

# Autoplot and Java Libraries for HAPI and Science Processing

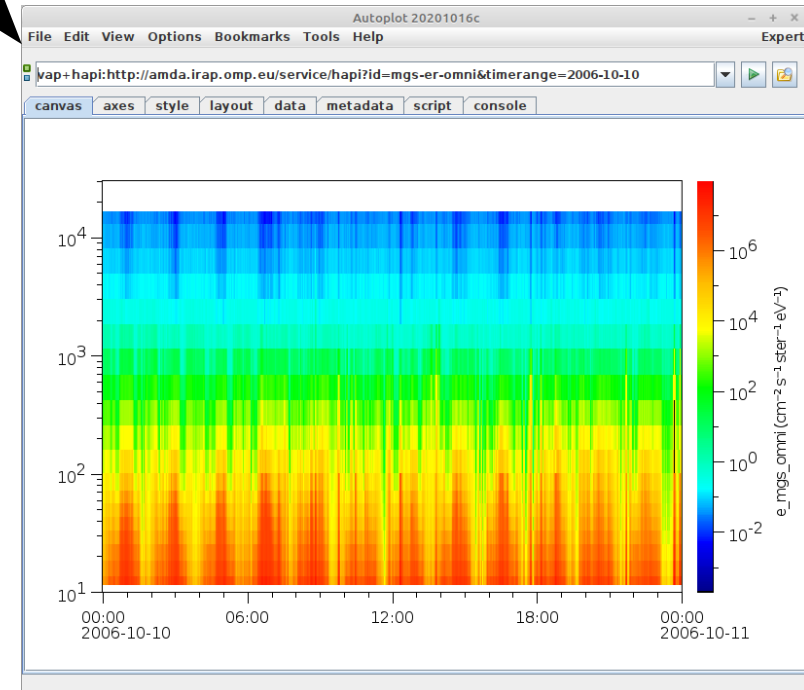
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(with contributions from many others)

- This will be an overview of changes in Autoplot this past year.
- There was a more introductory talk at last year's IHDEA meeting:  
<https://issues.cosmos.esa.int/socciwiki/download/attachments/42250123/5.4%20autoplot.pdf?version=1&modificationDate=1573127473000&api=v2>
- I'll also introduce two libraries which have been extracted from Autoplot which will should be useful to other Java codes on their own.

# 1-Slide Autoplot Overview

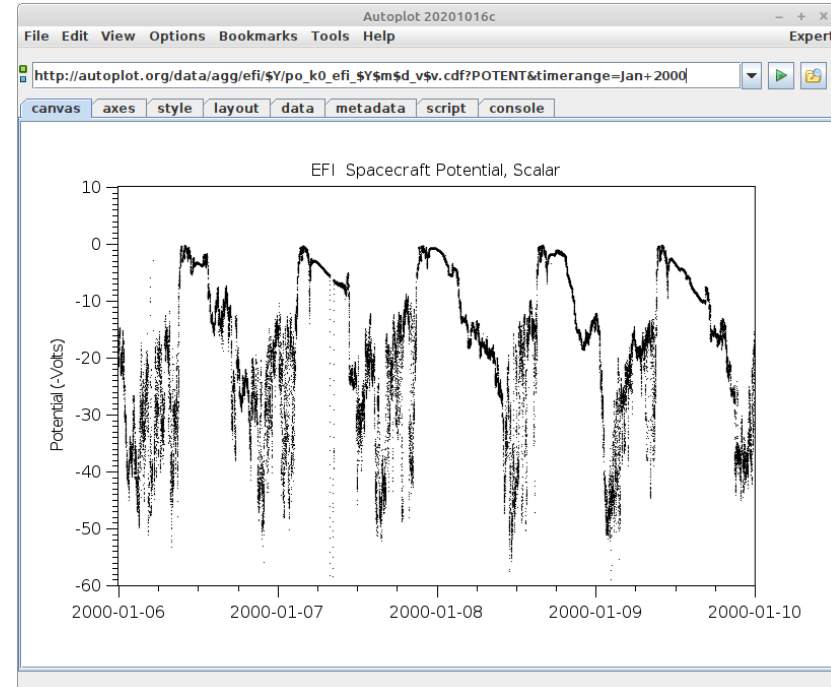
- Autoplot is a Java application for display of data, reading in data from many different sources.
- Data sources are identified by “Autoplot URIs” which are entered in the address bar at the top.
- Data is then displayed as spectrograms, lineplots, etc, depending on its structure.
- GUI editors allow scientists to create URIs.
- Lots of analysis can be done, such as slicing data, and also a scripting language (Jython) is provided for creating science workflows.

