Alpy 600 "Mixed Mode" Calibration

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October, 2016

1 Introduction

Alpy 600 Calibration using the "mixed mode" involves the following basic steps.

1. Use a sequence of spectra from a type A or B star as the source.
2. Set up the project in ISIS using the conventional file naming and structure.
3. Use the Calibration assistant.

2 General settings

Ensure general settings as per Figure 1.

- Mixed mode uses the 'pre-defined' spectral calibration mode.
- Wavelength registration should be deactivated due to [currently] unexplained wavelength shifts in processed spectral profiles that appear when this feature is enabled.

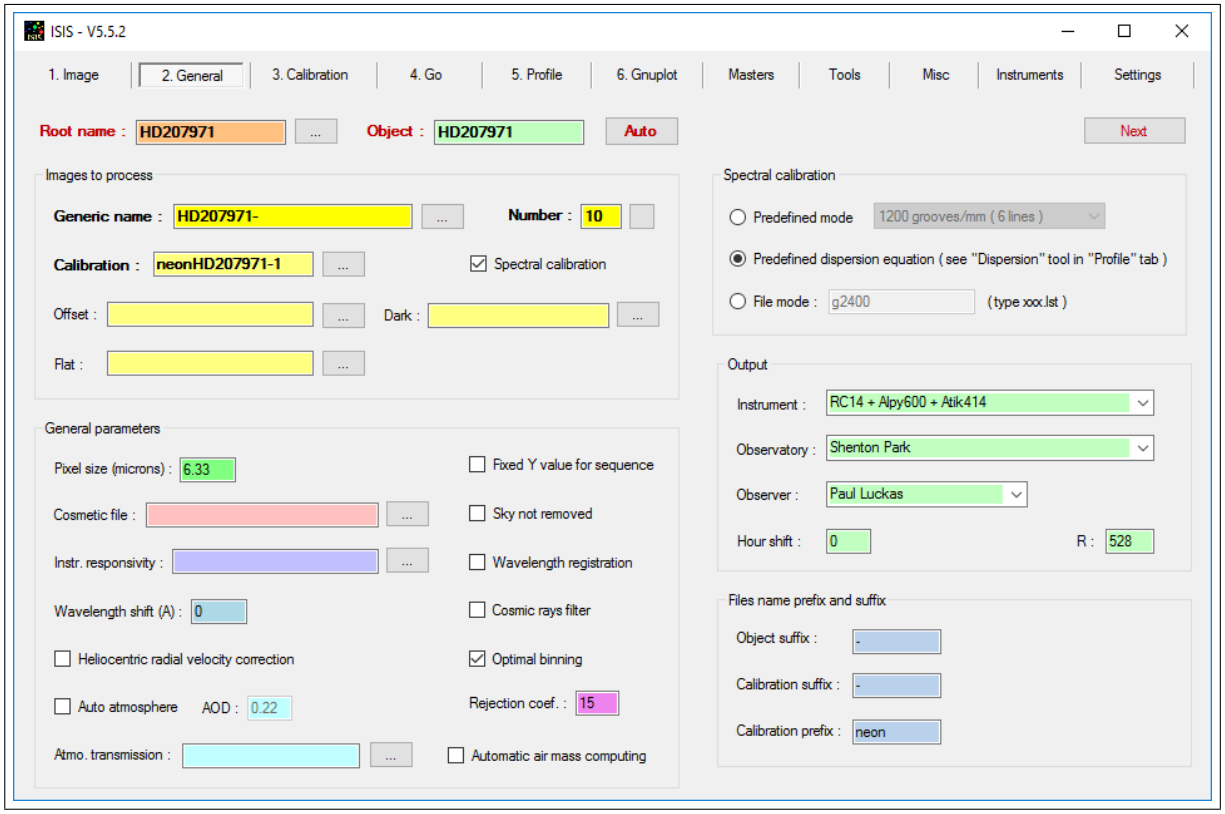

Figure 1: Settings on the **General** tab.

3 The Calibration assistant

Proceed to the **Calibration** tab and select **Calibration assistant**. The calibration assistant uses a 'mixed mode' of Balmer lines present in the spectra of type A or B stars, and calibration lines produced by the Alpy calibration module. Detection of these features is 'automatic', but involves a number of steps. Figure 2 shows the default screen with **Root name** and **Object name** automatically populated. Other fields may or may not be populated depending on how the assistant was last used.

