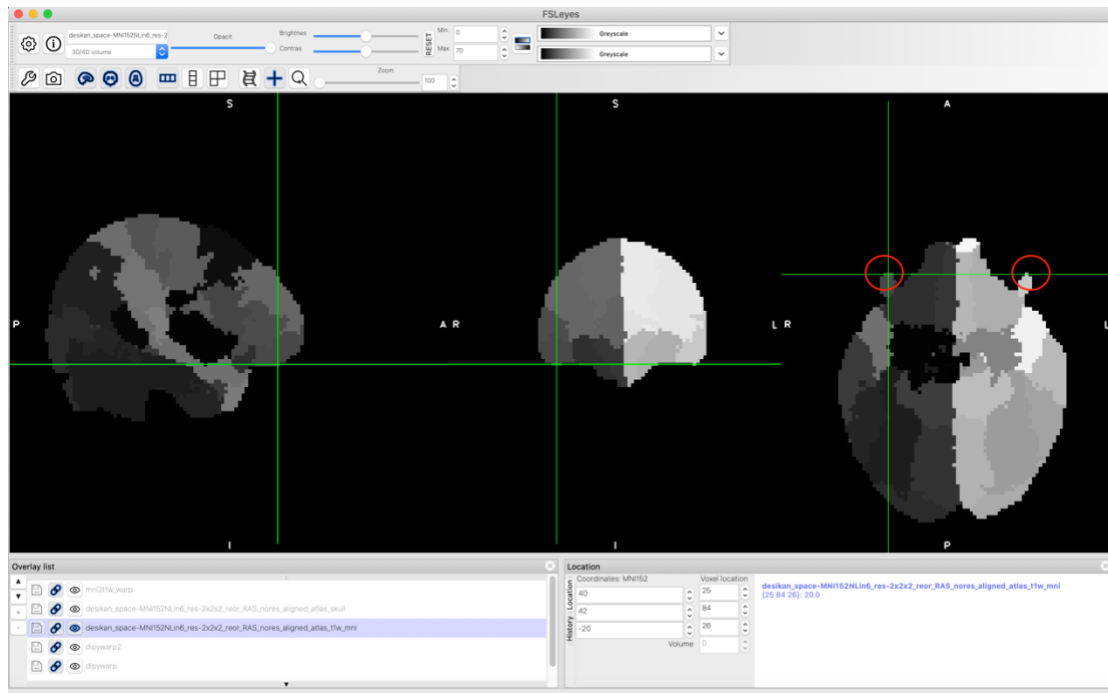# Using the marker method to compare the outcomes of applywarp in both FSL and dipy
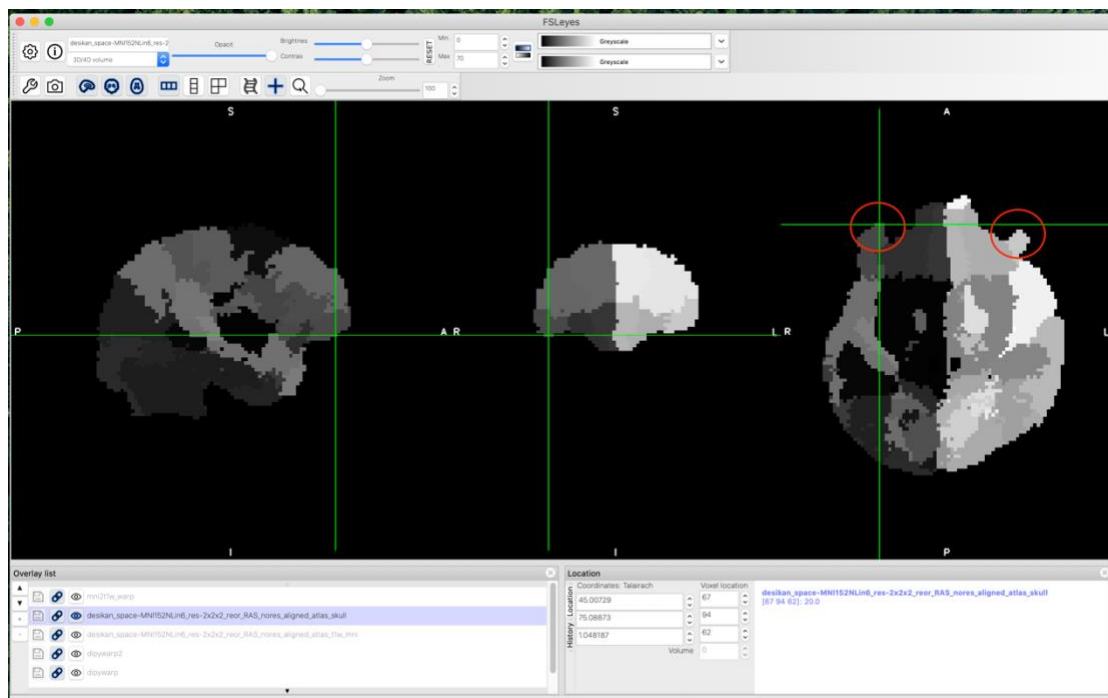
1. Method:

(1) Find points with obvious features in the input image, marked as marker and then save the coordinates.
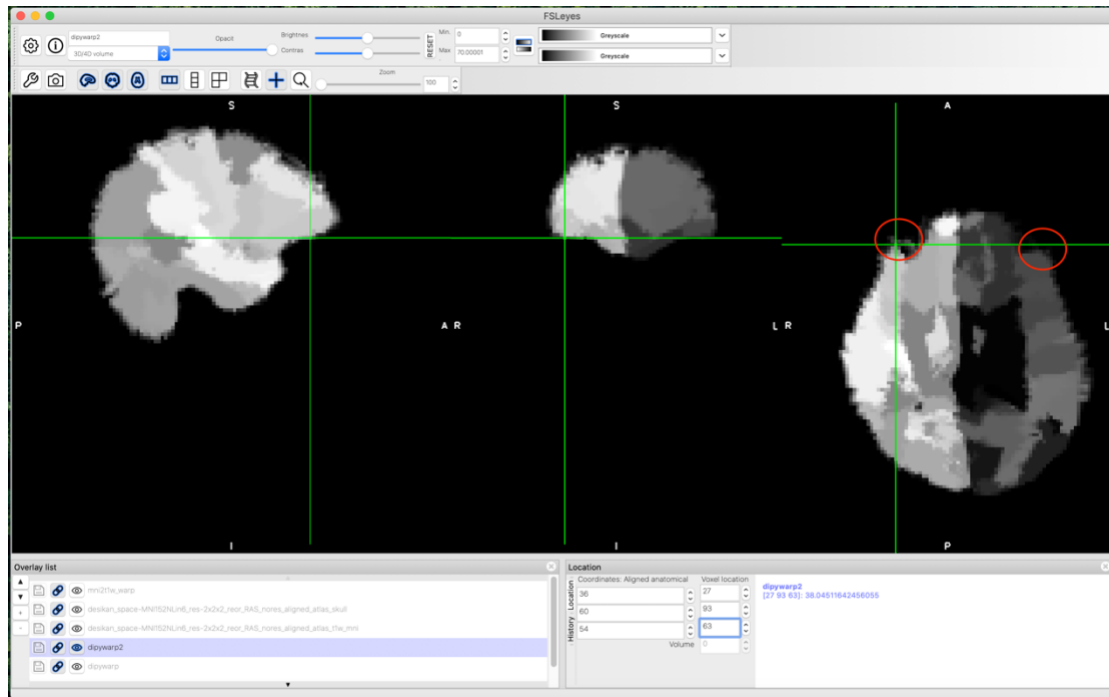

In my case, the coordinates are (25,84,26) and (64,84,26)

(2) Find the same points in the image generated by FSL function and save the coordinates.

In my case, the coordinates are (67,94,62) and (26,93,62)

(3) Do the same thing to image using dipy as step (2).

In my case, the coordinates are (27,93,63) and (69,91,63)

(4) Then calculate the distance of the markers between the original image and the warped image.

$$distance = \sqrt{(x_o - x_w)^2 + (y_o - y_w)^2 + (z_o - z_w)^2}$$

$$FSL: dis_{fsl1} = 56.2139; dis_{fsl2} = 53.1131$$

$$Dipy: dis_{dipy1} = 38.1314; dis_{dipy2} = 37.9868$$

(5) Calculate the average distances of markers.

$$FSL: dis_{fsl} = 54.6725$$

$$Dipy: dis_{dipy} = 38.0591$$

2. Analysis

From above, we can know that the distance using dipy is smaller than FSL. In this case, we can assume that dipy gets better outcomes than FSL. So it is feasible to replace FSL with dipy.