sent by Autoplot:

```
https://das2server.obs-nancay.fr/das2/server?server=dataset&dataset=DATA_SET_NAME
&start_time=BEGIN &end_time=END&resolution=RESOLUTION
```

with:

- *DATA_SET_NAME* = Nancay/NDA/routine_jup_rh *(example)*
- *BEGIN* et *END* = dates in ISO-8601 format, for instance: 2018-01-15T20:00:00.000Z
- *RESOLUTION* = temporal resolution, in seconds (typically, the pixel size on the temporal axis of Autoplot window)

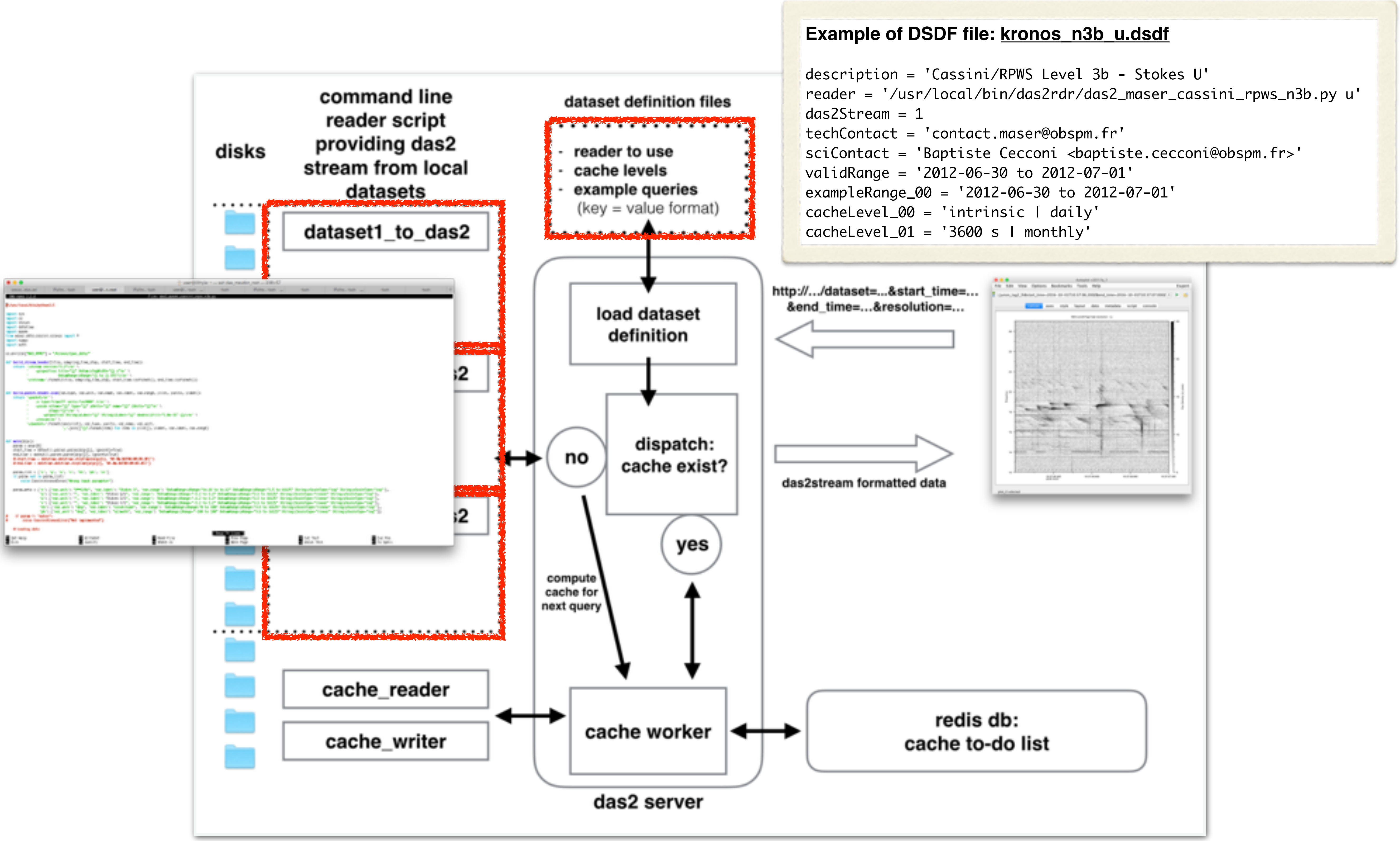
Processing on Das2 server:

- Reception of the query and parsing of the "data source definition file" (DSDF), here: *Nancay/NDA/routine_jup_rh.dsdf*
- If the data are present in the cache with adequate resolution: provision of cached data with das2stream format.
- Else: read original data with the "reader" script as defined in the DSDF (here: /usr/local/bin/das2rdr/das2nancay/das2_maser_nda_routine.py) with the necessary options. The reader reads the data file(s) and writes das2stream formatted content to standard output, with the native temporal resolution. The server pipes stdout to a resampling script (by default: *das2_bin_avgsec*), which sdtout is send to Autoplot through apache and http.

Das2stream: a data format adapted streaming time series:

- a global header defining the name and global parameters,
- a series of "packet headers", one for each data packet that will be streamed (e.g., several spectra types, with different spectral resolutions),
- comments to be displayed in the client (e.g., advancing of the processing),
- data: one ligne per spectrum,
- data part can be either in ASCII (easier for debugging) or binary (faster over the internet)

