

Skin Detection - Lavoro iniziale di definizione soglie

Bianchi Luca - 4805748

In []:

```
import os
%matplotlib inline
import numpy as np
import matplotlib.pyplot as plt
from skimage import io
import cv2 as cv
import warnings
warnings.filterwarnings('ignore')

FILE_DIR = './material/images'
```

In []:

```
def normalized(rgb):

    norm=np.zeros_like(rgb,np.float32)

    r = rgb[:, :, 0]
    g = rgb[:, :, 1]
    b = rgb[:, :, 2]
    sum = rgb.sum(axis=2)

    norm[:, :, 0]=r/sum
    norm[:, :, 1]=g/sum
    norm[:, :, 2]=b/sum
    return norm
```

In []:

```
def run_skin_analysis_norm():

    with os.scandir(FILE_DIR+"/skin/") as direct:
        maxes_rg = []
        maxes_rb = []
        mins_rg = []
        mins_rb = []
        for file in direct:
            plt.figure(figsize=(32, 8))
            plt.suptitle(file.name)
            skin_img = io.imread(FILE_DIR + "/skin/" + file.name)
            skin_img_array = normalized(np.asarray(skin_img))
            plt.subplot(1, 9, 1)
            plt.imshow(skin_img_array)
            plt.subplot(1, 9, 2)
            plt.scatter(skin_img_array[:, :, 0], skin_img_array[:, :, 1], norm=True)
            plt.subplot(1, 9, 3)
            plt.scatter(skin_img_array[:, :, 0], skin_img_array[:, :, 2], norm=True)
            plt.subplot(1, 9, 4)
            plt.scatter(skin_img_array[:, :, 1], skin_img_array[:, :, 2], norm=True)
            plt.subplot(1, 9, 5)
            plt.imshow(skin_img)
            plt.subplot(1, 9, (6, 7))
            tmp_mx = (skin_img_array[:, :, 0]/skin_img_array[:, :, 1]).max(axis=1)
            tmp_mn = (skin_img_array[:, :, 0]/skin_img_array[:, :, 1]).min(axis=1)
            plt.plot(tmp_mx)
            plt.plot(tmp_mn)
            tmp_mx = tmp_mx.max()
            tmp_mn = tmp_mn.min()
            maxes_rg.append(tmp_mx)
            mins_rg.append(tmp_mn)
            plt.subplot(1, 9, (8, 9))
            tmp_mx = (skin_img_array[:, :, 0]/skin_img_array[:, :, 2]).max(axis=1)
            tmp_mn = (skin_img_array[:, :, 0]/skin_img_array[:, :, 2]).min(axis=1)
            plt.plot(tmp_mx)
            plt.plot(tmp_mn)
            tmp_mx = tmp_mx.max()
            tmp_mn = tmp_mn.min()
            maxes_rb.append(tmp_mx)
            mins_rb.append(tmp_mn)
        print(f"95 perc max = {np.percentile(np.asarray(maxes_rg), 95)}, {np.percentile(np.asarray(maxes_rb), 95)}")
        print(f"10 perc min = {np.percentile(np.asarray(mins_rg), 10)}, {np.percentile(np.asarray(mins_rb), 10)}")
```

In []:

```
def run_skin_analysis_hsv():

    with os.scandir(FILE_DIR+"/skin/") as direct:
        maxes_rg = []
        maxes_rb = []
        mins_rg = []
        mins_rb = []
        for file in direct:
            plt.figure(figsize=(32, 4))
            plt.suptitle(file.name)
            skin_img = io.imread(FILE_DIR + "/skin/" + file.name)
            skin_img_hsv = cv.cvtColor(skin_img, cv.COLOR_BGR2HSV)
            plt.figure(figsize=(32, 8))
            plt.subplot(1, 7, 1)
            plt.imshow(skin_img_hsv[:, :, 0], cmap="hsv")
```

```

plt.colorbar(orientation='horizontal')
plt.subplot(1, 7, 2)
plt.imshow(skin_img_hsb[:, :, 1], cmap="Reds")
plt.colorbar(orientation='horizontal')
plt.subplot(1, 7, 3)
plt.imshow(skin_img_hsb[:, :, 2], cmap="gray")
plt.colorbar(orientation='horizontal')
plt.subplot(1, 7, (4, 5))
tmp_mx = (skin_img_hsb[:, :, 0]).max(axis=1)
tmp_mn = (skin_img_hsb[:, :, 0]).min(axis=1)
plt.plot(tmp_mx)
plt.plot(tmp_mn)
tmp_mx = tmp_mx.max()
tmp_mn = tmp_mn.min()
maxes_rg.append(tmp_mx)
mins_rg.append(tmp_mn)
plt.subplot(1, 7, (6, 7))
tmp_mx = (skin_img_hsb[:, :, 1]).max(axis=1)
tmp_mn = (skin_img_hsb[:, :, 1]).min(axis=1)
plt.plot(tmp_mx)
plt.plot(tmp_mn)
tmp_mx = tmp_mx.max()
tmp_mn = tmp_mn.min()
maxes_rb.append(tmp_mx)
mins_rb.append(tmp_mn)
print(f"98% perc max = {np.percentile(np.asarray(maxes_rg), 98)}, {np.percentile(np.asarray(maxes_rb), 98)}")
print(f"5% perc min = {np.percentile(np.asarray(mins_rg), 5)}, {np.percentile(np.asarray(mins_rb), 5)}")

```

In []:

```

def run_skin_analysis_ycbcr():
    with os.scandir(FILE_DIR+"/skin/") as direct:
        maxes_rg = []
        maxes_rb = []
        mins_rg = []
        mins_rb = []
        for file in direct:
            plt.figure(figsize=(32, 4))
            plt.suptitle(file.name)
            skin_img = io.imread(FILE_DIR + "/skin/" + file.name)
            skin_img_ycbcr = cv.cvtColor(skin_img, cv.COLOR_RGB2YCrCb)
            plt.subplot(1, 2, 1)
            plt.imshow(skin_img_ycbcr)
            plt.subplot(1, 2, 2)
            plt.imshow(skin_img)
            plt.figure(figsize=(32, 8))
            plt.subplot(1, 7, 1)
            plt.imshow(skin_img_ycbcr[:, :, 0], cmap="gray")
            plt.colorbar(orientation='horizontal')
            plt.subplot(1, 7, 2)
            plt.imshow(skin_img_ycbcr[:, :, 1], cmap="Greens")
            plt.colorbar(orientation='horizontal')
            plt.subplot(1, 7, 3)
            plt.imshow(skin_img_ycbcr[:, :, 2], cmap="Reds")
            plt.colorbar(orientation='horizontal')
            plt.subplot(1, 7, (4, 5))
            tmp_mx = (skin_img_ycbcr[:, :, 1]).max(axis=1)
            tmp_mn = (skin_img_ycbcr[:, :, 1]).min(axis=1)
            plt.plot(tmp_mn)
            plt.plot(tmp_mx)
            tmp_mx = tmp_mx.max()
            tmp_mn = tmp_mn.min()
            maxes_rg.append(tmp_mx)
            mins_rg.append(tmp_mn)
            plt.subplot(1, 7, (6, 7))
            tmp_mx = (skin_img_ycbcr[:, :, 2]).max(axis=1)
            tmp_mn = (skin_img_ycbcr[:, :, 2]).min(axis=1)
            plt.plot(tmp_mn)
            plt.plot(tmp_mx)
            tmp_mx = tmp_mx.max()
            tmp_mn = tmp_mn.min()
            maxes_rb.append(tmp_mx)
            mins_rb.append(tmp_mn)
        print(f"98% perc max = {np.percentile(np.asarray(maxes_rg), 98)}, {np.percentile(np.asarray(maxes_rb), 98)}")
        print(f"2% perc min = {np.percentile(np.asarray(mins_rg), 2)}, {np.percentile(np.asarray(mins_rb), 2)}")

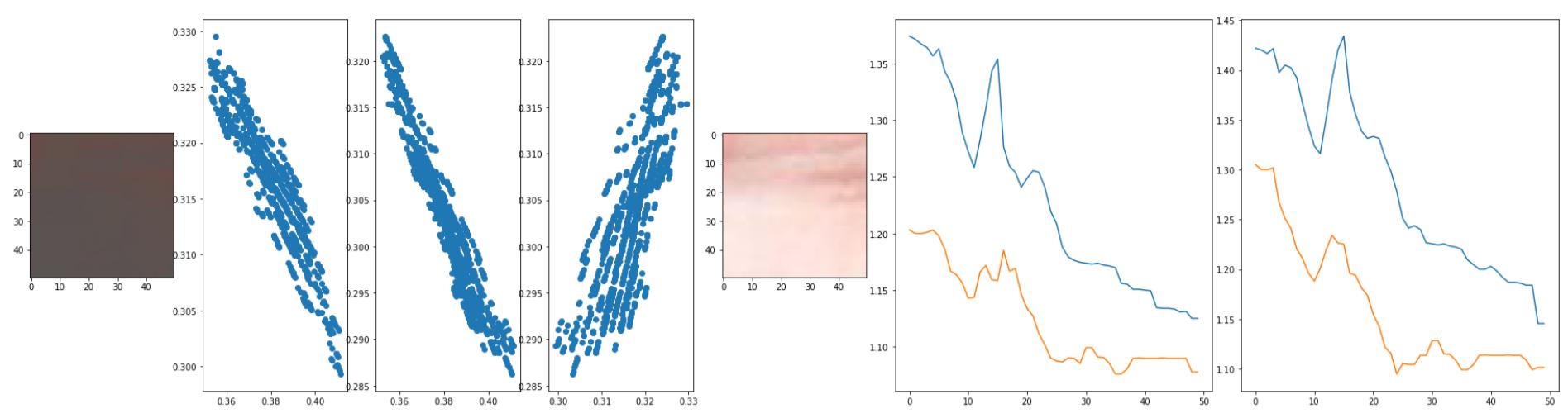
```

In []:

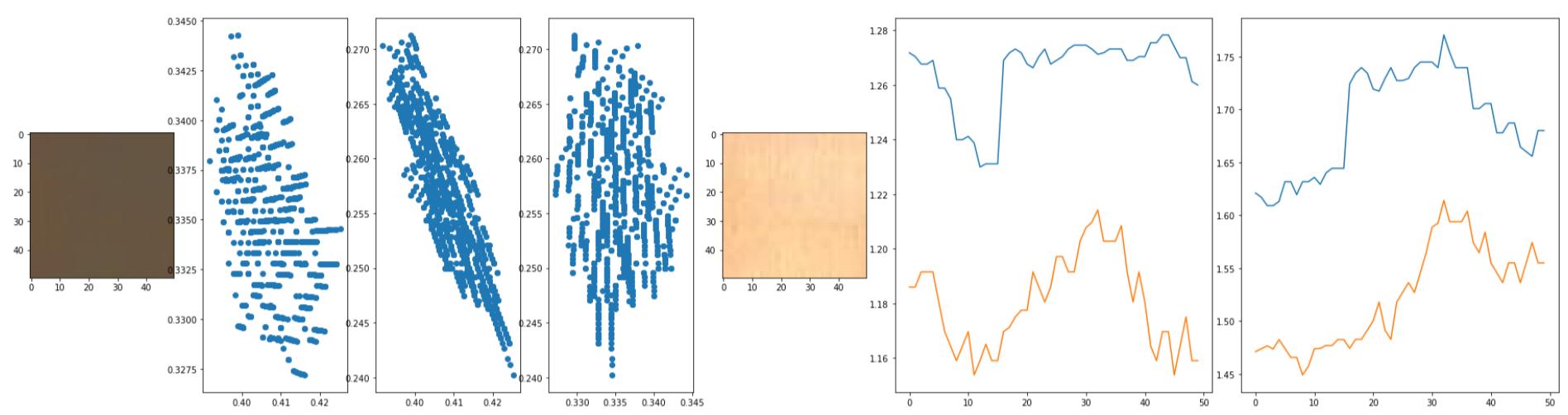
```
run_skin_analysis_norm()
```

```
95 perc max = 2.368037152290344, inf
10 perc min = 1.0686118721961975, 1.0960114479064942
```

