

DELIVERABLE D50.1

Status Requirements and Development of the Instruments Pipelines

WP50 Tools for Innovative Data Handling: Pipelines, Databases
and SVO

1ST Reporting Period

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PROJECT GENERAL INFORMATION

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SOLARNET WP50 – Deliverable D50.1

Status of data reduction pipelines at 18 months into the project

2014-09-30

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SOLARNET Work Package 50.1 has as its aim to produce modern and user-friendly data-reduction pipelines for the major European ground-based solar instruments. These are mounted on the following telescopes: GREGOR, THEMIS, and VTT on Tenerife, SST on La Palma, and DST at Sac Peak observatory in the United States. The following is a status report as of September 30, 2014. The report is in the form of a table (Table 1 on page 2) with some comments.

The instruments

GFPI@GREGOR: A two-dimensional spectro-polarimeter based on a Fabry–Pérot Interferometer. Managed by AIP.

GRIS@GREGOR: An infrared spectro-polarimeter with a grating spectrograph. Managed by AIP.

BLISS@GREGOR: Not yet in operation, this will be an imager for blue wavelengths based on a Fabry–Pérot Interferometer. Managed by AIP.

CRISP@SST: A spectro-polarimeter for red wavelengths, 510–860 nm, based on a double Fabry–Pérot Interferometer. Managed by SU.

TRIPPEL@SST: A multi-line grating spectrograph. Managed by SU.

CHROMIS@SST: Not yet existing

imaging instrument for (far) blue wavelengths, based on a double Fabry–Pérot Interferometer. Managed by SU.

MTF@THEMIS: Multi-wavelength spectro-polarimeter. Managed by CNRS.

TUNIS@THEMIS: A two-dimensional spectro-photometer/polarimeter. Managed by CNRS.

TESOS@VTT: A Triple Fabry–Pérot Interferometer system. Managed by KIS.

LARS@VTT: A Spectrograph with a laser comb. Managed by KIS.

IBIS@DST: A Fabry–Pérot Interferometer system. Managed by INAF.

ROSA@DST: A high-cadence multi-band imaging system. Managed by QUB.

Table 1: Pipeline status.

Telescope	GREGOR			SST		
Instrument	GRIS-TIP	BLISS	GFPI	CRISP	CHROMIS	TRIPPEL
Institute	IAC	AIP	AIP	SU	SU	SU
In operation	Y	N	Y	Y	N	Y
\exists pipeline	Y	N	Y	Y	N	Y
Name	GRIS	sTools	sTools	CRISPRED	–	specred
Version	3	–	–	–	–	–
Released	download	–	download	git	–	request
Quick-look	Y	–	Y	Y	–	N
Interface	CL	–	GUI/CL	CL	–	N
Verified calib.	N	–	N	Basic	–	N
Meta-data	N	–	N	N	–	N

Telescope	VTT		DST		THEMIS	
Instrument	LARS	TESOS	ROSA	IBIS	TUNIS	MTR
Institute	KIS	KIS	QUB	INAF	CNRS	CNRS
In operation	N	Y	Y	Y	Y	Y
\exists pipeline	Y	Y	Y	Y	Y	Y
Name	larsrdc		(rosadrp)	ibis_lib		SQUV
Version	0.1.99.9		–	1.4		
Released	git	git	request	http	N	download
Quick-look	Basic	Y	Y	N		Y
Interface	CL not UF	GUI	CL+GUI	CL/batch		automatic
Verified calib.	Basic		N	N		
Meta-data	N	N	N	N	N	N

Comments on the table

In operation

CHROMIS and BLISS are not built yet.

LARS exists but is only used by developers for testing purposes.

GRIS-TIP: formally in the "science verification phase" but is actually in use since April 2014.

∃ pipeline

All existing instruments have a pipeline, capable of at least basic reductions.

Name

Most pipelines have a name and/or an acronym.

"CRISPRED" means CRisp Imaging SpectroPolarimeter REDuction pipeline.

The acronym "rosadrp" that appears in the table is not official. The real name is "ROSA data reduction pipeline".

Version

Version numbers in the table are as of October 2014.

CRISPRED and the BLISS pipeline do not work with version numbers (yet). Improvements and bug fixes are committed to the git repositories continuously.

Ibis.lib: Is validated by INAF and NSO scientists, every modification is agreed upon before being released with a new version number.

Version control of sTools will begin with the first thoroughly tested and stable release.

Released

The pipelines are available to observers/scientists via a variety of different mechanisms.

The larsrdc, the TESOS pipeline, and CRISPRED are under *git* version control. Users get access to improvements and bug fixes by pulling the latest changes to their own repositories.

Ibis.lib is available as a tar archive via a link from <http://nsosp.nso.edu/dst-pipelines#IBIS>.

The GRIS, and MTR pipelines are available for download from computers at the observatory sites, known to observers.

The specred and rosadrp packages are available from the developers on request.

The developers of sTools are planning to officially release an initial version for basic reductions of GFPI data in December 2014. The current (development) version is however already available to observers from the GREGOR/VTT computer system.

The MTR@THEMIS standard pipeline SQUV is available for download from the observatory site. There exists an alternate pipeline, DeepStokes, available upon request.

BLISS and CHROMIS do not exist yet. BLISS data reductions are planned to be handled with the same pipeline (sTools) as GFPI.

Quick-look

Some instruments or their pipelines have provisions for quick-look data products, movies or image sequences that allows

the observer to quickly assess the quality of a data set.

LARS: very basic quick-look tools, but final data products can be obtained in a few steps with the pipeline.

GRIS: Quick-look data (i.e, I, Q, U and V spectral images) are generated in real time during the observations.

sTools does not need to produce quick-look data products as this is handled by the observer's GUI for GFPI.

SQUV runs automatically at the observatory so that a standard data reduction is performed in almost real time.

Interface

Some pipelines are operated through a Graphical User Interface (GUI), others from the Command Line (CL) of either the operating system/shell or a compute environment like IDL. Also CL-operated pipelines can be called user-friendly if the user is not required to know where intermediate data is stored.

LARS: CL, not user-friendly.

CRISPRED: Initial handling of calibration data and setting up for MOMFBD image restoration through IDL CL, mostly but not entirely automatic. MOMFBD started from shell CL. Post-restoration steps again from IDL CL.

ROSA: Initial handling of calibration data and setting up for KISIP image restoration through IDL CL. KISIP run from a GUI. Back to IDL CL for post-restoration steps.

GRIS: The interface is an IDL CL

with very input few parameters. Observers can very easily produce scripts to automatically reduce a large number of files with few code lines.

sTools: programs can be started via a GUI and from the command line. Various debugging modes and capabilities for batch processing are included in the software design.

Verified calibrations

In order for a pipeline to operate without user-interventions, it is desirable that it automatically verifies the success of the various steps in the computations and alerts the user in case of problems. This is particularly important for the integration of calibration data.

Most pipelines are lacking in this respect.

CRISPRED and LARS: very basic consistency checks.

sTools: Nothing automatic. There are many instantaneous checks for errors during data acquisition. All calibration data are archived for monitoring the long-term performance of the GFPI.

Meta-data

Inclusion of science data in a Virtual Solar Observatory archive with search capabilities requires the data to be tagged with relevant meta-data. SOLARNET WP20.3 will soon issue the requirements.

We expect most pipelines to implement this tagging soon after the requirements are released.