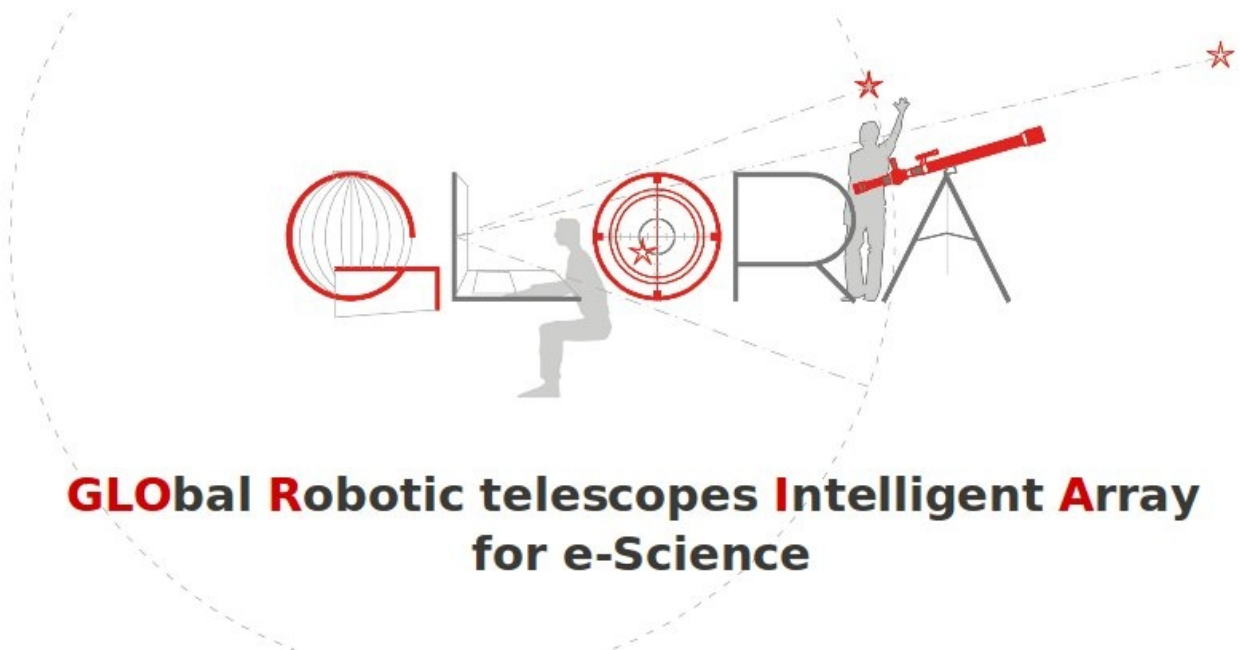




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# On-line demonstrator experiment implemented

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**Change Control**

Issue	Date	Section	Page	Change Description
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**Reference Documents**

N°	Document Name	Code	Version
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## 1. Introduction

This deliverable outlines the implemented online demonstration experiment (see also R.1) alongside the online experiment under development to observe the Sun and calculate the Wolf Number.

## 2. Demonstration Online Experiment

This simple online experiment allows a user to view live webcam images of some of the GLORIA telescope domes in order to determine telescope status in response to commands transmitted through the network. While this is scientifically the simplest of tasks, this demonstration of Liferay portlets in action shows how they work and how can be used for GLORIA ahead of the forthcoming full integration of telescopes into the network. More detail is given on this in R.1.

The demonstration experiment is made of three Liferay web portlets: a web camera alongside dome and telescope controls.

### 2.1. GLORIA Web Camera

This portlet is used to show the images of a webcam (CCD or surveillance) installed in an observatory.

1.- When the GLORIA Web Camera portlet is added for the first time, it can be set up to display appropriate images. To do this, the user must click on the icon of "tools" at the top right and then "preferences" (Figure 1).