Das2server

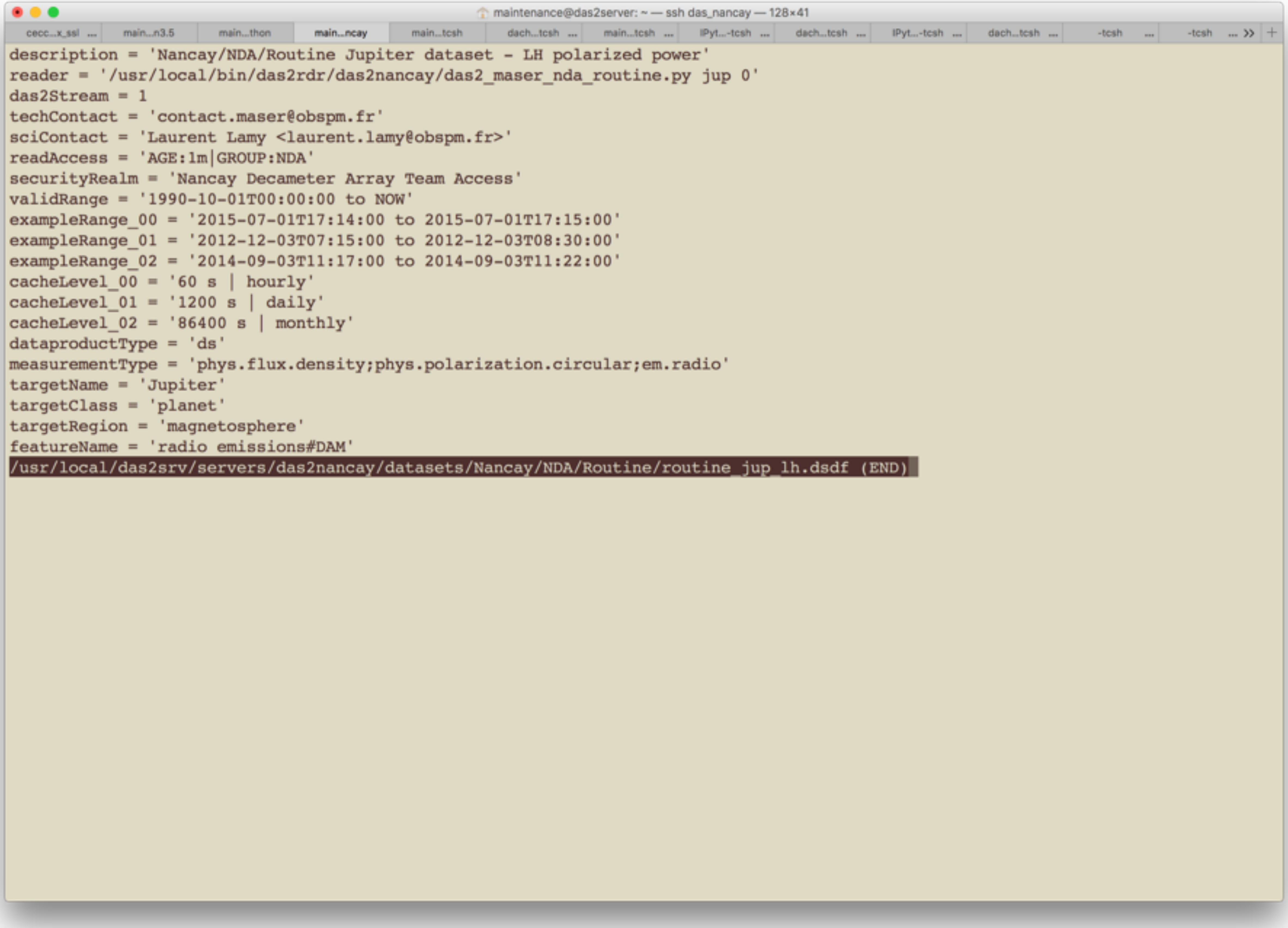


Example of DSDF file: kronos_n3b_u.dsdf

```
description = 'Cassini/RPWS Level 3b - Stokes U'
reader = '/usr/local/bin/das2rdr/das2_maser_cassini_rpws_n3b.py u'
das2Stream = 1
techContact = 'contact.maser@obspm.fr'
sciContact = 'Baptiste Cecconi <baptiste.cecconi@obspm.fr>'
validRange = '2012-06-30 to 2012-07-01'
exampleRange_00 = '2012-06-30 to 2012-07-01'
cacheLevel_00 = 'intrinsic | daily'
cacheLevel_01 = '3600 s | monthly'
```

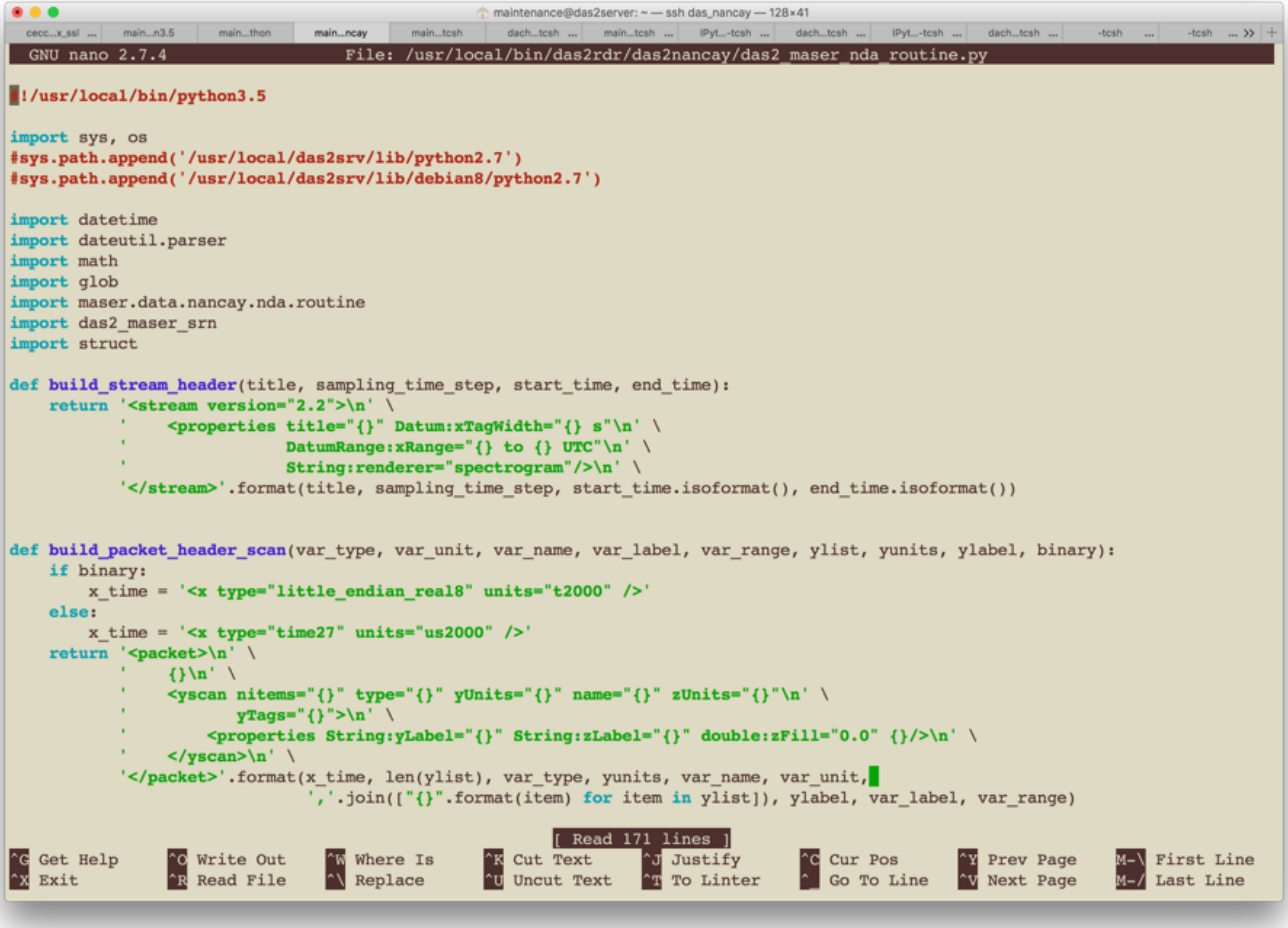
disks
command line reader script providing das2 stream from local datasets
dataset1_to_das2
2
2
cache_reader
cache_writer
dataset definition files
- reader to use
- cache levels
- example queries
(key = value format)
load dataset definition
dispatch: cache exist?
no
yes
compute cache for next query
cache worker
das2 server
http://.../dataset=...&start_time=...&end_time=...&resolution=...
das2stream formatted data
redis db: cache to-do list

