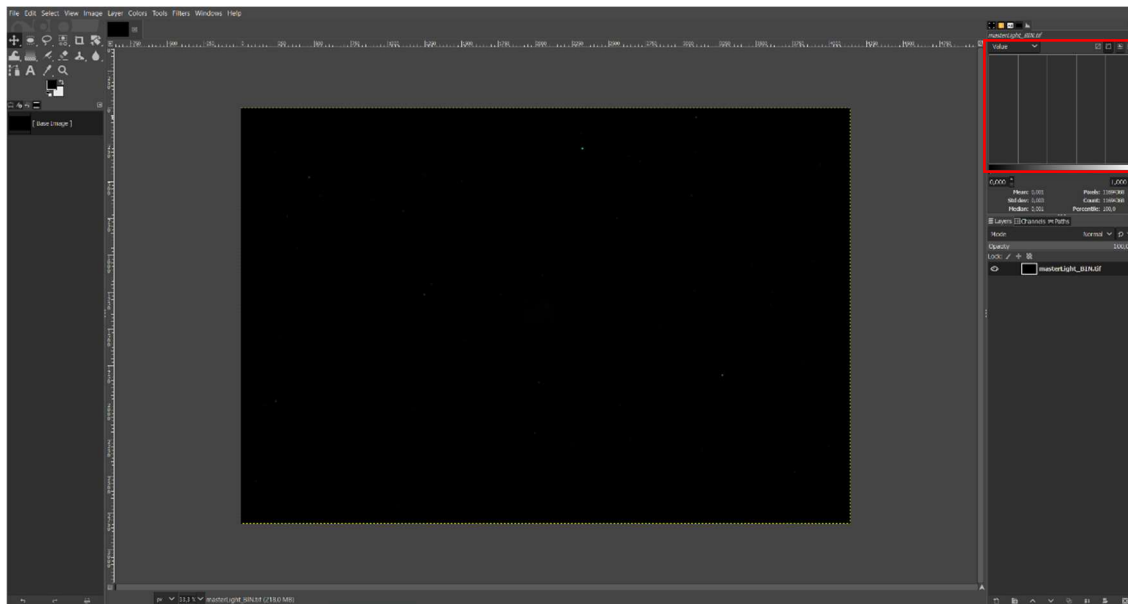# Stretching with GIMP (Version 2.10)

When the stacked image is opened in GIMP the black image shown above is visible.


In the upper right corner there is a histogram, and the tone value curve at the left edge is just visible.

The goal is now to detach the tone value curve in the histogram area from the left edge of the image. To do this, open the 'Levels' window under the 'Colors' menu point.
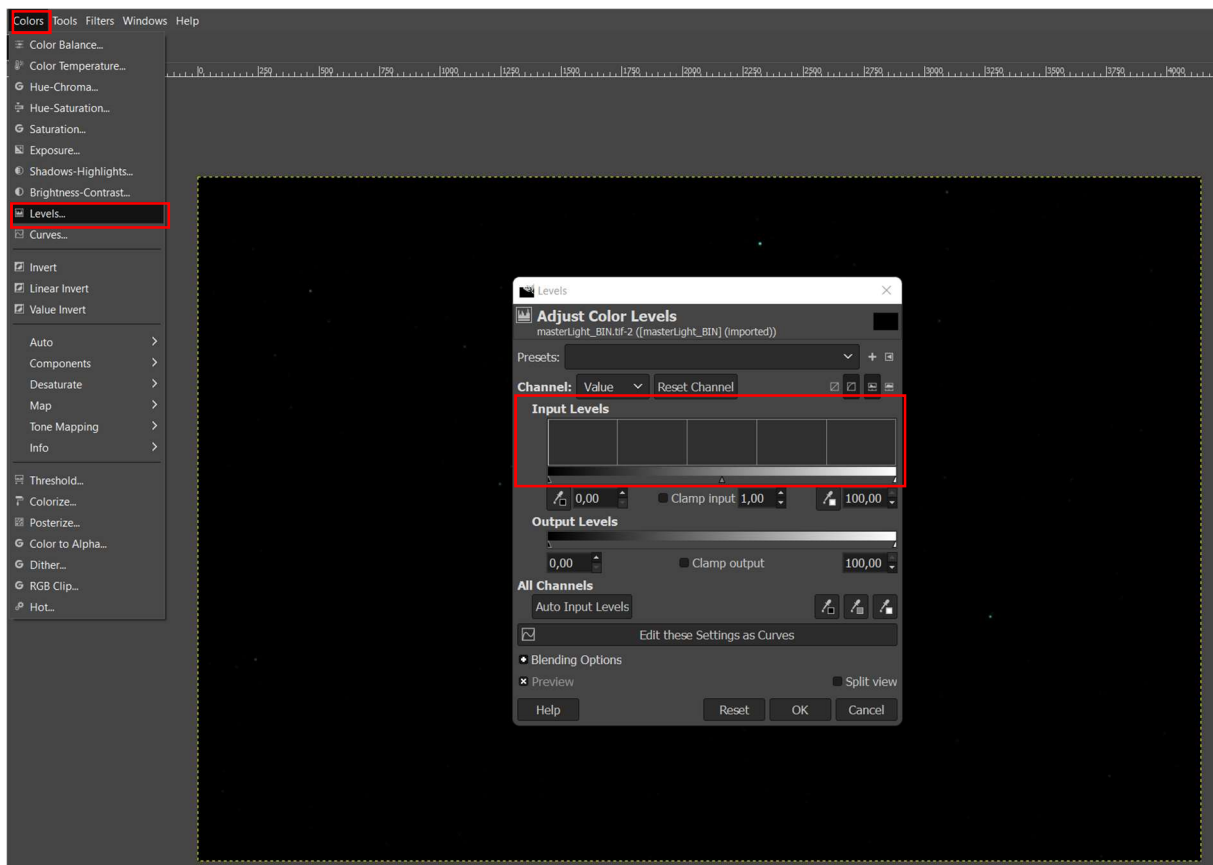
A histogram is displayed here, under which three arrows can be seen. The left arrow indicates the zero point, i.e. absolute black. The arrow on the far right applies to the maximum of signal information and thus results in the color white. The arrow in the middle stands for an average brightness value.

