

LEIBNIZ INSTITUT FÜR ASTROPHYSIK POTSDAM



LEIBNIZ-INSTITUT FÜR SONNENPHYSIK (KIS)



MAX PLANCK INSTITUT FÜR SONNENSYSTEM-FORSCHUNG

GREGOR:
Guider

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Signatures & Approval

	Name	Signature	Date
Prepared by	Grassin - KIS Software engineer		2024/05/21
Reviewed by			
Approved by			
Released by			

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1 Scope

This document explains the details of the GREGOR Guider interface and its use.

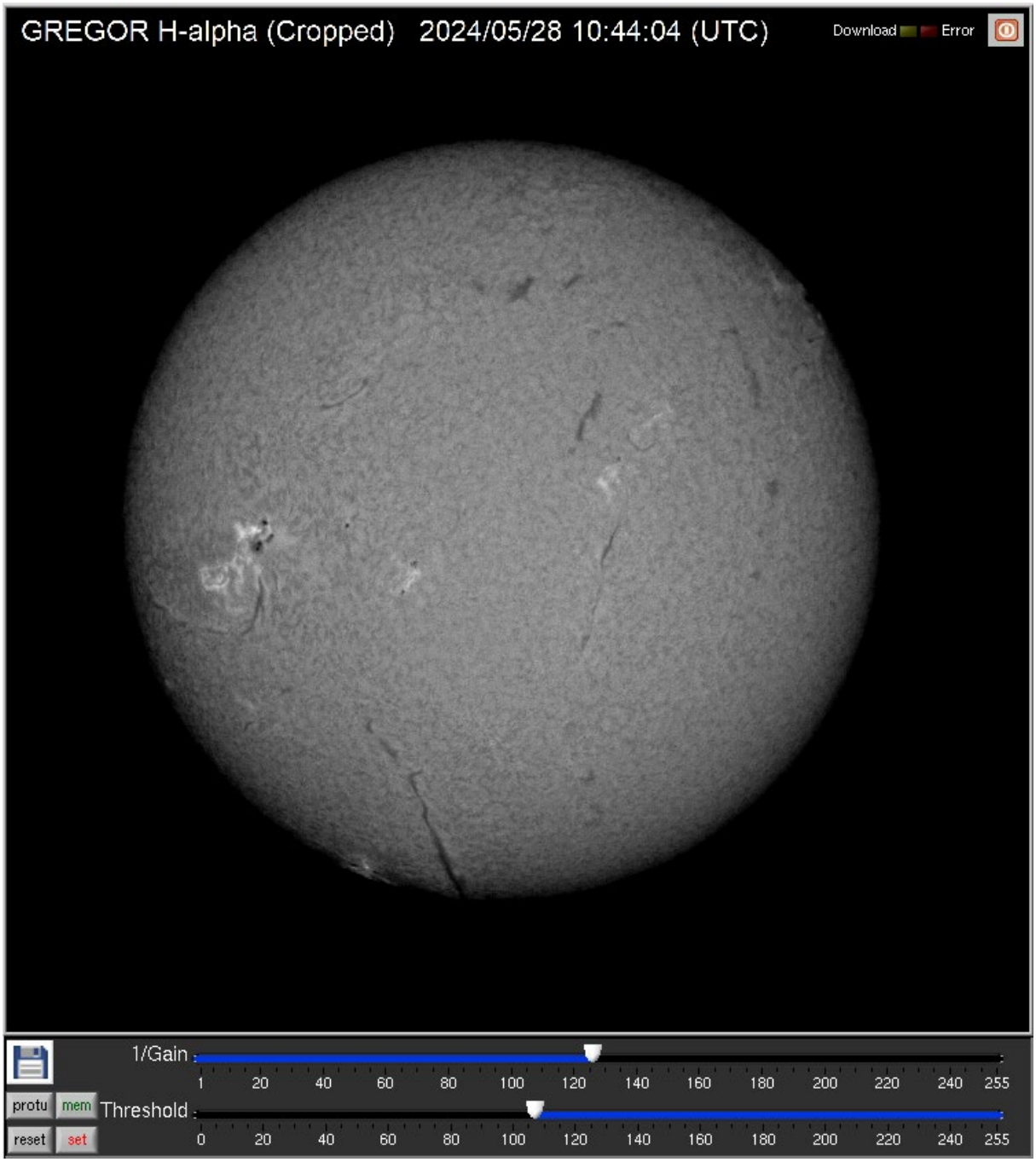


Figure 1 - Interface

2 Reference and applicable documents [if needed]

3 Overview

In the GREGOR control system, it is mandatory to supervise the correct telescope tracking. Since the telescope is aligned toward to the Sun and the M1 cover is opened, it is important to be sure of its correct positioning and be able to actuate in case of misalignment leading to possible burning reflections, fire, etc.

During a normal use as in observations, the user makes sure of a good tracking and can follow the Sun activity over the day. The user can adjust the picture controls, selecting a best contrast of the Sun elements as filaments, spots, flares and prominences…

4 Guider system structure

The Guider system, is composed of two parts; the image acquisition system and the interface software. Both are connected via the local network.

5 Image acquisition