DSDF file example



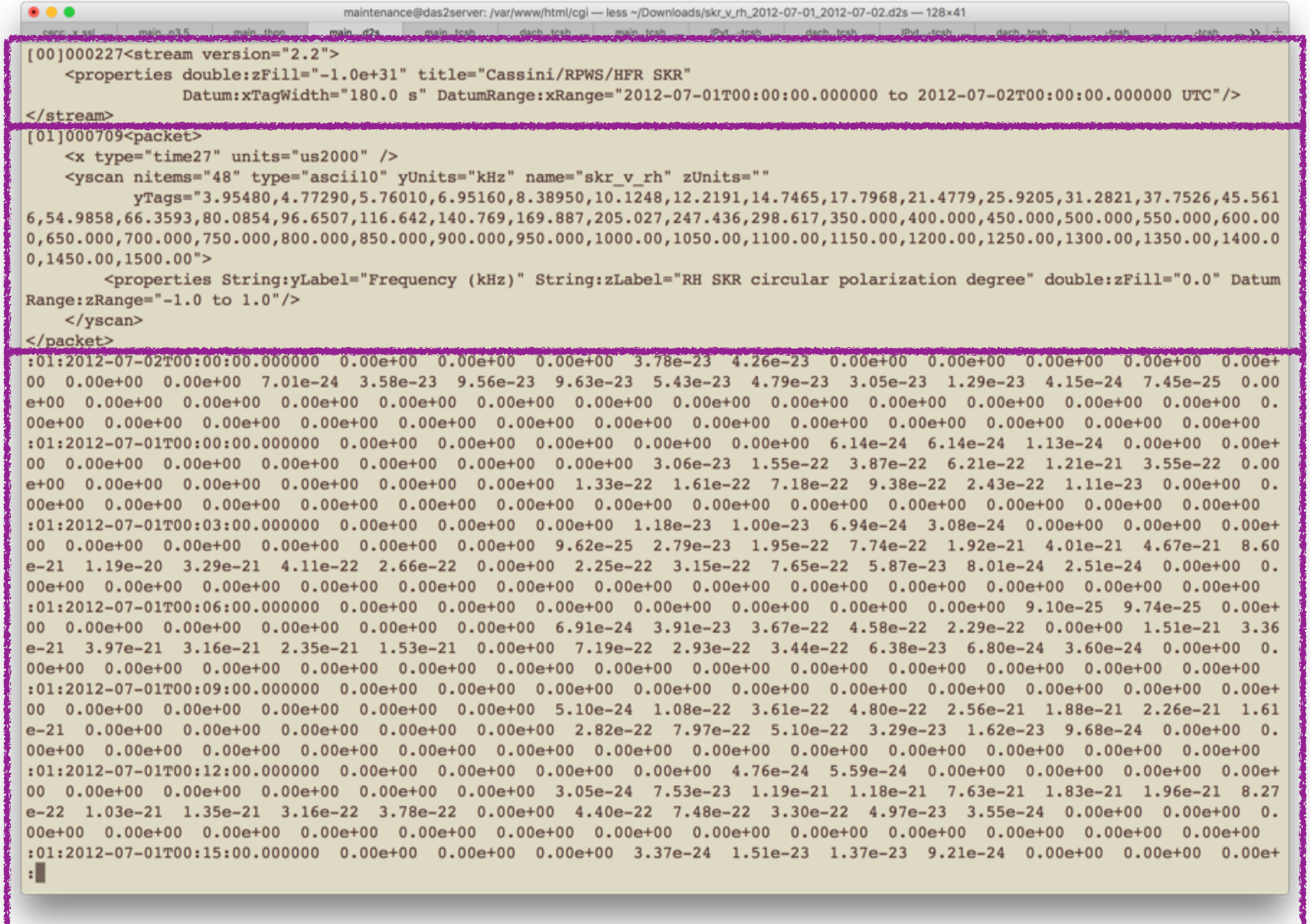
```
description = 'Nancay/NDA/Routine Jupiter dataset - LH polarized power'
reader = '/usr/local/bin/das2rdr/das2nancay/das2_maser_nda_routine.py jup 0'
das2Stream = 1
techContact = 'contact.maser@obspm.fr'
sciContact = 'Laurent Lamy <laurent.lamy@obspm.fr>'
readAccess = 'AGE:1m|GROUP:NDA'
securityRealm = 'Nancay Decameter Array Team Access'
validRange = '1990-10-01T00:00:00 to NOW'
exampleRange_00 = '2015-07-01T17:14:00 to 2015-07-01T17:15:00'
exampleRange_01 = '2012-12-03T07:15:00 to 2012-12-03T08:30:00'
exampleRange_02 = '2014-09-03T11:17:00 to 2014-09-03T11:22:00'
cacheLevel_00 = '60 s | hourly'
cacheLevel_01 = '1200 s | daily'
cacheLevel_02 = '86400 s | monthly'
dataproductType = 'ds'
measurementType = 'phys.flux.density;phys.polarization.circular;em.radio'
targetName = 'Jupiter'
targetClass = 'planet'
targetRegion = 'magnetosphere'
featureName = 'radio emissions#DAM'
/usr/local/das2srv/servers/das2nancay/datasets/Nancay/NDA/Routine/routine_jup_lh.dsdf (END)
```

reader script example



```
  GNU nano 2.7.4                File: /usr/local/bin/das2rdr/das2nancay/das2_maser_nda_routine.py

#!/usr/local/bin/python3.5

import sys, os
#sys.path.append('/usr/local/das2srv/lib/python2.7')
#sys.path.append('/usr/local/das2srv/lib/debian8/python2.7')

import datetime
import dateutil.parser
import math
import glob
import maser.data.nancay.nda.routine
import das2_maser_srn
import struct

def build_stream_header(title, sampling_time_step, start_time, end_time):
    return '<stream version="2.2">\n' \
           '    <properties title="{}" Datum:xTagWidth="{} s"\n' \
           '                DatumRange:xRange="{} to {} UTC"\n' \
           '                String:renderer="spectrogram"/>\n' \
           '</stream>'.format(title, sampling_time_step, start_time.isoformat(), end_time.isoformat())


def build_packet_header_scan(var_type, var_unit, var_name, var_label, var_range, ylist, yunits, ylabel, binary):
    if binary:
        x_time = '<x type="little_endian_real8" units="t2000" />'
    else:
        x_time = '<x type="time27" units="us2000" />'
    return '<packet>\n' \
           '    {}\n' \
           '    <yscan nitems="{}" type="{}" yUnits="{}" name="{}" zUnits="{}"\n' \
           '           yTags="{}">\n' \
           '       <properties String:yLabel="{}" String:zLabel="{}" double:zFill="0.0" {}/>\n' \
           '    </yscan>\n' \
           '</packet>'.format(x_time, len(ylist), var_type, yunits, var_name, var_unit,
                              ','.join(["{}".format(item) for item in ylist]), ylabel, var_label, var_range)

                                   [ Read 171 lines ]
^G Get Help    ^O Write Out   ^W Where Is    ^K Cut Text    ^J Justify     ^C Cur Pos     ^Y Prev Page   M-\ First Line
^X Exit        ^R Read File   ^\ Replace     ^U Uncut Text  ^T To Linter   ^_ Go To Line  ^V Next Page   M-/ Last Line
```

das2stream example


maintenance@das2server: /var/www/html/cgi — less ~/Downloads/skr_v_rh_2012-07-01_2012-07-02.d2s — 128×41

header

```
[00]000227<stream version="2.2">
    <properties double:zFill="-1.0e+31" title="Cassini/RPWS/HFR SKR"
                Datum:xTagWidth="180.0 s" DatumRange:xRange="2012-07-01T00:00:00.000000 to 2012-07-02T00:00:00.000000 UTC"/>
</stream>
```

