Dave's Video Stabilizer

User Manual

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2015

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INTRODUCTION

Dave's Video Stabilizer (DVS) is software that can remove the shakes from a sequence of time-lapse frames.

It is designed to be very simple to use with all commands available via buttons – it has no menu bar.

DVS can perform the following actions.

- Align an image sequence to pixel or sub-pixel accuracy.
- Manual alignment of problem frames.
- Crop edges of frames for export.
- Add text and graphics overlays, including images with transparent regions.
- Export to AVI or image sequence.
- Perform astrometry on image pairs to measure object motion.

DVS can also be used to crop and add overlays to single images.

DVS QUICK START INSTRUCTIONS

Install Microsoft .NET Framework 4
You need the Microsoft .NET Framework 4 on your PC for this software to run. If it is not already on your PC or you can install it from [here](#).

Download DVS
Download the zipped software package and unzip it to your hard drive. Open the unzipped folder and run the file called DVSv4.7(.exe) or similar. You can create a shortcut to this file or pin it to your start menu to make it easier to launch.

This version works on both Windows 32bit and 64bit.

Load Demo Frames
Go to www.starrydave.com, open the Downloads page and download and unzip one of the DVS demo frame sequences.
Click the 1. Load button and select all the demo frames. Give DVS time to load the frames.

Align Frames
Move the Alignment Settings dialog until you can see the whole frame.
Click on a feature on the frame.
Click the Align frames button and watch DVS align the frames.
Click the Hide button.

Adjust Crop Settings
Click the 4. Crop button.
Adjust the numbers in the Crop Settings dialog as required.
Click the Hide button.

Adjust Overlays
Click the 5. Overlays button.
Change the scale disk diameter to 15 which is the correct value for this sequence.
Click on the scale disk M(ove) button and hold down the mouse button. Drag down and to the right to reposition the disk.
Change 'New text here.' to 'Earth to scale'.
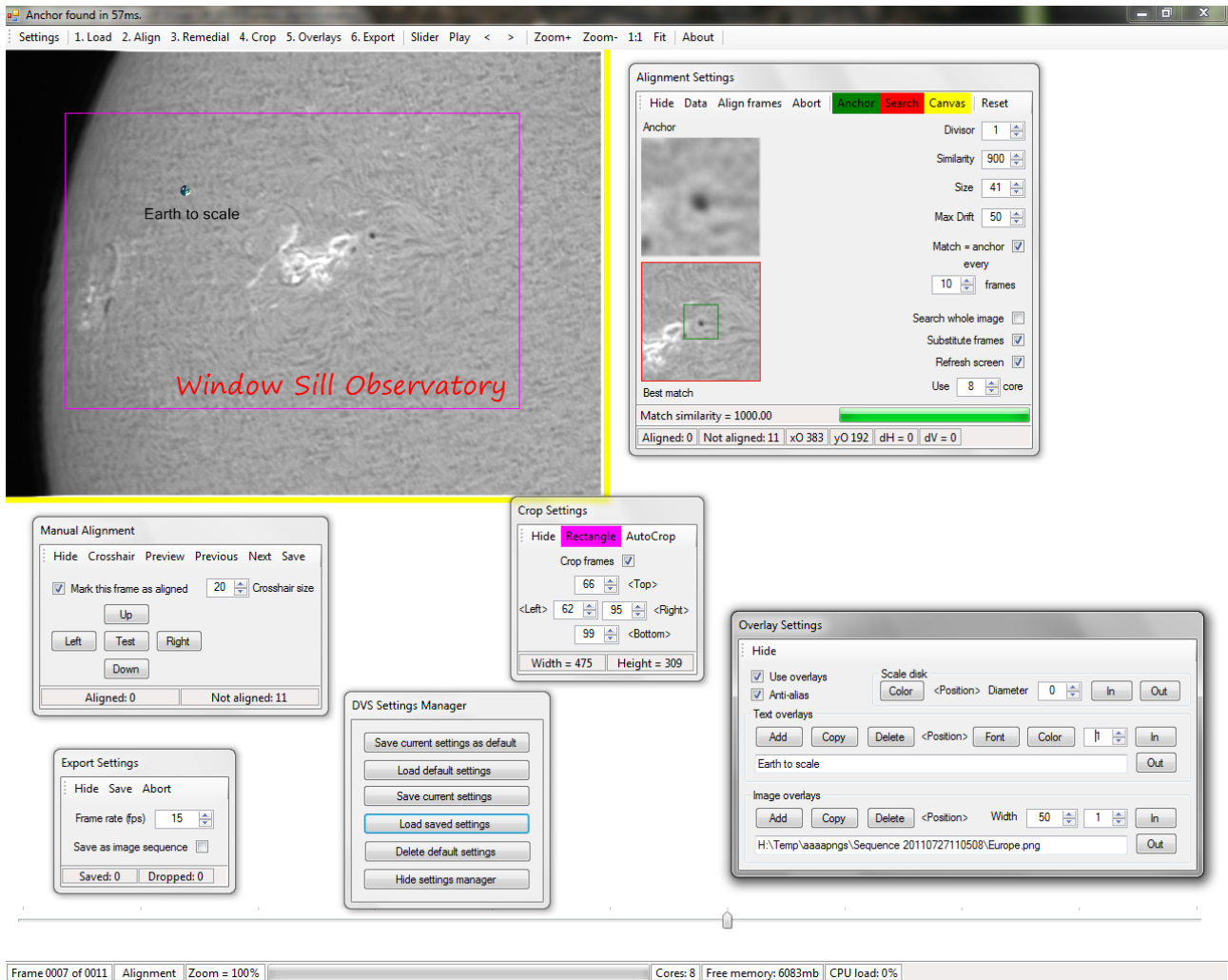Drag on the text overlays M button to reposition the text under the disk.
Click the Hide button.