In short, the images are generated from an acquisition system. It is built with a LUNT telescope (60mm providing H-alpha wavelength) mount at the lower part of the GREGOR tube, an IDS UI-5290FA-M-GL GiG camera, a PC running the LabVIEW VISION software on Windows 10, for the image acquisition and hosting an Apache server, to publish the produced pictures on the intranet.

6 Installation

The interface program is a LabVIEW virtual instrument, running on Linux Cent OS 7.

Its last version (2024-05-17) is available in Leibniz-GitLab server.

The remote port for "remote panel" operation is: 8016

The executable is built on LabVIEW64-15 from the Guider project (Guider.lvproj)

It is installed on the GCS computer in the "//opt/G_Control/Guider" directory as the "Guider" executable. Here is the files tree (in blue: directories, in green: executable):

./config

./config/Guider_config.ini

./images

./Guider

./Guider.aliases

./Guider.conf

./niwebserver64.conf

7 Starting the interface

First of all, verify if the Guider interface is not already running, checking the desktop and the "LabVIEW64-2015" minimized elements group, at the GCS desktop. Then, in a way to launch the interface, open the ICS available on the GCS desktop taskbar; if the ICS interface is not visible, look inside the "LabVIEW-2015" minimized elements group of the taskbar. If not, run it from the start menu.

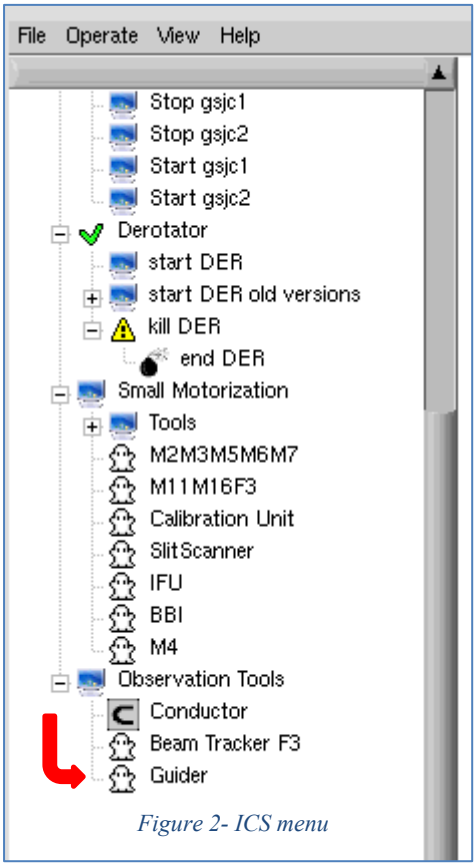


Figure 2- ICS menu

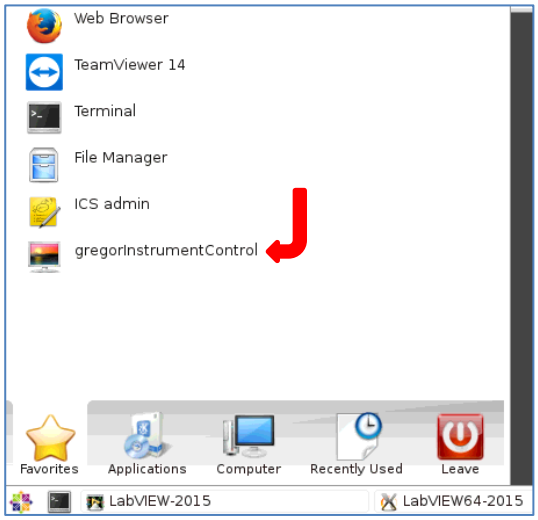


Figure 3- GCS Start menu

From the left menu, double-click the "Guider" icon; the interface will start immediately.

