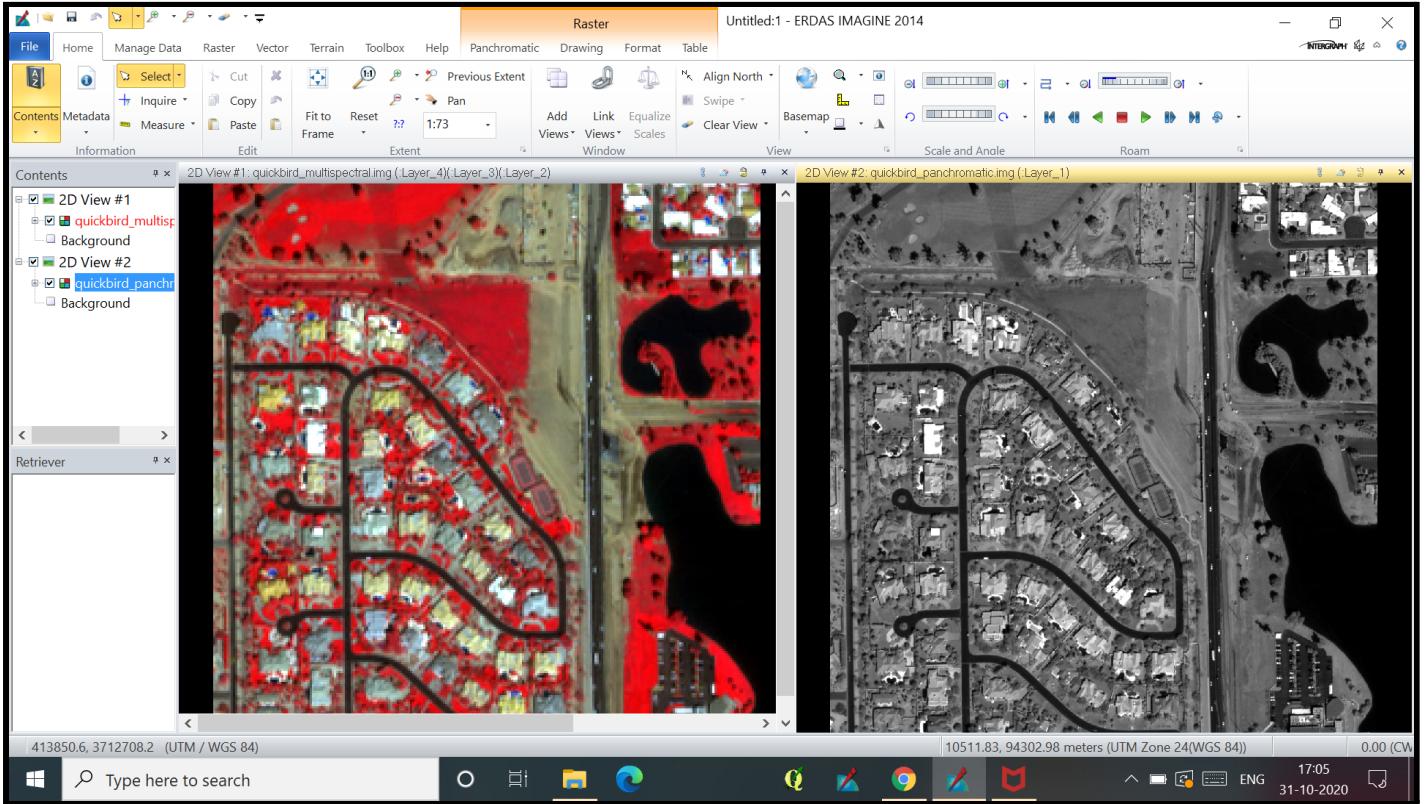
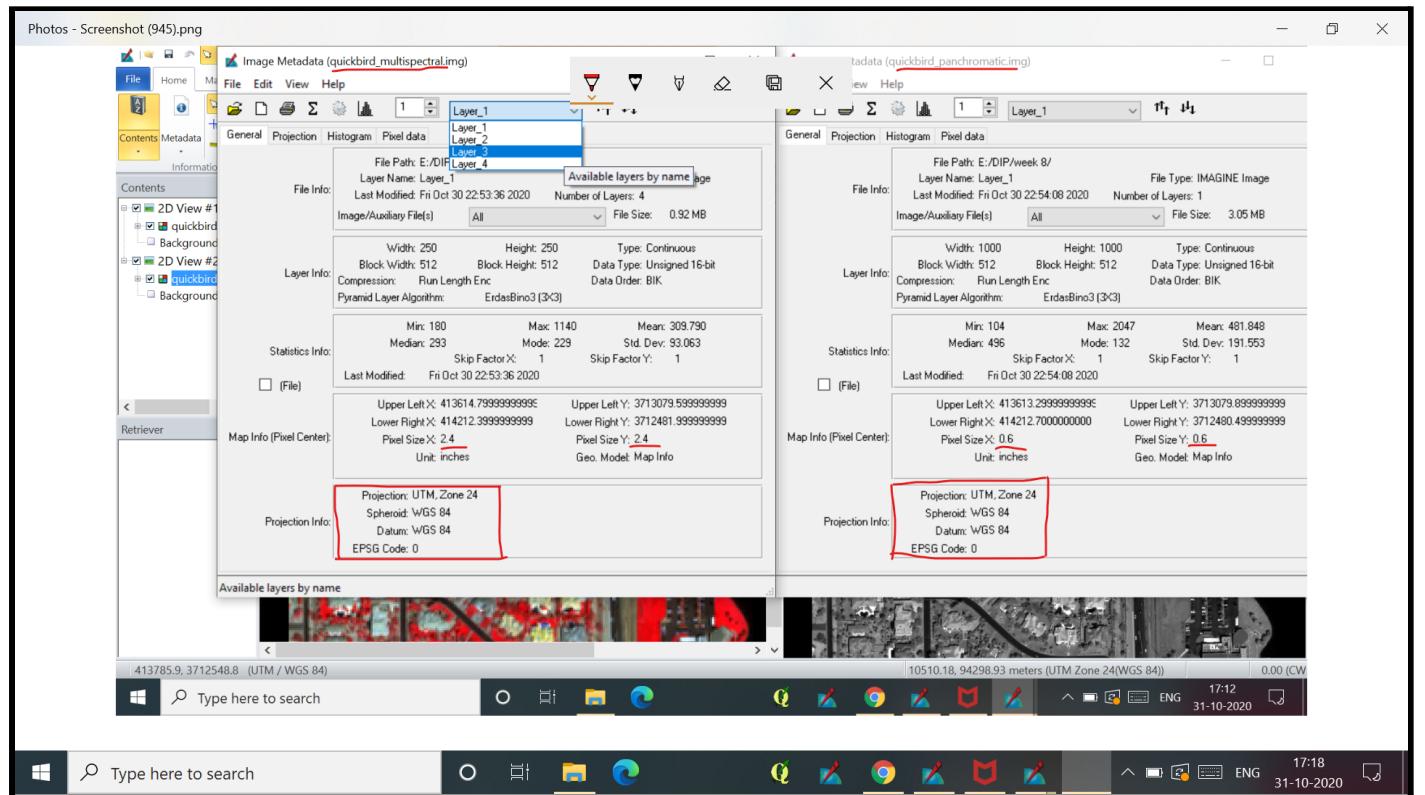


IMAGE FUSION/ PAN SHARPENING/ RESOLUTION MERGE

Step-1 Open both the images (i.e. coarse multispectral image and panchromatic high resolution image)