vap+hapi:http://amda.irap.omp.eu/service/hapi?id=mgs-er-omni&timerange=2006-10-10

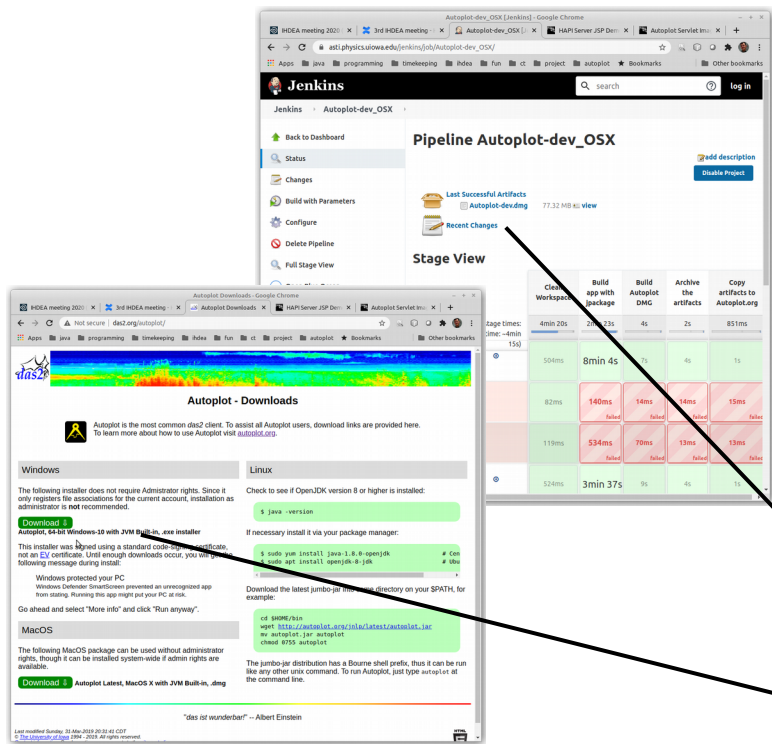


## 2, I mean, 2-Slide Autoplot Overview

- The URI can be a file on a remote server, and it will be downloaded.
- Autoplot can also take a template specification for filenames, like  
`http://autoplot.org/data/agg/efi/$Y/po_k0_efi_$Y$m$d_v$v.cdf?`  
`timerange=Jan+2000`
- The files within the time range are read in and “aggregated” together.



# New .dmg and .exe Release Methods



Convenient launchers which have Java embedded within are available. I'll continue to support Java Webstart.

Autoplot Application (v2020a\_11) - Google Chrome

Autoplot Application (v2020a\_11)

Launch

The image shows the Autoplot application window. It has a menu bar (File, Edit, View, Options, Bookmarks, Tools, Help) and a toolbar. The main window displays a plot of data with three series: EXY12G (blue), EZ12G (green), and ESPIN (red). The x-axis represents time from 00:00 to 00:00 on 2000-01-01. The y-axis represents values from -50 to 100. The plot shows several sharp peaks, particularly around 06:00 and 18:00. Below the plot, there is a table of data points.

Several datasets can be loaded at once from a CDF file.