8 Interface software

As a LabVIEW virtual instrument, the interface is shared in two parts. The front panel is graphically organized into 2 sections; image and indicators on the upper side, buttons and sliders on the lower one.

The block diagram shows the software, here detailed:

- Remote panel configuration and activation
- Initialization / configuration
- Main loop for image downloading
    - Display/Error management
- Loop for user events [100ms]
    - Image zoom
    - Image adjustments/calculation
    - Presets
    - Image saving
    - Exit

At a first step, the interface configures and enables its remote panel, to be visible from a client on the network. It is possible to access it from the Gregor Flight Stations, through the FS-ICS (Gregor Instrument Control System) launcher. A quick view of the interface is also available from a web browser at the URL: "gcs.tt.iac.es:8016/.snap?Guider.vi"

Then, it initializes its variables, reads the configuration file where are stored program variables as the image server URL and the loop delay to refresh the image…

After these steps, the software enters the main loop to download and show the camera image, applying the settings defined by the user.

It is also possible to render the image visualization at a x2 zoom. In fact, it shows then the image at its 100% size, as it is normally displayed at half size. In this function, it will be described further a tip to keep the visualization in zoom mode.

Presets are also available for sliders positions, allowing to swap easily from predefined settings (as Limb protuberances, user preset, raw image).

A save image function allows the user to keep in the hard disk ("images" directory) a snapshot of the current image.

8.1 Front panel

The interface includes the following elements: image display, download indicators, 2 sliders, 4 preset buttons, a disk save and an Exit buttons. There is also a visible green light indicator while an image is saved.

8.1.1 Image display

The display size is 750x750 pixels, reducing by 2 the original size of the camera picture.

During operation, the Sun should be seen, with different intensity along the day. The most visible fluctuation is seen in the early morning and before sunset, or due to Calima and clouds.

Choosing a region of the Sun, the user can do a left click (maintained) with the mouse, to zoom x2. Releasing the button, the zoom returns to normal.

In some cases, to follow the visualization of a region waiting for flares for example, it is convenient to keep the zoom x2, without to keep the mouse button manually clicked.

Just double-click on the zone of the image to observe and the zoom x2 is kept on the display and the user can also adjust the image settings.
Here is a tip, to do the same behavior:

- Click on the desired region and maintain the mouse button down.
- Drag the mouse cursor outside the display.
- Release the mouse button.

These settings are continuously applied to the downloaded image.