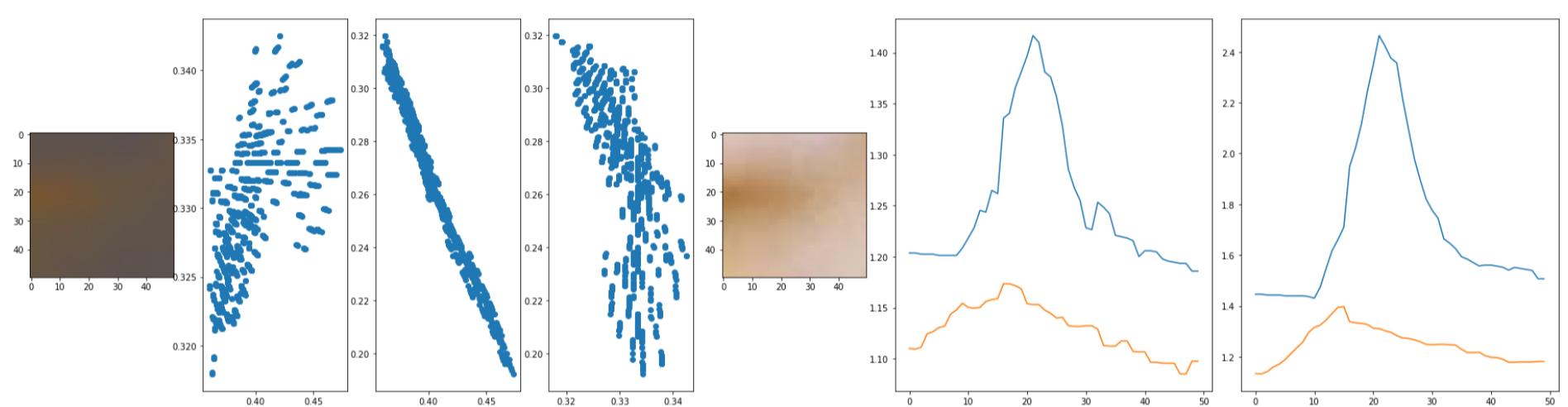
pelle1.jpg



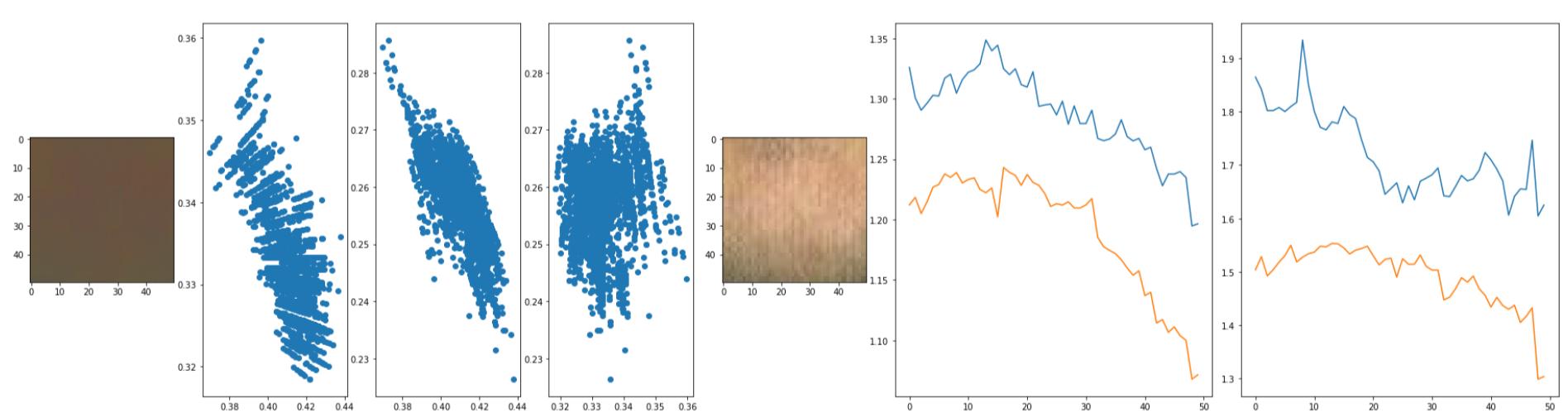
pelle10.jpg



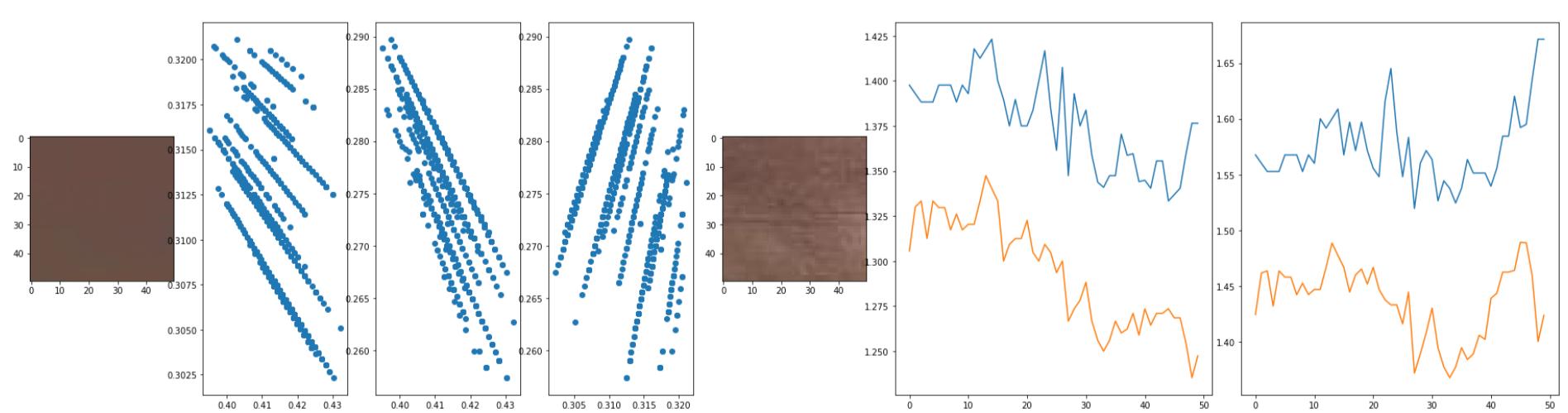
pelle11.jpg



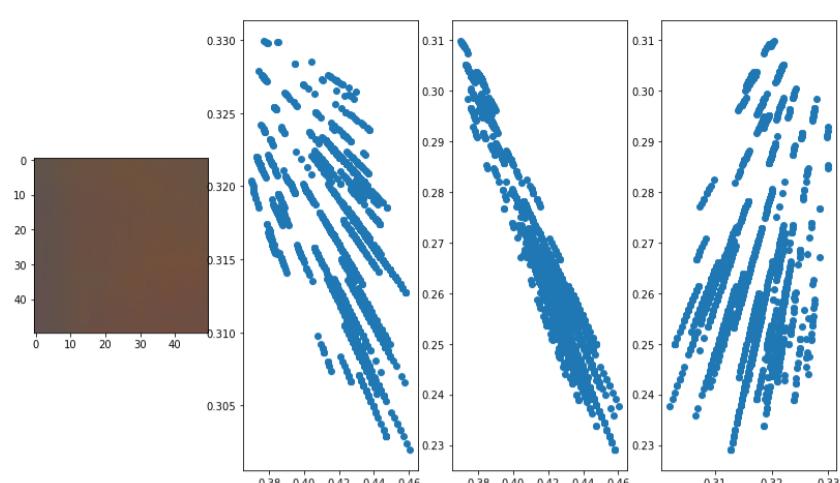
pelle12.jpg



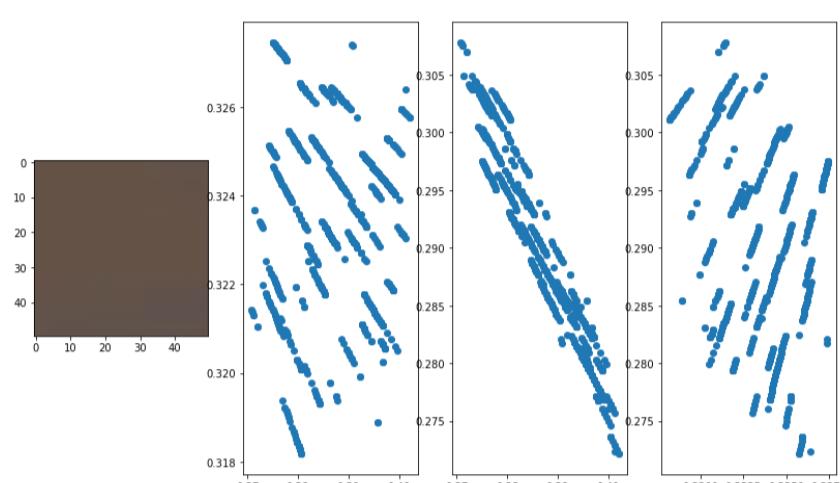
pelle13.jpg



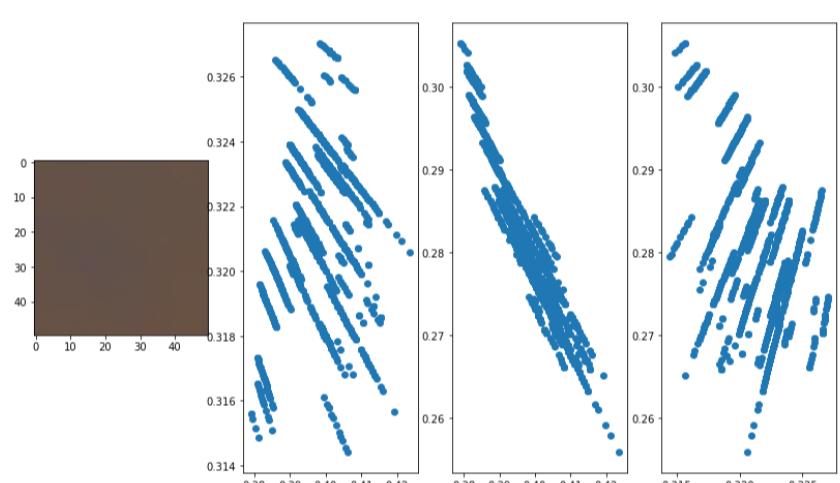