Autoplot allows plotting of data from many data sources, including remote CDF files and OpenDAP servers. Datasets are identified with URIs, and by the URI's extension, data are loaded into the internal data model. Data are then displayed by guessing the rendering method and axis ranges to provide a reasonable, useful view of the data. Data can then be additionally processed with other operations like smooth and FFT, and Jython scripting provides a capable programming environment.

This is the Autoplot v2020a branch. This is an update to the production version containing bugfixes and minor new features. Java 7 is now required. Java 8 will be required sometime soon.

Run with 4GB of memory (64-bit Java only): [autoplot 4GB.jnlp](#)

Single-jar version, [autoplot.jar](#), can be run without network access and from the command line.

[Mac DMG Release](#) is available.

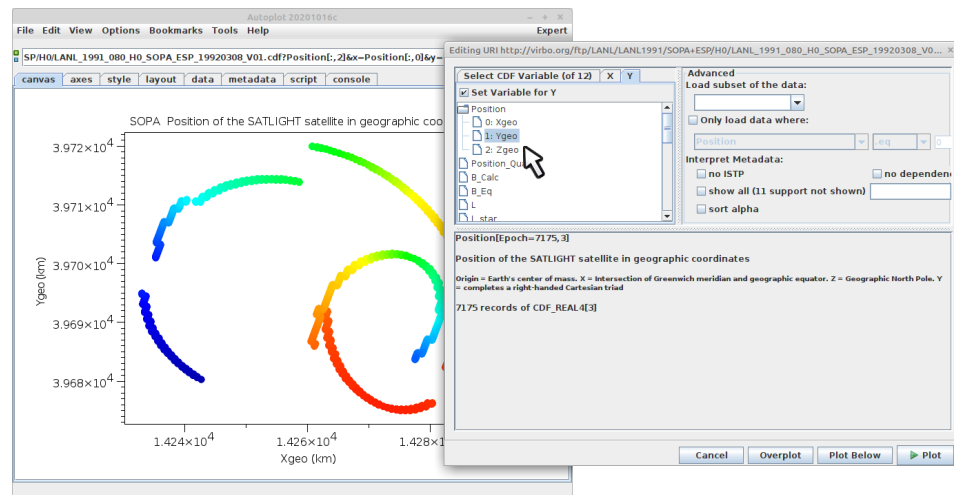
[Windows .exe](#) is available.

Bugfixes (2020-09-30 r25152):

- 2289: IOException when TAB is pressed in empty data set selector, instead of discovery of types.
- 2274: Handle redirect to authenticated URL. Thanks, Jon N and Kristoff!