Export
Click on the 6. Export button.
Click on Save and then Save again to export the raw video clip.

DVS MAIN WINDOW

The DVS main window has a toolbar at top and a status bar at bottom. Also, the top title bar is used to display messages to the user. The frames window is displayed after you have loaded your frame(s).

The toolbar buttons are arranged in the following main groups:

Actions – processing steps 1 to 6.
Playback – play and step forward and back.
Zoom – adjust zoom level.

The bottom status bar displays the following (left to right):
Current frame number.
Frame aligned?
Crop?
Overlays?
Zoom factor.
Progress bar.

There is also a slider bar that can be used to move within the frame sequence. Left-click on the Slider button to switch it between top and bottom of the screen. Right-click on it to hide or show the slider.

SETTINGS BUTTON
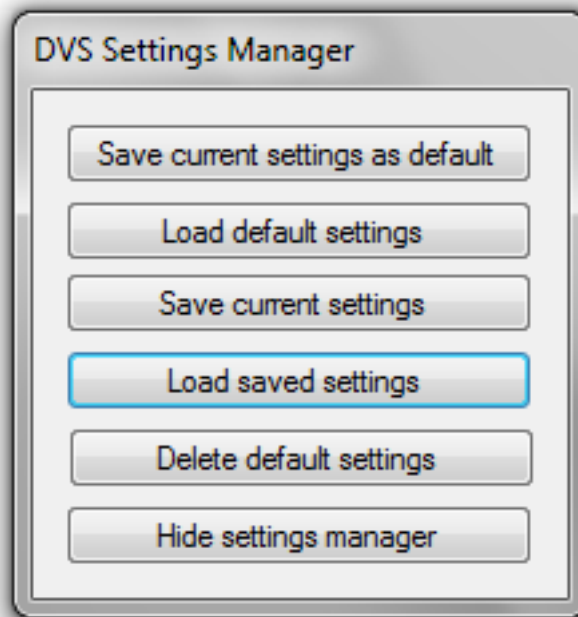
This launches the Settings Manager. This is a powerful feature because it lets you store different settings files for each of your target objects. For instance, you can have one settings file for solar prominences and another for Jupiter timelapse animations.

All the current overlays are saved with the settings file. This is useful for saving templates of frequently used overlays such as credits, copyright, etc.

The Settings Manager has the following controls.

Save Current Settings As Default
Saves the current settings as the DVS default settings which will be loaded on startup.

Load Default Settings
Loads your DVS default settings. These settings are loaded by DVS on startup.

Save Current Settings
Saves the current settings to a file of your choice.

Load Saved Settings
Load a previously saved settings file into DVS.

Delete Default Settings
This deletes the default settings file. Factory settings will be loaded by DVS at next startup.