In order to distribute the tone value curve, the right arrow could theoretically now be shifted to the left. The collapsed area would then define the new histogram area from the left arrow (black) to the right arrow (white) after pressing 'OK'. This achieved that the dark areas were spread apart (stretched), but all brighter values that were spread on the shifting path from the right to the left arrow would thereby be assigned the highest white value. All stars would thus be equally bright and burned out (maximally saturated).
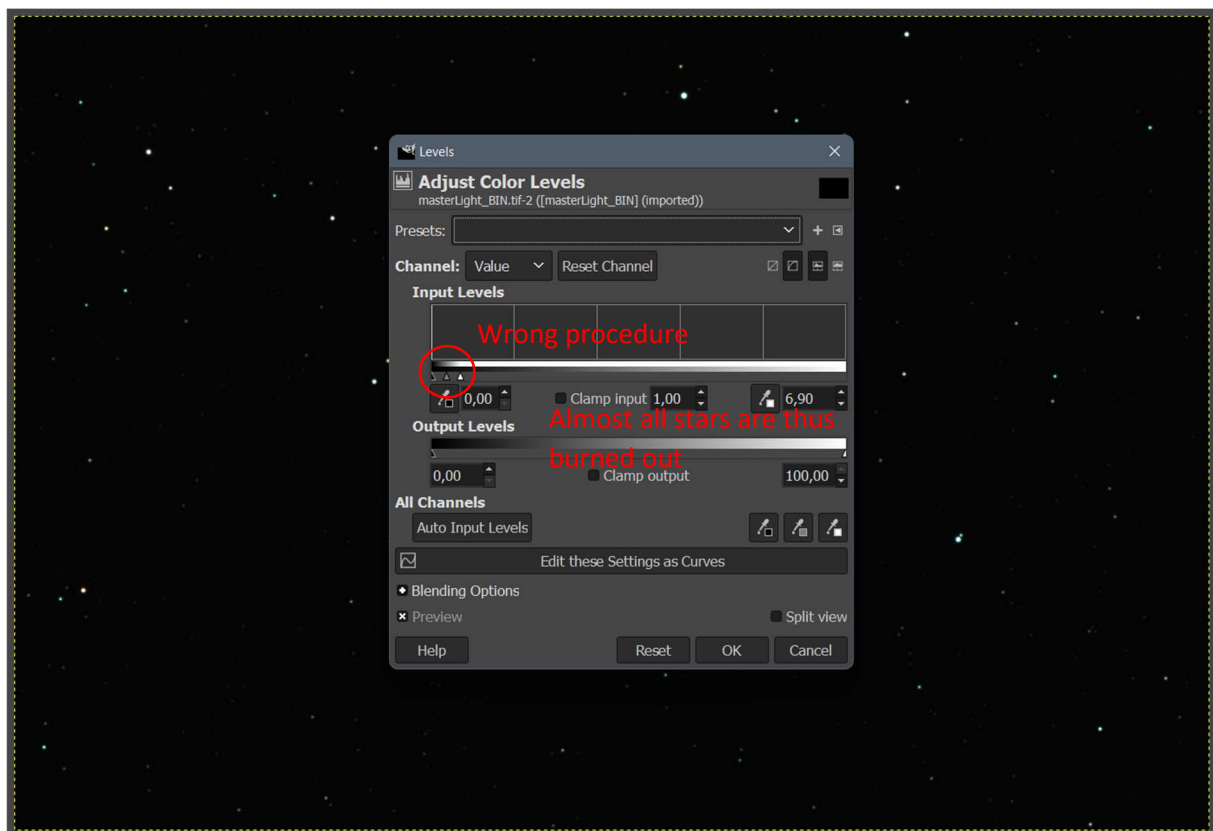
So a useful way is to move the middle arrow to the left. This way the bright stars keep their values and the rest is brightened.
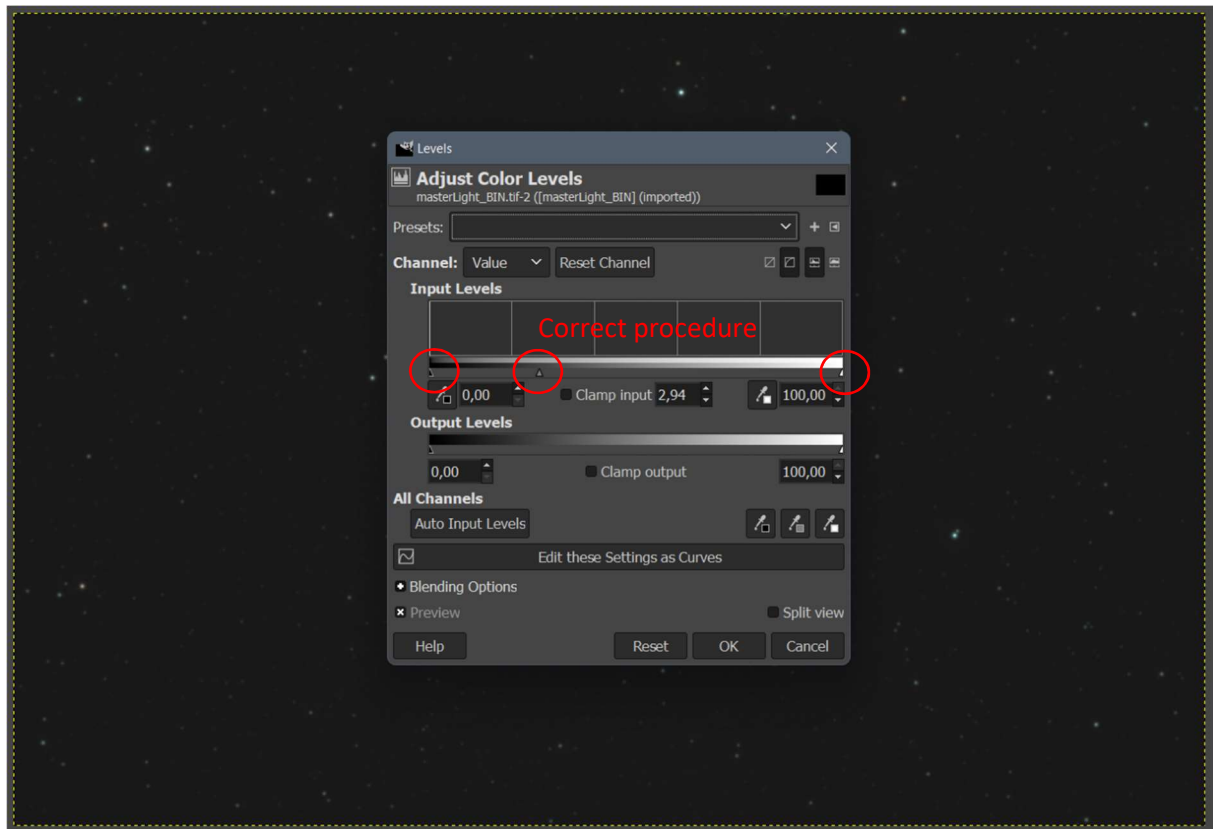