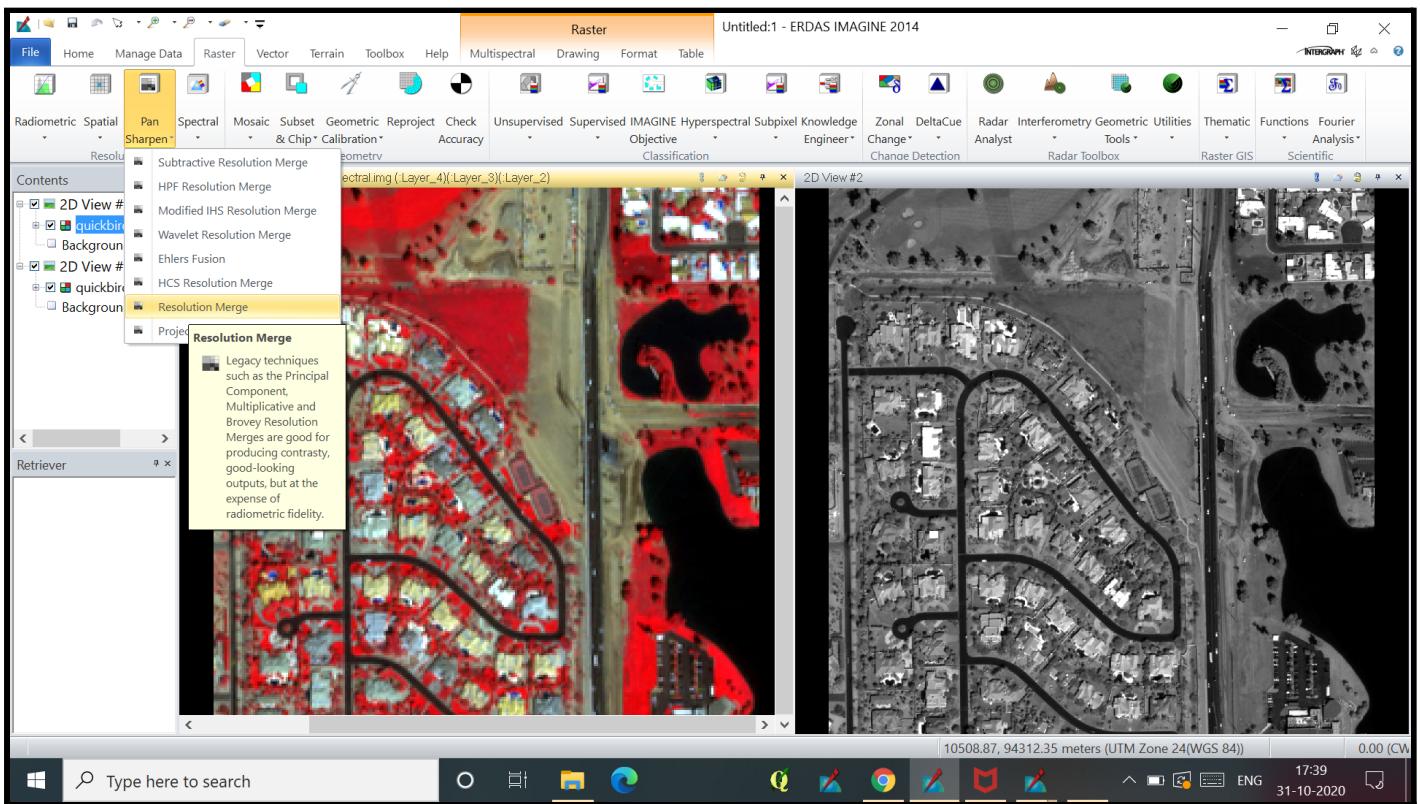


Step-2 Check whether the images are georeferenced or not.