Notes.
You should save a default settings file as soon as possible. Otherwise, DVS will startup with factory settings.

If you use settings files as overlay templates, you should first position your overlays at top left. This means they will be visible regardless of the size of the new frames you want to apply them to.

The currently loaded image format will be saved as the default for the Load images dialog.

The default folder for settings files is My Documents\Window Sill Observatory\DVS. You can change this folder to 'hidden' if you don't want to display it.

1. LOAD BUTTON
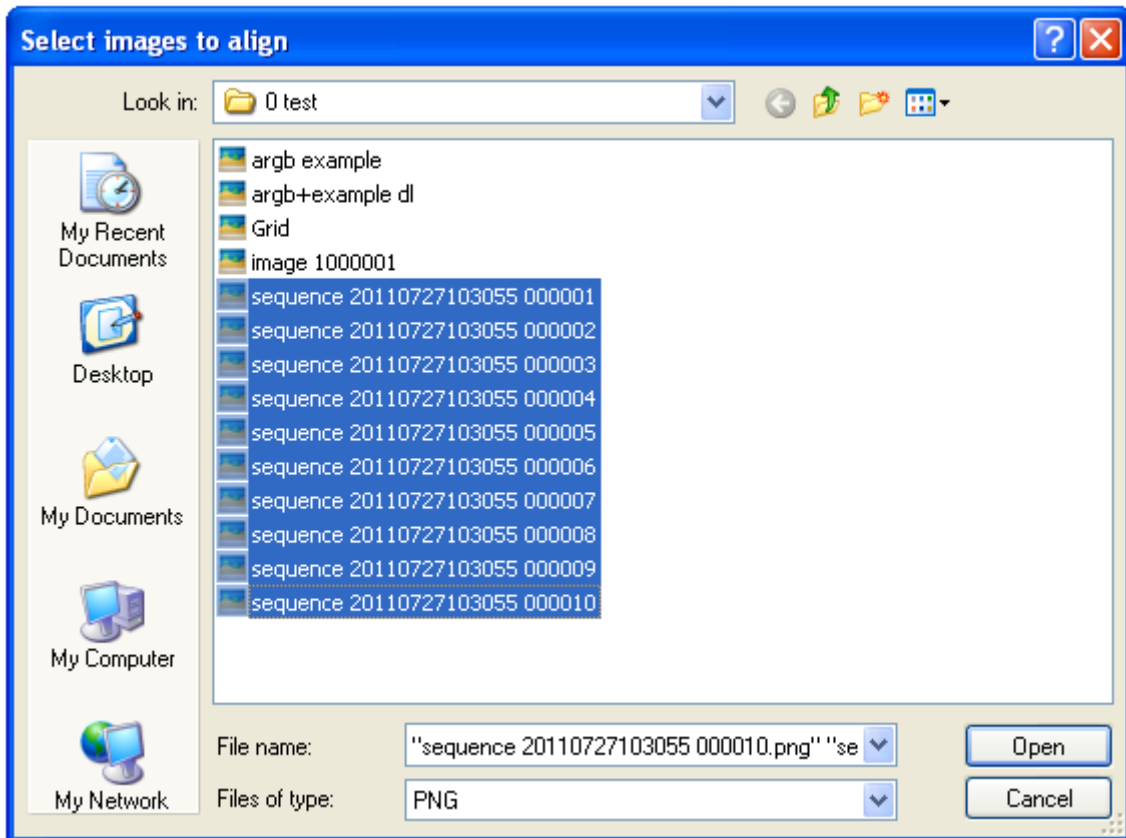
Left-click to display the above dialog for image sequences which have different image dimensions (width and height). Right-click for a faster load of images all with the same dimensions.

Use the Files of type dropdown to display images of type PNG, JPEG, BMP, GIF or TIFF.

Select a single image or multiple images and then click the Open button.

DVS will then load and perform a preliminary analysis of each frame. This may take several minutes for large image collections.

Once all images are loaded, DVS will display the Alignment dialog as detailed in the next section.

The frame slider will also be displayed which you can use to move around the animation.