Important: Pressing **Go** adjacent to the Object name dialogue on the calibration assistant default window will produce the unexpected result of renaming the *generic*, *calibration* and *response* file names back on the **General** tab. Accordingly, this 'step' should be ignored if file names have already been correctly configured on the **General** tab.

3.1 Producing a mean spectral image

The calibration assistant will produce a mean image from a sequence of spectral images. Together with a calibration image, this 'improved' image will be used in determining the calibration.

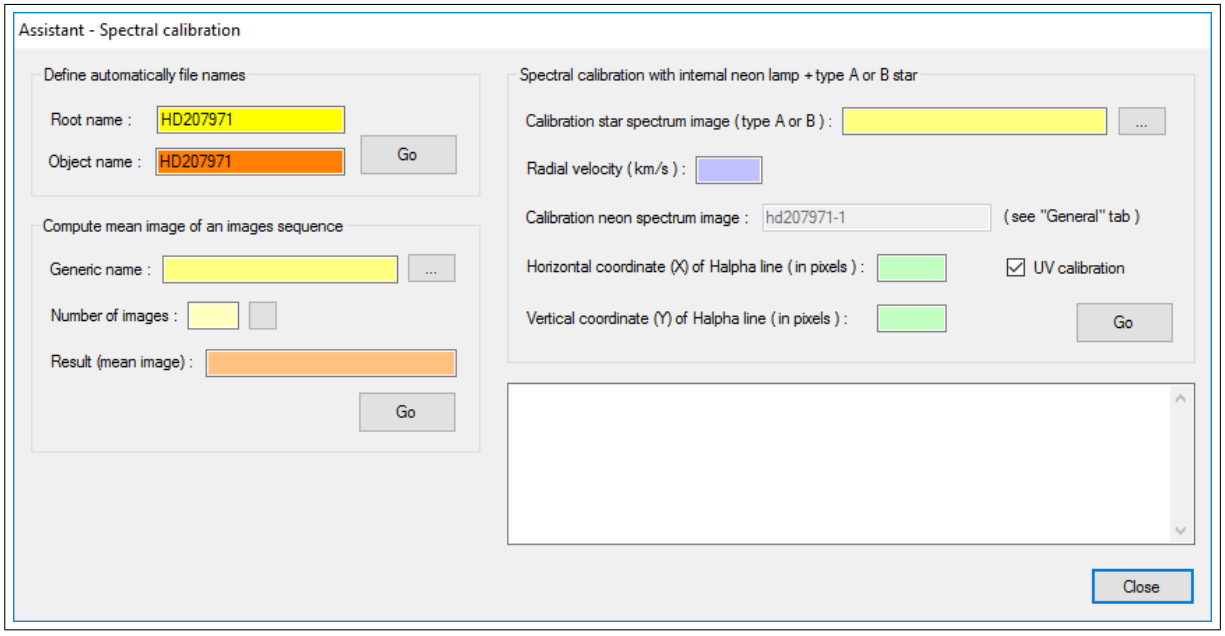

Figure 2: The calibration assistant default screen.

1. Enter the **Generic name** using the dialogue to navigate to the appropriate file.
2. Select the **Number of images** 'auto-complete' button.
3. Type a meaningful name into the **Result (mean image)** dialogue.
4. Press **Go**.

The mean image will be created and saved to the working directory as shown in Figure 3. It should also automatically appear in the top right Calibration selection dialogue.

3.2 Determining the calibration

The mean image together with a neon calibration spectrum is used as part of the 'mixed method'. The inputs for these, and the process for determining the calibration are oulined as follows:

1. Ensure the mean image created in the last step appears in the top left *Calibration star spectrum* dialogue. It can also be manually selected by navigating to the file.
2. Enter the star's radial velocity (if known).
3. Ensure the *Calibration neon spectrum image* file name is correct. If not, it is selected by **placing a cursor in the CALIBRATION file name box located back on the GENERAL tab and pressing ENTER**. There is no need to close the calibration assistant during this step.
4. The horizontal and vertical coordinates of the H-alpha line are entered by selecting the feature on the open spectral image. Ensure the **correct** absorption feature is selected!