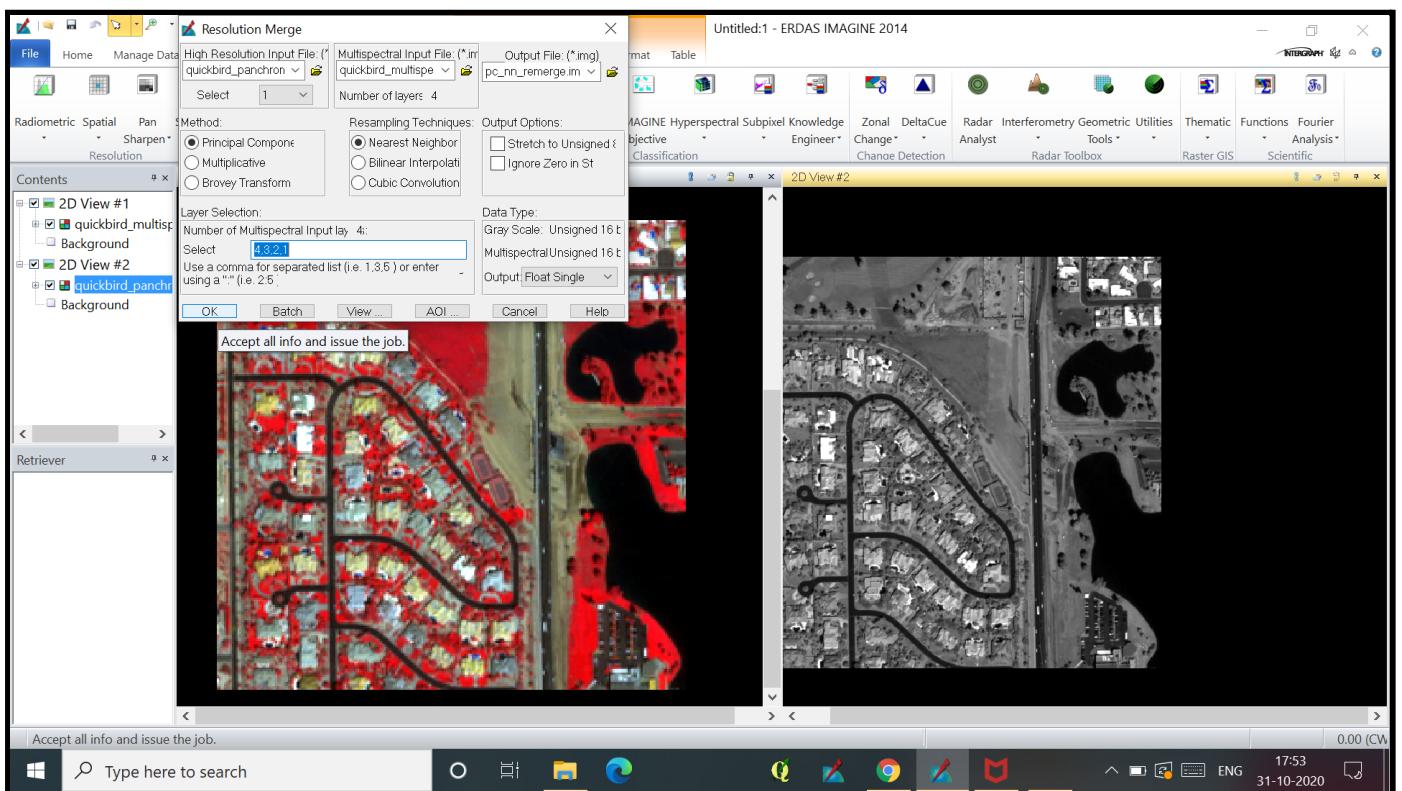


1. PCA

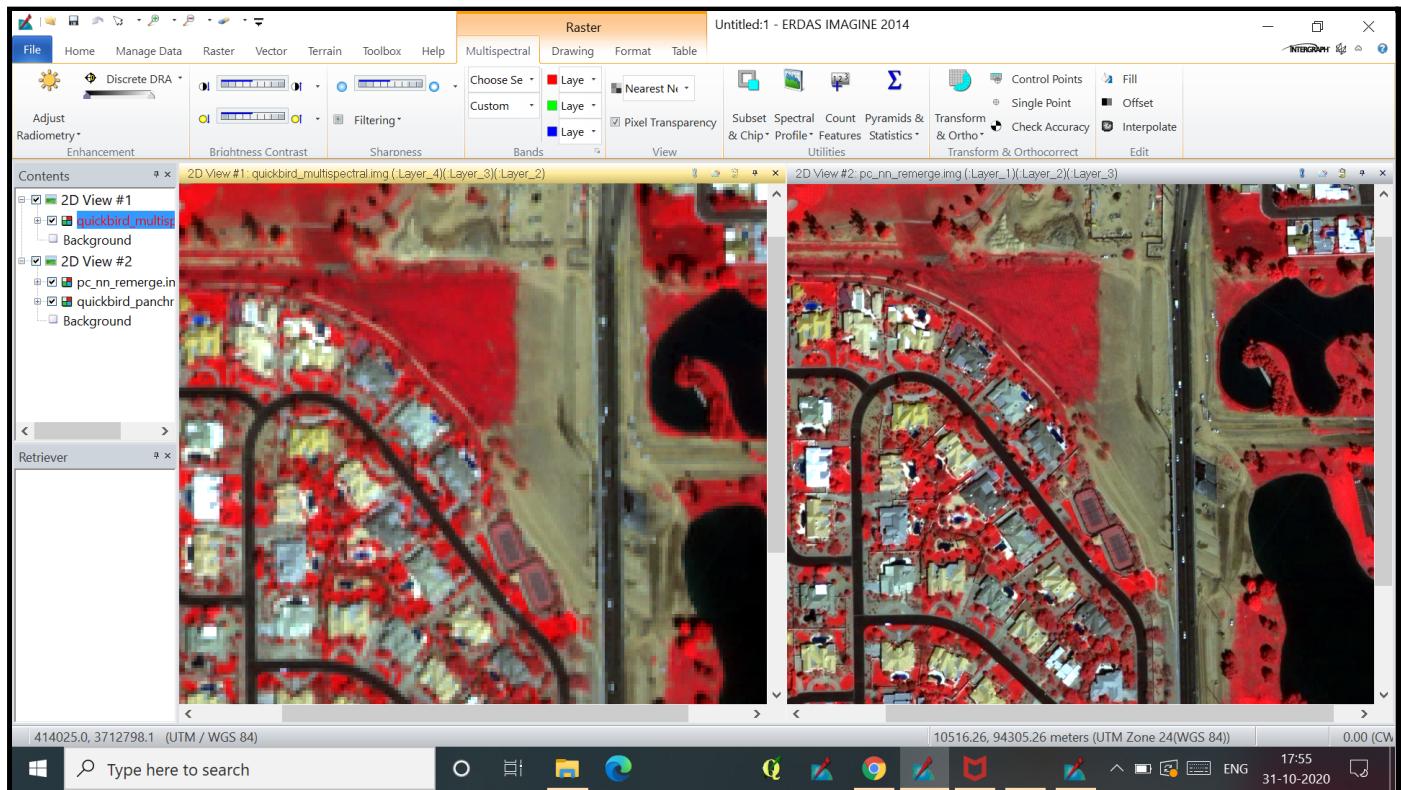
Step-1 Raster > Pan Sharpen > Resolution Merge



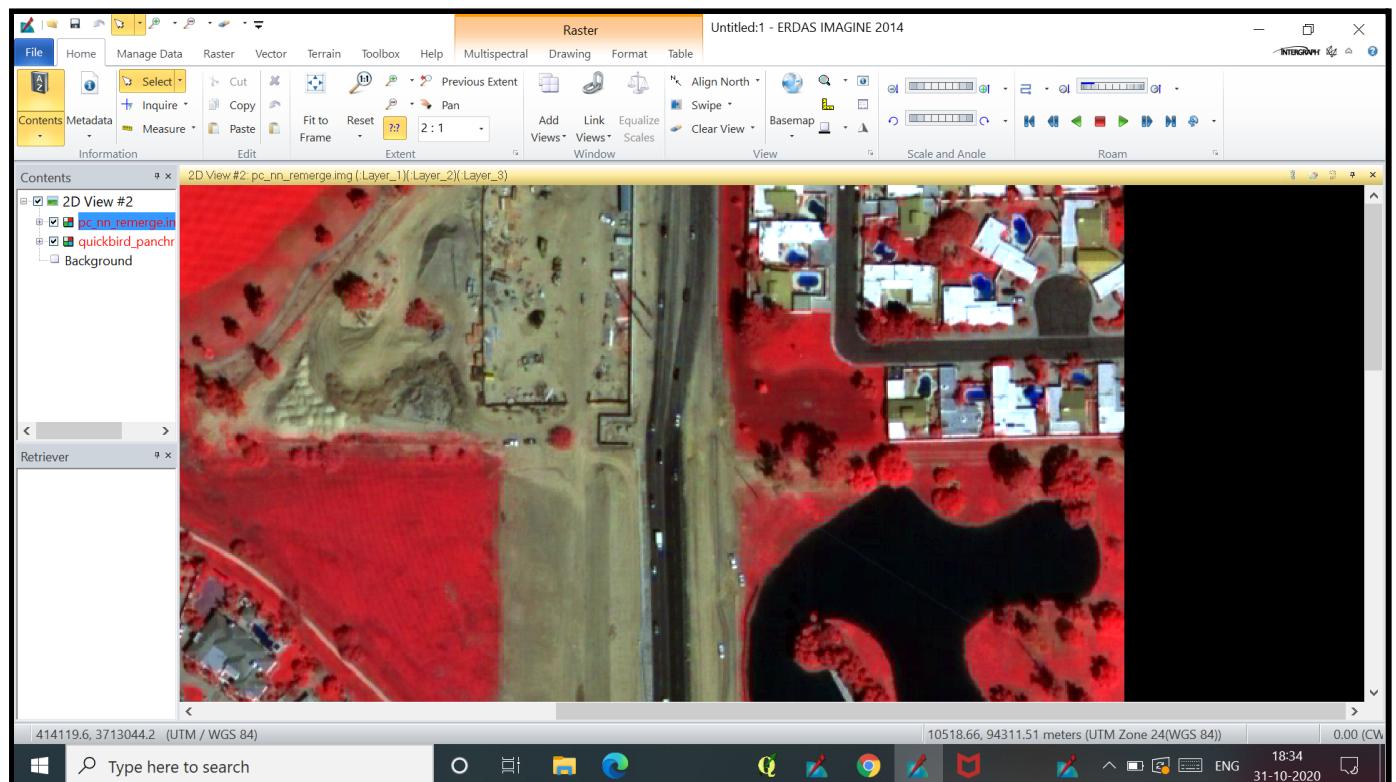
Step-2 High Resolution input file- Pan image, Multispectral input file- Multispectral image, **Method- Principal Component, Resampling method- Nearest Neighbour, Layer- 4:1**, rest all by default values and give output file name and click ok.



Step-3 After computation, open the fused image created.



The fused image have **complementary spatial and spectral resolution characteristics**. The new product has high resolution and is in colour composite.