After clicking 'OK' this process can be repeated until the tone curve moves away from the left edge.
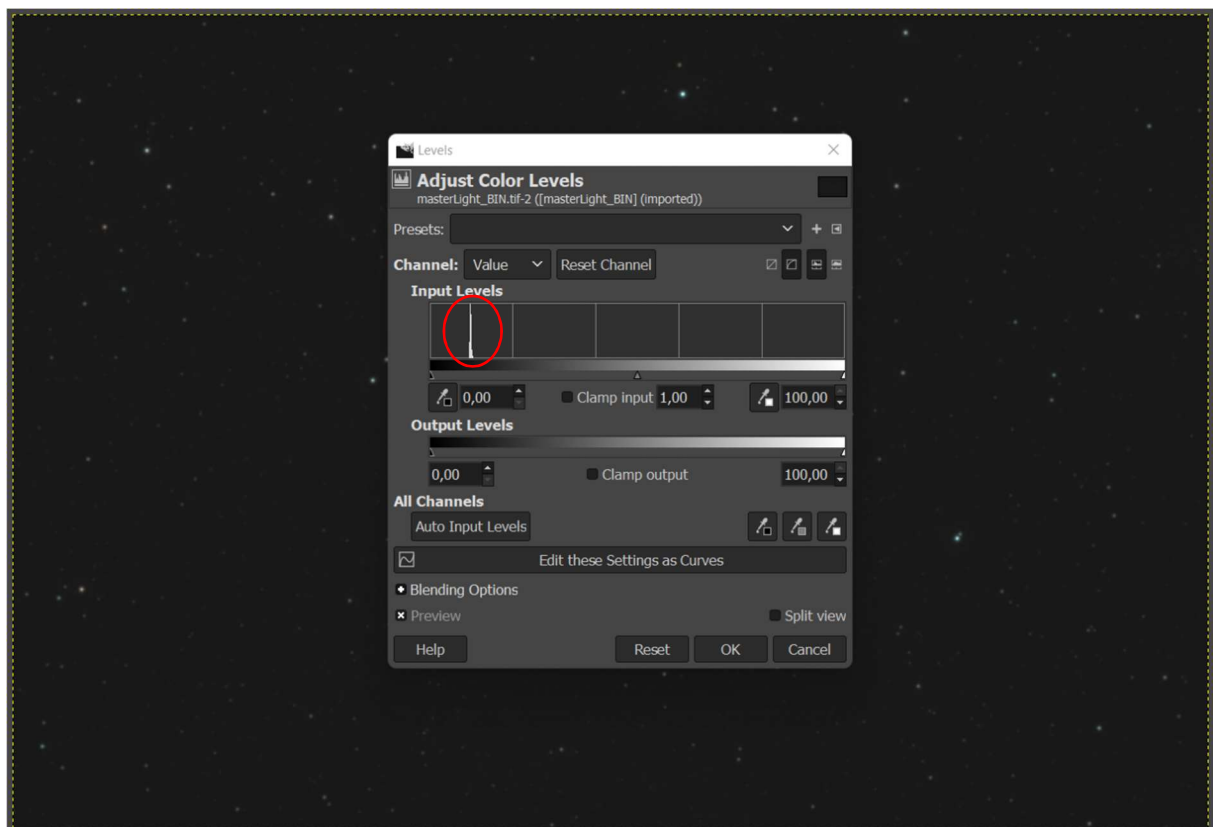
The tone value curve is now away from the left edge. The middle arrow can be moved further to the left towards the curve. In addition, however, the left arrow is now also moved a little closer to the curve mountain. It should be ensured that the curve is not cropped, otherwise image information will be lost.
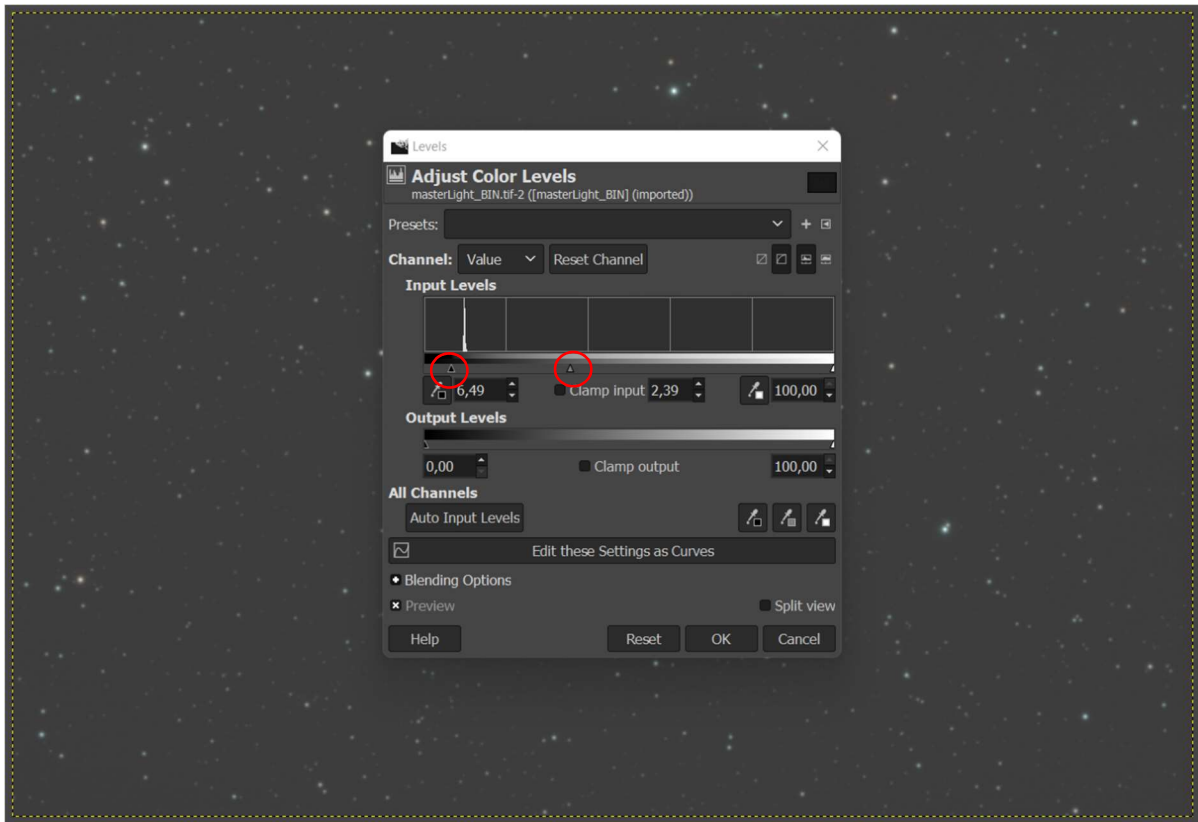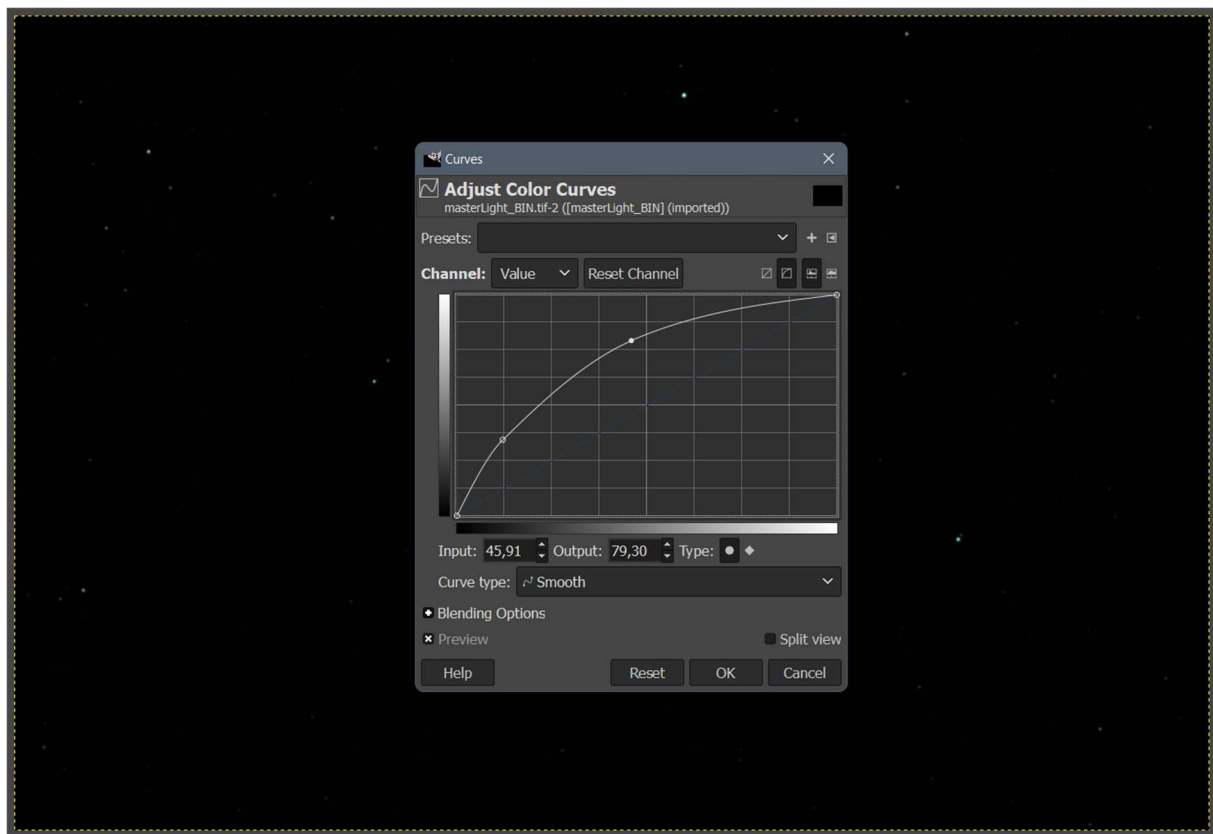