packet header

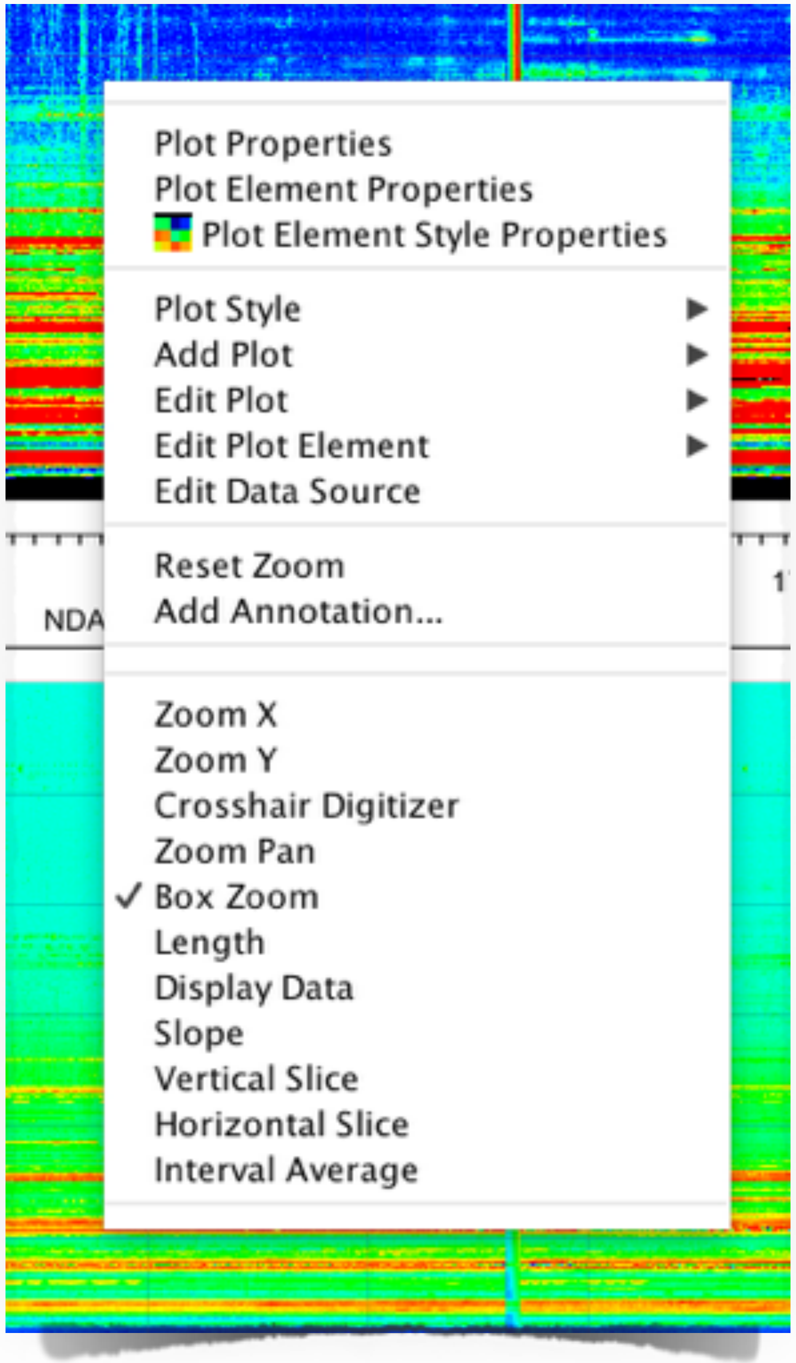
```
[01]000709<packet>
    <x type="time27" units="us2000" />
    <yscan nitems="48" type="ascii10" yUnits="kHz" name="skr_v_rh" zUnits=""
           yTags="3.95480,4.77290,5.76010,6.95160,8.38950,10.1248,12.2191,14.7465,17.7968,21.4779,25.9205,31.2821,37.7526,45.561
6,54.9858,66.3593,80.0854,96.6507,116.642,140.769,169.887,205.027,247.436,298.617,350.000,400.000,450.000,500.000,550.000,600.00
0,650.000,700.000,750.000,800.000,850.000,900.000,950.000,1000.00,1050.00,1100.00,1150.00,1200.00,1250.00,1300.00,1350.00,1400.0
0,1450.00,1500.00">
        <properties String:yLabel="Frequency (kHz)" String:zLabel="RH SKR circular polarization degree" double:zFill="0.0" Datum
Range:zRange="-1.0 to 1.0"/>
    </yscan>
</packet>
```

data

```
:01:2012-07-02T00:00:00.000000  0.00e+00  0.00e+00  0.00e+00  3.78e-23  4.26e-23  0.00e+00  0.00e+00  0.00e+00  0.00e+00  0.00e+
00  0.00e+00  0.00e+00  7.01e-24  3.58e-23  9.56e-23  9.63e-23  5.43e-23  4.79e-23  3.05e-23  1.29e-23  4.15e-24  7.45e-25  0.00
e+00  0.00e+00  0.00e+00  0.00e+00  0.00e+00  0.00e+00  0.00e+00  0.00e+00  0.00e+00  0.00e+00  0.00e+00  0.00e+00  0.00e+00  0.
00e+00  0.00e+00  0.00e+00  0.00e+00  0.00e+00  0.00e+00  0.00e+00  0.00e+00  0.00e+00  0.00e+00  0.00e+00  0.00e+00  0.00e+00
:01:2012-07-01T00:00:00.000000  0.00e+00  0.00e+00  0.00e+00  0.00e+00  0.00e+00  6.14e-24  6.14e-24  1.13e-24  0.00e+00  0.00e+
00  0.00e+00  0.00e+00  0.00e+00  0.00e+00  0.00e+00  0.00e+00  3.06e-23  1.55e-22  3.87e-22  6.21e-22  1.21e-21  3.55e-22  0.00
e+00  0.00e+00  0.00e+00  0.00e+00  0.00e+00  0.00e+00  1.33e-22  1.61e-22  7.18e-22  9.38e-22  2.43e-22  1.11e-23  0.00e+00  0.
00e+00  0.00e+00  0.00e+00  0.00e+00  0.00e+00  0.00e+00  0.00e+00  0.00e+00  0.00e+00  0.00e+00  0.00e+00  0.00e+00  0.00e+00
:01:2012-07-01T00:03:00.000000  0.00e+00  0.00e+00  0.00e+00  1.18e-23  1.00e-23  6.94e-24  3.08e-24  0.00e+00  0.00e+00  0.00e+
00  0.00e+00  0.00e+00  0.00e+00  0.00e+00  0.00e+00  9.62e-25  2.79e-23  1.95e-22  7.74e-22  1.92e-21  4.01e-21  4.67e-21  8.60
e-21  1.19e-20  3.29e-21  4.11e-22  2.66e-22  0.00e+00  2.25e-22  3.15e-22  7.65e-22  5.87e-23  8.01e-24  2.51e-24  0.00e+00  0.
00e+00  0.00e+00  0.00e+00  0.00e+00  0.00e+00  0.00e+00  0.00e+00  0.00e+00  0.00e+00  0.00e+00  0.00e+00  0.00e+00  0.00e+00
:01:2012-07-01T00:06:00.000000  0.00e+00  0.00e+00  0.00e+00  0.00e+00  0.00e+00  0.00e+00  0.00e+00  9.10e-25  9.74e-25  0.00e+
00  0.00e+00  0.00e+00  0.00e+00  0.00e+00  0.00e+00  6.91e-24  3.91e-23  3.67e-22  4.58e-22  2.29e-22  0.00e+00  1.51e-21  3.36
e-21  3.97e-21  3.16e-21  2.35e-21  1.53e-21  0.00e+00  7.19e-22  2.93e-22  3.44e-22  6.38e-23  6.80e-24  3.60e-24  0.00e+00  0.
00e+00  0.00e+00  0.00e+00  0.00e+00  0.00e+00  0.00e+00  0.00e+00  0.00e+00  0.00e+00  0.00e+00  0.00e+00  0.00e+00  0.00e+00
:01:2012-07-01T00:09:00.000000  0.00e+00  0.00e+00  0.00e+00  0.00e+00  0.00e+00  0.00e+00  0.00e+00  0.00e+00  0.00e+00  0.00e+
00  0.00e+00  0.00e+00  0.00e+00  0.00e+00  0.00e+00  5.10e-24  1.08e-22  3.61e-22  4.80e-22  2.56e-21  1.88e-21  2.26e-21  1.61
e-21  0.00e+00  0.00e+00  0.00e+00  0.00e+00  0.00e+00  2.82e-22  7.97e-22  5.10e-22  3.29e-23  1.62e-23  9.68e-24  0.00e+00  0.
00e+00  0.00e+00  0.00e+00  0.00e+00  0.00e+00  0.00e+00  0.00e+00  0.00e+00  0.00e+00  0.00e+00  0.00e+00  0.00e+00  0.00e+00
:01:2012-07-01T00:12:00.000000  0.00e+00  0.00e+00  0.00e+00  0.00e+00  4.76e-24  5.59e-24  0.00e+00  0.00e+00  0.00e+00  0.00e+
00  0.00e+00  0.00e+00  0.00e+00  0.00e+00  0.00e+00  3.05e-24  7.53e-23  1.19e-21  1.18e-21  7.63e-21  1.83e-21  1.96e-21  8.27
e-22  1.03e-21  1.35e-21  3.16e-22  3.78e-22  0.00e+00  4.40e-22  7.48e-22  3.30e-22  4.97e-23  3.55e-24  0.00e+00  0.00e+00  0.
00e+00  0.00e+00  0.00e+00  0.00e+00  0.00e+00  0.00e+00  0.00e+00  0.00e+00  0.00e+00  0.00e+00  0.00e+00  0.00e+00  0.00e+00
:01:2012-07-01T00:15:00.000000  0.00e+00  0.00e+00  0.00e+00  3.37e-24  1.51e-23  1.37e-23  9.21e-24  0.00e+00  0.00e+00  0.00e+
:
```