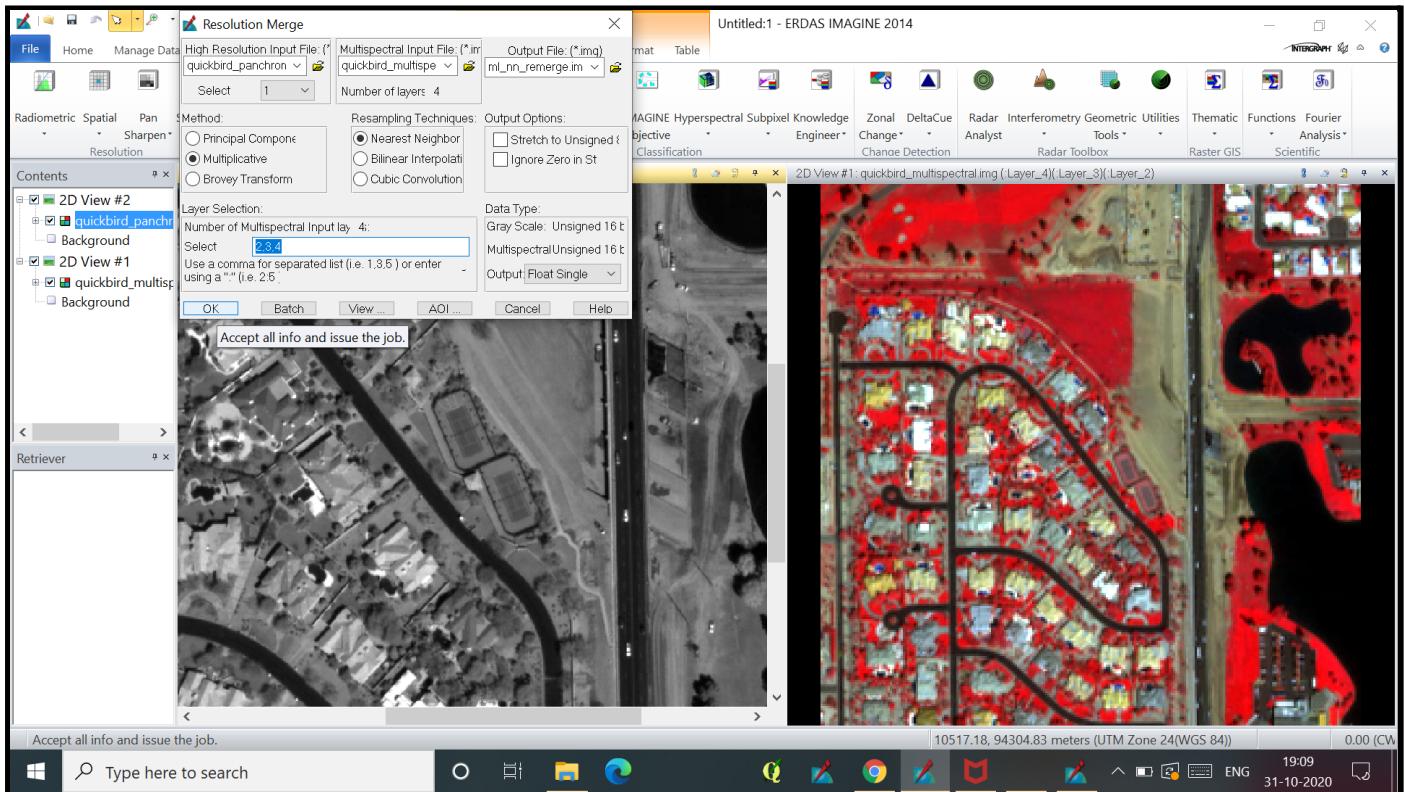


In this the image has **sharpened** and **resolution has improved** and the enhanced certain **features not clearly visible** earlier. One may see the vehicles on the road, the water body (probably swimming pools), in fact the shadow of trees is also visible.

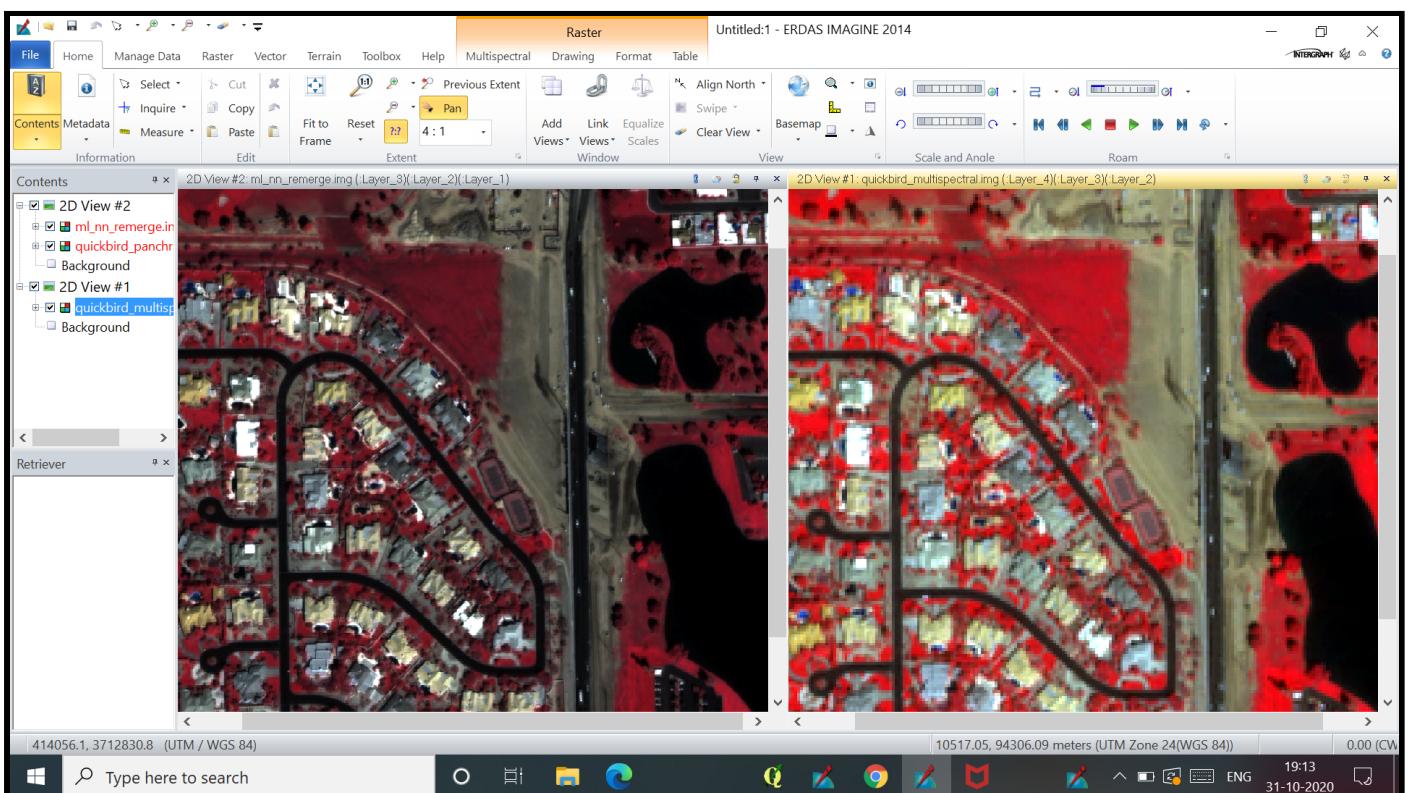
2. Multiplicative

Step-1 Raster > Pan Sharpen > Resolution Merge

Step-2 High Resolution input file- Pan image, Multispectral input file- Multispectral image, **Method- Multiplicative, Resampling method- Nearest Neighbour, Layer- 2,3,4**, rest all by default values and give output file name and click ok.



Step-3 After computation, open the fused image created.

