Soonspot: user guide

The program Soonspot allows to calculate the heliographic coordinates and areas of sunspots from solar images very simply and quickly.

Soonspot has three different steps, linked to very user-friendly interfaces. In the first one the user must set the solar limb, choose the binarization threshold and select the sunspot groups.The second step allows to calculate the center and area in pixel of each sunspot. Finally, in the third step, user must enter the observation date and time. Then, heliographic coordinates and area in msh (millionth of solar hemisphere) are showed for each sunspot.

INSTRUCTIONS

1. FIRST INTERFACE:

Important: for the correct running of the software, images must be in the same folder of Soonspot executable.

1.1. Fixing the solar limb (step necessary to determine the solar radius in the image): user must click three times wherever on the solar limb. Double click to finish. There is a zoom option to improve accuracy. User can change solar limb as many times as he/she want.

1.2. Selecting the binarization threshold: user can zoom the image and change the binarization threshold as many times as he/she want before click on select sunspot. Click on “reset” for changing value.

1.3. Selecting sunspot: user must click twice on the selection area after select sunspot to save it. Moreover, sunspot thus selected is showed as a black and white image on the left up corner to compare it with the original one. There is a zoom option in both images to improve accuracy. Clicking on “clear” all sunspots selected are erased. Click on “next” when finished. This interface remains open during the entire process to allow changes anytime.

2. SECOND INTERFACE:

2.1. Press to “set” on “set sunspots”: pressing on this button soonspot calculates the center of gravity of each sunspot and shows all areas of selected sunspots (in pixels). User can see the original and the black and white sunspot images with their areas.

2.2. W-E direction: user must click in two different point of image, once for the first point and twice for the second. First point must be further west than the second one.

2.3. N-S direction: user must click in two different point of image, once for the first point and twice for the second. First point must be further north than the second one.

Note that the default orientation is: left-west, east-right, top-north, bottom-south.

2.4. Click on Solar “N” at the top if image is orientated following the solar rotation axis. Click on Terrestrial “N” at the top if image is orientated following terrestrial rotation axis. This is the default value. Click “next” when finished.

3. LAST INTERFACE:

3.1. Observation date and time: user must enter the observation date (day, month, year) and time (hour, minute) in U.T. (Universal Time).

3.2. Solar parameters: pressing on the button “show solar parameters” soonspot calculates the solar parameters P, B_0 and L_0 for the observation date and time. User must always click on it before calculating heliographic coordinates. These are displayed in the section “heliographic coordinates”, after pressing the corresponding button, along with the areas in msh.

3.3. Save file: the results can be saved in two ways:

-As an Excel file: choosing xls file format user can save the following data in an Excel file.

First row: date and time of observation and Sun's parameters
Second row and next: from the first to the last column
1) Sunspot name 2) TH (polar angle, degrees) 3) r/R 4) Ro (radial coordinate) 5) Area (pixels) 6) B (degrees) 7) L (degrees) 8) Area (msh) 9) CMD (angular distance to the central meridian)

-As txt file: choosing txt file format user can save the following data in a txt file.

First row: Headers line
Second row and next: from the first to the last column
1) Sunspot name 2) TH (polar angle, degrees) 3) r/R 4) Ro (radial coordinate) 5) Area (pixels) 6) B (degrees) 7) L (degrees) 8) Area (msh) 9) CMD (angular distance to the central meridian)
Last row: date and time of observation and Sun's parameters