pelle14.jpg



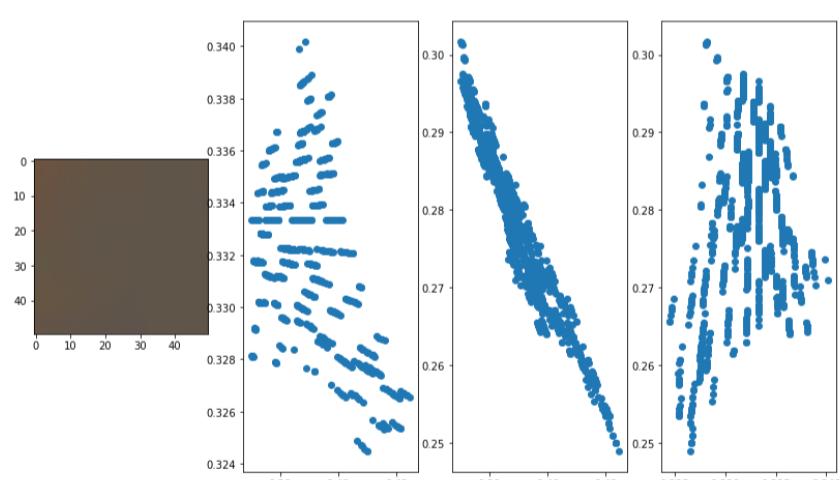
pelle15.jpg



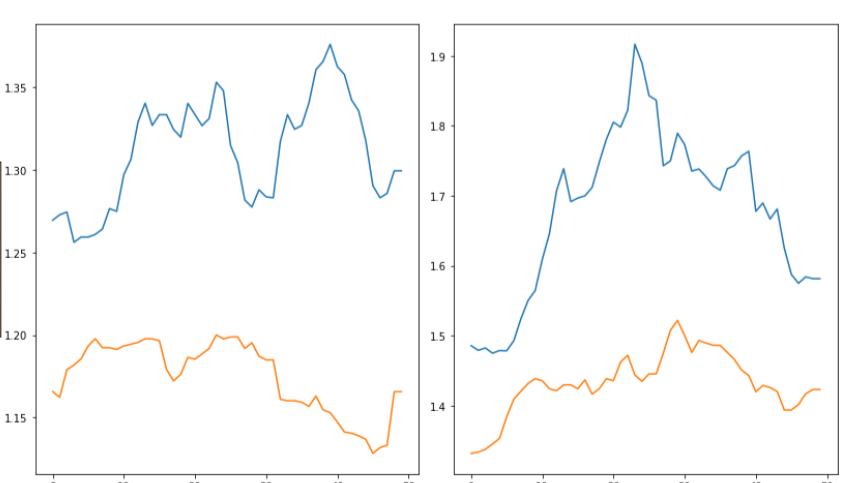
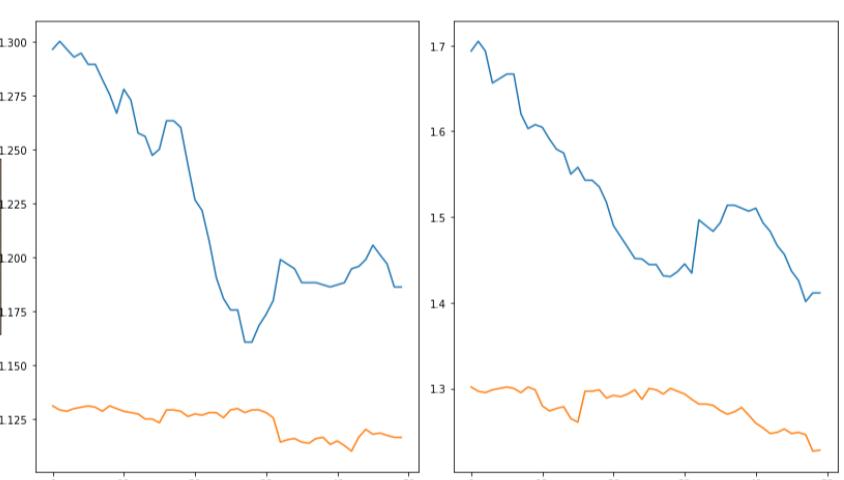
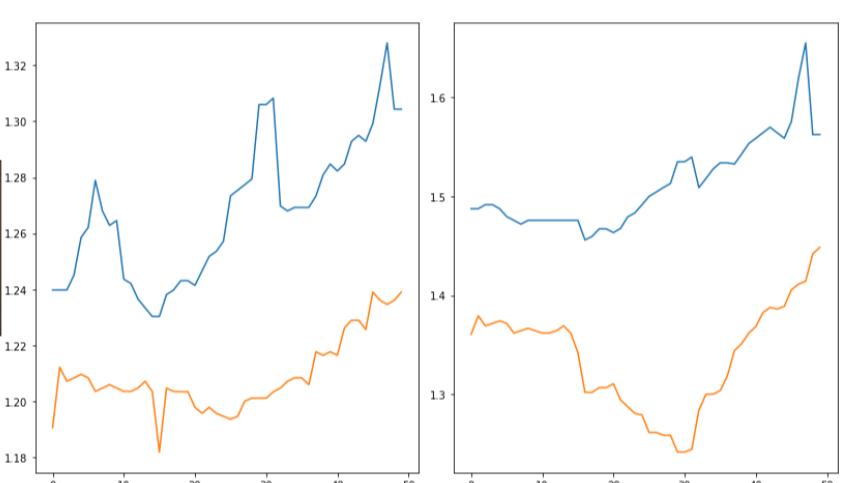
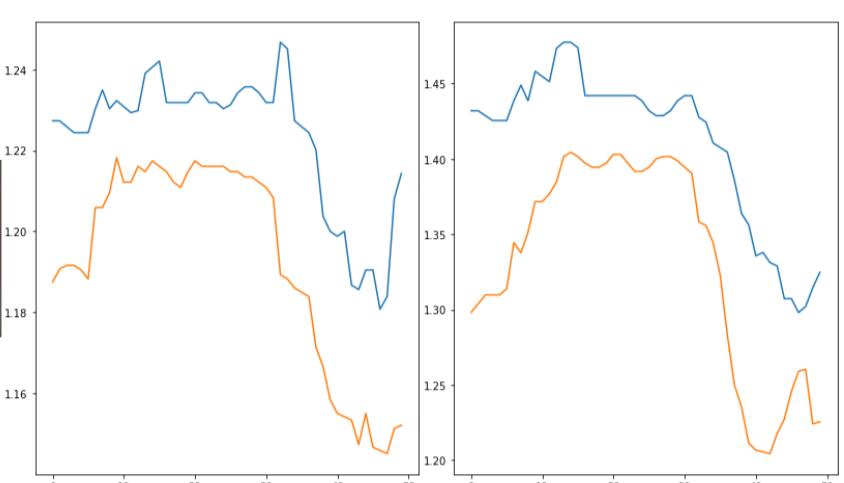
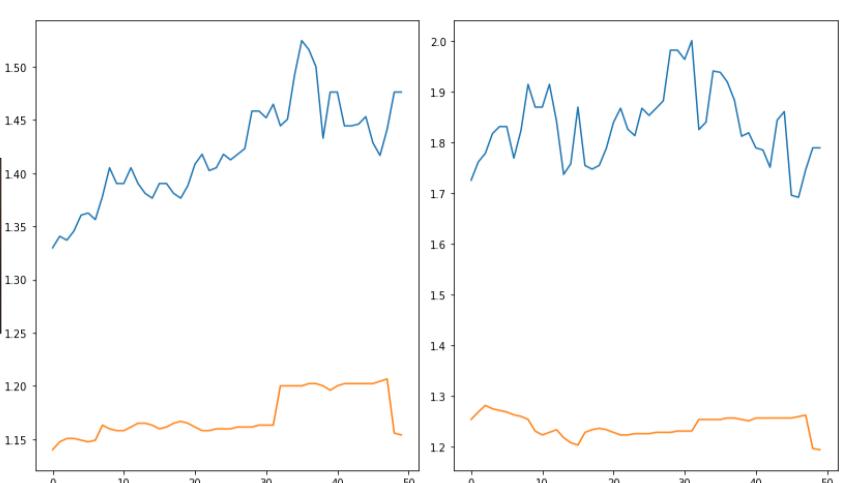
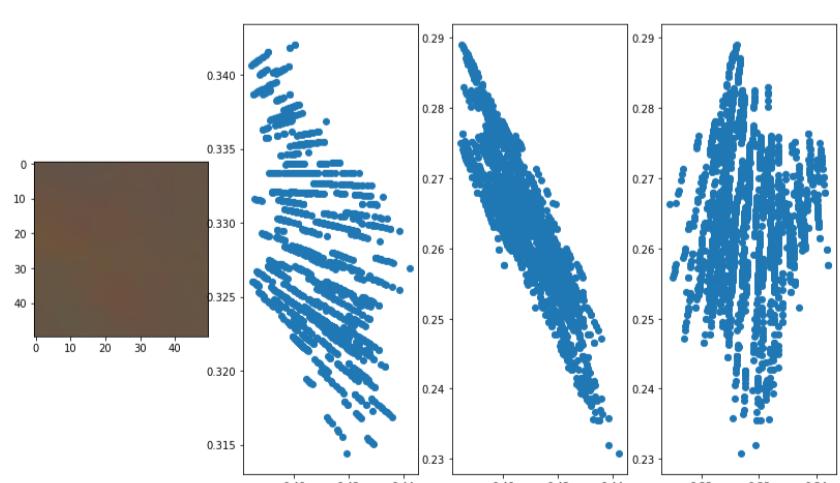
pelle16.jpg