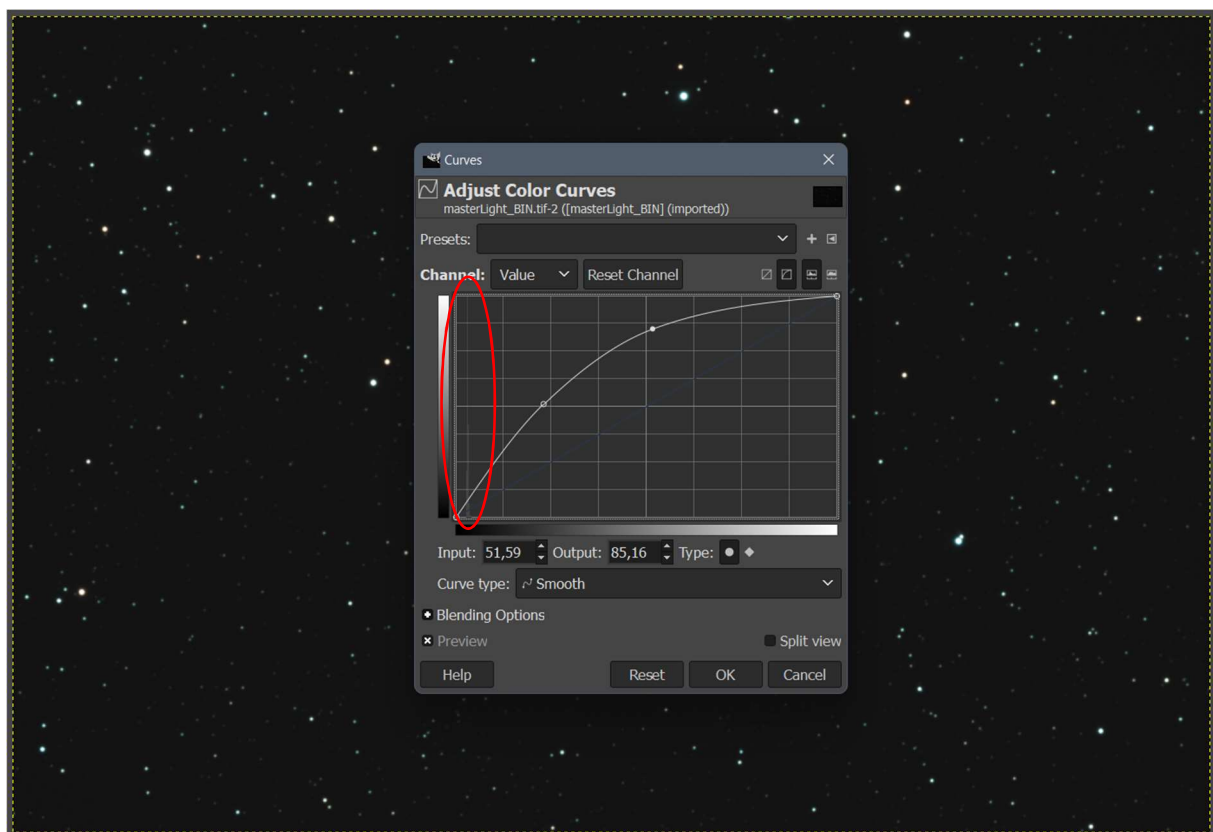The whole process is repeated until a satisfactory result is achieved.
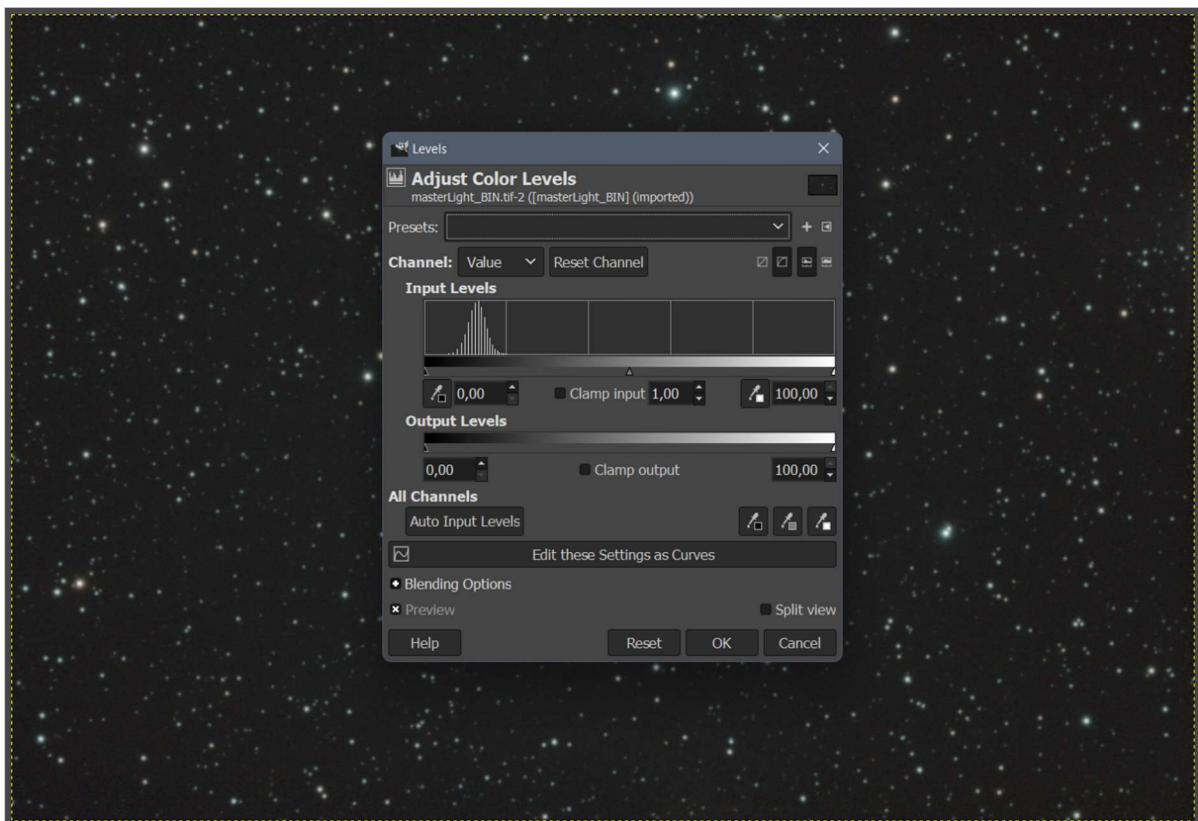
The same can be achieved via a gradation curve adjustment. For this purpose, the 'Curves' window is opened under the 'Colors' menu point.
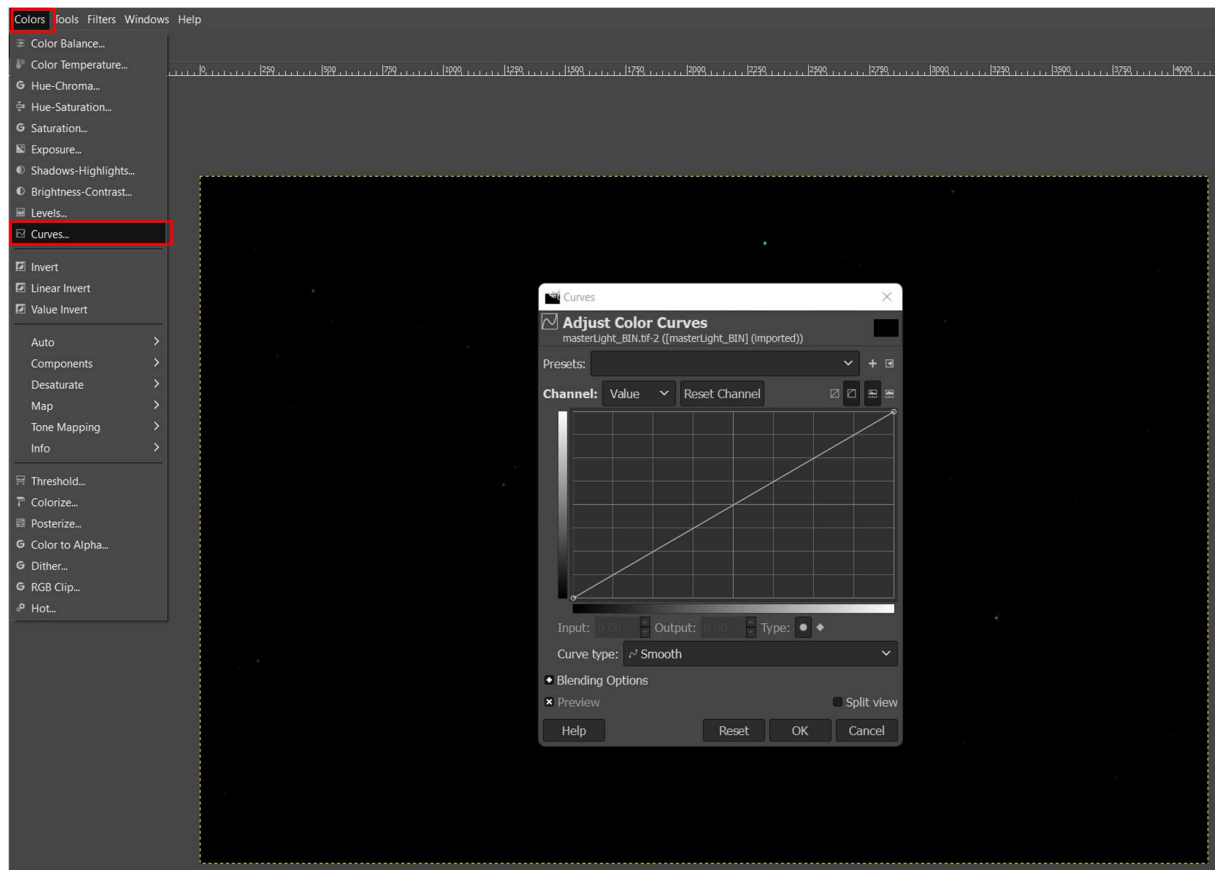