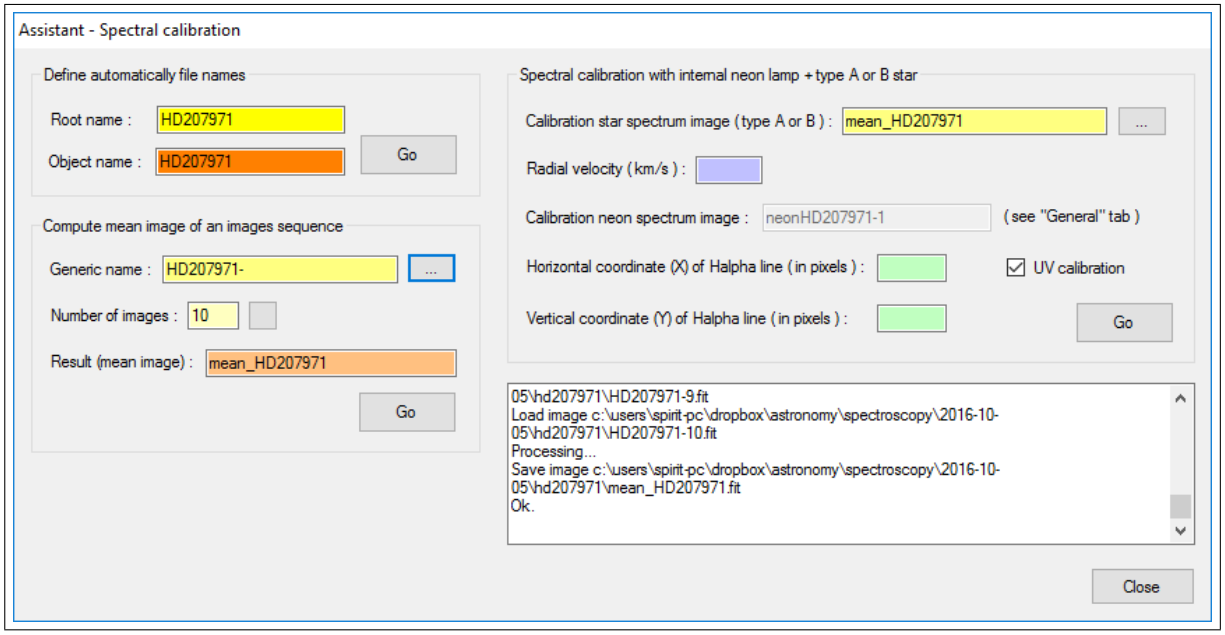

Figure 3: Computing the mean of an image sequence.

5. Experiment with **UV calibration** to increase the data range used in the computation for a potentially improved result.

The result is shown in Figure 4.