2. ALIGN BUTTON
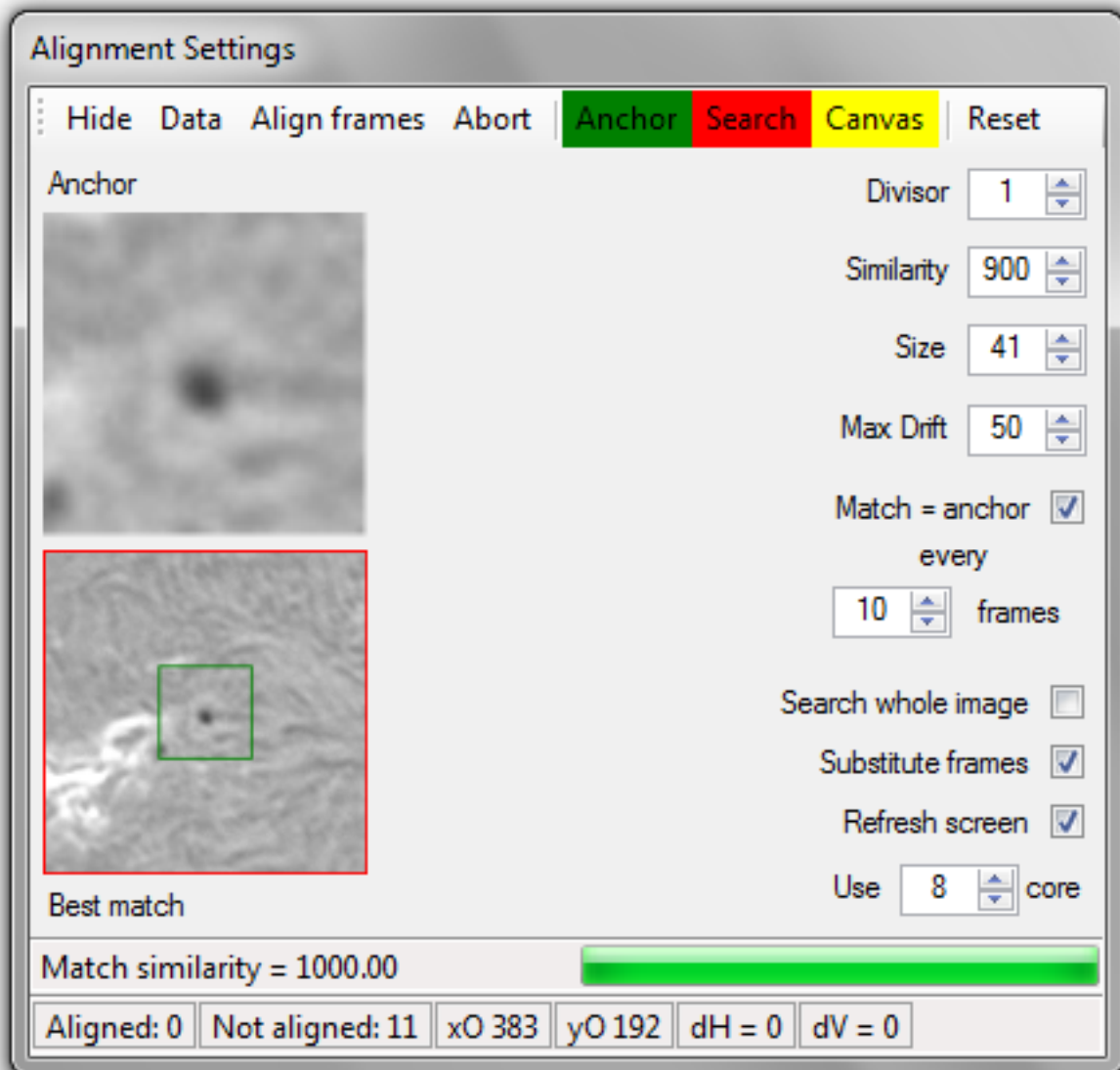
This button displays the Alignment dialog above. At first, the Anchor and Best match images are empty, so the first thing to do is to left-click on a prominent feature to use as the anchor point.

You will then see the bottom status bar showing the coordinates of the original anchor point (xO and yO) as well as the horizontal and vertical drift (dH and dV) of the best match that DVS found on this frame. The match similarity is also shown numerically as well as on a progress bar.

DVS will try to position this anchor point in the same place in each frame. You can do a trial alignment by dragging the slider to any frame and waiting until DVS finds the best match. DVS will report if it is unable to find the target point.

