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Netherlands Institute for Radio Astronomy

DTC (Dynspec Toolkit Content)

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DTC (Dynspec Toolkit Content)

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What is DTC:

- Packages of tool for LOFAR Beam formed data (ICD3 format)
- 6 conversions tools (convert Beam formed data to dynspec format: ICD6 format)
- 3 processing tools
- 1 Visualization tool

In Practice:

- 8 C++ codes interfaced with python scripts
- 1 Graphical Interface (Tkinter) for visualization

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ICD3 format:

Nomenclature:

Lxxx_SAPxxx_Bxxx_Sx_Pxxx.h5

Lxxx_SAPxxx_Bxxx_Sx_Pxxx.raw

2 files for each:

- SAP (Sub-Array Pointing) i.e target
- Beam (direction)
- S (Stokes)
- Part (large observation are split in several part)

Data Matrix is 2D: time and frequency

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ICD6 format:

Nomenclature:

Dynspec_Lxxx_SAPxxx.h5

1 files for each:

- SAP (Sub-Array Pointing) i.e target

Data Matrix is 3D: time,frequency and Stokes

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Hdfview:

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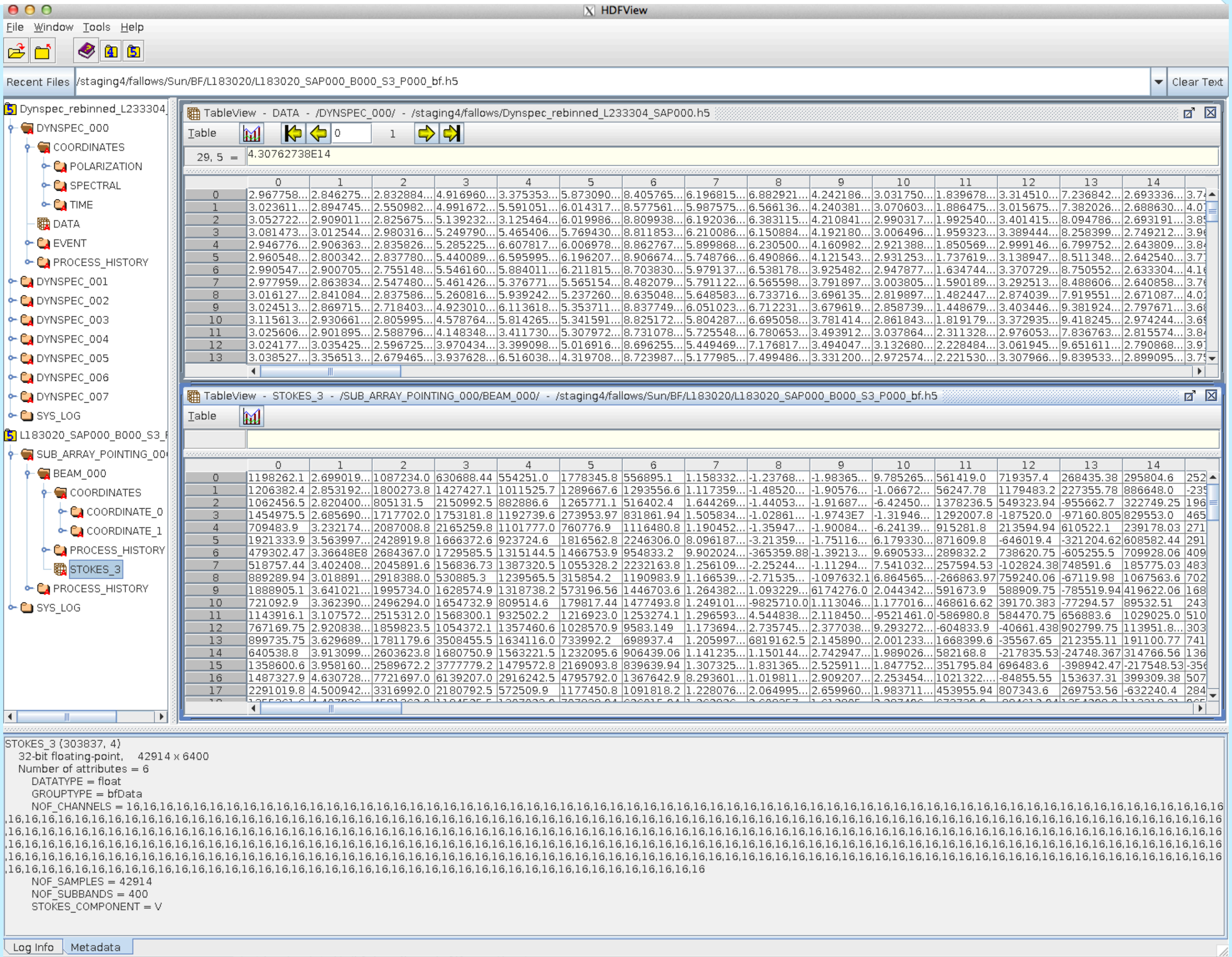

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Where to find it ?