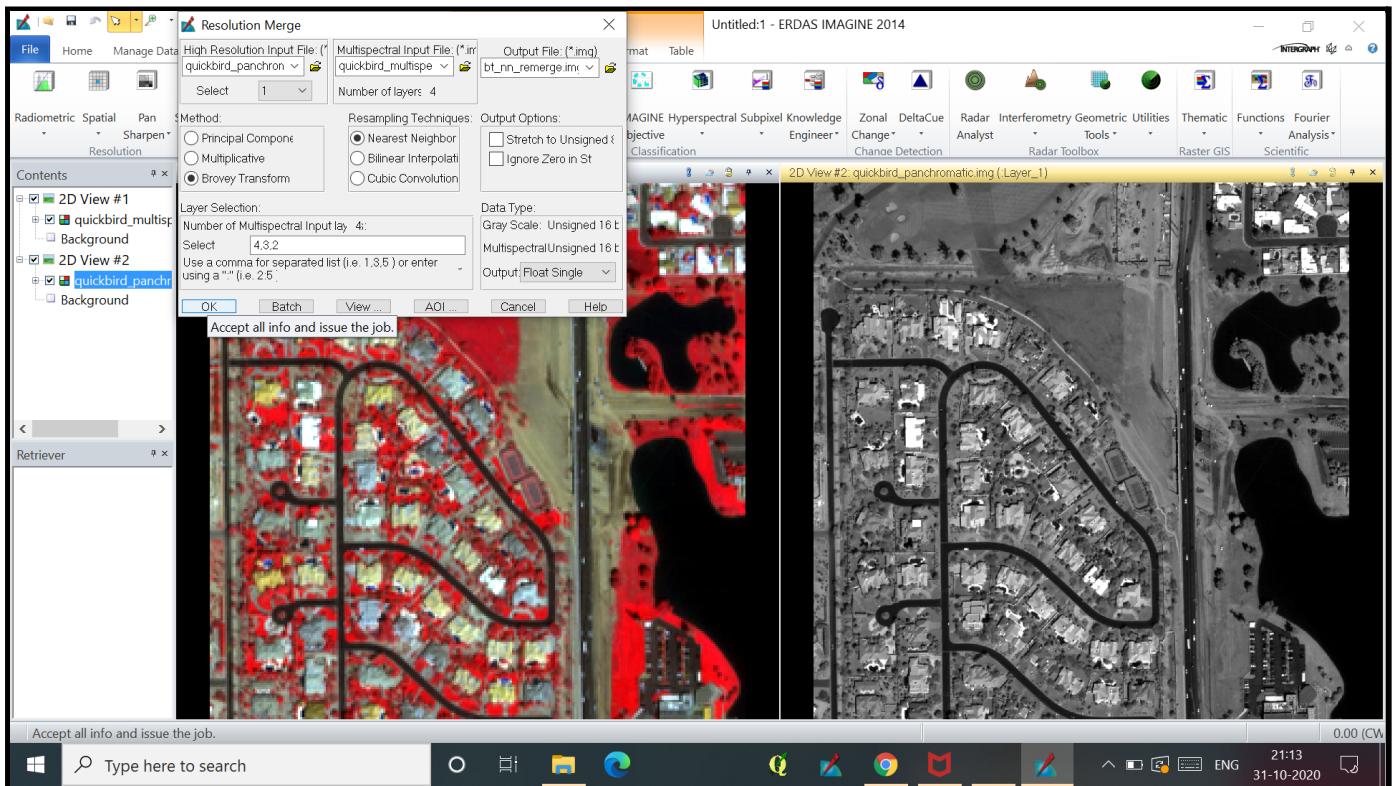


The information/output has **improved although it is not that good.**

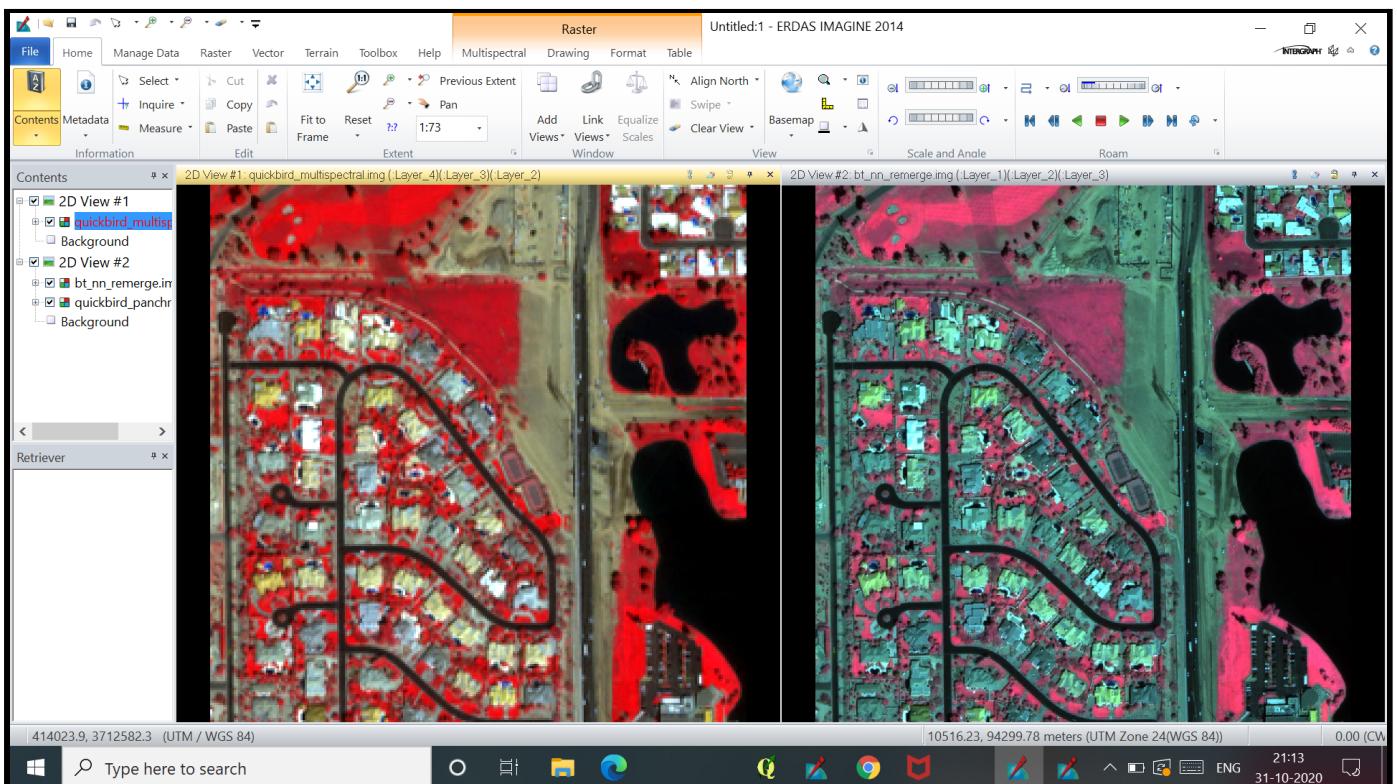
3. Brovey Transform

Step-1 Raster > Pan Sharpen > Resolution Merge

Step-2 High Resolution input file- Pan image, Multispectral input file- Multispectral image, **Method- Multiplicative, Resampling method- Nearest Neighbour, Layer- 4,3,2** rest all by default values and give output file name and click ok.