Autoplot features

- Display time dependent data (spectrograms and time series)
- Various capabilities on displayed data
- Event list capability
- Scripting (in jython)
- Saving plot configuration (“.vap” file)

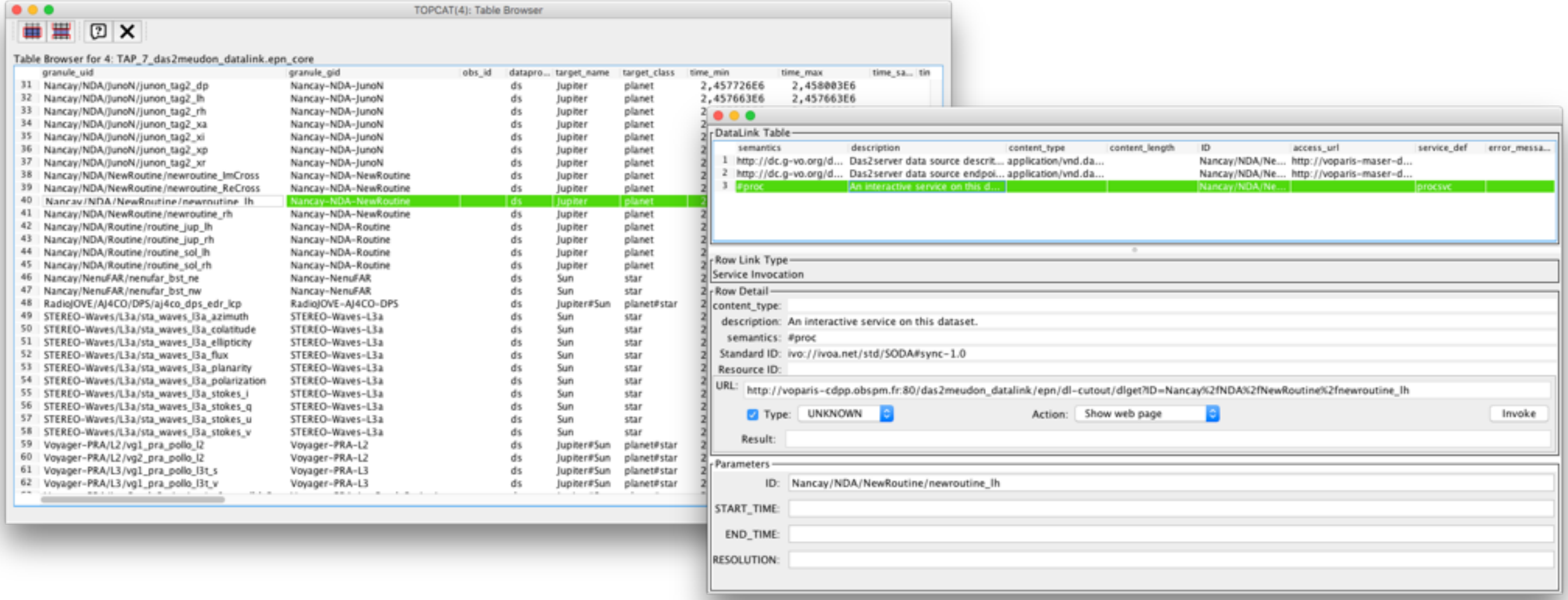


Bridging with the VO

- EPN-TAP test service: product = 1 data source
  EPNcore metadata stored in DSDF file.

- Datalink capability included with **start_time**, **end_time** and **resolution** parameters