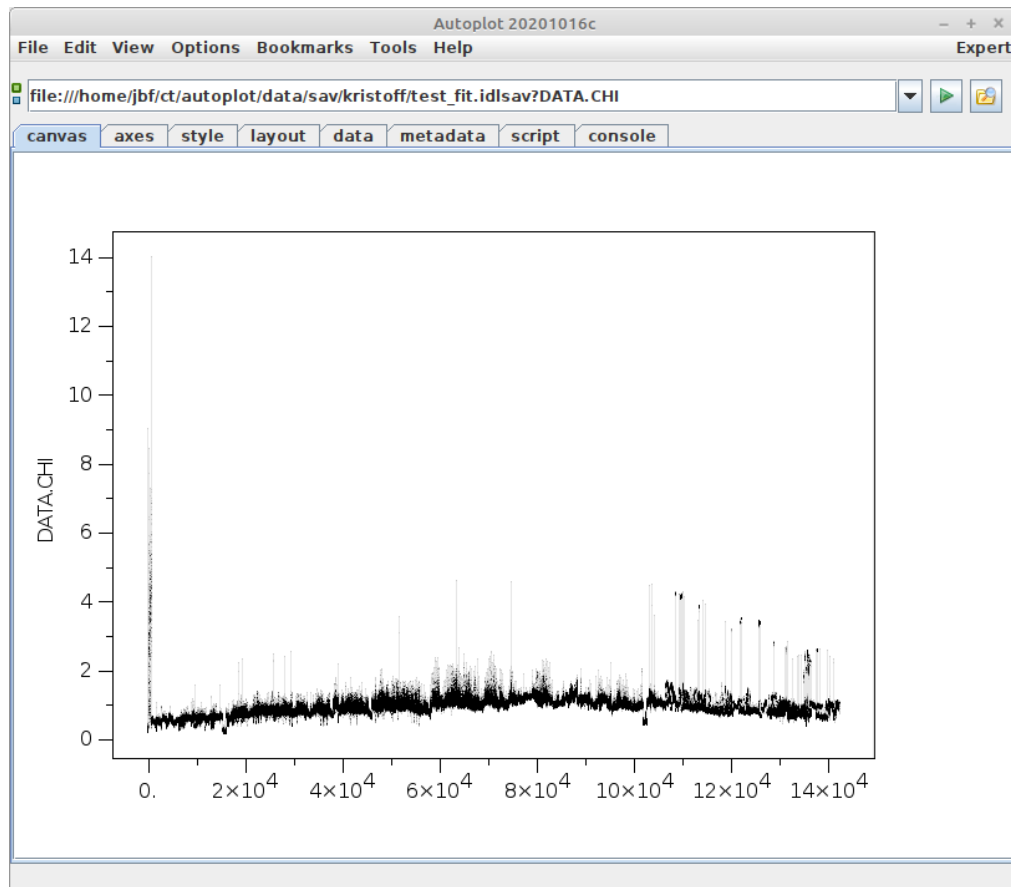
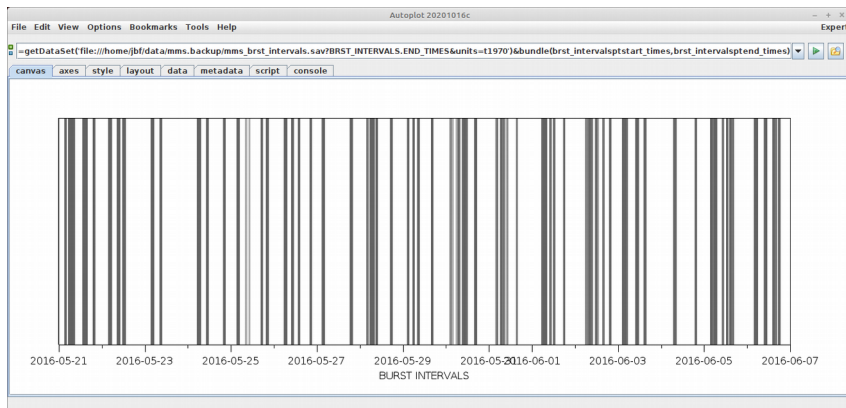
# CDF Improvements

- Load/Export multiple variables at once.
  - X,Y,Z
  - Load multiple for efficiency
  - Export multiple for efficiency
- Memory requirements and limitations.
  - 2GBytes per variable should be possible, but this is not coded.
  - Autoplot should support this.
  - Drop support for 32bit machines?
- Waveform Scheme is being adapted, support in CDAWeb
  - Radio and Plasma Waves group at Iowa has been using this form on many missions.
  - Other groups have similar data—to store a timetag for each measurement is very expensive.
  - For example, you have 2-D Voltage[Time,TimeOffset]
- Support similar features in NetCDF. I use a 3rd-party library where I don't have so much control



# IDLSave and .mat Support

- IDLSave files can now be read (you've been able to write for years.)
- Older Matlab .mat can now be read and written.
- Like with any other file format, you can aggregate files, etc.



# “Basic” Mode Revisited

The goal is to provide a means to “lock down” this flexible app for those unfamiliar with Autoplot.