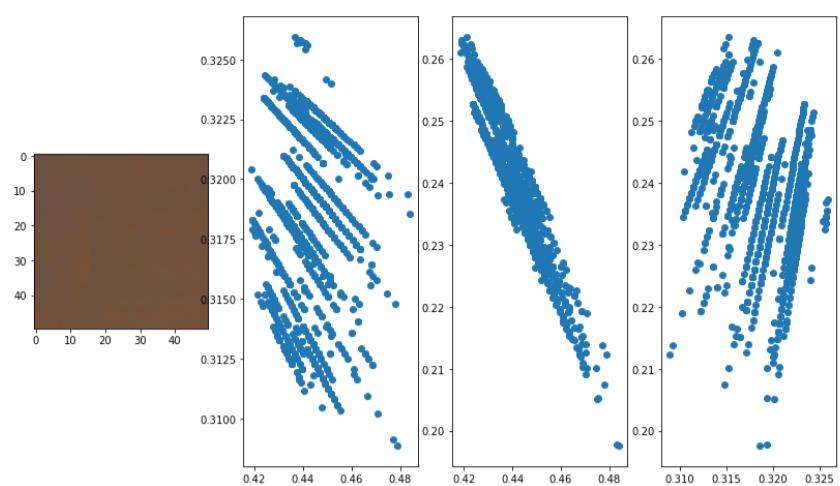
pelle17.jpg



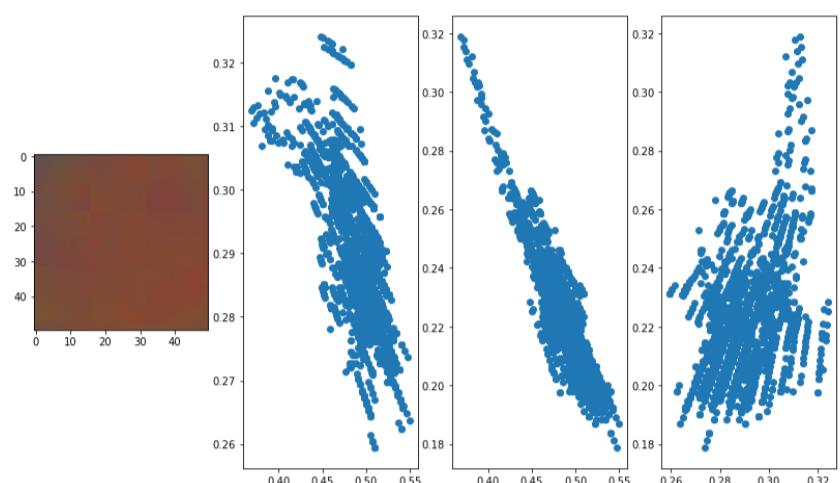
pelle18.jpg



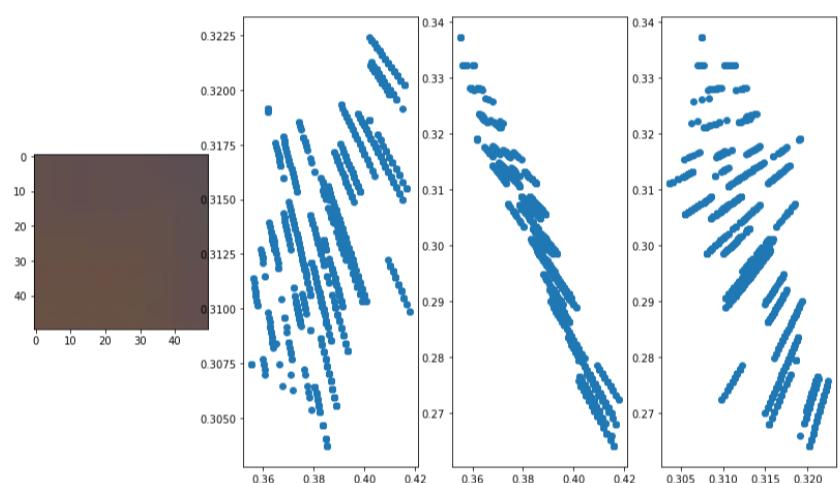
pelle19.jpg



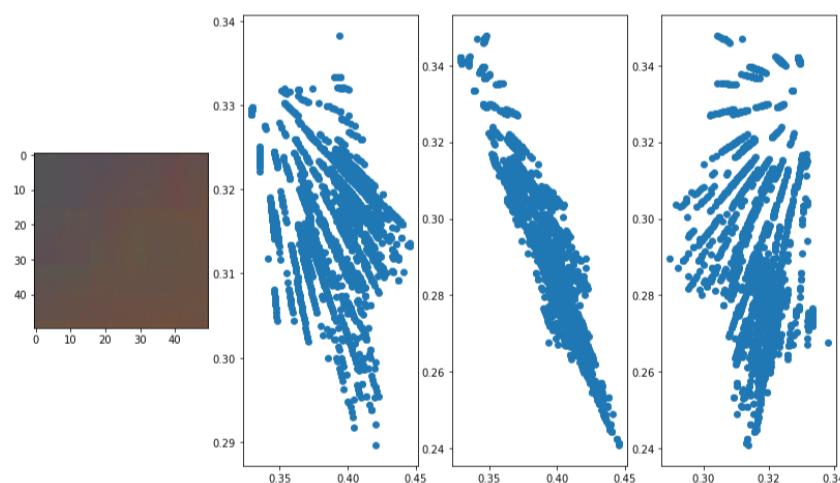
pelle2.jpg



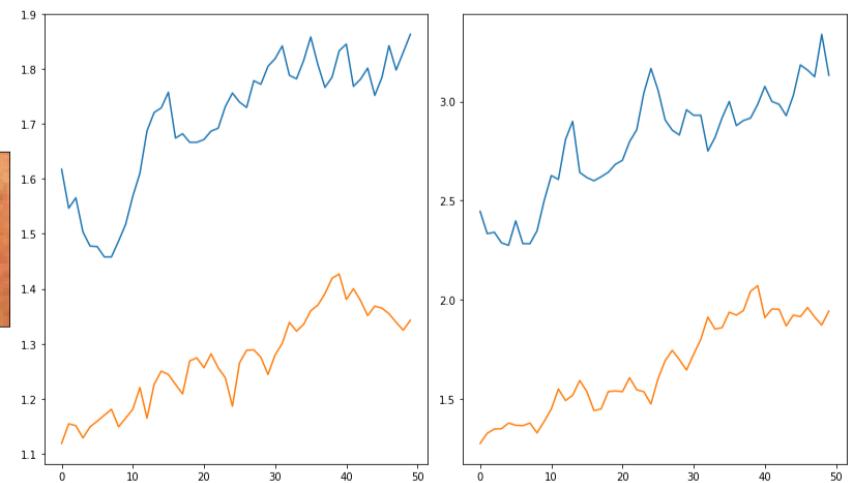
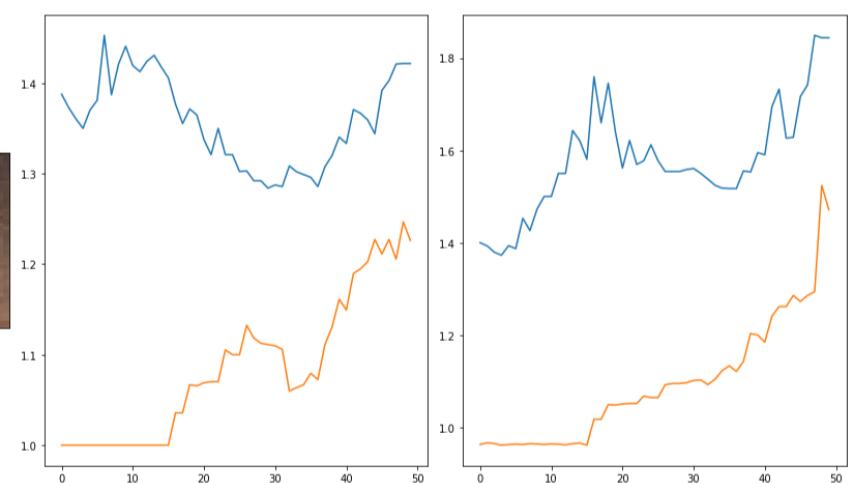
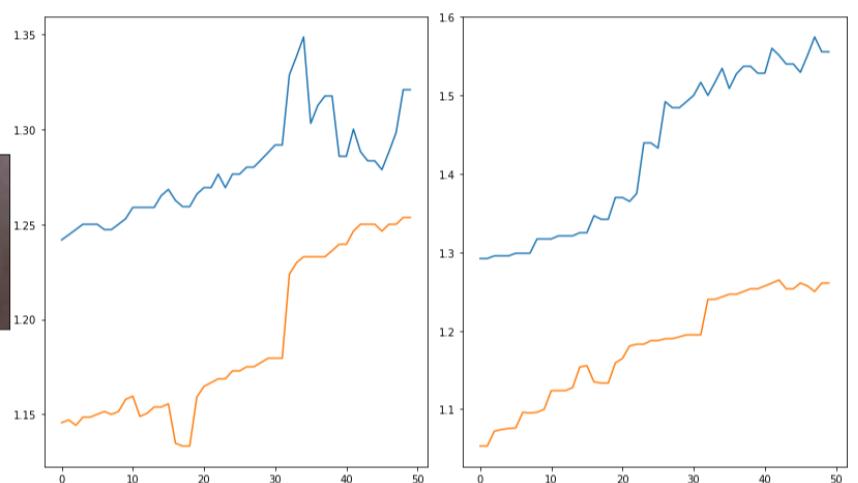
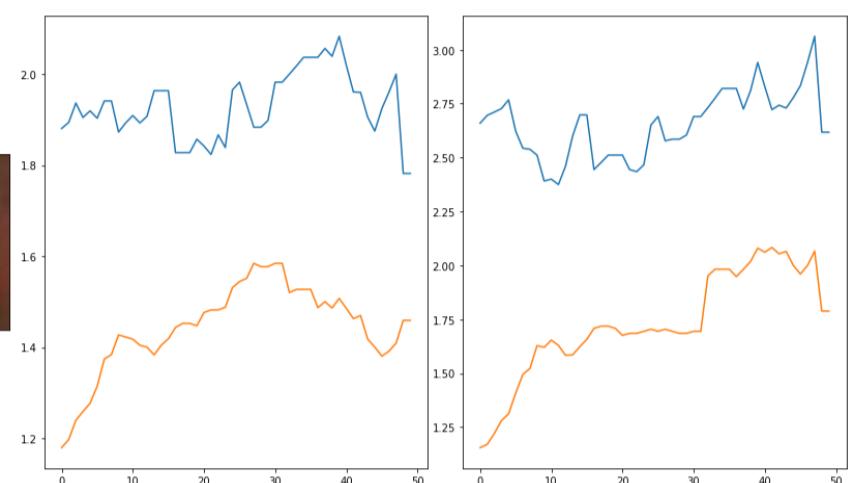
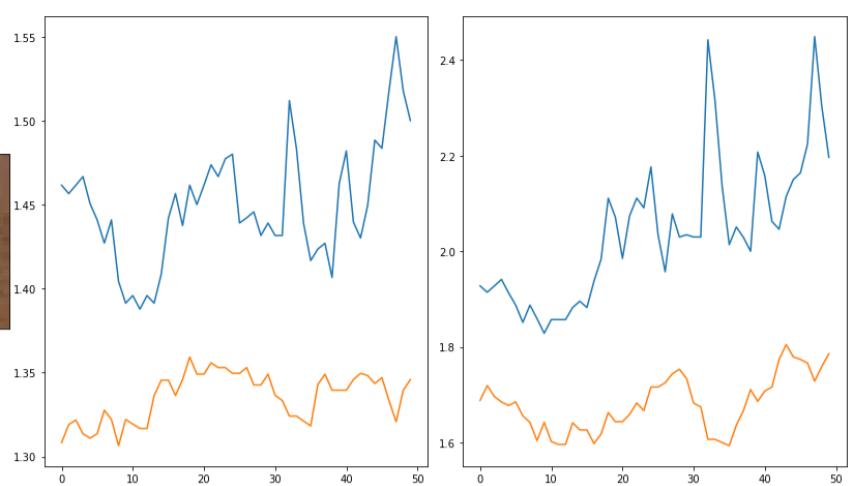
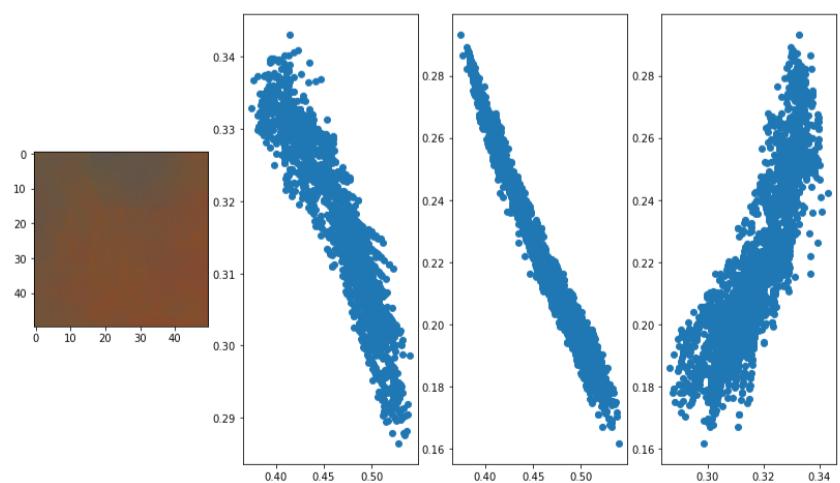
pelle20.jpg