- Output in VOTable+binary2 is under study



TOPCAT(4): Table Browser

Table Browser for 4: TAP_7_das2meudon_datalink.epn_core

	granule_uid	granule_gid	obs_id	datapro...	target_name	target_class	time_min	time_max	time_sa...	tin
31	Nancay/NDA/JunoN/junon_tag2_dp	Nancay-NDA-JunoN		ds	Jupiter	planet	2,457726E6	2,458003E6		
32	Nancay/NDA/JunoN/junon_tag2_lh	Nancay-NDA-JunoN		ds	Jupiter	planet	2,457663E6	2,457663E6		
33	Nancay/NDA/JunoN/junon_tag2_rh	Nancay-NDA-JunoN		ds	Jupiter	planet	2			
34	Nancay/NDA/JunoN/junon_tag2_xa	Nancay-NDA-JunoN		ds	Jupiter	planet	2			
35	Nancay/NDA/JunoN/junon_tag2_xi	Nancay-NDA-JunoN		ds	Jupiter	planet	2			
36	Nancay/NDA/JunoN/junon_tag2_xp	Nancay-NDA-JunoN		ds	Jupiter	planet	2			
37	Nancay/NDA/JunoN/junon_tag2_xr	Nancay-NDA-JunoN		ds	Jupiter	planet	2			
38	Nancay/NDA/NewRoutine/newroutine_ImCross	Nancay-NDA-NewRoutine		ds	Jupiter	planet	2			
39	Nancay/NDA/NewRoutine/newroutine_ReCross	Nancay-NDA-NewRoutine		ds	Jupiter	planet	2			
40	Nancay/NDA/NewRoutine/newroutine_lh	Nancay-NDA-NewRoutine		ds	Jupiter	planet	2			
41	Nancay/NDA/NewRoutine/newroutine_rh	Nancay-NDA-NewRoutine		ds	Jupiter	planet	2			
42	Nancay/NDA/Routine/routine_jup_lh	Nancay-NDA-Routine		ds	Jupiter	planet	2			
43	Nancay/NDA/Routine/routine_jup_rh	Nancay-NDA-Routine		ds	Jupiter	planet	2			
44	Nancay/NDA/Routine/routine_sol_lh	Nancay-NDA-Routine		ds	Jupiter	planet	2			
45	Nancay/NDA/Routine/routine_sol_rh	Nancay-NDA-Routine		ds	Jupiter	planet	2			
46	Nancay/NenuFAR/nenufar_bst_ne	Nancay-NenuFAR		ds	Sun	star	2			
47	Nancay/NenuFAR/nenufar_bst_nw	Nancay-NenuFAR		ds	Sun	star	2			
48	RadioJOVE/AJ4CO/DPS/aj4co_dps_edr_lcp	RadioJOVE-AJ4CO-DPS		ds	Jupiter#Sun	planet#star	2			
49	STEREO-Waves/L3a/sta_waves_l3a_azimuth	STEREO-Waves-L3a		ds	Sun	star	2			
50	STEREO-Waves/L3a/sta_waves_l3a_colatitude	STEREO-Waves-L3a		ds	Sun	star	2			
51	STEREO-Waves/L3a/sta_waves_l3a_ellipticity	STEREO-Waves-L3a		ds	Sun	star	2			
52	STEREO-Waves/L3a/sta_waves_l3a_flux	STEREO-Waves-L3a		ds	Sun	star	2			
53	STEREO-Waves/L3a/sta_waves_l3a_planarity	STEREO-Waves-L3a		ds	Sun	star	2			
54	STEREO-Waves/L3a/sta_waves_l3a_polarization	STEREO-Waves-L3a		ds	Sun	star	2			
55	STEREO-Waves/L3a/sta_waves_l3a_stokes_i	STEREO-Waves-L3a		ds	Sun	star	2			
56	STEREO-Waves/L3a/sta_waves_l3a_stokes_q	STEREO-Waves-L3a		ds	Sun	star	2			
57	STEREO-Waves/L3a/sta_waves_l3a_stokes_u	STEREO-Waves-L3a		ds	Sun	star	2			
58	STEREO-Waves/L3a/sta_waves_l3a_stokes_v	STEREO-Waves-L3a		ds	Sun	star	2			
59	Voyager-PRA/L2/vg1_pra_pollo_l2	Voyager-PRA-L2		ds	Jupiter#Sun	planet#star	2			
60	Voyager-PRA/L2/vg2_pra_pollo_l2	Voyager-PRA-L2		ds	Jupiter#Sun	planet#star	2			
61	Voyager-PRA/L3/vg1_pra_pollo_l3t_s	Voyager-PRA-L3		ds	Jupiter#Sun	planet#star	2			
62	Voyager-PRA/L3/vg1_pra_pollo_l3t_v	Voyager-PRA-L3		ds	Jupiter#Sun	planet#star	2			

DataLink Table

	semantics	description	content_type	content_length	ID	access_url	service_def	error_messa...
1	http://dc.g-vo.org/d...	Das2server data source descrit...	application/vnd.da...		Nancay/NDA/Ne...	http://voparis-maser-d...		
2	http://dc.g-vo.org/d...	Das2server data source endpoi...	application/vnd.da...		Nancay/NDA/Ne...	http://voparis-maser-d...		
3	#proc	An interactive service on this d...			Nancay/NDA/Ne...		procsvc	

Row Link Type

Service Invocation

Row Detail

content_type:

description: An interactive service on this dataset.

semantics: #proc

Standard ID: ivo://ivoa.net/std/SODA#sync-1.0

Resource ID:

URL: http://voparis-cdpp.obspm.fr:80/das2meudon_datalink/epn/dl-cutout/dlget?ID=Nancay%2fNDA%2fNewRoutine%2fnewroutine_lh

☑ Type: UNKNOWN   Action: Show web page

Result:

Parameters

ID: Nancay/NDA/NewRoutine/newroutine_lh

START_TIME:

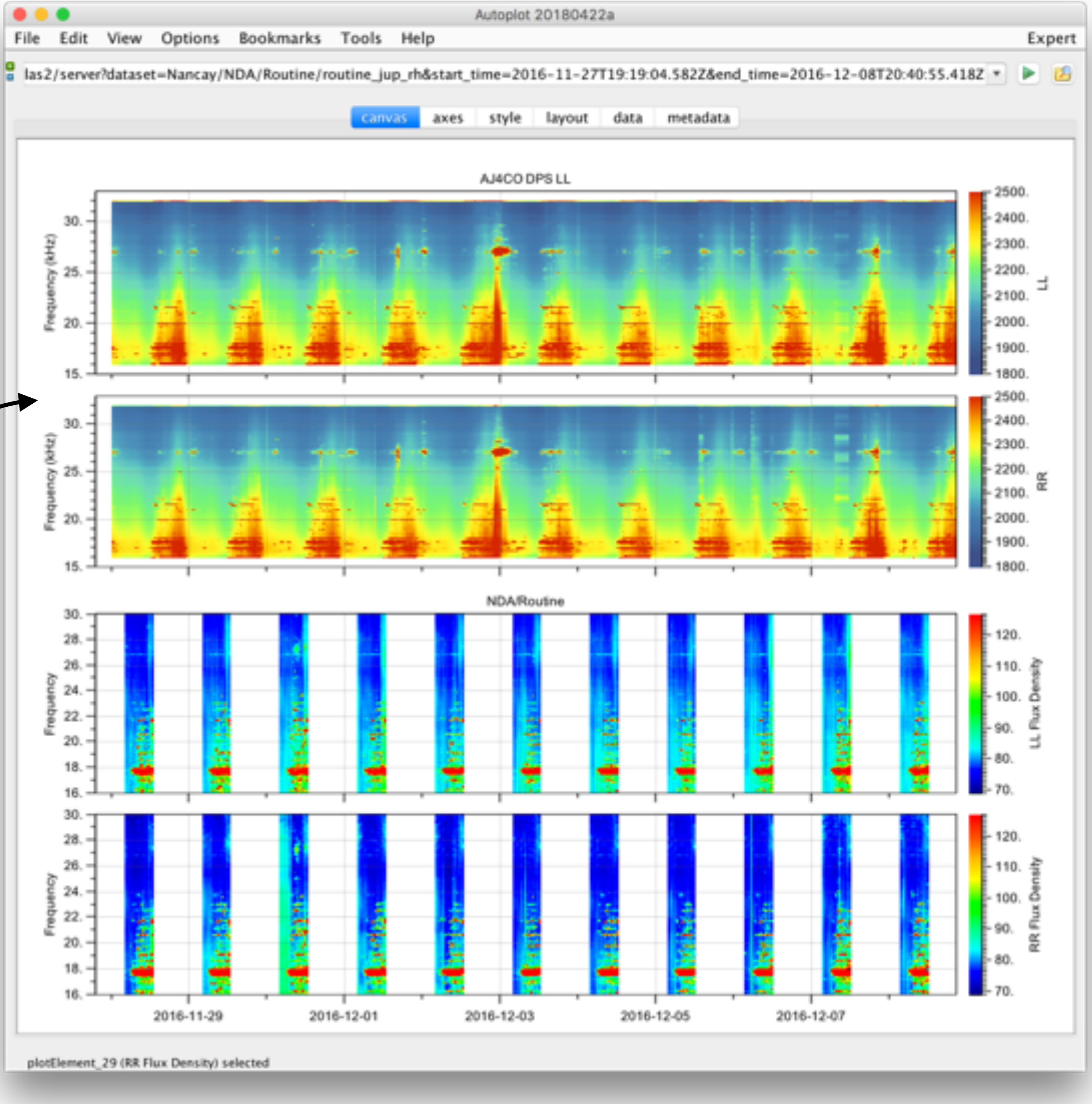
END_TIME:

RESOLUTION:

Examples

- Pro + Amateurs
- Ground + Space
- Old missions

2 top rows : ~7 GB raw data,
only 760kB dowloaded for display



```
las2/server?dataset=Nancay/NDA/Routine/routine_jup_rh&start_time=2016-11-27T19:19:04.582Z&end_time=2016-12-08T20:40:55.418Z
```

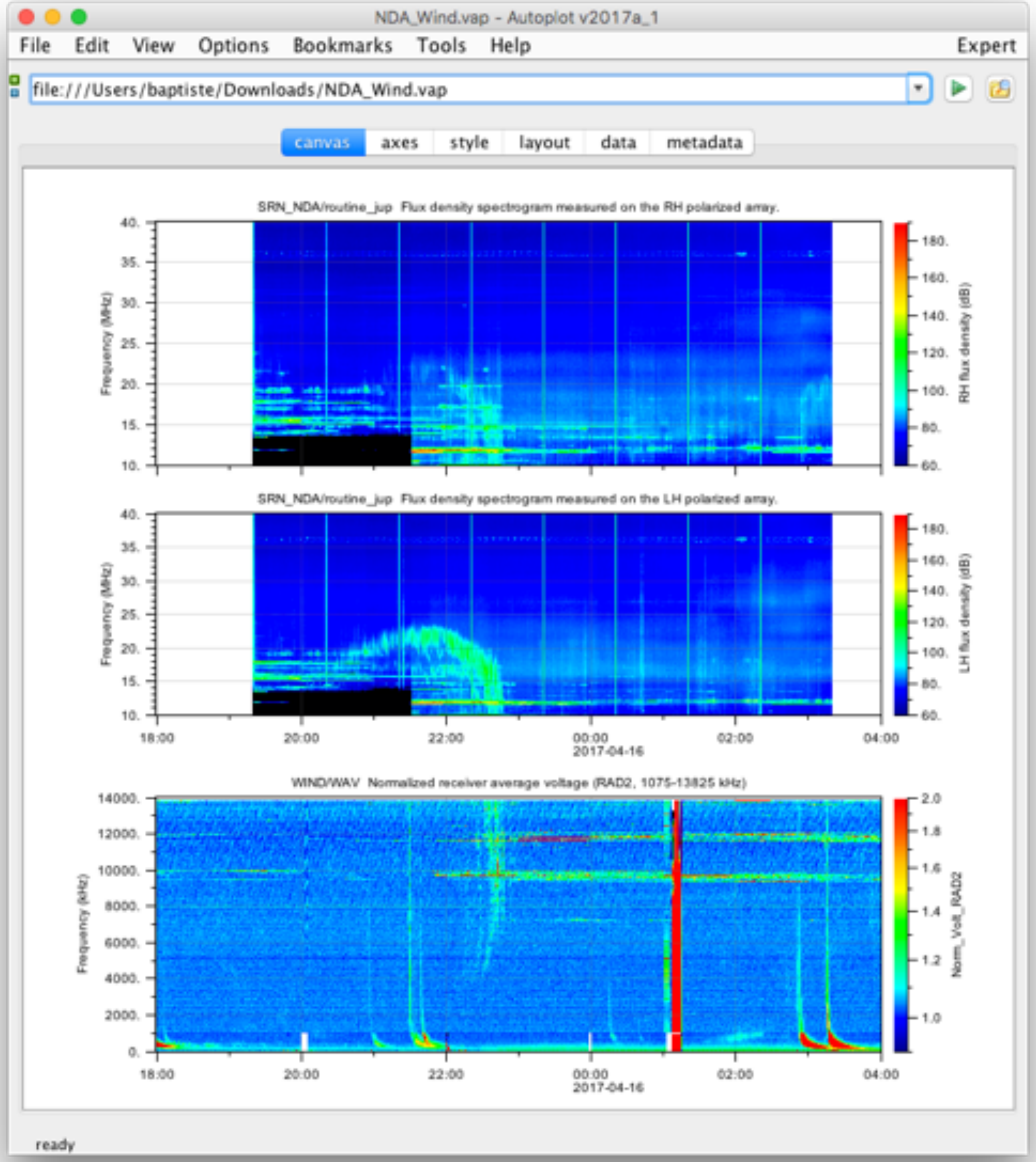
plotElement_29 (RR Flux Density) selected