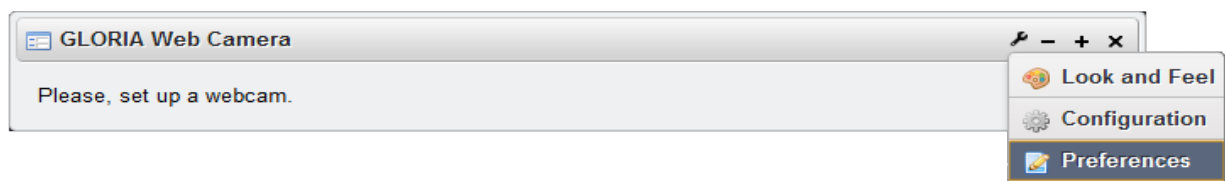


Figure 1: GLORIA Web Camera preferences.

2.- In the general settings tab, the user can select a camera of observatories, telescopes and cameras availables in GLORIA (Figure 2)

Figure 2: GLORIA Web Cam general settings

After selecting the camera, the camera data (the URL of the camera image, its coordinates, a title and a short description) will be displayed before the user adds it to the portal. The behaviour of this menu is detailed in the table below :

Content of General setting	Description	Available
Select observatory	Shows all available observatories GLORIA.	OK
Select telescope	Shows all available telescopes of an observatory.	OK
Select CCD camera	Shows all available CCD cameras of a telescope.	OK
Select surveillance camera	Shows all available surveillance cameras of a telescope.	OK
Title	Title to display in the portlet.	OK
Description	Description to display in the portlet.	OK
URL	URL of the camera images.	OK
Coordinates	Coordinates of telescope	OK

3.- In the visibility options tab, the user can configure the camera controls they want to add the portlet (Figure 3):

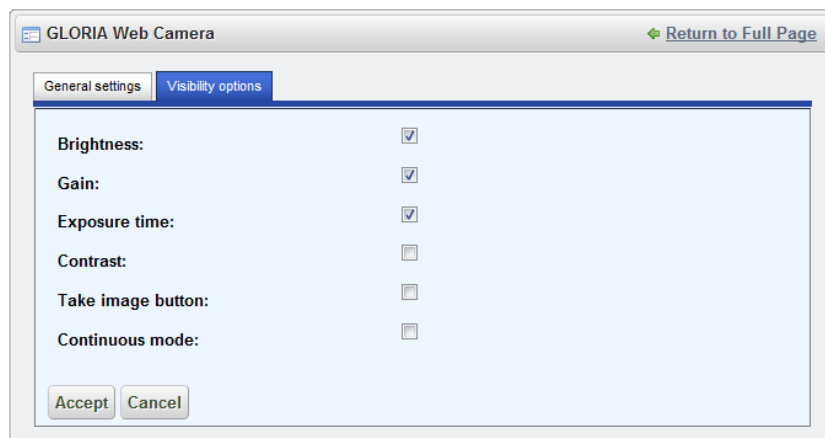


Figure 3: GLORIA Web Cam visibility options

Content of visibility options	Description	Available
Brightness	Shown in the portlet, the brightness setting controls.	OK
Gain	Shown in the portlet, the gain setting controls.	OK
Contrast	Shown in the portlet, the contrast setting controls.	OK
Take image button	Shown in the portlet, the take image button.	OK
Continuous mode	Shown in the portlet, the continuous mode setting controls.	NO

4.- When configuration is complete, the user presses accept before clicking on "Return to Full Page" in order to return to the main view of the portlet (Figure 4).

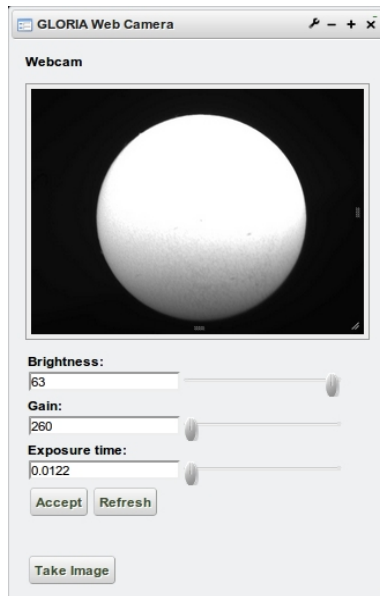


Figure 4: Different settings for GLORIA Webcam. A CCD camera configured of the Montgancedo Observatory.