- Documentation page + Tutorial on LOFAR wiki:

http://www.lofar.org/operations/doku.php?id=dynspec

How to install it ?

- Dependencies:
  - DAL (Data access Library)
  - Hdf5 librairies
  - H5py (python package)

- Installation (see documentation page)
  - Svn LUS (Lofar User Software)
  - Cmake installation

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3 Sub-Packages:

- **CEP2 sub-package:**

  Process LOFAR Beam formed data:

  - Beam2Dynspec-Quick: Generate a Quicklook of the data in dynspec format and a jpeg image
  - Beam2Dynspec-Complete: do a complete conversion without selection, rebining of the data to a dynspec
  - Beam2Dynspec-Rebin: possibility to select a time and frequency window; possibility to rebin in time and in frequency.

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3 Sub-Packages:

- **Stand-alone sub-package:**

  Process Single Station LOFAR Beam formed data,
  Convert XX,XY,YX,YY to I,Q,U,V:

  - Beam2Dynspec-Standalone-Quick: Generate a Quicklook of the data in dynspec format and a jpeg image

  - Beam2Dynspec-Standalone-Complete: do a complete conversion without selection, rebining of the data to a dynspec

  - Beam2Dynspec-Standalone-Rebin: possibility to select a time and frequency window; possibility to rebin in time and in frequency.

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3 Sub-Packages:

- **TOOLS sub-package:**

  Playing with Dynspec and Visualize them:

  - Dynspec-LinPol: Convert I, Q, U, V polarization to I, Linear, PA, Total
  - Dynspec-Rebin: Rebin and select a dynpec in time and frequency (avoid to reprocess the original data)
  - Dynspec-Substract: Do the substraction of 2 beam like: Beam1-(k Beam2) with k a number
  - Dynspec-Visu: Visualization tool

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Example with L183020:

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1 SAP => The Sun

92 Beams => 92 Beams on the sun

4 Stokes => I,Q,U,V

400 Sub-bands with 16 channels each

=> 6400 frequency channels

Time resolution 0.083 s

Observation duration 1 hour => 42914 time pixels

Total size => **377 Gb in (1x92x4x1)x2=736 files**

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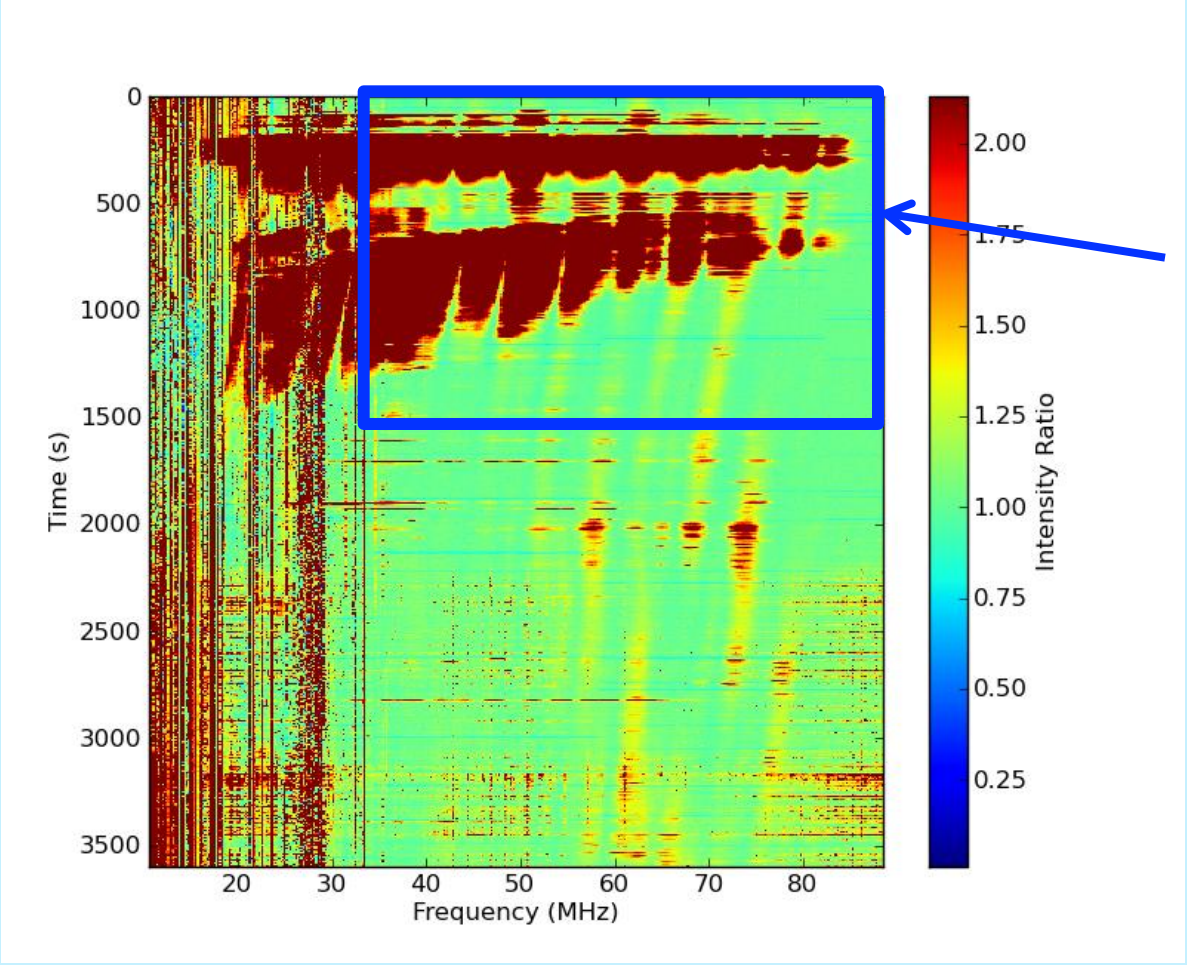
Quicklook:

Beam2Dynspec-Quick --id=L183020 --obsDIR=/staging4/fallows/Sun/BF/L183020/
--outputDIR=/data/scratch/vilchez/dynspec2/ --percentTimeData=0.05
--percentSpectralData=0.1 --transpose=no --nofPart=1



Time Computing: 202.1 s

Region of interest:

0-1500 s

35-88 MHz

Time scale:1 s

1 ch/SB

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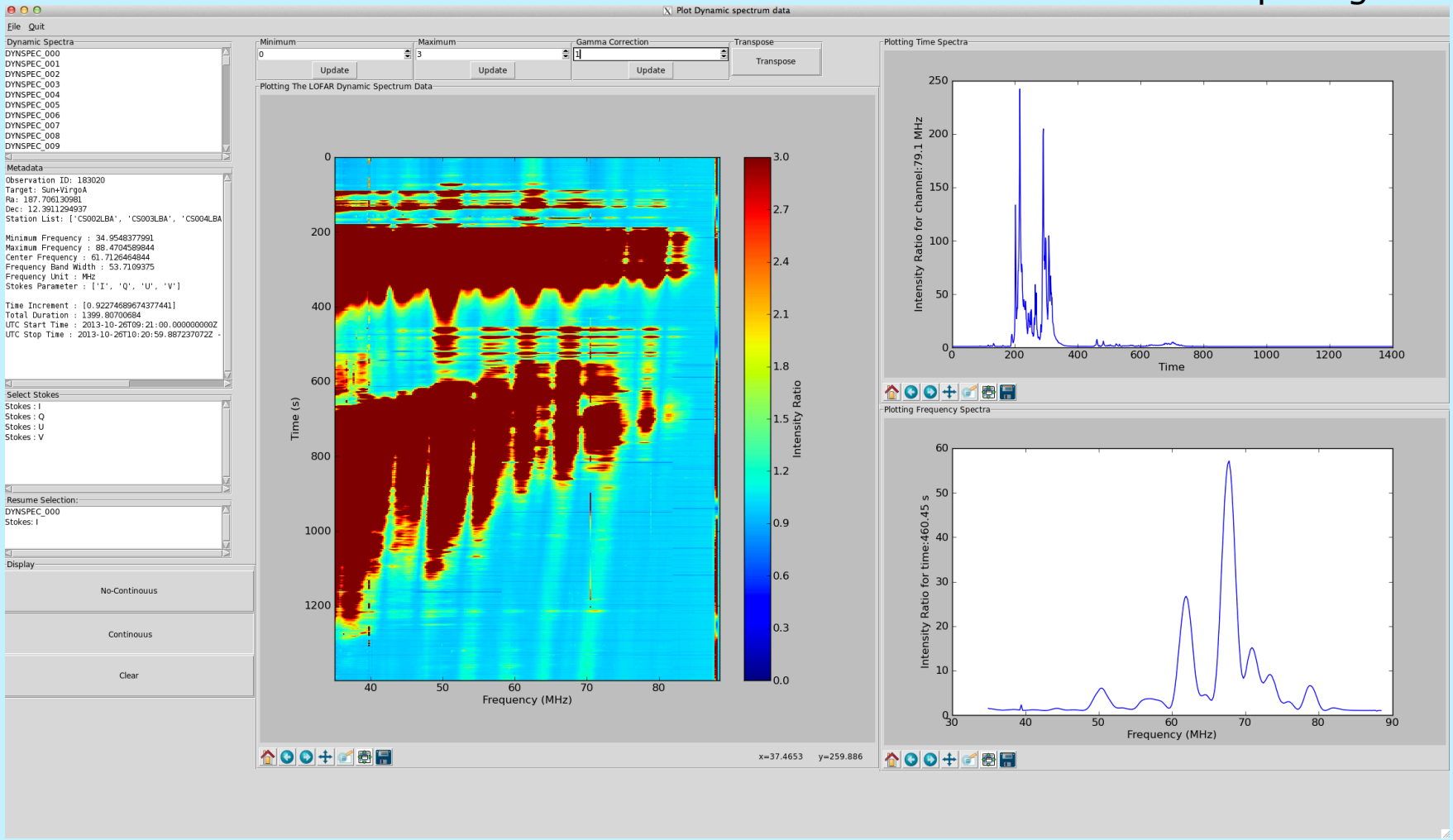
Rebin:

Beam2Dynspec-Rebin --id=L183020 --obsDIR=/staging4/fallows/Sun/BF/L183020/ --outputDIR=/data/scratch/vilchez/dynspec --tmin=0 --tmax=1500 --tscale=1 --fmin=35 --fmax=88 --chanPerSubband=1 --RAM=1 --Npart=1 --RebinAll=yes

Time Computing: 948.4 s



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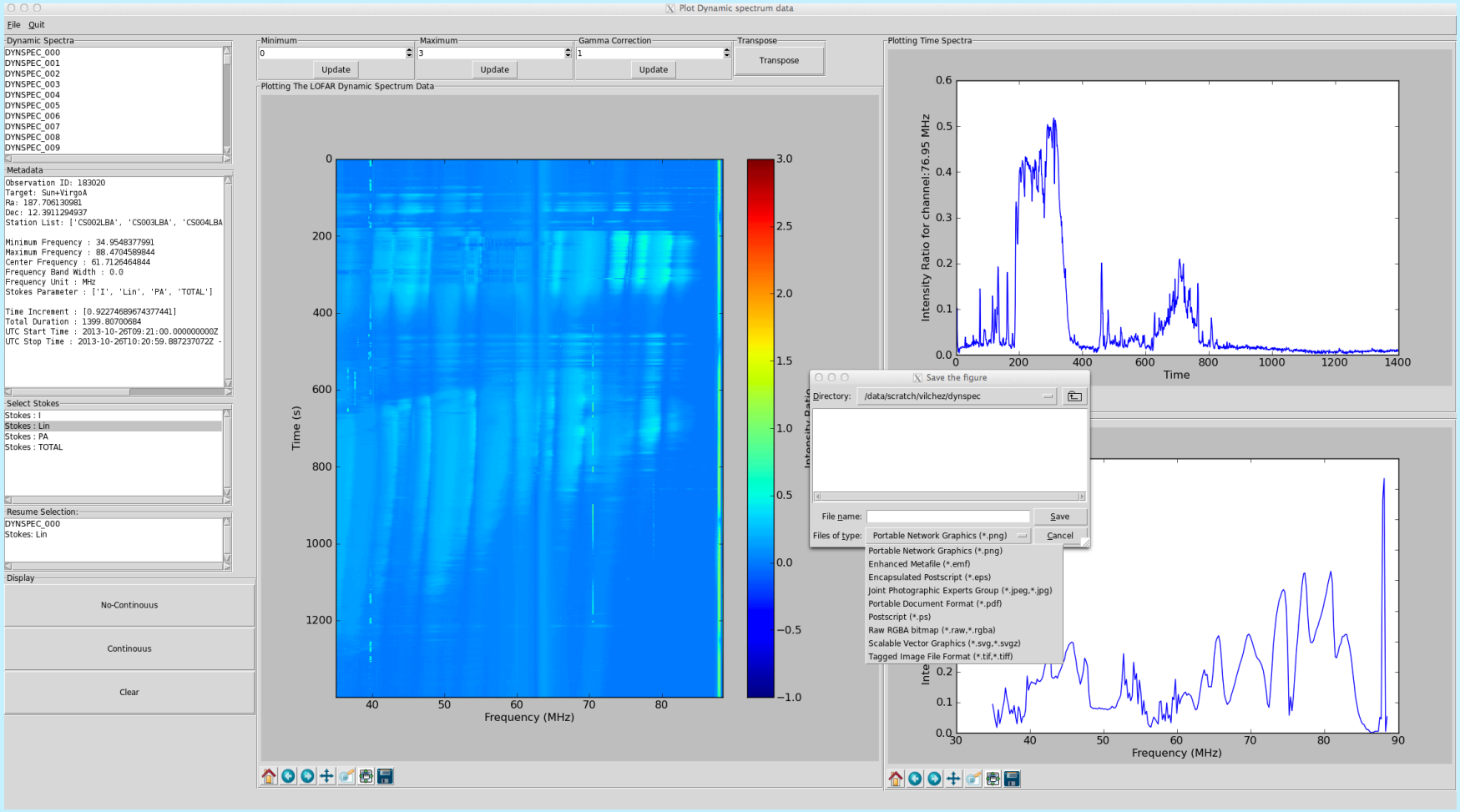
Linear,PA,Total polarisation:

Dynspec-LinPol --outDir=/data/scratch/vilchez/dynspec/ --ID=183020
--filename=/data/scratch/vilchez/dynspec/Dynspec_rebinned_L183020_SAP000.h5 --RAM=1

Time Computing: 4.94s



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Beam Subtraction: DYNSPEC_000-(1xDYNSPEC_091)

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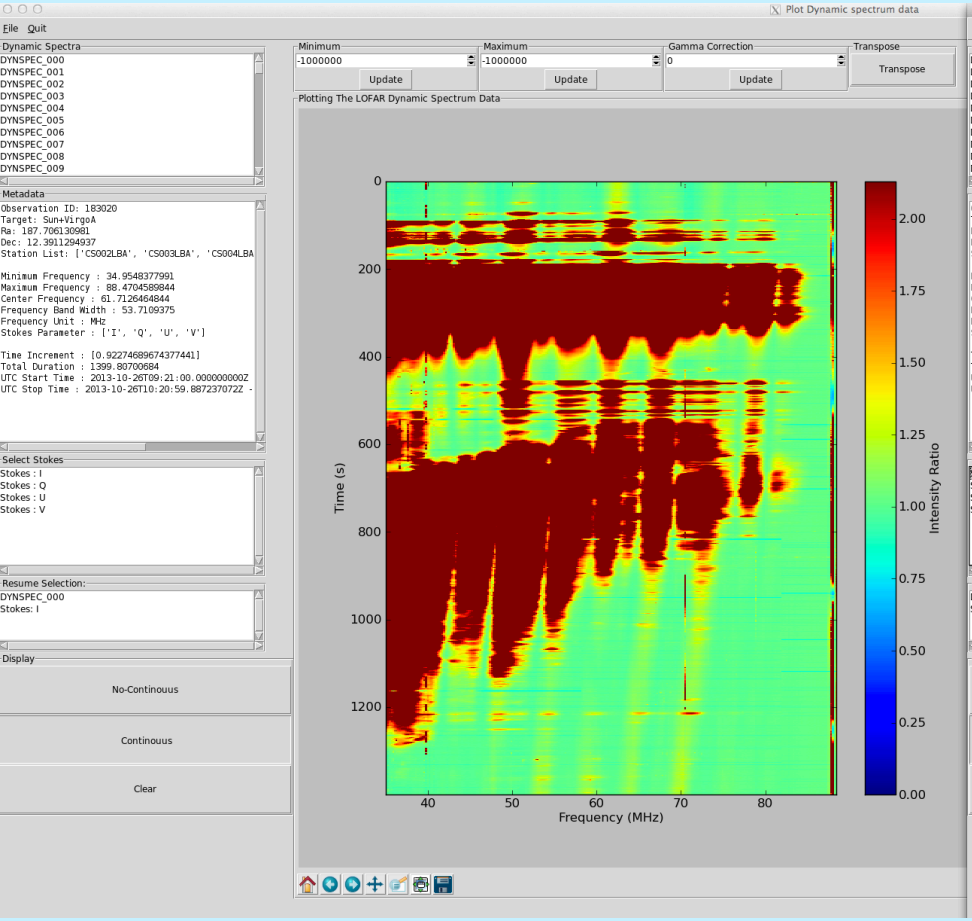
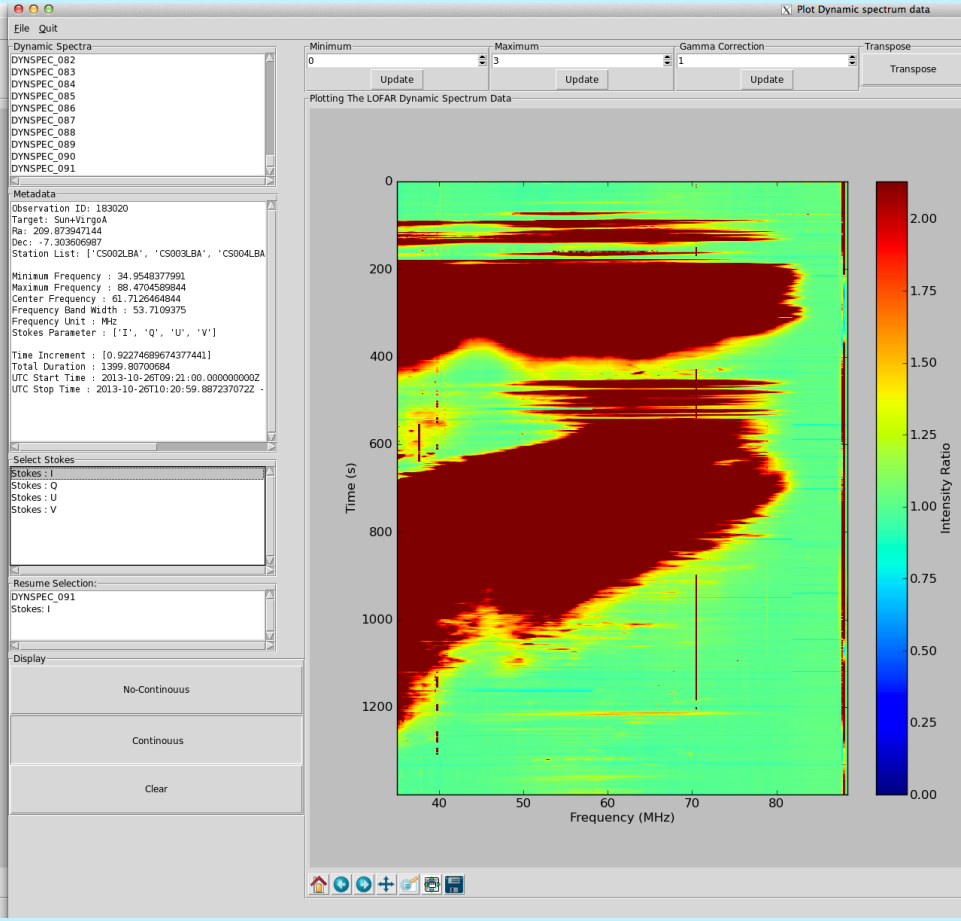
Dynspec-Substract --outDir=/data/scratch/vilchez/dynspec/ --id1=L183020 --file1=/data/scratch/vilchez/dynspec/Dynspec_rebinned_L183020_SAP000.h5 --dynspec1=DYNSPEC_000 --id2=183020 --file2=/data/scratch/vilchez/dynspec/Dynspec_rebinned_L183020_SAP000.h5 --dynspec2=DYNSPEC_091 --k=1 --RAM=1