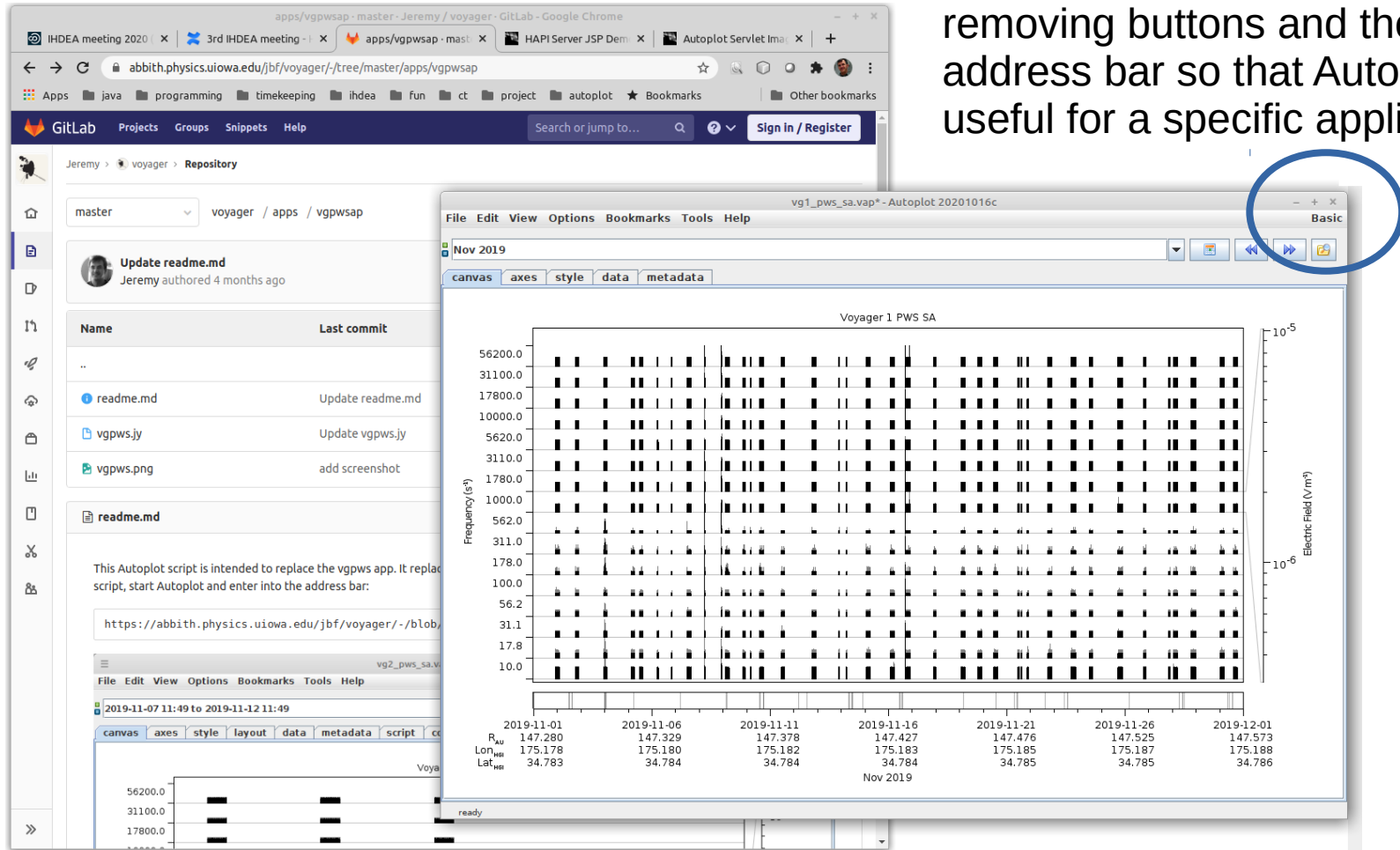
The image shows a web browser window displaying a GitLab repository for 'apps/vgpwsap'. The repository page lists files: '..', 'readme.md', 'vgpws.jy', and 'vgpws.png'. A black arrow points from the 'vgpws.png' file link to an Autoplot application window. The Autoplot window, titled 'Autoplot 20201016c', has a menu bar (File, Edit, View, Options, Bookmarks, Tools, Help) and a toolbar with a dropdown for 'Enter data location or select a bookmark'. Below the toolbar are tabs: 'canvas', 'axes', 'style', 'layout', 'data', 'metadata', 'script', and 'console'. The 'canvas' tab is active, showing a 2D plot with both x and y axes ranging from 0 to 100. The plot area is currently empty. At the bottom of the Autoplot window, a 'log console added' message is visible.