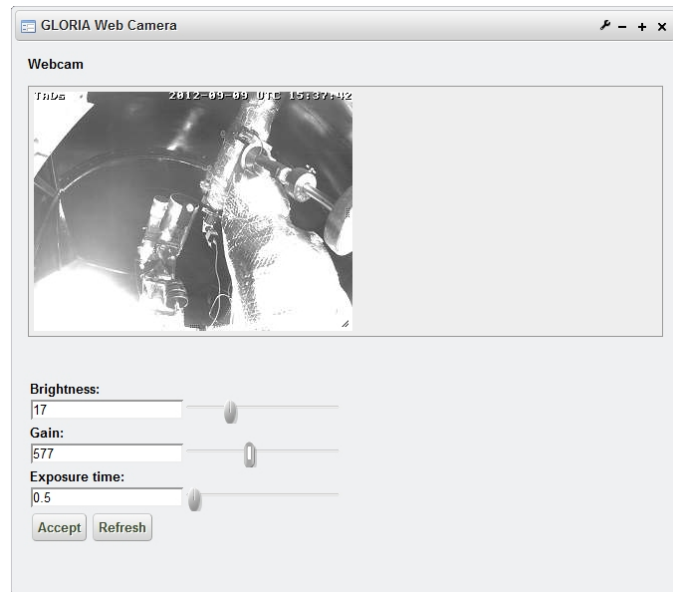


Figure 5: Different settings for GLORIA Webcam. A surveillance camera configured of the Teide Observatory.

- 5.- Clicking on “Accept” button, the camera is configured with the values inserted.
- 6.- Clicking on “Refresh” button, fields are updated with the values of the camera.
- 7.- Clicking on “take Image” button, a big image (see Figure 7) is generated with the settings configured in the camera and is shown in a new window, where users can download the image to their computer.

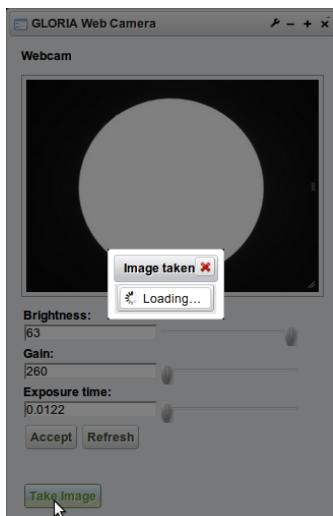


Figure 6: Action of “take image” button. Pop-up of loading image.

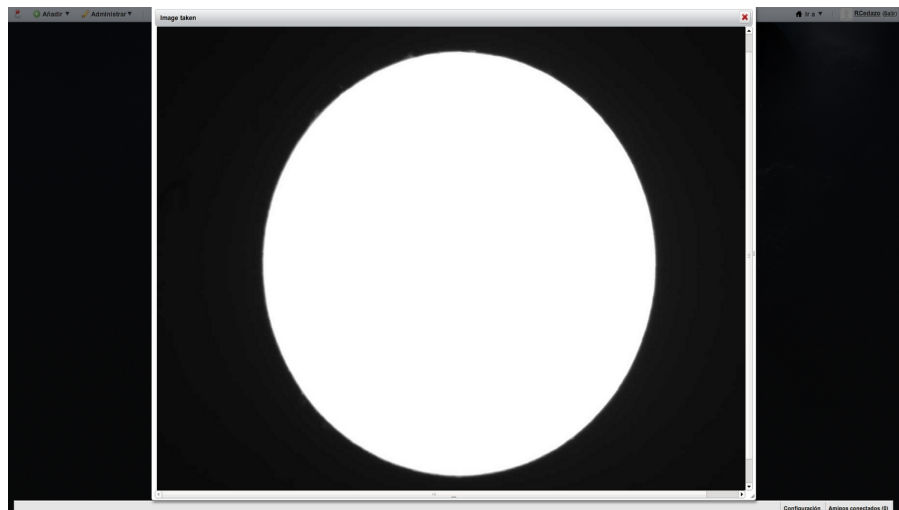


Figure 7: Action of “take image” button. Pop-up of image generated.

## 2.2. GLORIA Dome Control

This portlet is used to control the dome installed in an observatory.

- 1.- When GLORIA Dome Control portlet is added for the first time, it must be set up. To do this, the user must click on the icon of "tools" at the top right and then on "preferences" (Figure 8).