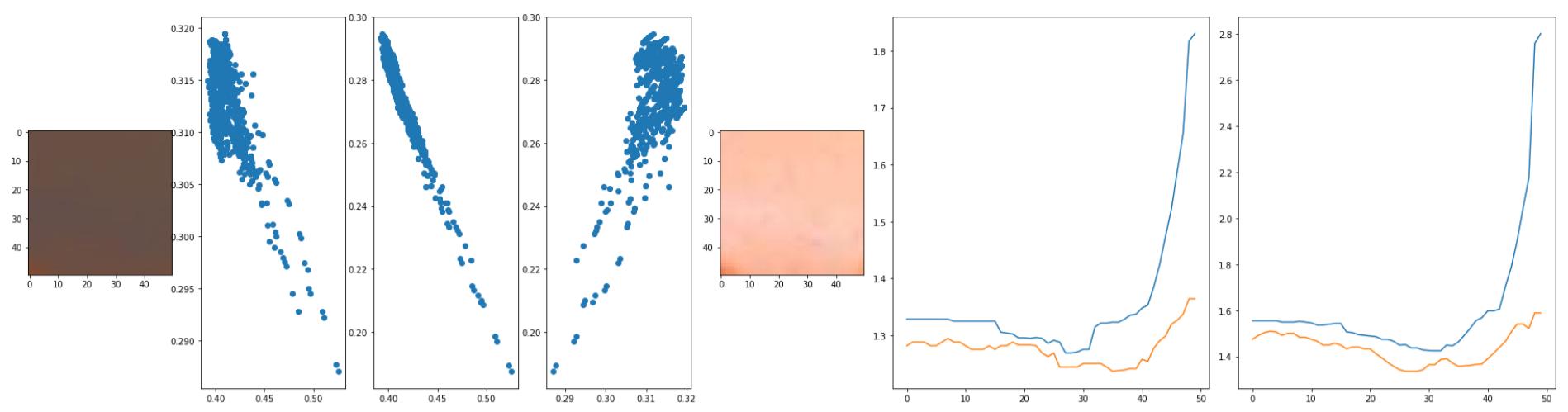
pelle21.jpg



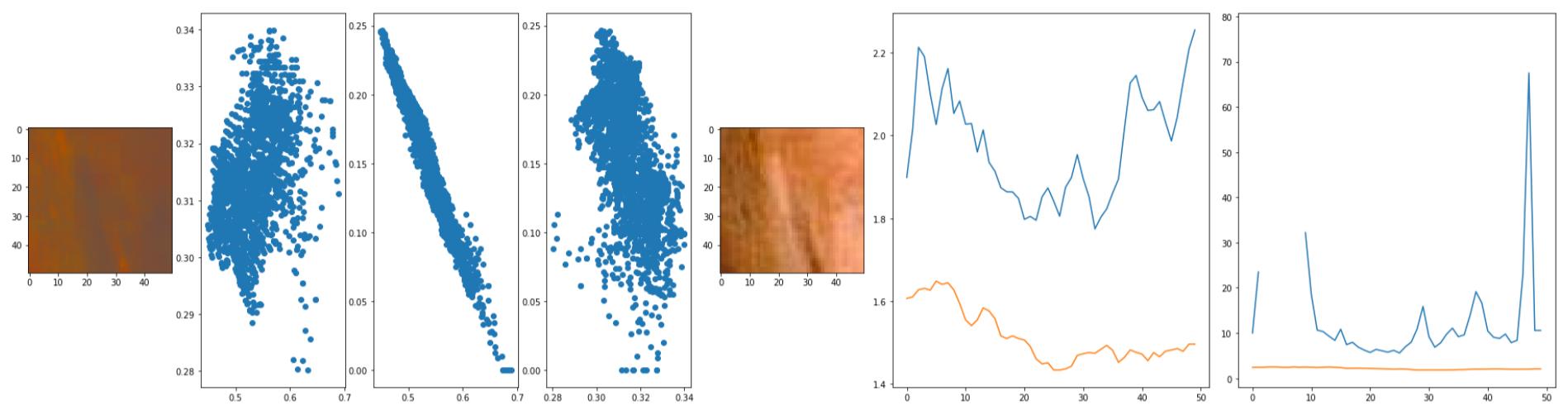
pelle22.jpg



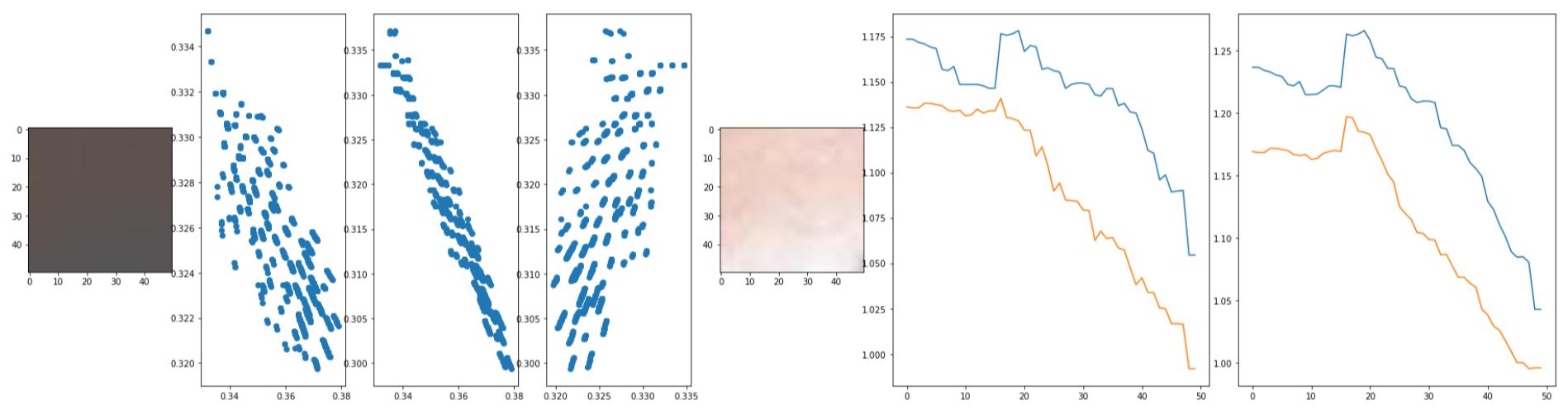
pelle23.jpg



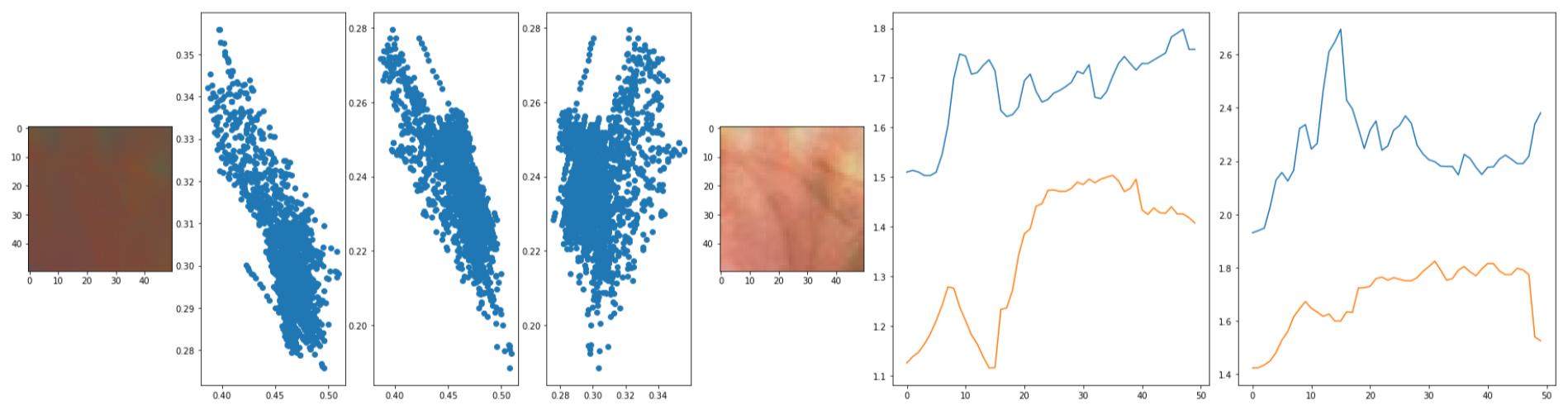
pelle24.jpg



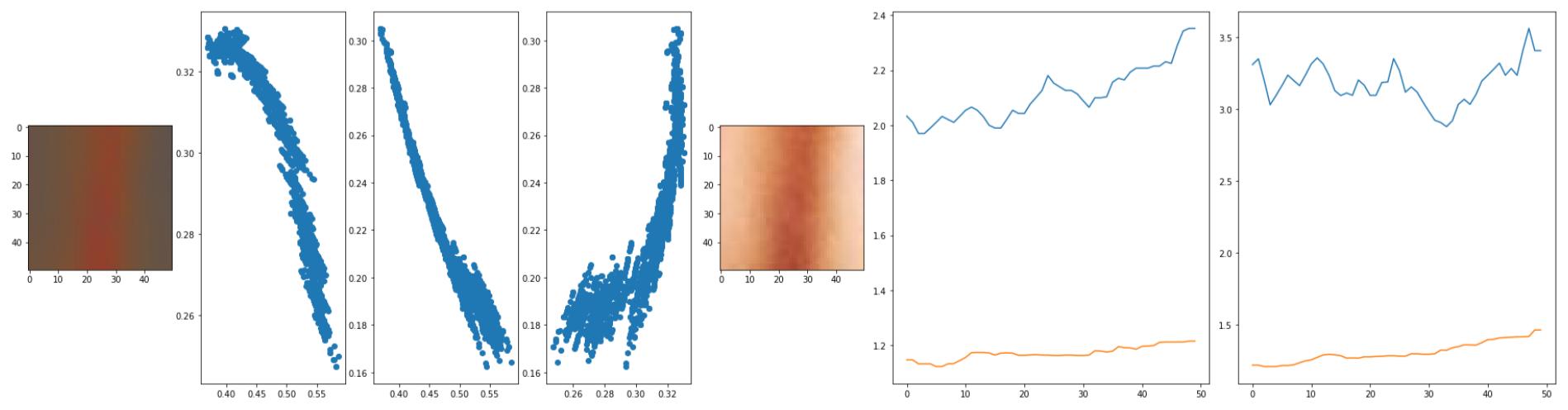
pelle25.jpg



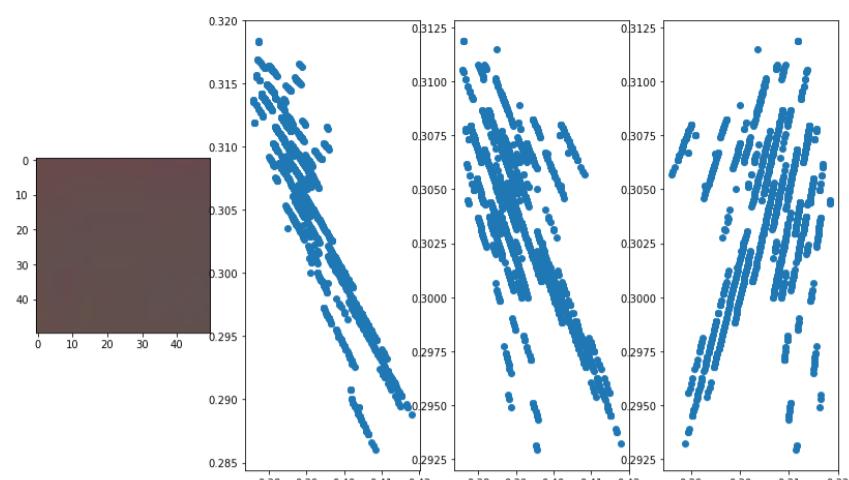
pelle26.jpg



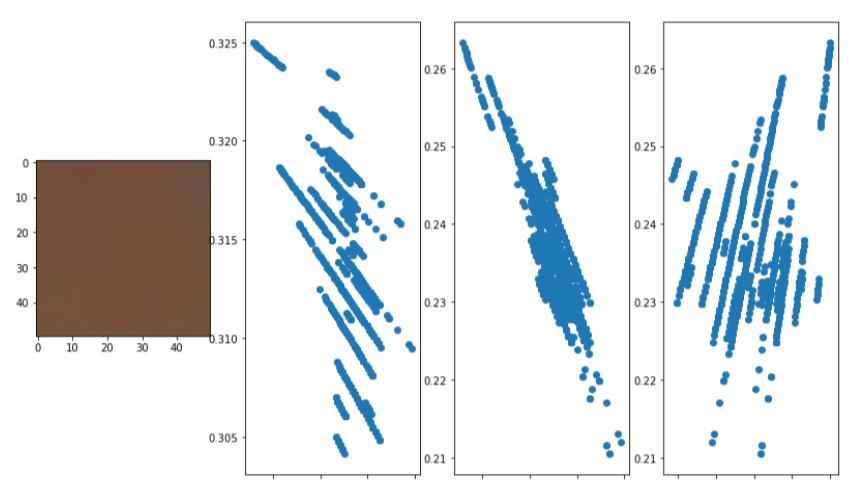