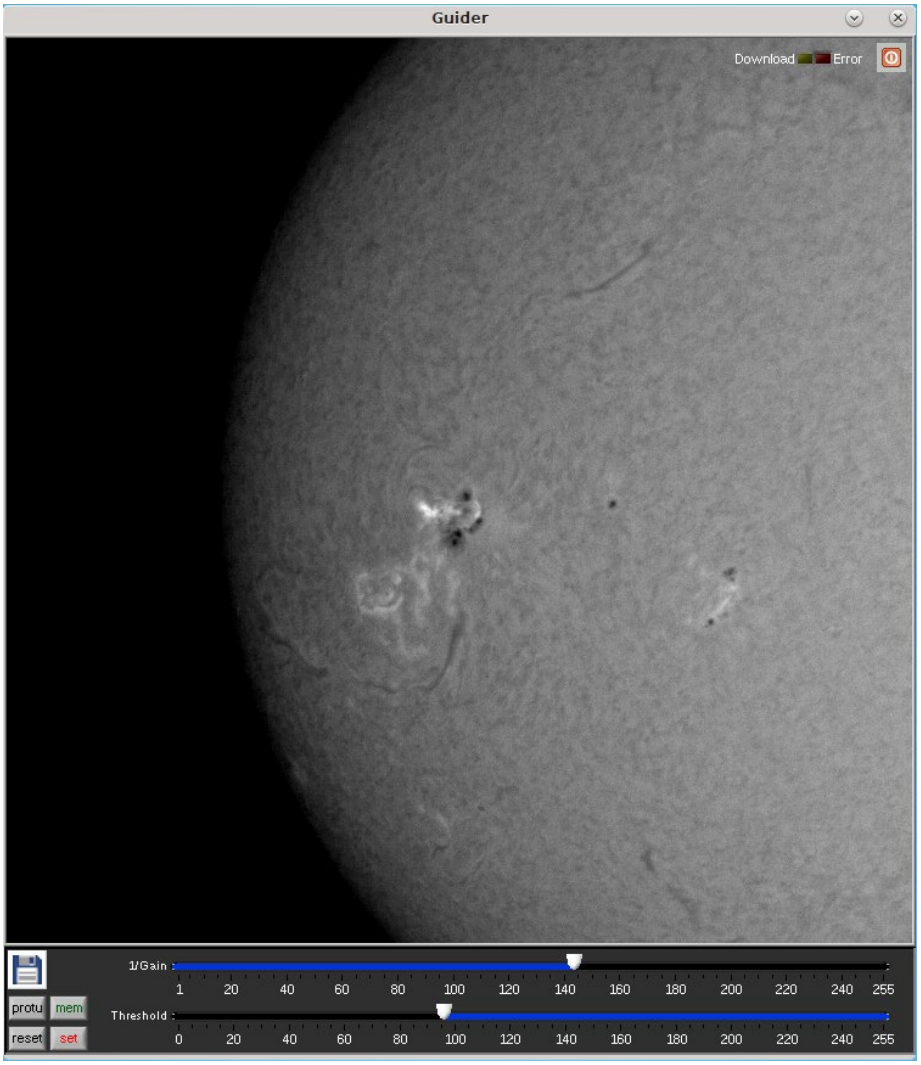


Figure 4 - Zooming

8.1.2 Exit button

At the right top corner of the interface, a button allows to stop the VI and exits.



Figure 5 - Download indicators

8.1.3 Download indicators

In the above picture, the Download indicator shows the image acquisition and goes lightened (in yellow) while the image is downloading.

In case of network/server problem and the image cannot be downloaded, the Error indicator is lightened (in red). If it occurs, check the network communication of the server, currently: "leon.tt.iac.es". From a browser the web page should be visible, as:



Figure 6 - Web page images index

8.1.4 Slider controls

The Threshold slider allows to move to intensity levels of the image. Increasing the slider value will decrease the intensity of the image, resting its value to all pixel intensity and losing the respective information below. The result is: more the slider increases, less will be the image luminosity.

The 1/Gain slider actuates as an amplifier of the intensity value, extending the range of luminosity. The less the slider value is, the more intensity is applied to all pixels, corresponding to a contrast adjustment. As the image intensity varies from 0 to 255, the 1/Gain should be from 1 to 255, to avoid a 0 division. Low value will produce an intensity saturation. In combination with low values of Threshold, this image will show possible limb prominences.



Figure 7 - Sliders

8.1.5 Preset buttons

The 4 preset buttons allow the user to fast swap to 3 defined configurations:

- The "set" button grab the current slider position in memory.
- Then, this configuration can be recall at any time pressing the "mem" button.
- The "protu" button will adjust the sliders to a default position where Sun protuberances are visible on the limb.
- The "reset" button configures the sliders to default positions without modification to the image.



Figure 8 - Preset & save buttons

8.1.6 Disk save

Clicking on the Disk button saves the current Guider image with its applied settings, to the "images" directory at the GCS computer (//opt/G_Control/Guider/images/), available for further use.

A green indicator LED lights ON, during the disk saving operation… (see image above)

9 Configuration file

The configuration file keeps the external variables of the program and could be changed according to the need. Here are listed the current parameters:

[Network]

GuiderImageAddress = "leon.tt.iac.es"

[General]

LoopDelay = 2000

[Protu]

ProtuGain = 12

ProtuThreshold = 6

[Preset]

PresetGain = 120

PresetThreshold = 100