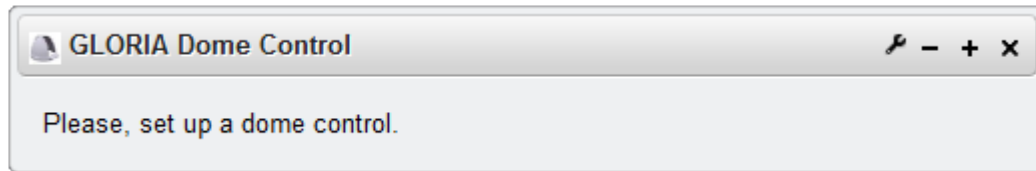


Figure 8: Initial message of GLORIA Dome Control

2.- The dome control includes an image, and so in preferences, the user can select a camera from the observatories, telescopes and dome availables in GLORIA (Figure 9)

Figure 9: GLORIA Dome Control preferences.

Content of preferences	Description	Available
Select observatory	Shows all available observatories GLORIA.	OK
Select telescope	Shows all available telescopes of an observatory.	OK
Select dome	Shows all available domes of a telescope.	OK
Show webcam	Shown in the portlet the image of a camera.	OK
Select camera	Shows all available cameras of a telescope.	OK
Show open button	Shown in the portlet, the open dome button.	OK
Show close button	Shown in the portlet, the close dome button.	OK
Show stop button	Shown in the portlet, the stop dome button.	NO

3.- When configuration is complete, press accept and clicking on "Return to Full Page" we return to the main view of the portlet (Figure 10).





Figure 10: GLORIA Dome Control configured.

4.- Clicking on “Open” button, the dome is opened.

5.- Clicking on “Close” button, the dome is closed.

### 2.3. GLORIA Telescope Control:

This portlet is used to control a telescope installed in an observatory.

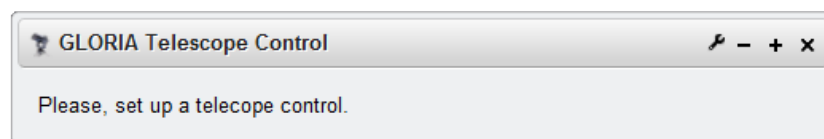


Figure 11: Initial message of GLORIA Telescope Control

1.- When GLORIA Telescope Control portlet is added for the first time, it must be set up. To do this, must click on the icon of "tools" at the top right and then to "preferences" (Figure 11).

2.- In preferences, one can select a camera of observatories, telescopes and mounts availables in GLORIA (Figure 12)

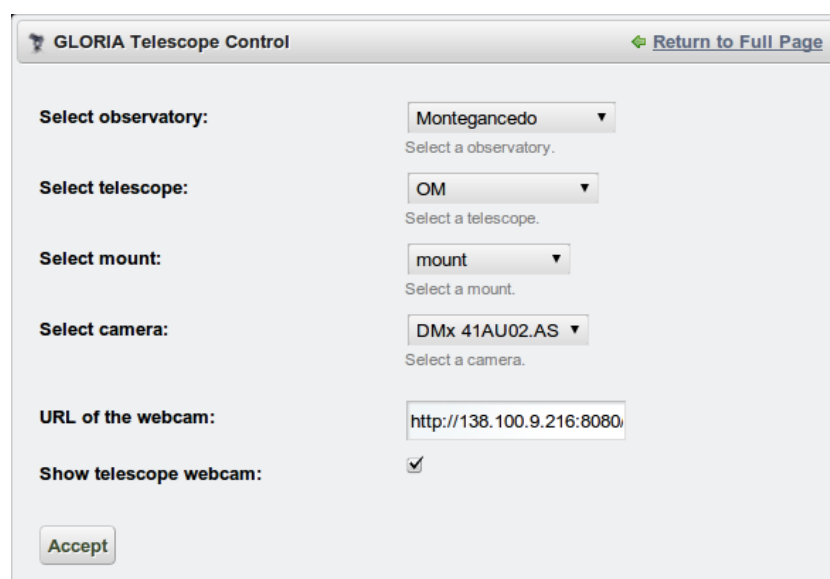


Figure 12: GLORIA Telescope Control preferences.