pelle27.jpg



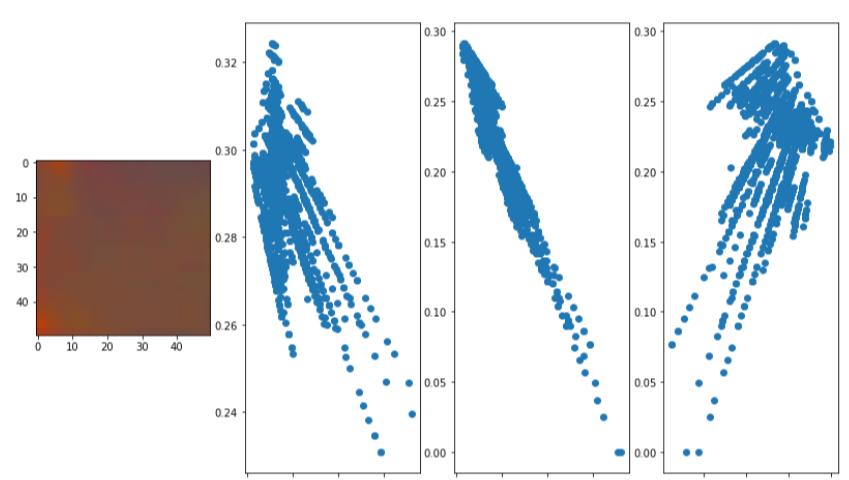
pelle28.jpg



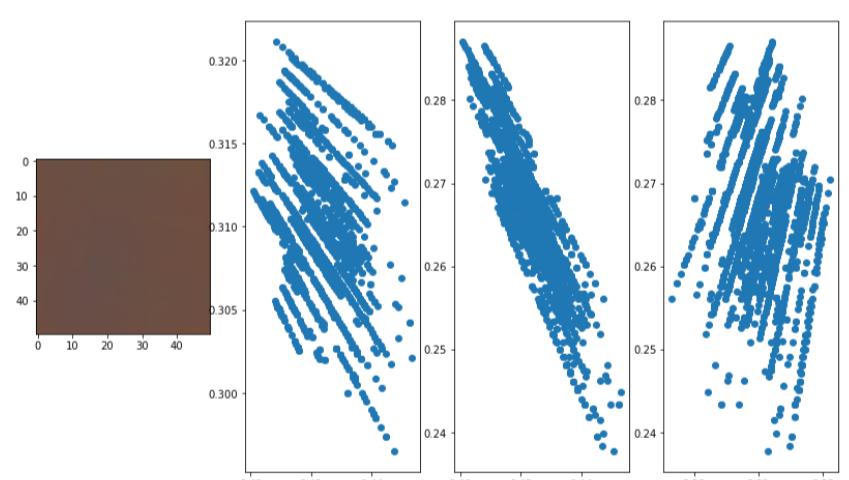
pelle29.jpg



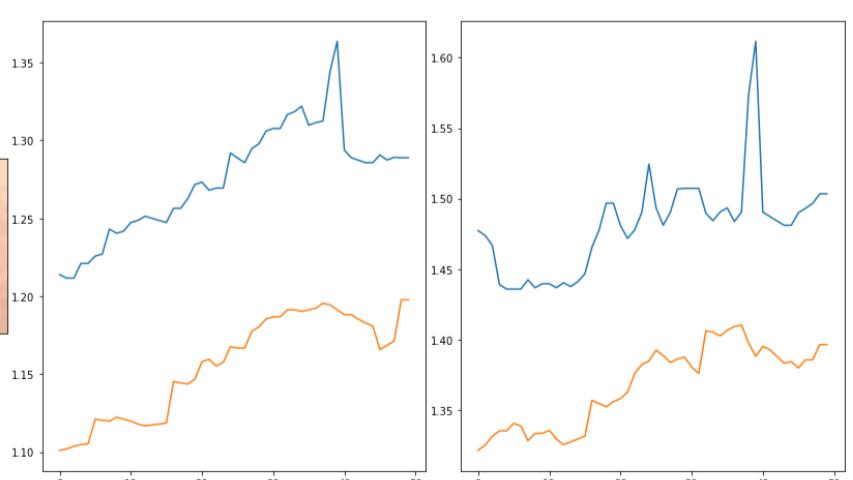
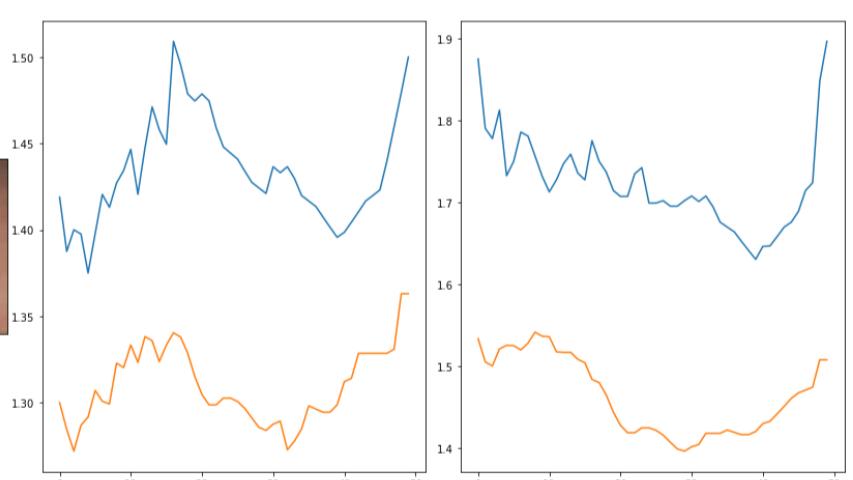
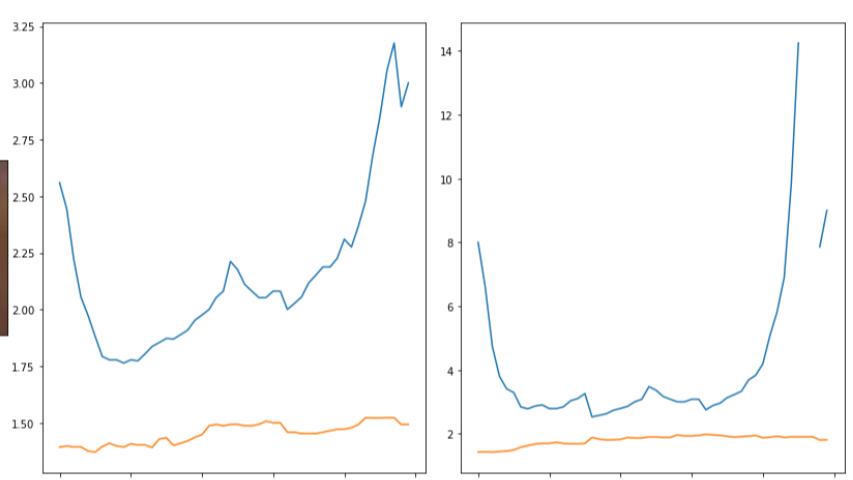
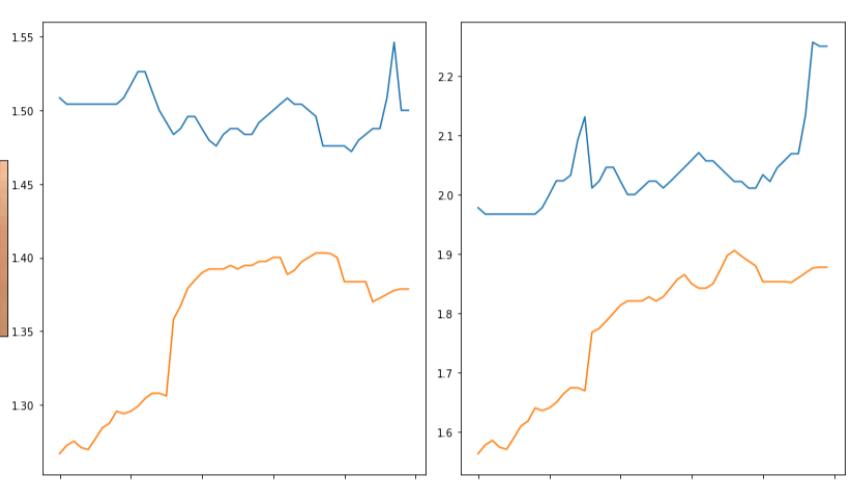
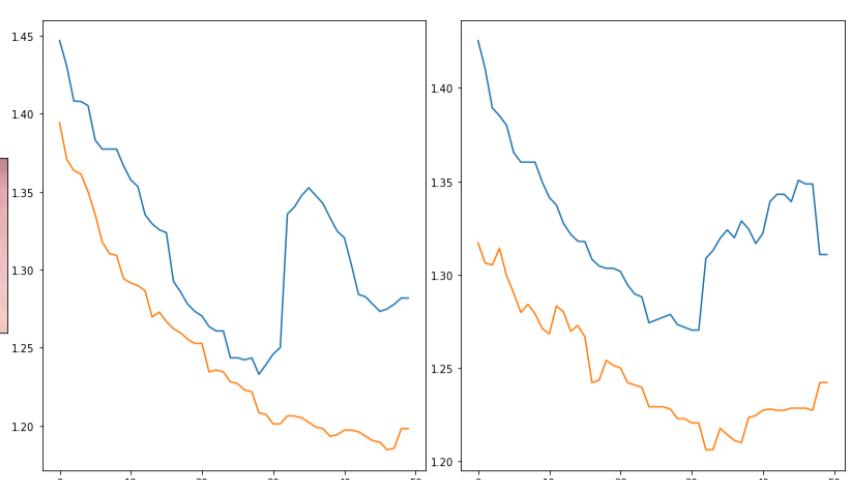
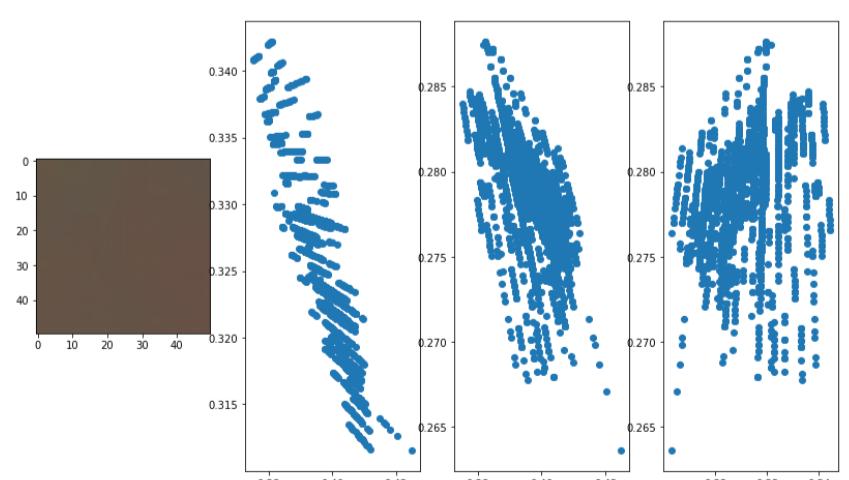
pelle3.jpg