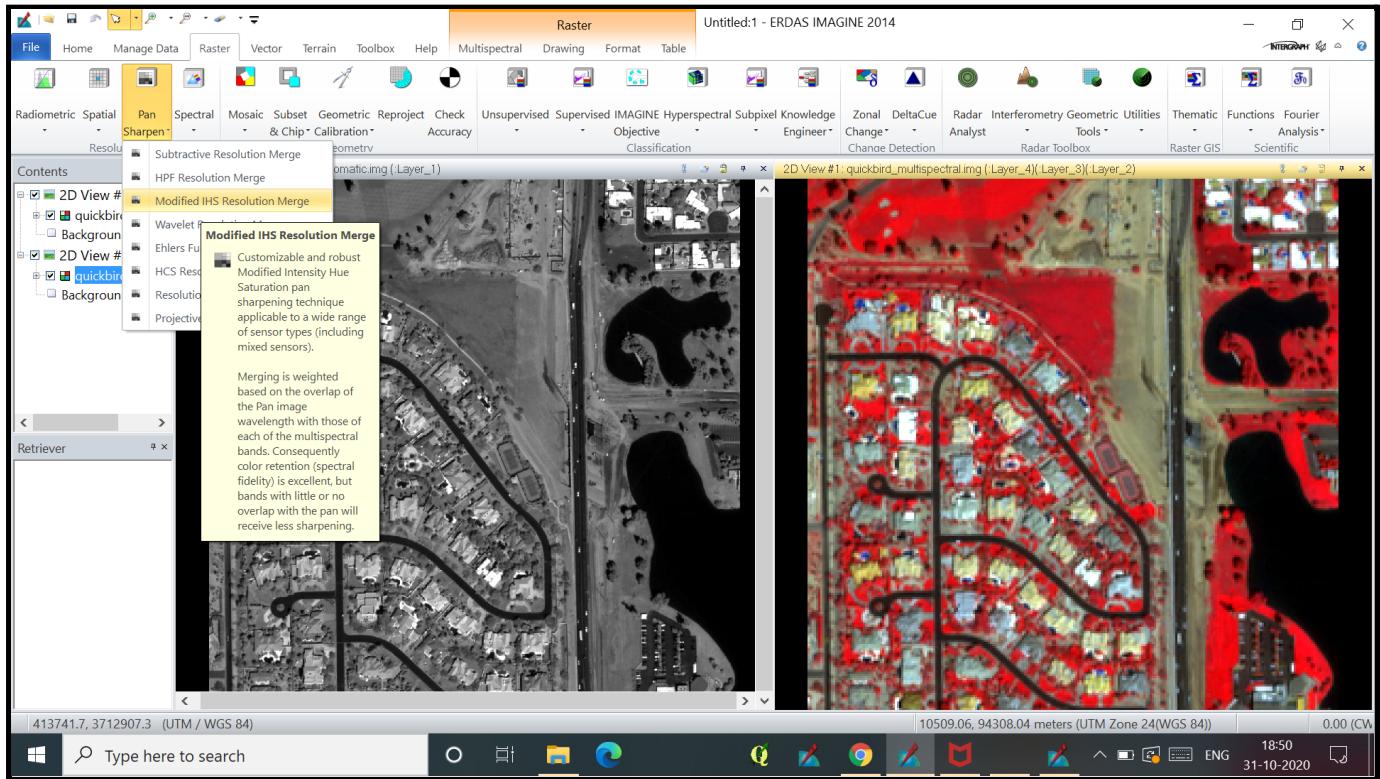
Step-3 After computation, browse the fused image.



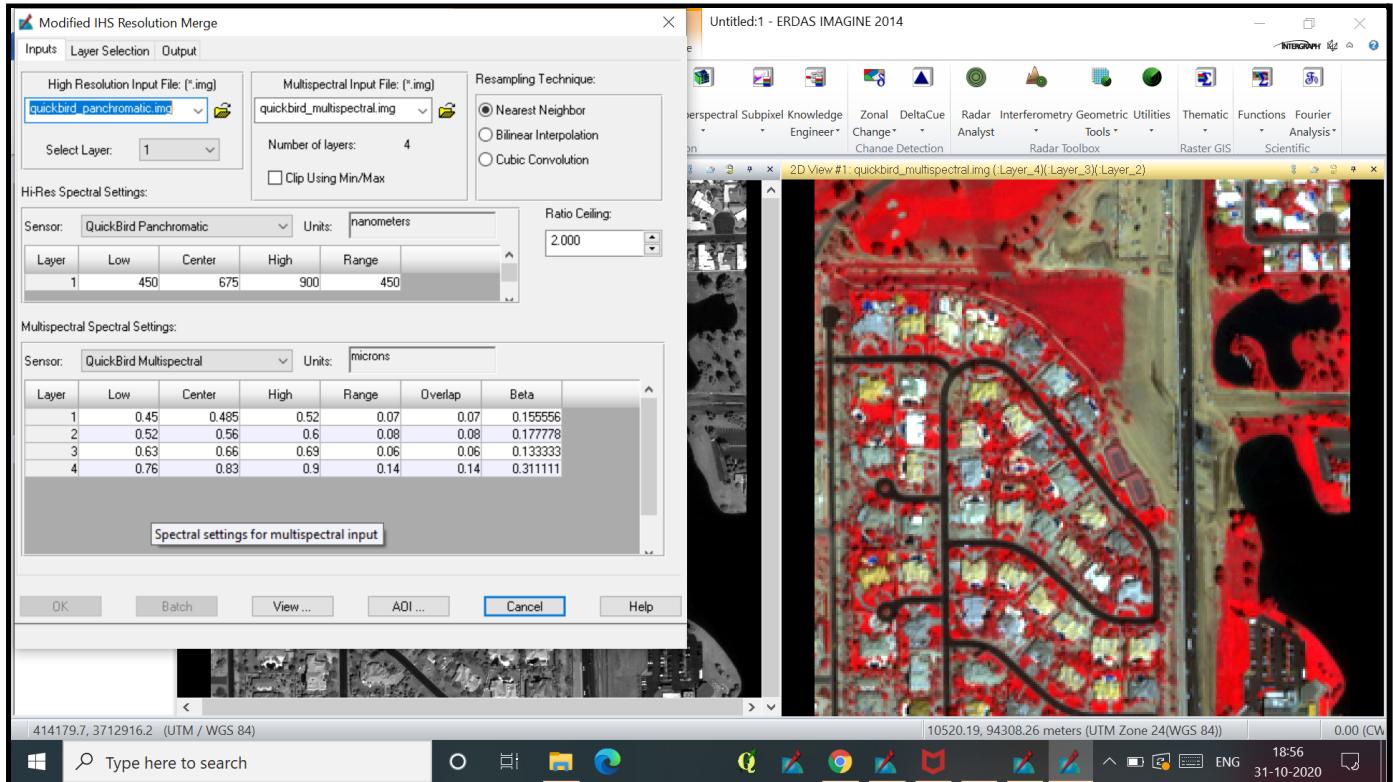
The information/output has **improved although it is not that good.**