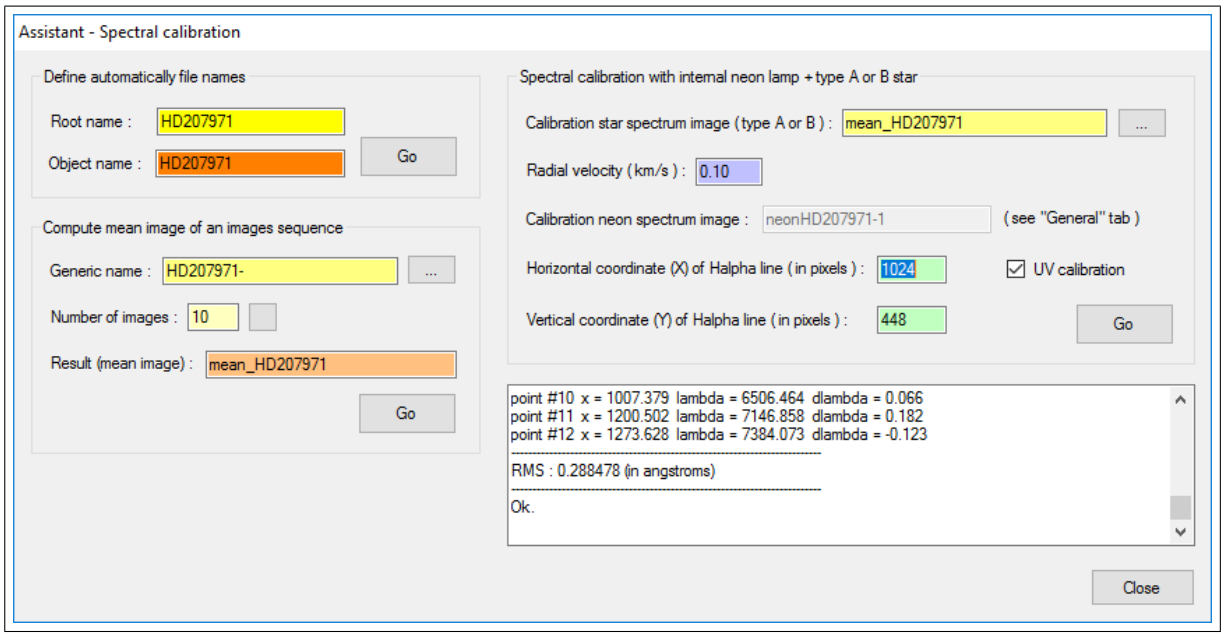

Figure 4: A successfully completed spectral calibration calculation.

The dispersion coefficients are transferred to the spectral dispersion dialogue on the **Profile** tab (Figure 5).

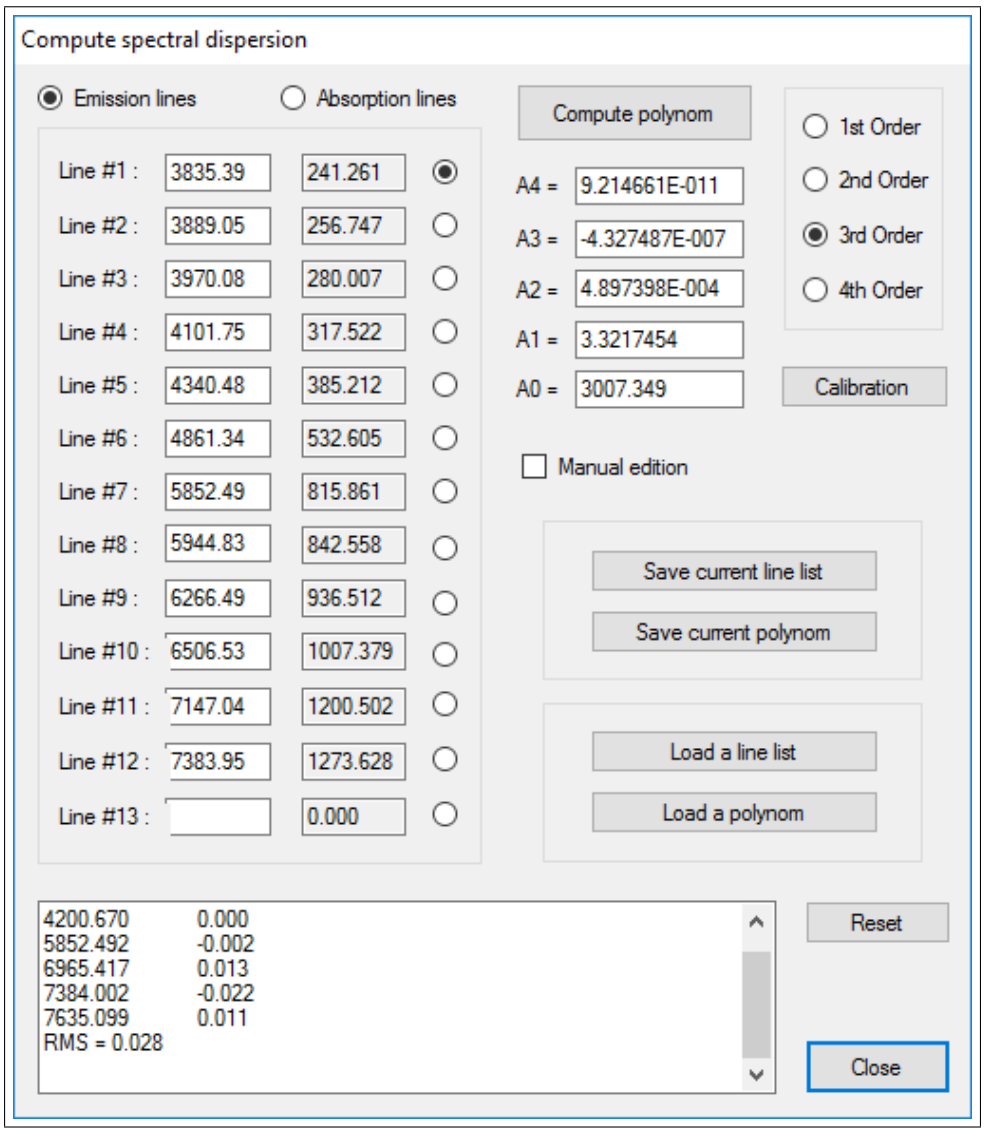

Figure 5: The updated dispersion dialogue.