The point at the bottom left here again corresponds to the absolute black value, the point at the top right to the absolute white value. The tone value curve at the left edge is almost no longer visible. By deforming the line into a curve, the particularly weak areas of the image (pixels in the lower left area of the diagram) are brightened more than those in the upper area. However, the curve should not touch the upper edge, since this would be equivalent to moving the right point.
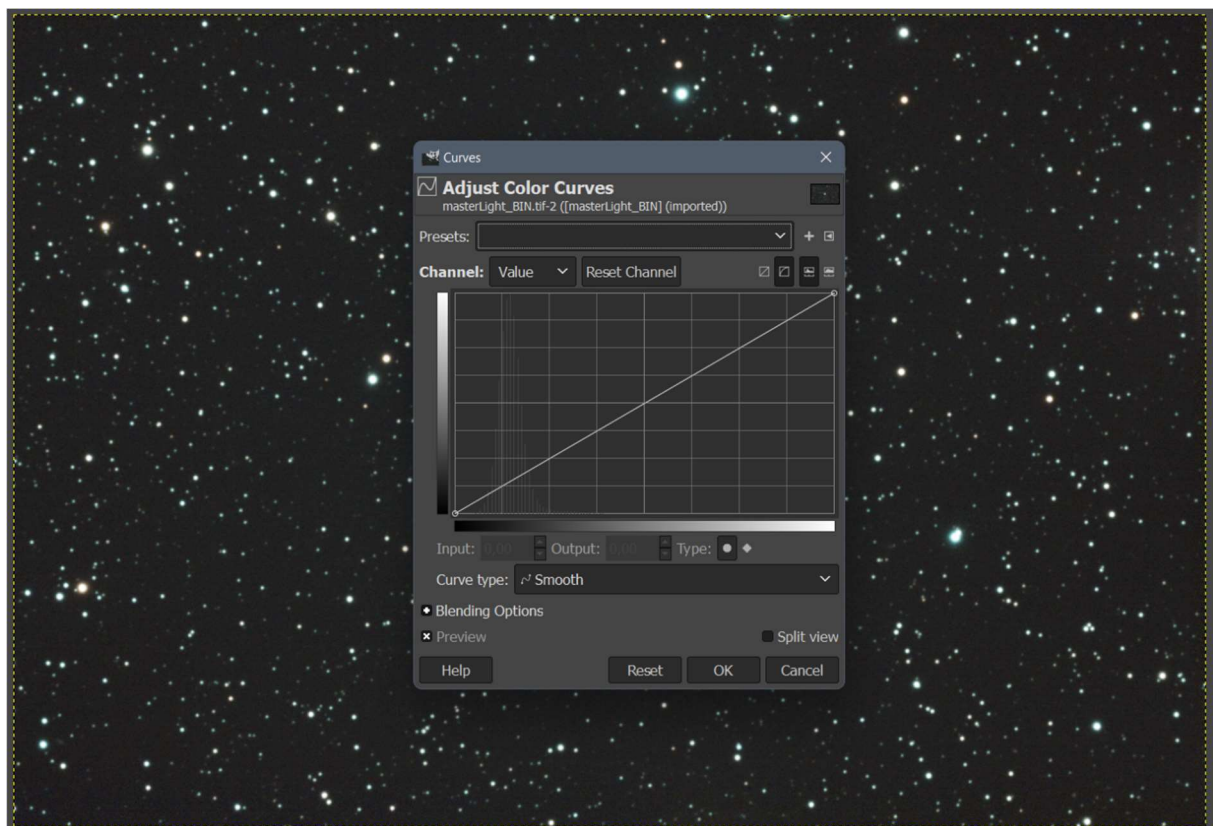
After clicking 'OK', this process is repeated until the tone value curve stands out from the left edge.