You can select a new anchor by simply left-clicking on any frame.

Top ToolBar Buttons

Data
Click to load an existing alignment data file from disk. Then enter the multi-pass factor which will be 1 for single passes. See notes below.

Align Frames
Click to start frame alignment. DVS will step through each frame in turn and try to find the best match for the anchor. The Alignment dialog will report if any frames were not aligned. You can then launch the Remedial dialog to correct them or go directly to the Crop dialog. DVS will save a timestamped copy of the alignment results data to disk.

Abort
Click to abort frame alignment. If you have selected the search whole image option, it will take some time for DVS to abort.

Anchor, Search and Canvas
Click to select the color for the boxes round the anchor and search areas as well as the background canvas color for frames.

Clear Anchor
Deletes the current anchor selection and marks all frames as non-aligned.

Alignment Settings

Divisor
Use this to adjust the sub-pixel accuracy of DVS. A value of 1 will align to the nearest pixel, 2 to the nearest ½ pixel, 3 to the nearest 1/3 pixel, etc. The time taken to align goes up as the square of this number so a value of 5 will take 25 times longer to align than a value of 1.

Similarity
Sets the minimum acceptable similarity between the anchor and best match.
1000 = perfect match.

Size
Size in pixels of anchor box. Higher values take longer to process.

Maximum Drift
Allowable drift of best match from original anchor position. Higher values take longer to process.

Match = Anchor every Z Frames
Replaces the original anchor with the latest best match every Z frames. Useful for anchor features which are changing rapidly.

Search Whole Image
This option searches the whole image for the best match. This is very slow and should only be used in extreme cases.

Substitute Frames
If unchecked, DVS will drop any non-aligned frames at export time. If checked, DVS will substitute non-aligned frames with the nearest previous aligned frame. Useful for keeping the correct time-line on animations with non-aligned frames.

Refresh Screen
Use this option to enable or disable screen refreshes during alignment. Disabling screen refresh speeds up the alignment process.

Use X Cores
Select the number of processor cores that DVS is allowed to use. More cores mean shorter alignment times.

CPU Snooze (s)
Use this setting to put DVS to sleep for the specified number of seconds between frames to allow CPU cool down. Set to 0 for full DVS power on well cooled PCs.

Notes
You can try setting the anchor point on a frame near the middle of the animation. This increases the chance of a match being found on all frames because it halves the number of frames between the anchor and furthest frame.

The size and drift values are applied to the sub-pixel size determined by the divisor setting. For example, you align an animation with divisor 1 and the maximum drift observed is 8. Changing divisor to 3 will give a maximum drift of 24 and you should change the drift value to suit.

Using 2 cores will increase alignment speed by 1.9x. 8 cores will give a 5.3x increase.

Sustained use of multiple cores may damage your PC.

For very large image sequences, you can run an initial pass on a smaller version of the image sequence. To do this, make a resized copy of your sequence in VirtualDub using the Video>Filter>Resize filter – let's say you make a 1/10th sized sequence. DVS can align this 100 times faster to save the first data file. You can then load the full-sized sequence and load the data file and enter a multipass factor of 10. This will roughly align your full-sized sequence to the nearest 10 pixels.

3. REMEDIAL BUTTON
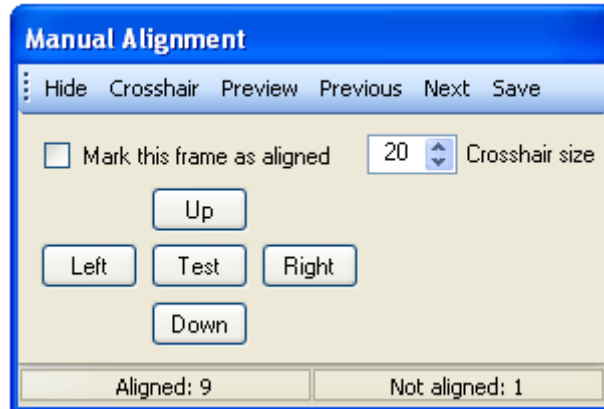
This button will open the Manual Alignment dialog which you can use it to manually align problem frames.

The commands are:

Crosshair
Display a crosshair on the original anchor location. The crosshair color is the same as the anchor box and the size is adjusted using the numeric up down control.