RadioJOVE/AJ4CO

Nançay Decameter Array

Examples

- Pro + Amateurs
- Ground + Space
- Old missions

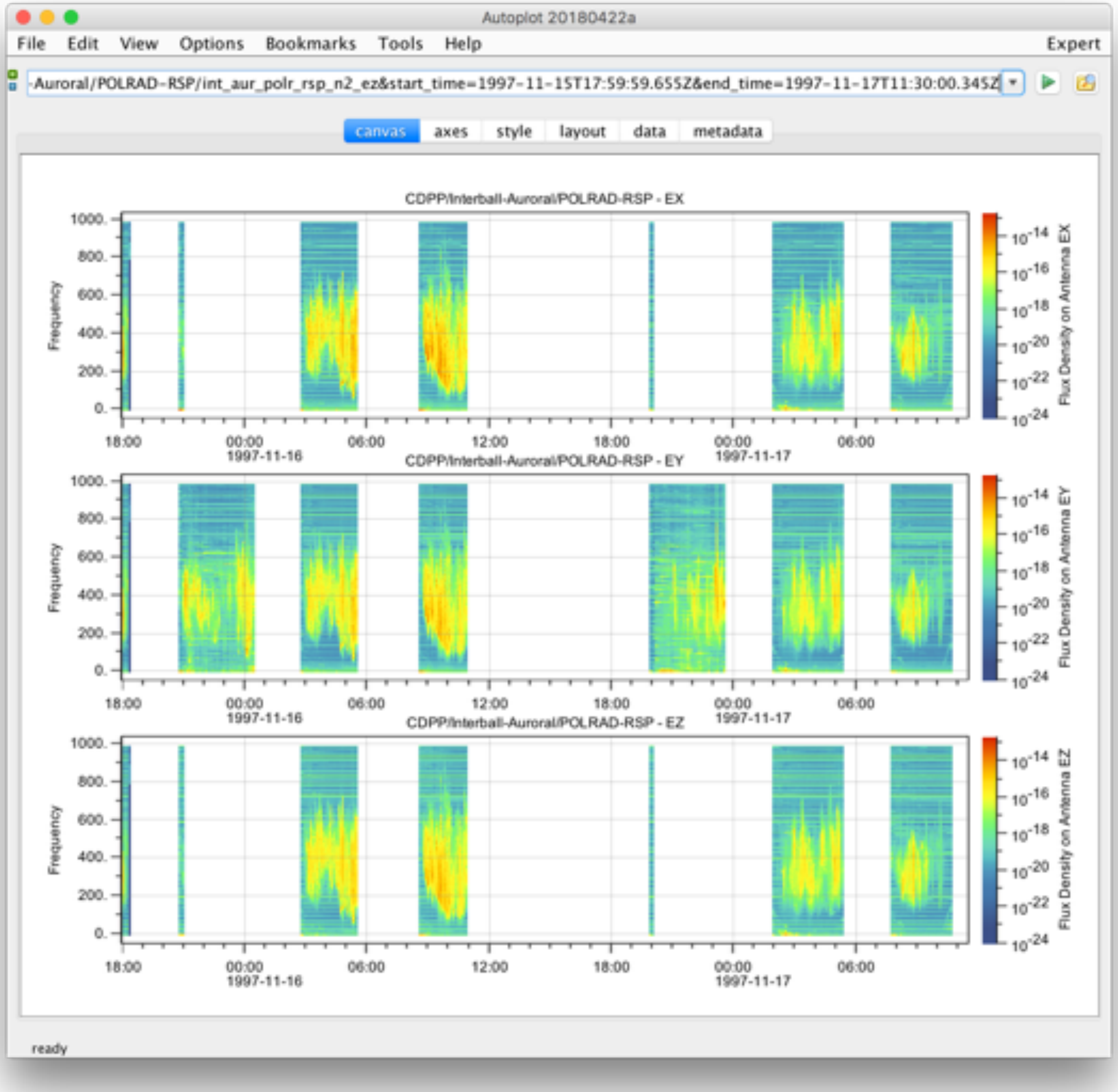


Nançay Decameter Array

Wind/Waves

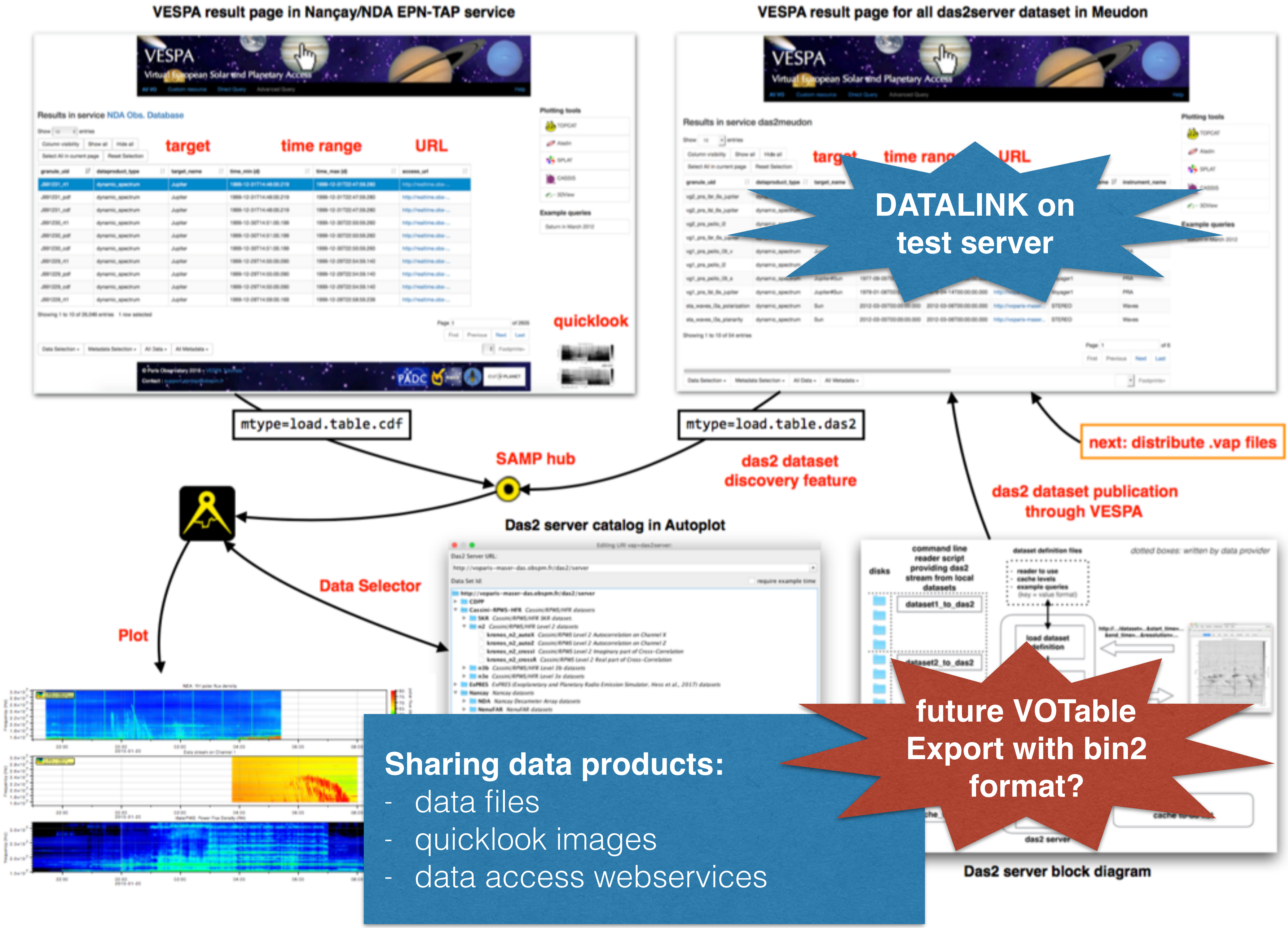
Examples

- Pro + Amateurs
- Ground + Space
- Old missions



-Auroral/POLRAD-RSP/int_aur_polr_rsp_n2_ez&start_time=1997-11-15T17:59:59.655Z&end_time=1997-11-17T11:30:00.345Z

Interball/POLRAD



VESPA result page in Nançay/NDA EPN-TAP service

VESPA
Virtual European Solar and Planetary Access
Results in service NDA Obs. Database
Plotting tools
TOPCAT
Aladin
SPLAT
CASSIS
3DView
Example queries
target
time range
URL
quicklook

mtype=load.table.cdf

VESPA result page for all das2server dataset in Meudon

VESPA
Virtual European Solar and Planetary Access
Results in service das2meudon
target
time range
URL

DATALINK on test server

mtype=load.table.das2

SAMP hub

das2 dataset discovery feature

next: distribute .vap files

das2 dataset publication through VESPA

Data Selector

Plot

Das2 server catalog in Autoplot

Editing URI vap+das2server:

Das2 Server URL:

http://voparis-maser-das.obspm.fr/das2/server

Data Set Id:

□ require example time

- http://voparis-maser-das.obspm.fr/das2/server
  - CDPP
  - Cassini-RPWS-HFR *Cassini/RPWS/HFR datasets*
    - SKR *Cassini/RPWS/HFR SKR dataset*
    - n2 *Cassini/RPWS/HFR Level 2 datasets*
      - kronos_n2_autoX *Cassini/RPWS Level 2 Autocorrelation on Channel X*
      - kronos_n2_autoZ *Cassini/RPWS Level 2 Autocorrelation on Channel Z*
      - kronos_n2_crossI *Cassini/RPWS Level 2 Imaginary part of Cross-Correlation*
      - kronos_n2_crossR *Cassini/RPWS Level 2 Real part of Cross-Correlation*
    - n3b *Cassini/RPWS/HFR Level 3b datasets*
    - n3e *Cassini/RPWS/HFR Level 3e datasets*
  - ExPRES *ExPRES (Exoplanetary and Planetary Radio Emission Simulator, Hess et al., 2017) datasets*
  - Nancay *Nancay datasets*
    - NDA *Nancay Decameter Array datasets*
    - NenuFAR *NenuFAR datasets*

disks
command line reader script providing das2 stream from local datasets
dataset definition files
dotted boxes: written by data provider
reader to use
cache levels
example queries
(key = value format)
dataset1_to_das2
dataset2_to_das2
load dataset definition
http://.../dataset=...&start_time=...&end_time=...&resolution=...
cache
das2 server

future VOTable Export with bin2 format?

Das2 server block diagram

Sharing data products:

- data files
- quicklook images
- data access webservices

demos

1. Cassini/RPWS data
from Meudon/Kronos database

2. Nançay/NDA/Routine Jupiter dataset