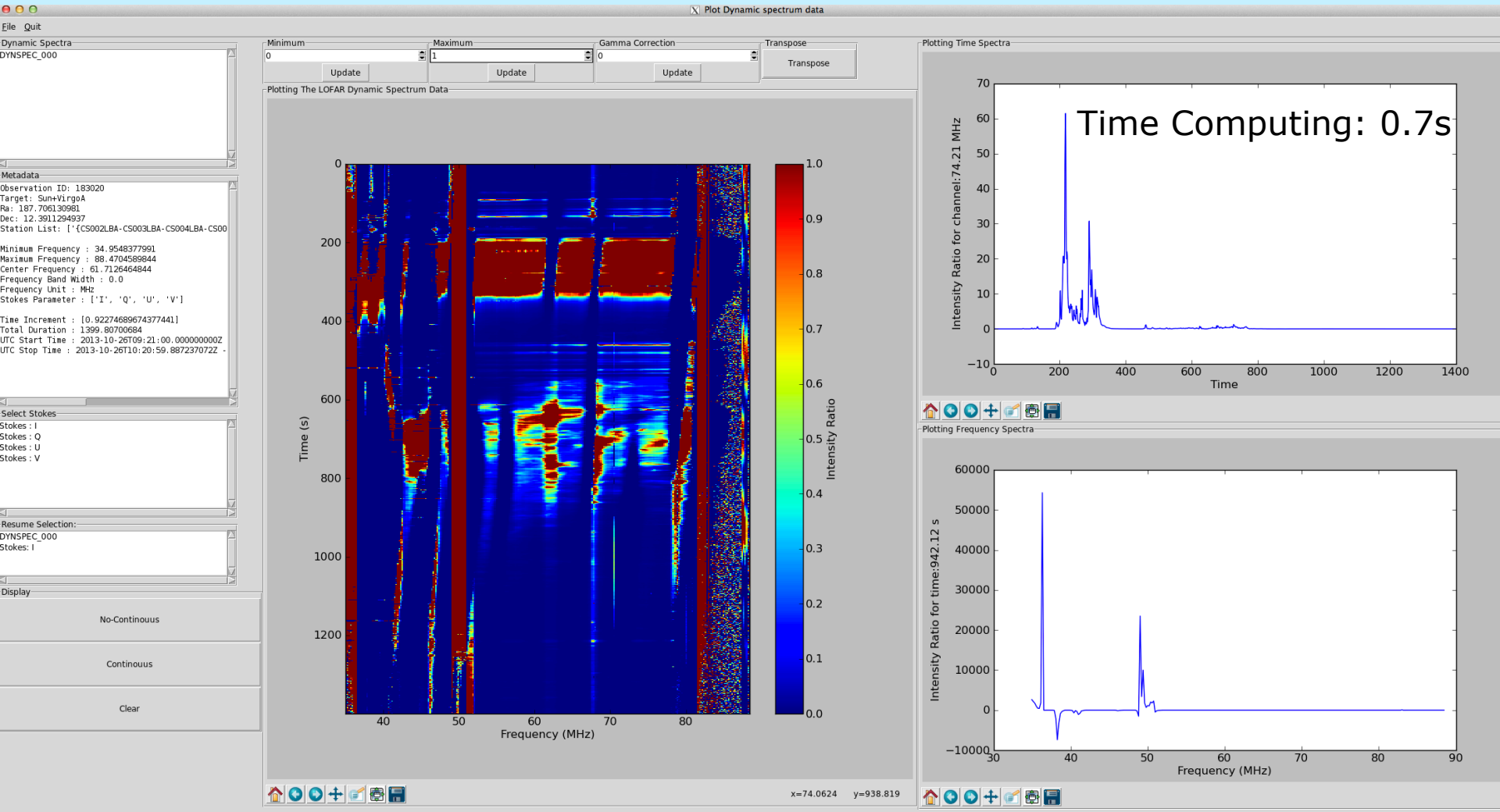


DYNSPEC_000

DYNSPEC_091

DTC (Dynspec Toolkit Content):