Preview
Click this to flick rapidly between the current frame and the frame just before it when the direction buttons are pressed. This helps to align the frames.

Previous
Move to the previous non-aligned frame.

Next
Move to the next non-aligned frame.

Save
Click to save a timestamped copy of the current alignment data to disk.

Speed
Increase this number to increase the preview flick rate.

Mark as Aligned
This box will display whether this frame was aligned or not during the alignment routine. You can use this to override the automatic alignment result.
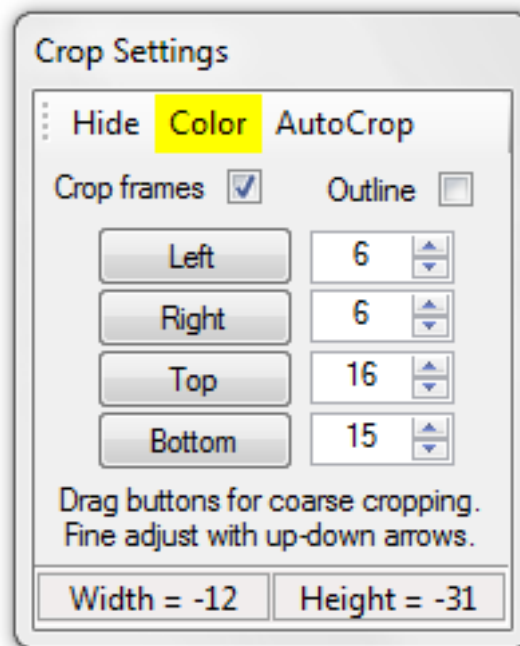
Up, Down, Left and Right
Click these buttons to nudge the current non-aligned frame by a single pixel or sub-pixel. Hold down the Shift key while clicking to move 10 pixels per click. You should mark the frame as aligned once you are happy with its alignment.

Test
Click to flick rapidly between the current frame and the frame just before it.

4. CROP BUTTON

The crop dialog is used to trim the edges of the frames before export. The cropped (or uncropped) frame dimensions are shown at bottom.

The settings are:

Color
Select the color of the crop rectangle.

AutoCrop
Automatically calculate the minimum crop rectangle and display it.

Crop Frames
Turn on or off frame cropping.

Outline
Switches between showing the crop rectangle as an outline or as a solid frame.

Crop Dimension Boxes
These display the current pixels or sub-pixels to crop from each edge of the frame. You can adjust these numbers directly. You can also adjust them by clicking and dragging on the adjacent buttons . Click-drag horizontally Left or Right, or vertically on Top or Bottom. The crop rectangle will change size accordingly.

Notes
The crop rectangle only shows on aligned frames.

Some video codecs need even values for frame dimensions. Some DivX codecs need even heights and widths a multiple of 4.

The AutoCrop will crop to the edges of the largest possible aligned frame set. However, there may still be some bright lines along the edges that were inserted by your stacking software that you may want to crop further.