Now, again, the lower left point can be moved closer to the tone curve, but again without cropping it.
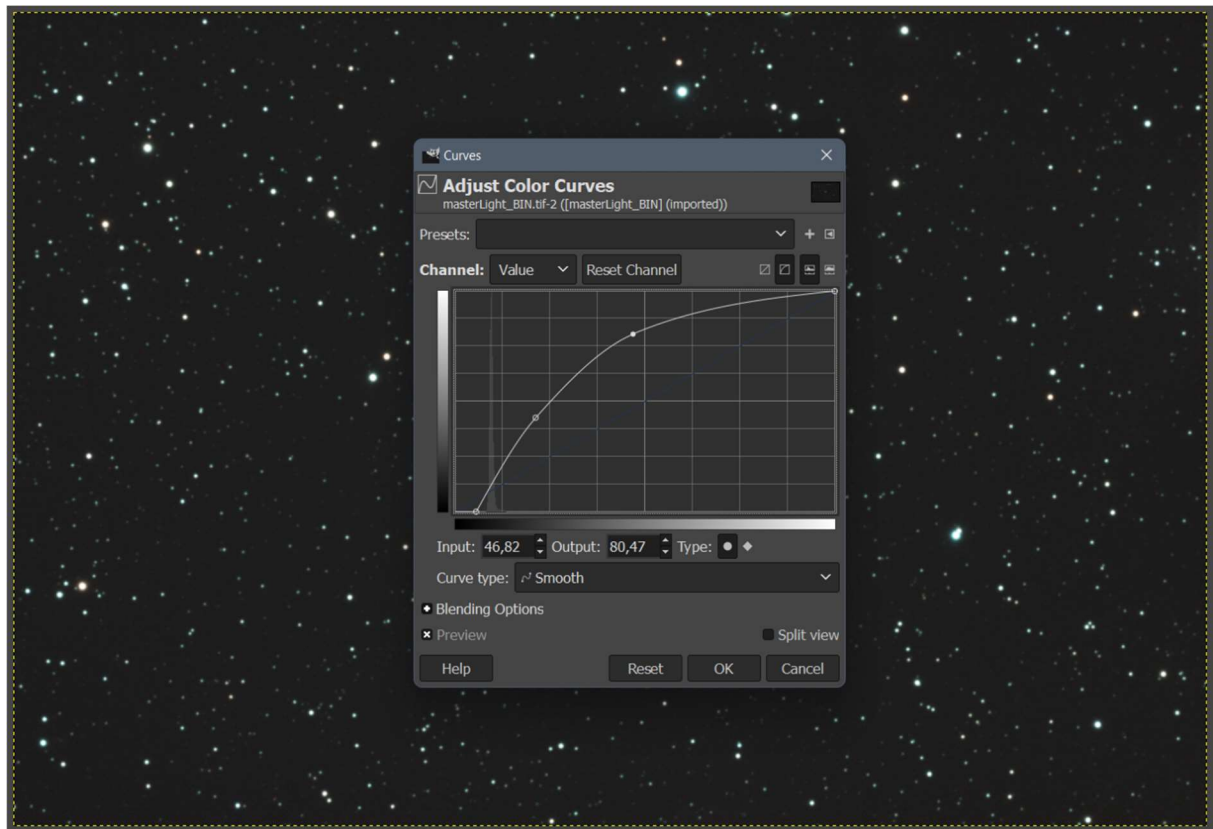
This process is repeated until a satisfactory result is obtained.