4. Modified IHS

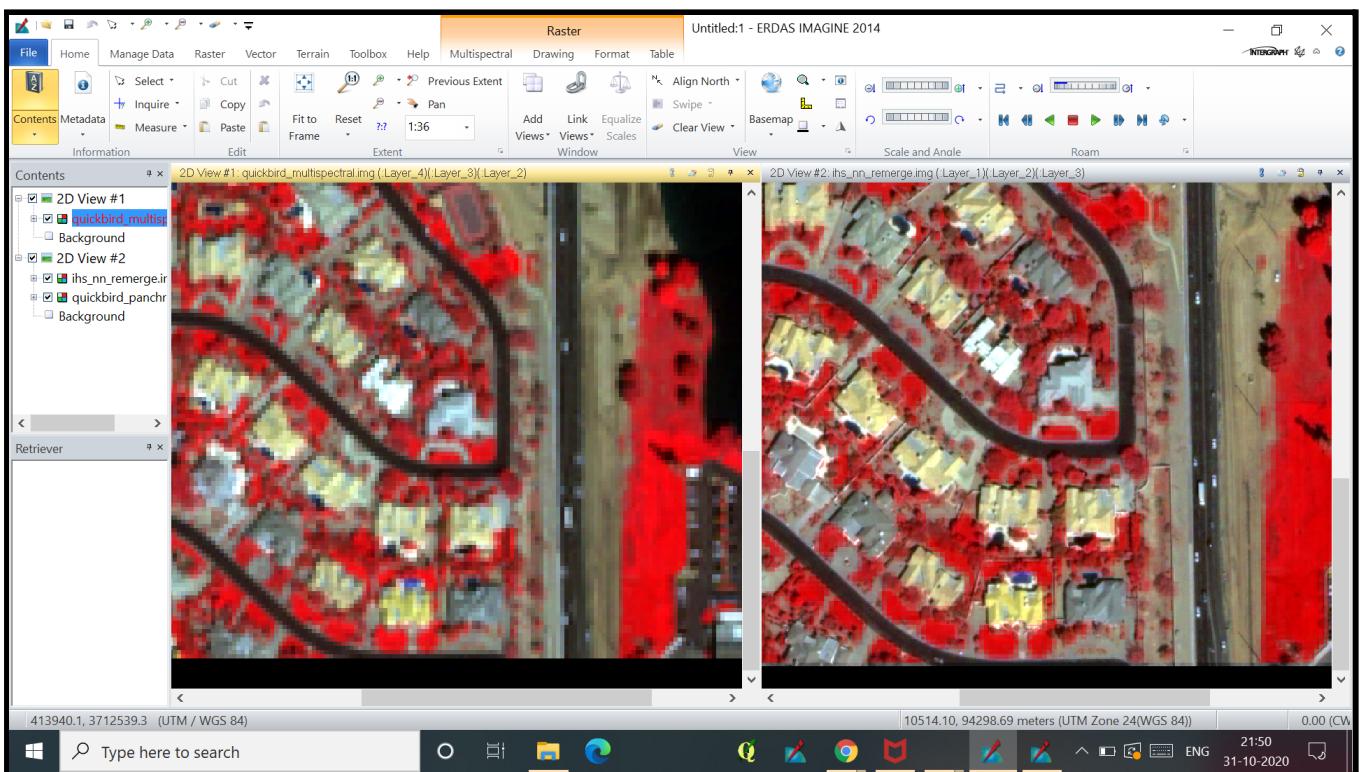
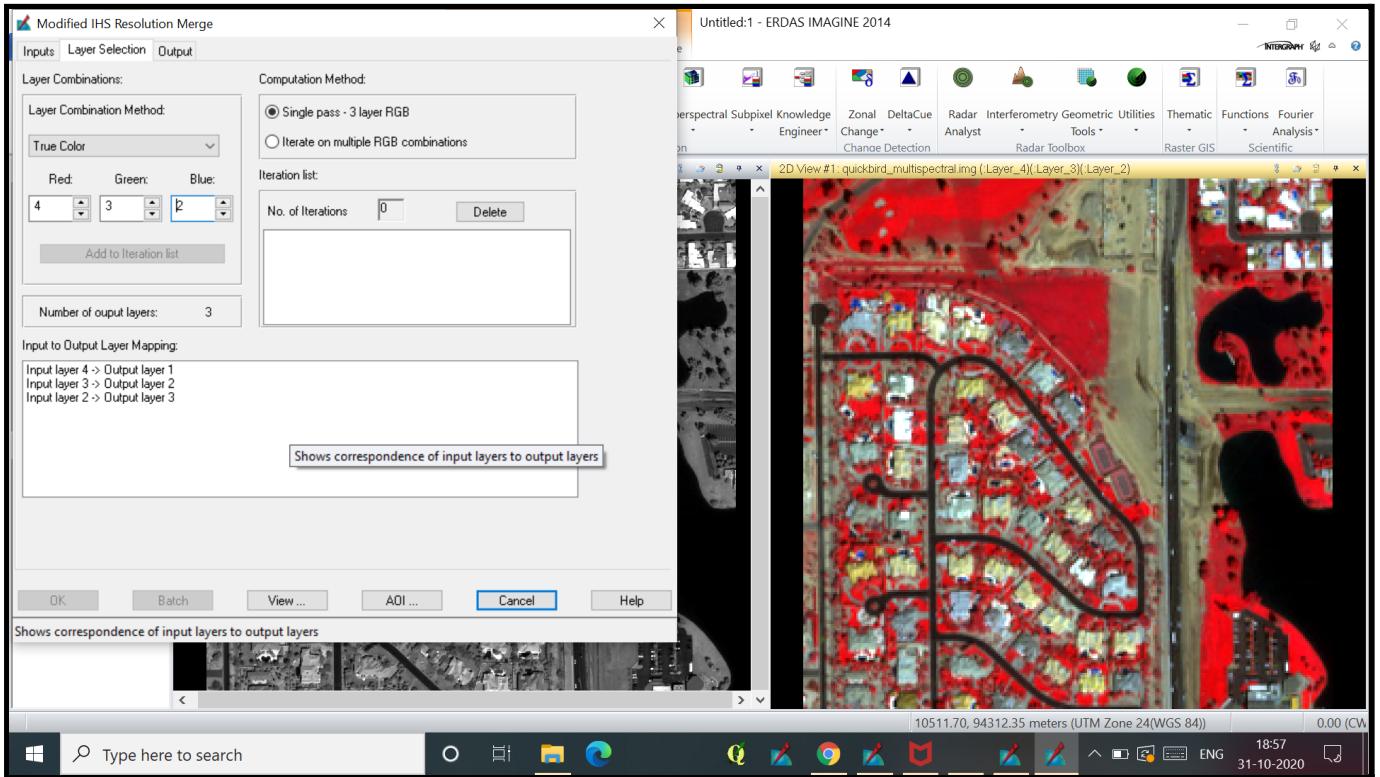
Step-1 Raster > Pan Sharpen > Modified IHS Resolution Merge



Step-2 Under the input tab- High Resolution input file- Pan image, Multispectral input file- Multispectral image, **Resampling method- Nearest Neighbour**. Also choose the respective sensors.