The unfamiliar scientist enters the script address into Autoplot’s address bar (or drags the link over), and the app runs.



# “Basic” Mode Revisited

Basic mode locks down the app, removing buttons and the address bar so that Autoplot is useful for a specific application.

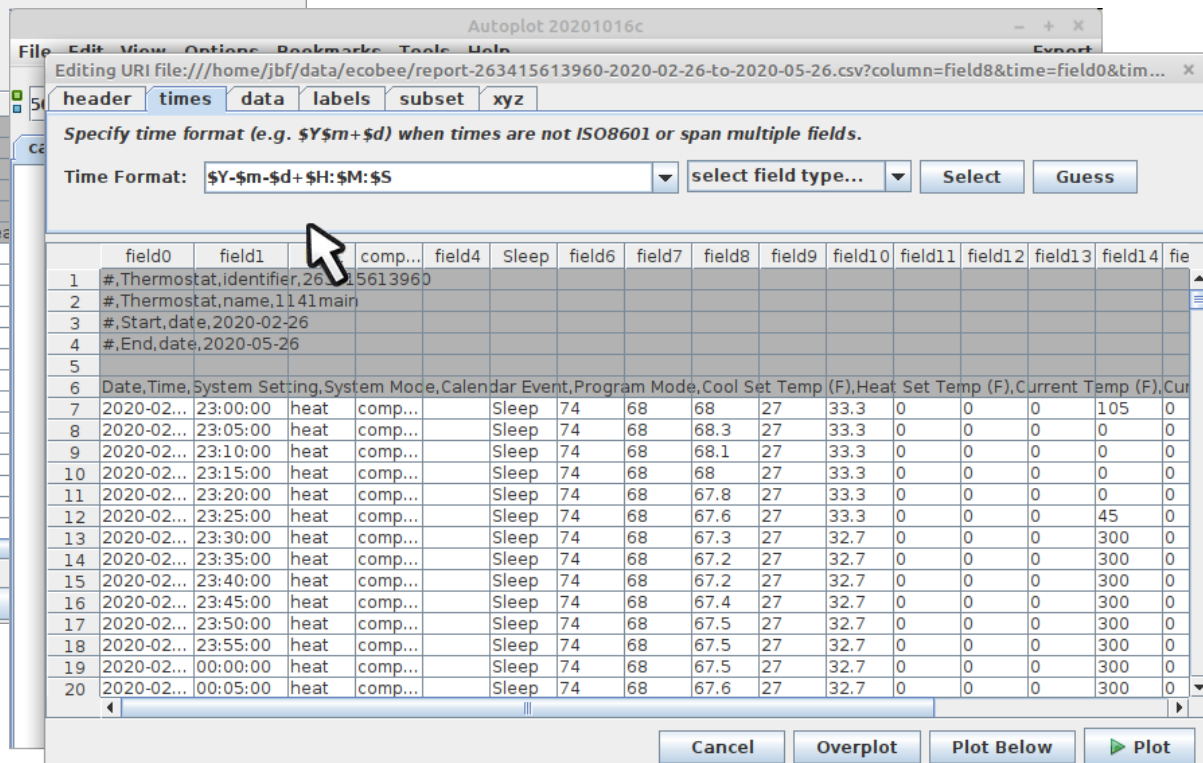
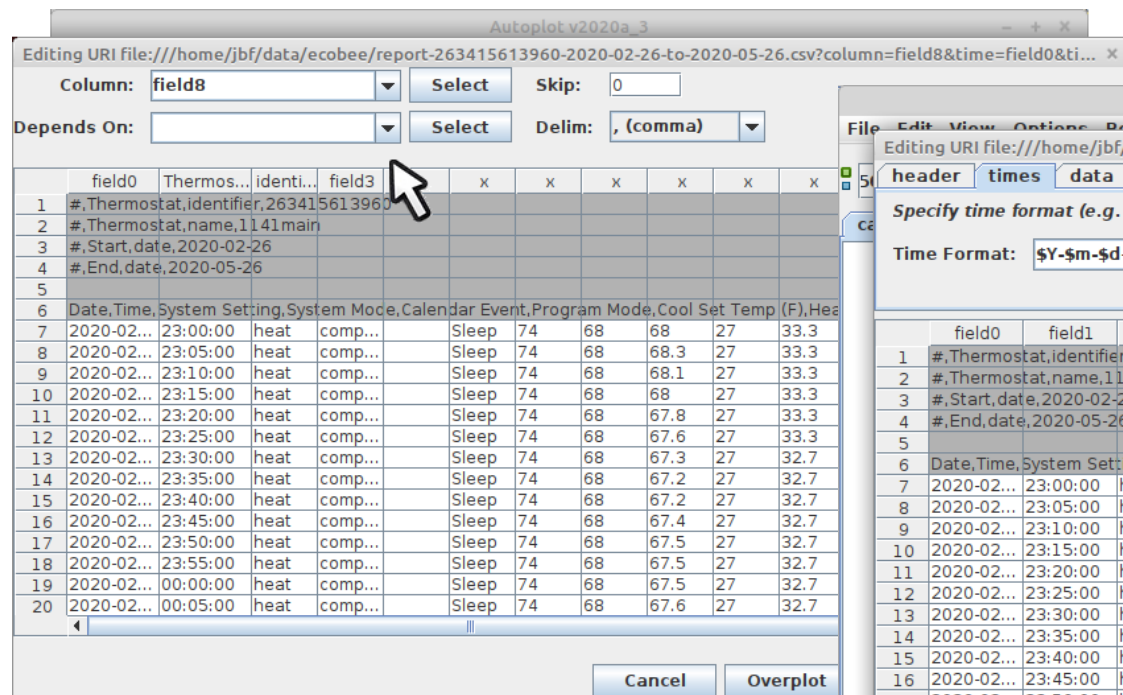