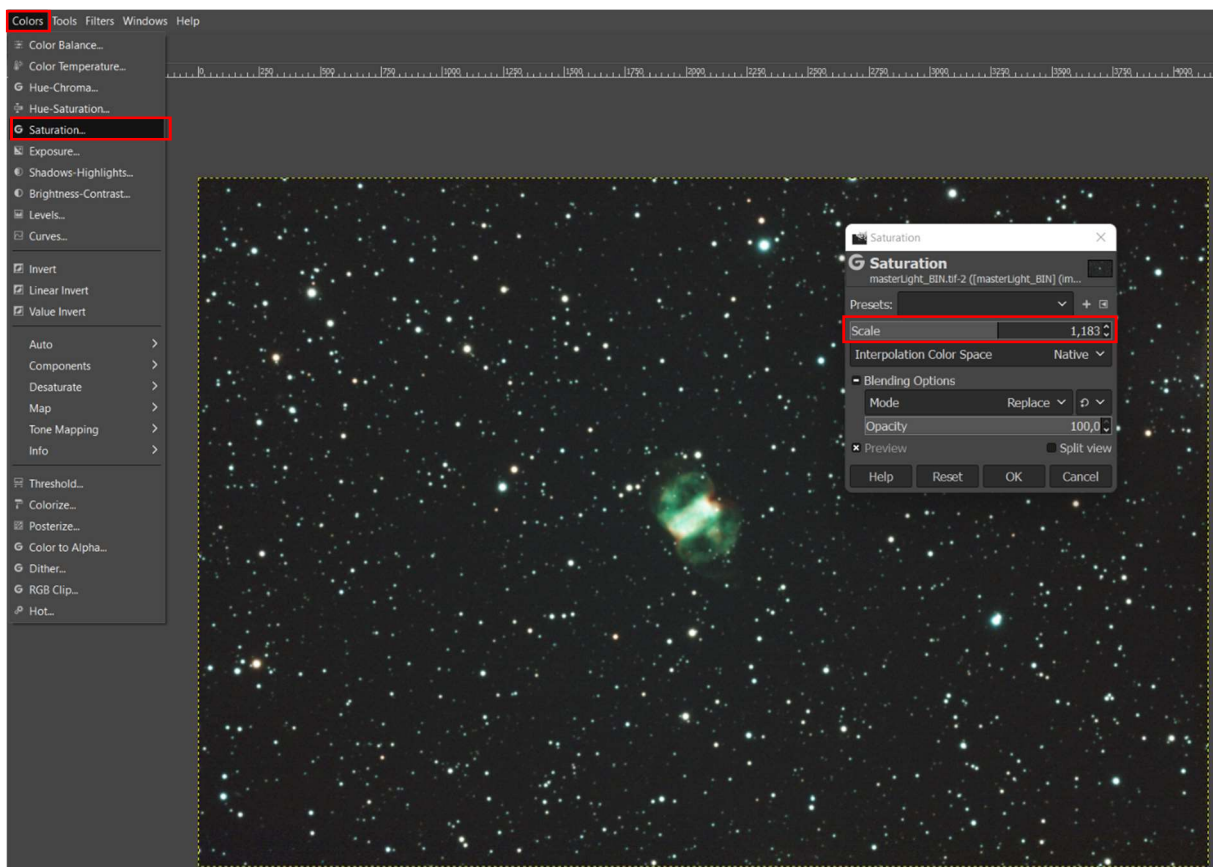The result after stretching now looks more like an astrophoto.