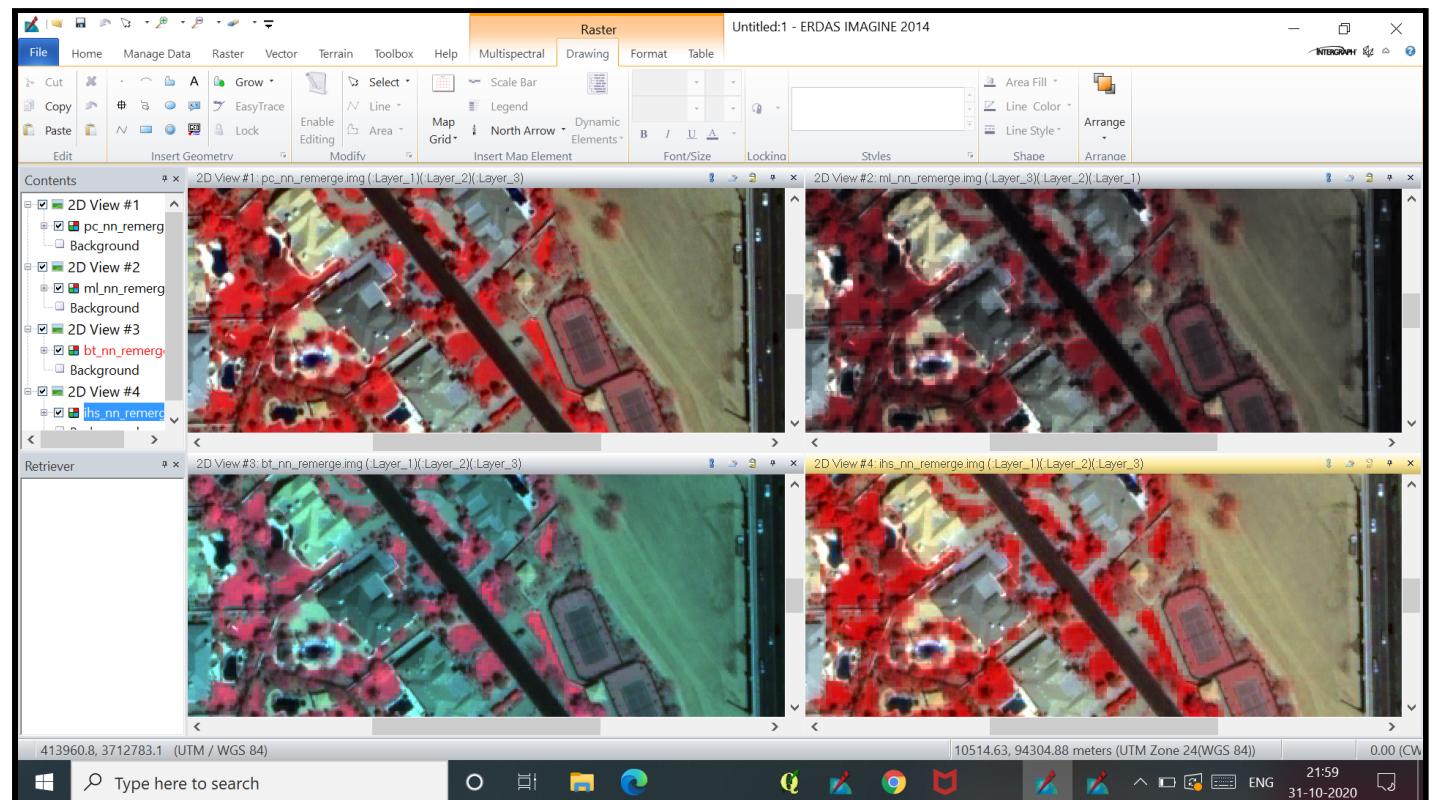
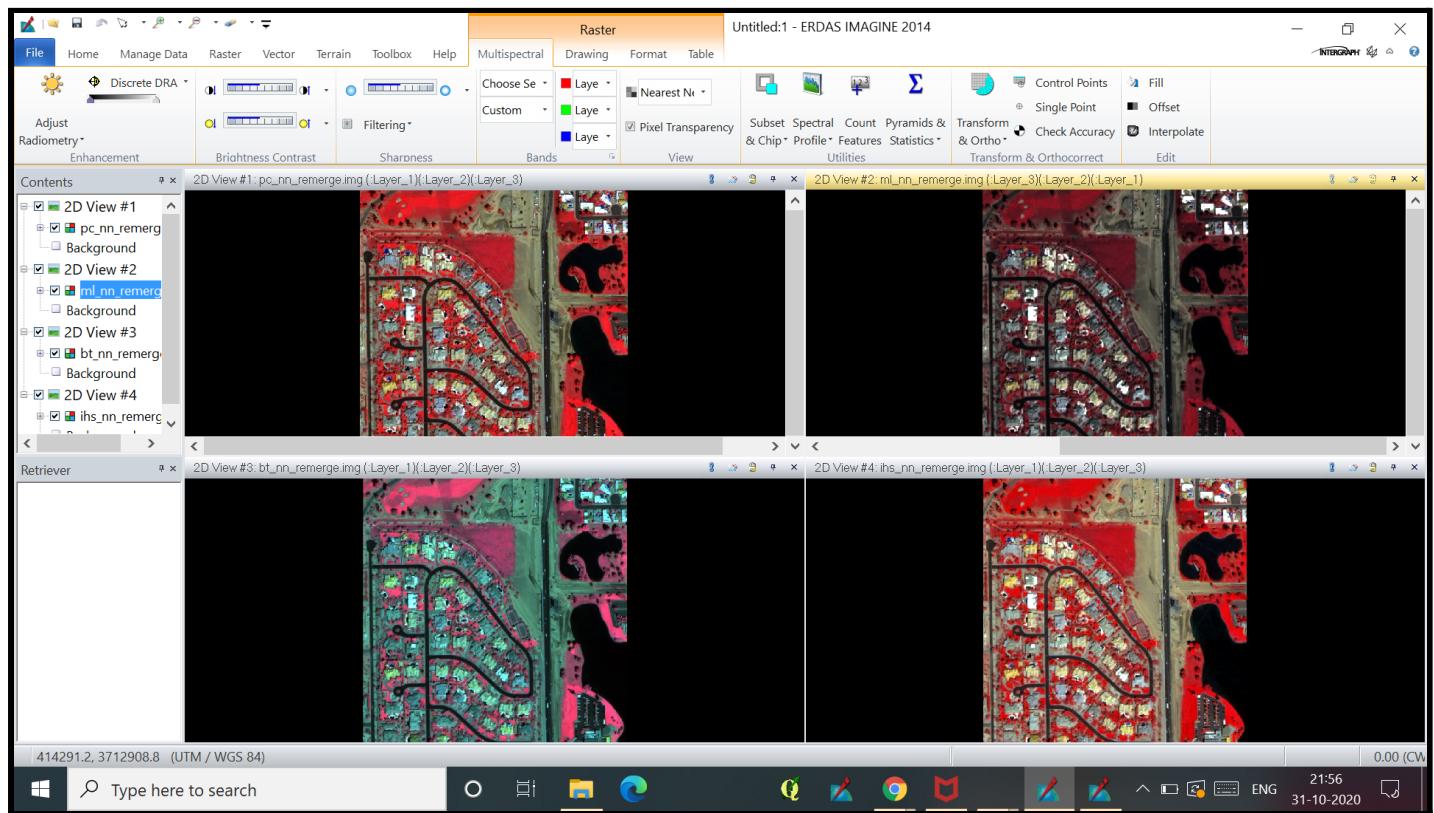
Step-3 Under the Layer Selection Tab, Select the layer Combination method. And in the output tab, give the output file name and then click ok.



The IHS method is also quite good and information has **improved**. **Finer details** are visible and therefore, **easy to interpret**.

PART-2

COMPARING IMAGE FUSION METHODS



There is a **difference of colours** in all the methods and **spatial resolution has improved in each method**. Among the principal component, Multiplicative method and Brovey transformation, the **Principal Component is best suited**. In the principal component, even the finest objects such as **vehicles on roads**

are identifiable, shadow of the trees, water bodies (swimming pools) etc. Advantage of PCA-based pan sharpening method is that the **number of bands are not restricted**.

In Multiplicative and Brovey Transformation, the **information has improved** but still they are not that good. The **Brovey method increases the contrast in the low and high ends** of an image histogram i.e. to provide contrast in shadows, water, urban features etc. It maintains the radiometric integrity of data while increasing spatial resolution. It optically **maintains the spectral information** of the band whilst sparinging the image.

Similarly, the **IHS method is also good**. Infact, it is better than multiplicative and Brovey transformations. The **finest details** are also visible in this one too. It has **improved color composite**. The IHS model is inherently **highly flexible**. However, the IHS method **distorts the spectral characteristics the most** and should be used cautiously if radiometric analysis on the data is to be performed.

Despite being similar to IHS, the **advantage of PCA method over IHS method** is that an **arbitrary number of bands can be used**. This is one of the most popular methods for image fusion.

Thus, image fusion **sharpens** the image and **improves interpretability** of the data by having **high resolution information which is also in color**. However, **data integrity is lost** i.e. **pixel values are modified and can't derive any parameters**. Thus, useful for only **visual interpretation**.