5. OVERLAYS BUTTON
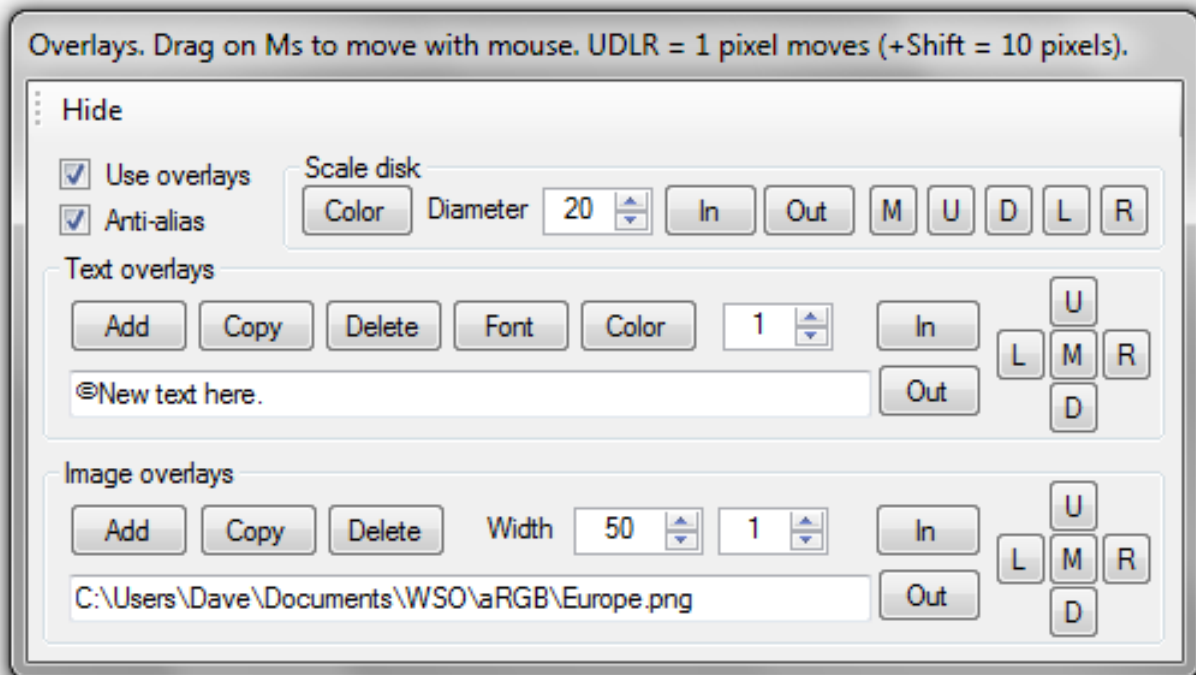
The overlay settings control how DVS adds overlays to your image or animation. There are 3 types of overlays:

Scale disk – 1 only
Text – any number
Image – any number

The settings are:

Use Overlays
Toggle use of overlays.

Anti-Alias
Toggle anti-alias smoothing of scale disk and text overlays.

Common Settings

Color
Set color of relevant overlay.

M (Move)
Click and drag on these buttons to adjust the position of the relevant overlay.

U, D, L, R (Up, Down, Left, Right)
Click on these buttons to move the relevant overlay by 1 pixel. Hold down the Shift key while clicking to move by 10 pixels.

In and Out
Set current frame as mark-in or mark-out points for relevant overlay. Use these points to control overlay visibility.

Index (Text and Image)
Switches between different overlays.

Add
Add a new overlay.

Copy
Copy the current overlay.

Delete
Delete the current overlay.

Other Settings

Scale Disk Diameter
Set the diameter of the scale disk. Set to zero to hide disk.

Text Overlay Font
Sets the font, size and effects for the selected text overlay.

Image Overlay Width
Sets the width of the selected image overlay. The height is derived automatically from the original image dimensions.

Notes
All dimensions are in whole pixels. Overlays will be scaled as required to display properly.

Image overlays can have transparency masks.

A selection of overlays are available for download here

http://windowsillobservatory.wordpress.com/support/

Time stamps can be applied to each frame using text overlays as follows:

DSSRTIME will display the capture time from DSSR file names in local time. Make sure the last 6 digits of the file name still show the capture time after processing the video.

DSSRUT will display capture time from DSSR file names in universal time.

CALCTIME from HH:MM:SS to HH:MM:SS will calculate the time to apply to each frame.

Any text after the PREFIX or SUFFIX keywords will be added to the time stamp.

Copy and paste these examples into a text overlay text box to see the options:
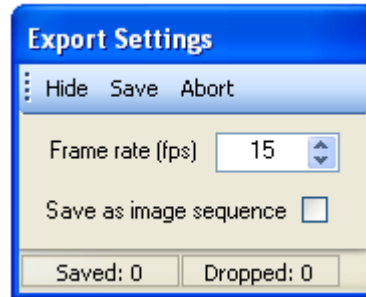
DSSRTIME

DSSRUT

CALCTIME from 12:15:56 to 15:07:03

CALCTIME from 22:00:00 to 06:00:00 PREFIX Universal time =

DSSRUT SUFFIX UT on 12th February, 2012

6. EXPORT BUTTON

This dialog is used to set the export settings for your animation. The settings and controls are:

Save
Save loaded image(s) as uncompressed AVI video, PNG image or image sequence (PNG).

Abort
Abort save routine.

Frame rate
Set AVI frame rate (frames per second).

Save as image sequence
Save animation as sequence of PNG images with sequential numbering.

Saved and Dropped
Displays how many frames were saved and dropped during export.

Notes

Maximum size of saved AVI video is 4GB. Sequences larger than this should be saved as image sequences.