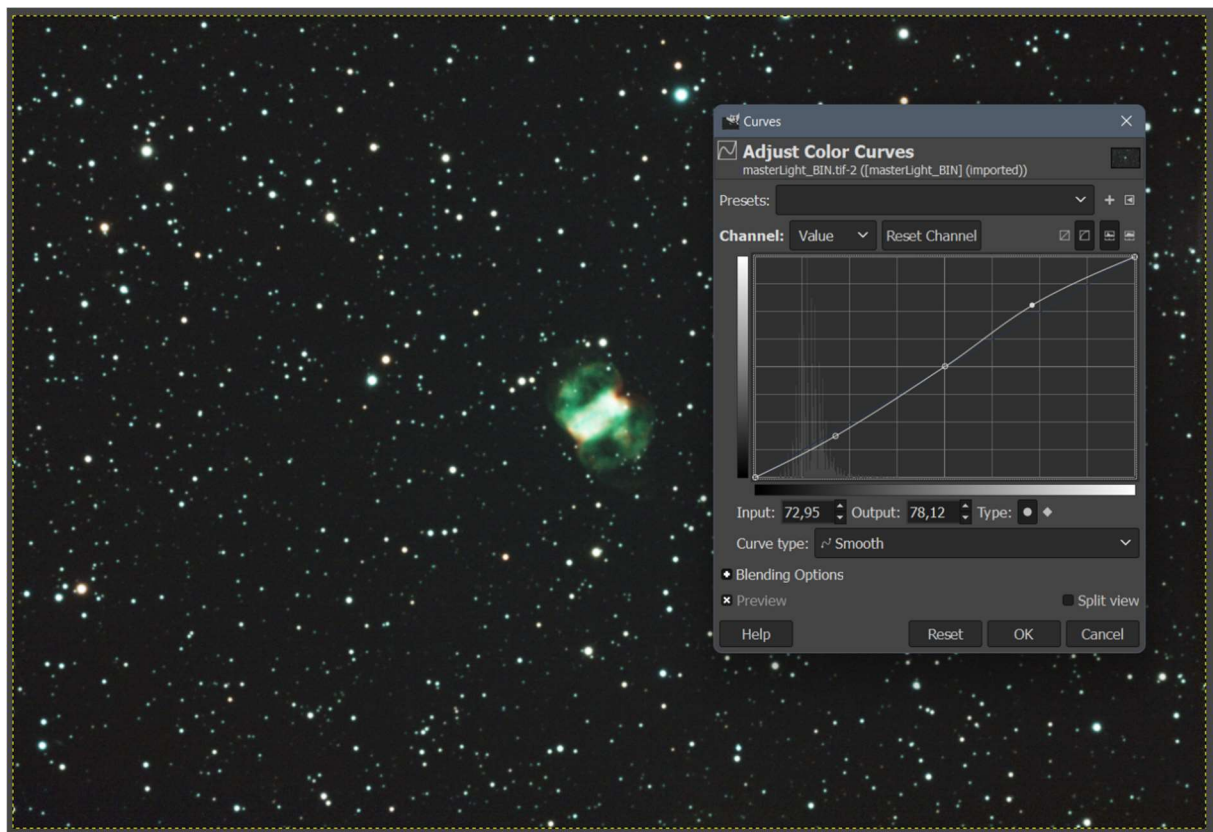*M76 (Small Dumbbell Nebula) before stretching*

M76 (Small Dumbbell Nebula) after stretching

Stretching has caused the colors to fade somewhat, which can be improved via the color saturation point.

To increase the contrast a little, a faint s-shaped line can be formed with the gradation curve.

The same effect would also be achieved using the contrast slider under 'Colors' - 'Brightness/Contrast'.

Then you can proceed with further image processing (adjust colors, minimize noise, etc.).