# Documentation

- Much of autoplot.org (a Mediawiki site) is being migrated to github. I have been slowly working on new documentation for the scientist-endusers. Feedback and requests are always welcome.
- Github site is full of scripting examples:  
<https://github.com/autoplot/dev/>

# ASCII/CSV Support

Autoplot's separate CSV and ASCII readers caused confusion for years.



CSV files are supported within the ASCII reader now, having been tested against hundreds of working CSV URIs. (Left is old Autoplot, right is new version.)

# URI\_Templates Feature Extracted

- Autoplot's aggregation (\$Y\$m\$d.dat) uses "URI\_Templates" and this has been extracted into an independent Java library.
- This also includes a fairly complete time-handling code and is unit-tested with 100% coverage.
- This is described on the other slideshow:

<https://indico.obspm.fr/event/427/contributions/501/attachments/350/497/AutoplotJavaScienceProcessing.pdf>

# HAPI Client Extracted

- Autoplot has a HAPI client within, but it could not be used independently from Autoplot.
- A clean Java HAPI client has been created as well. This handles client-side caching of data and is to be incorporated into other software systems.
- This is described on the other slideshow as well:  
<https://indico.obspm.fr/event/427/contributions/501/attachments/350/497/AutoplotJavaScienceProcessing.pdf>

Thanks!

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