SHARING YOUR ANIMATIONS

DVS is not intended to be a fully featured video editor. It is designed primarily to perform specific tasks needed by astronomers. The video output is uncompressed AVI which needs to be compressed before public release. Below are some tips on sharing your DVS animations. Some use the excellent and free software package VirtualDub which you can download from here

http://virtualdub.org/

Add Audio
Open your animation in VirtualDub and click menu item Audio and select Audio from other file. Then select the audio track you want to apply from the selection dialog.

Resize
Open your animation in VirtualDub and click menu item Video and select Filters. Click Add on the filter dialog and then scroll down and select resize from the list of filters. Enter the size you need in the resize dialog and then click OK.

Compress
Open your animation in VirtualDub and click menu item Video and select Compression. Select the compression you want to apply and optionally use the Configure button to fine tune it. Then press OK.

Save Changes
Once you have made the above changes click menu item File and select Save as AVI... Select where you want to save your video and press Save.

Upload to Web
There are plenty of free video sharing sites on the web. My favourite is Vimeo because it has a looping option on playback which is great for watching very short astro animations such as prominences. Watching the action loop automatically helps you see all the details.

ASTROMETRY MODULE
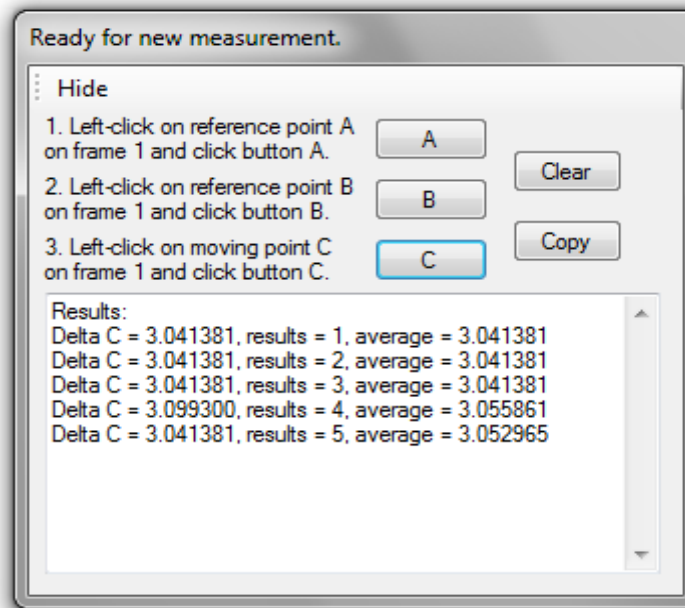
The astrometry module measures the movement of an object between a pair of images. It does this by creating a base line between 2 fixed points A and B. The movement of a moving point C is then calculated by DVS. It is intended to measure movement of comets, minor planets, asteroids, satellites etc. and to help with parallax measurements during transits.

It also works in sub-pixel mode for more accuracy when you apply a divisor greater than 1 in the Align dialog.

INSTRUCTIONS

1. Run DVS and load your image pair.
2. Set the divisor setting in the Align dialog as required for sub-pixel accuracy.
3. Click the Astrometry button in the top toolbar.
4. Left-click on reference point A on frame 1 and click button A.
5. Left-click on reference point B on frame 1 and click button B.
6. Left-click on moving point C on frame 1 and click button C.

DVS will then display the movement of the target C in pixels. Repeat steps 4 to 6 using different reference points to repeat the calculation. DVS will display the number of results as well as the average movement.

Click Copy to copy the results screen to the clipboard. Click the Clear button to clear the results screen and the stored results.

NOTES

1. Your image pair should have the same image scale – i.e. each pixel should subtend the same angle. DVS will compensate for small differences in image scale.
2. Your image pair should have the same orientation – e.g. North up. DVS will compensate for small differences in orientation between images.
3. DVS must find points A, B and C in both images. You can check this is happening

by moving to frame 2 after you select each point and checking whether DVS finds the target. Make sure you return to frame 1 after this check.

4. Images taken with different equipment may be very different and DVS may not find the points on image 2 using your usual settings. Try lowering the Similarity setting to say 500 to help DVS to find the target.

5. You can use different target box sizes and maximum drifts for each point.

6. The target box for the moving object should be just big enough to include it.