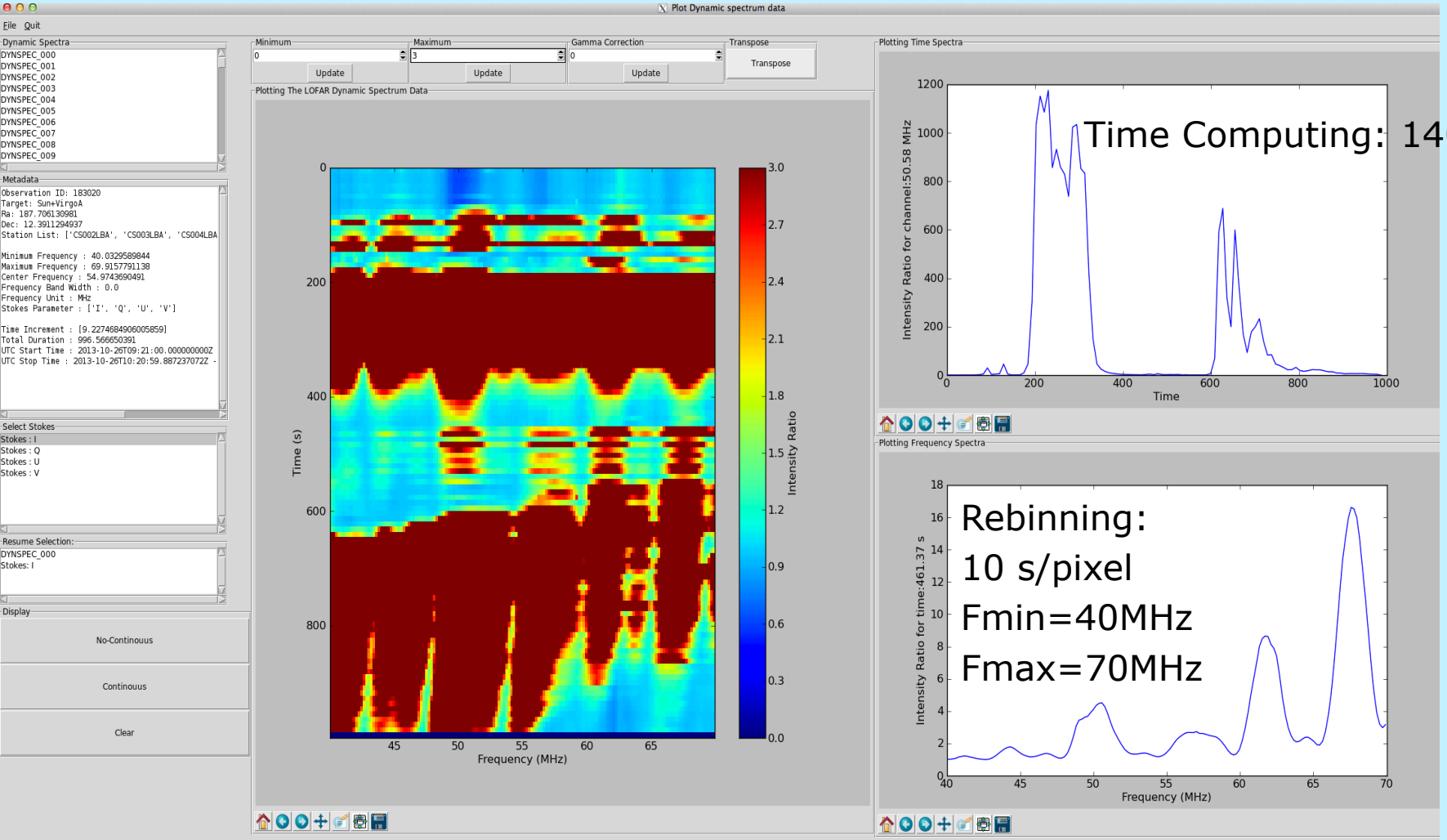
Beam Subtraction: *DYNSPEC_000-(1xDYNSPEC_091)*



DTC (Dynspec Toolkit Content):

Dynspec Rebin:

Dynspec-Rebin --Pathfile=/data/scratch/vilchez/dynspec/Dynspec_rebinned_L183020_SAP000.h5 --obsname=L183020 --outputFile=/data/scratch/vilchez/dynspec/Dynspec_rebinned_at10second_40-70MHz_L183020_SAP000.h5 --tmin=0 --tmax=1000 --tscale=10 --fmin=40 --fmax=70 --chanPerSubband=1 --RAM=1



Perpectives:

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- No future developments really planned
- Maintenance done by N.Vilchez (vilchez@astron.nl)
- Update the R.O “QuickImager” with the Quicklook (=> To have also an automatic quicklook after a Beam formed data observation)
- Dynspec Toolkit Content paper (Vilchez et al, in prep)
- Solar Physics conference (Jan-Feb 2015)

Time to a demonstration of the viewer ?

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ssh –XY lce010 (CEP1)
use Dynspec
use Pythonlibs
use DAL

Dynspec-Visu

Load in the GI /data/scratch/vilchez/dynspec/
Dynspec_rebinned_L183020_SAP000.h5