Content of preferences	Description	Available
Select observatory	Shows all available observatories GLORIA.	OK
Select telescope	Shows all available telescopes of an observatory.	OK
Select mount	Shows all available mounts of a telescope.	OK
Select camera	Shows all available cameras of a telescope.	OK
URL of the webcam	URL of the camera images.	OK
Show telescope webcam	Shown in the portlet the image of the camera.	OK

3.- When configuration is complete, pressing accept and clicking on "Return to Full Page" returns the user to the main view of the portlet (Figure 13).

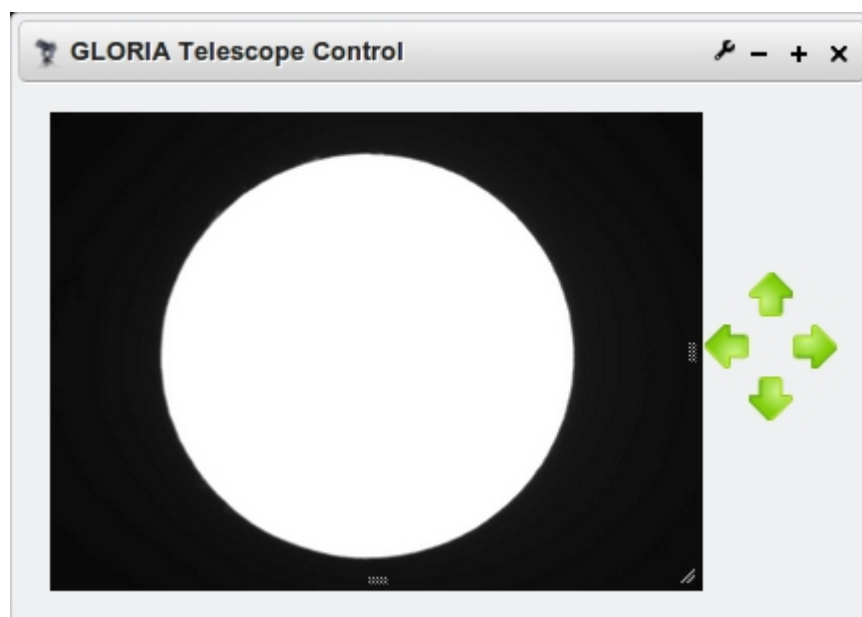


Figure 13: GLORIA Telescope Control configured.

4. -The arrows can then be used to take control of the telescope. Clicking up arrow, the telescope moves to the north.
5. -Clicking right arrow, the telescope moves to the east.
6. -Clicking left arrow, the telescope moves to the west.
7. -Clicking down arrow, the telescope moves to the south.

### 3. Online Education Experiment: Solar Observing

In order to demonstrate that even the limited functionality already provided on the GLORIA network can produce interesting results, the collaboration has developed material to support organised solar observing across the network. This experiment makes use of the tools described above to allow users to record the number of individual sunspots and sunspot groups, in order to make an estimate of total solar activity. As with many online experiments, the same tools and methodology can be used to investigate archive data as an offline experiment, and an extension which makes use of an automatic analysis pipeline is also possible.

The educational objectives to be achieved through this project are :

1. The application of a methodology for calculating an astrophysical parameter (in this case, the Wolf index)

from observations (digital images of the Sun) as a technique for teaching and research, applying basic knowledge of statistics and solar physics

2. The application of basic analytical image processing techniques.

A video (screencast) of this system in action can be found at the link below, and it shows the concept of controlling the telescope, seeing the mount move and then downloading the results.

Video: <http://youtu.be/V7RNUrKD1nw>

### 3.1. Data and Web Components

Specialist equipment is required in order to image the solar surface. Two of the GLORIA telescopes are equipped for such work - the Solar TAD (Open Telescope Outreach, <http://www.ot-tad.com>), and Montegancedo Robotic Telescope (<http://om.fi.upm.es>) - although in principle images could also be incorporated from other, public, repositories. Further details of the implementation of this first scientific online experiment is given in deliverable 3.10.

## 4. Future Work

Once the network is fully online and operational, the tools described above can be quickly implemented in a workflow in order to provide a straightforward interface to complete the education activity outlined above. This will then form the first online experiment being used by the GLORIA community.

## GLORIA Partners



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