4 Checking the result

The newly created calibration can be used to calibrate the open spectral images. The resultant profile can then be compared to a Miles standard to confirm alignment of the major absorption features of the type A or B star used to create the calibration. Creating and applying an instrument response profile, and scaling the comparison spectrum to the same spectral range allows a very precise visual comparison.

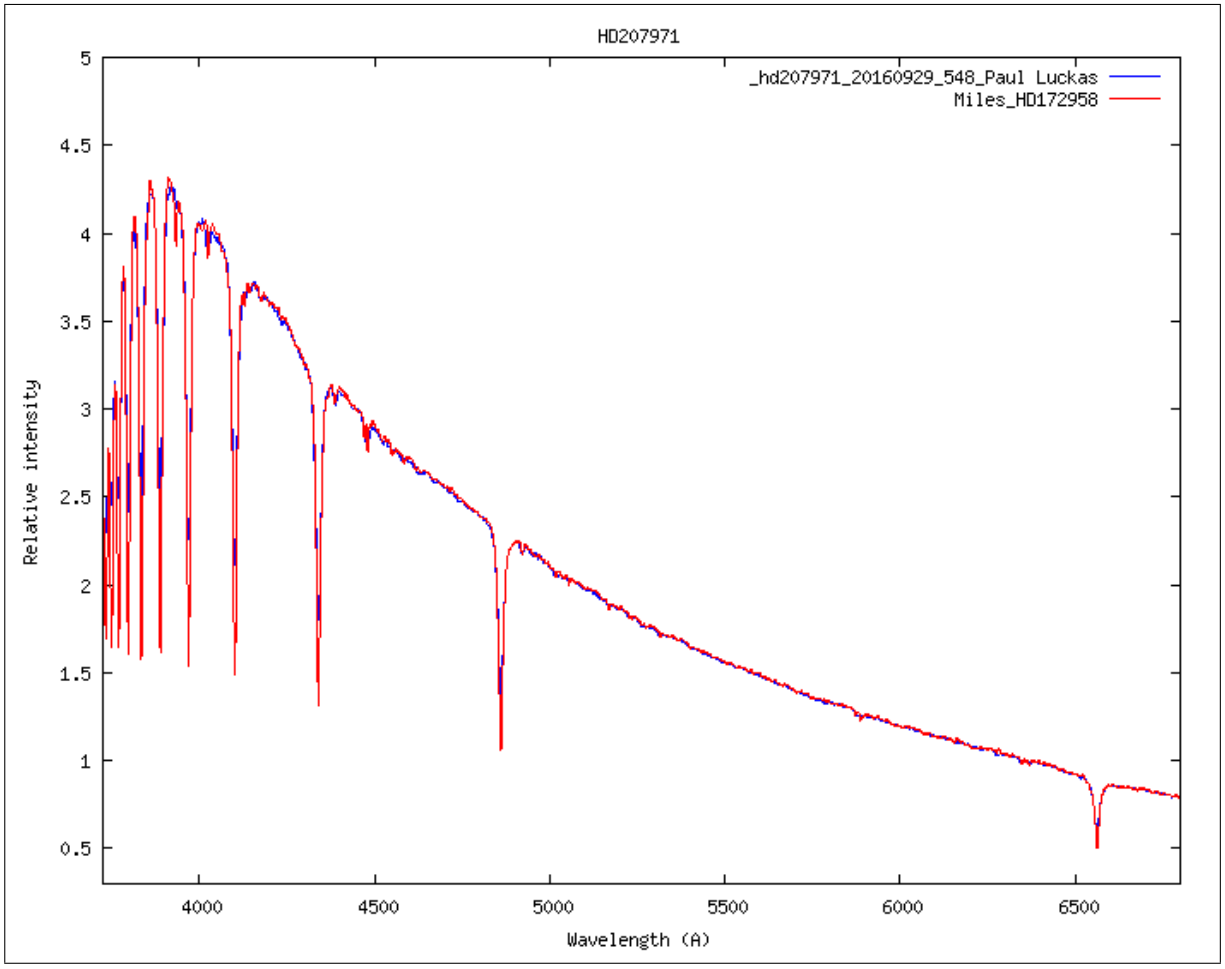

Figure 6: Comparison profiles.