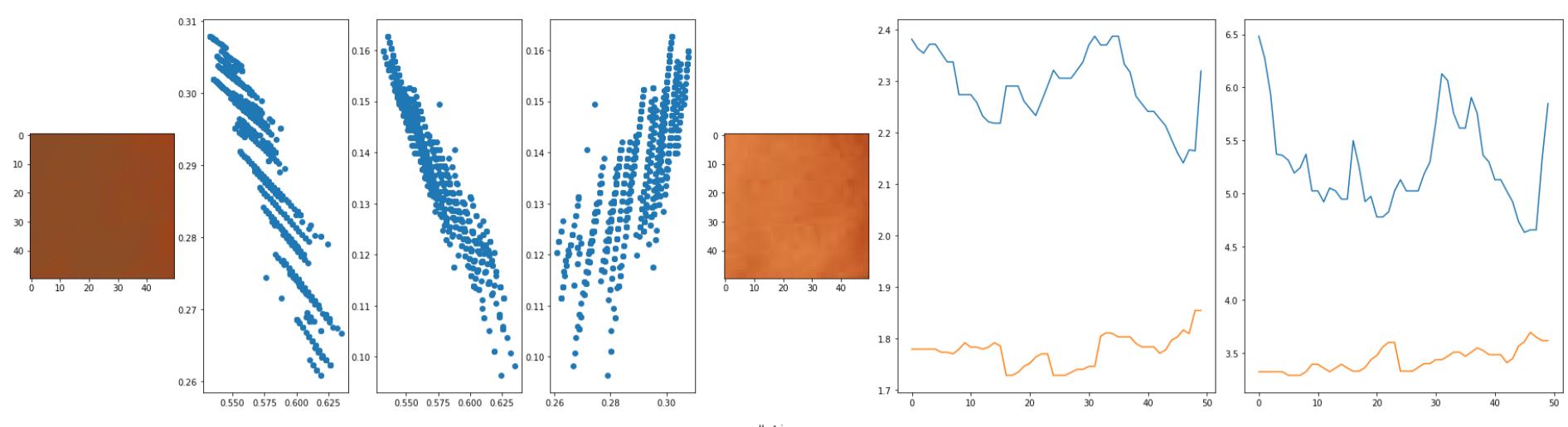
pelle30.jpg



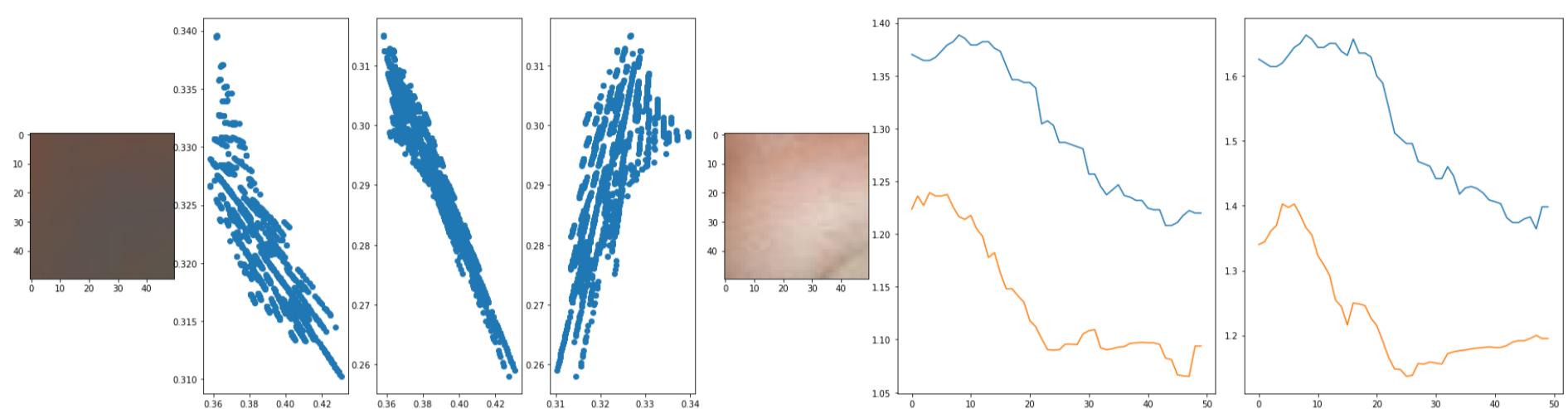
pelle31.jpg



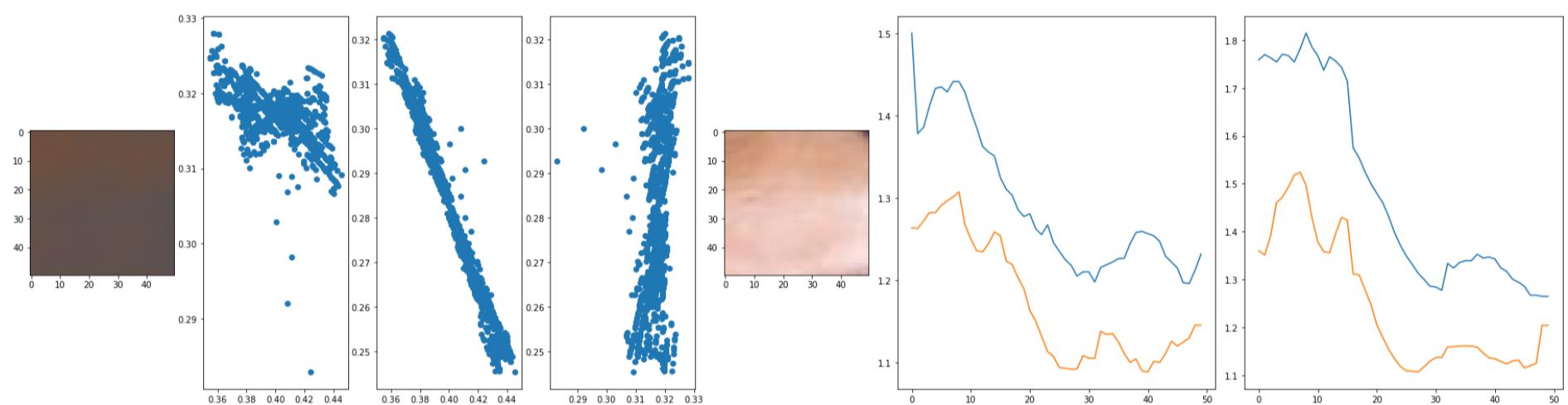
pelle32.jpg



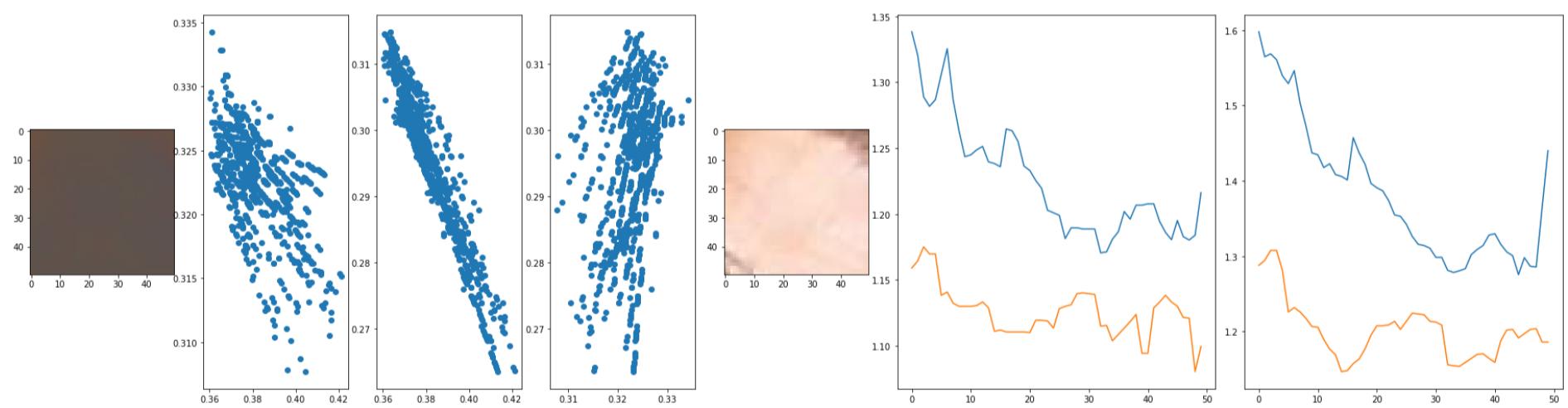
pelle4.jpg



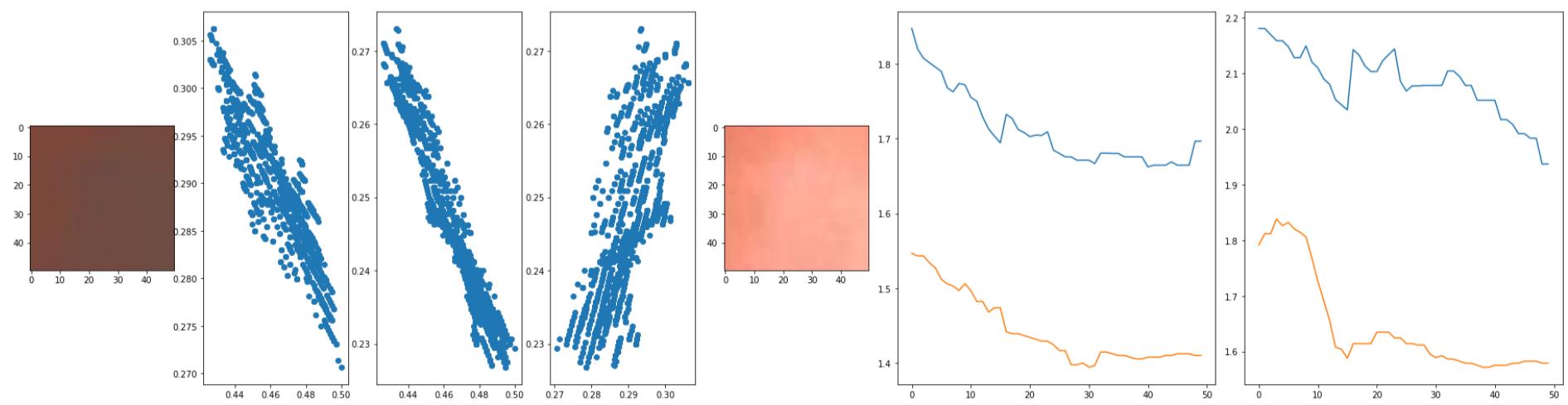
pelle5.jpg



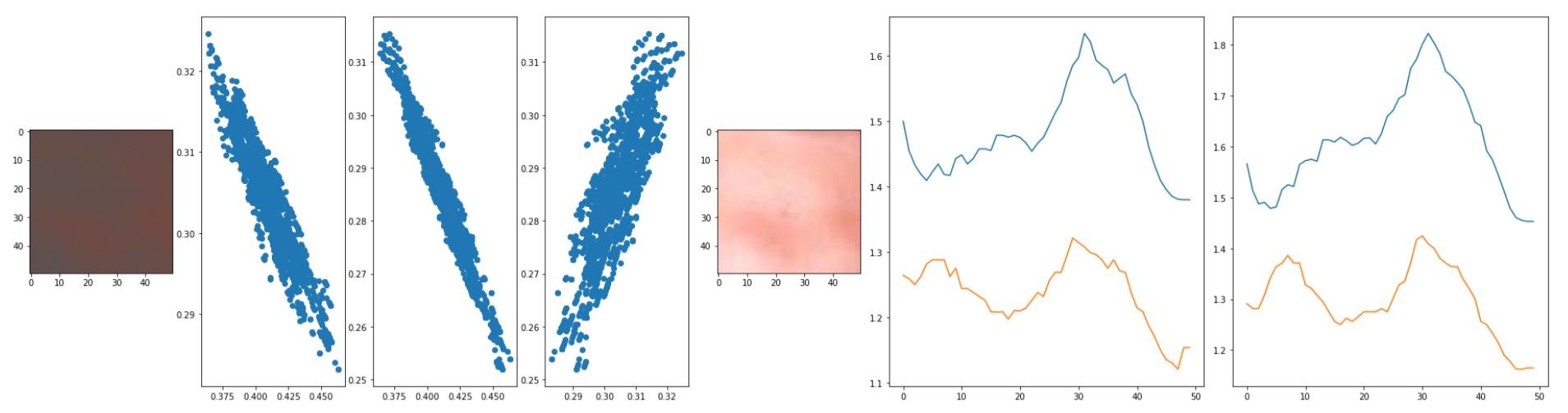
pelle6.jpg



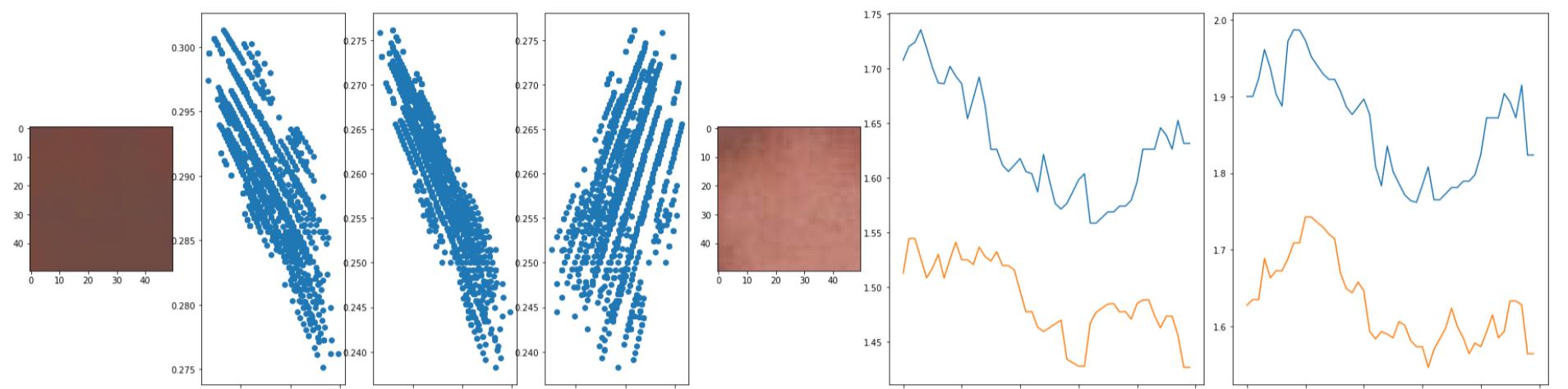
pelle7.jpg



pelle8.jpg

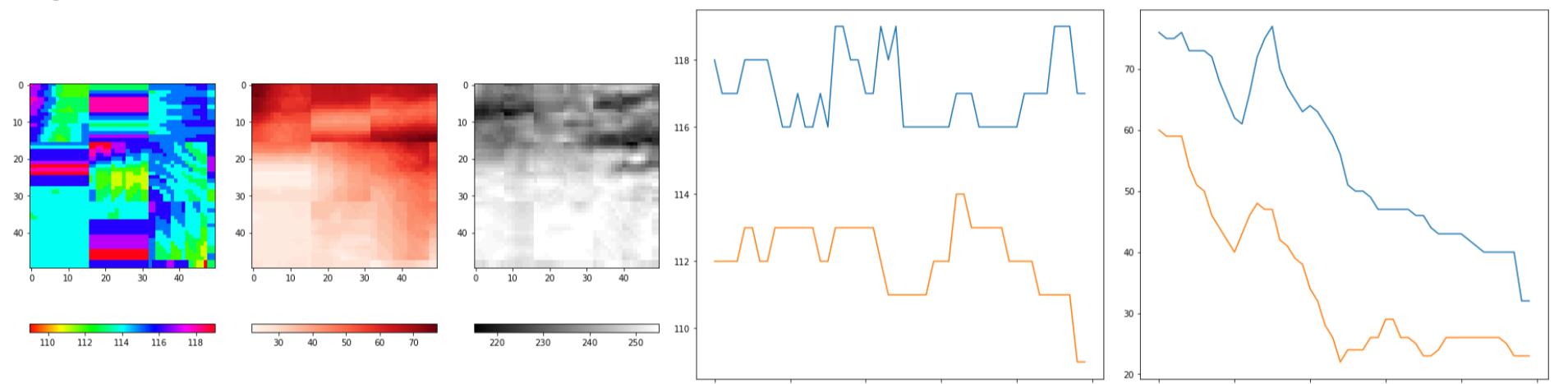


pelle9.jpg

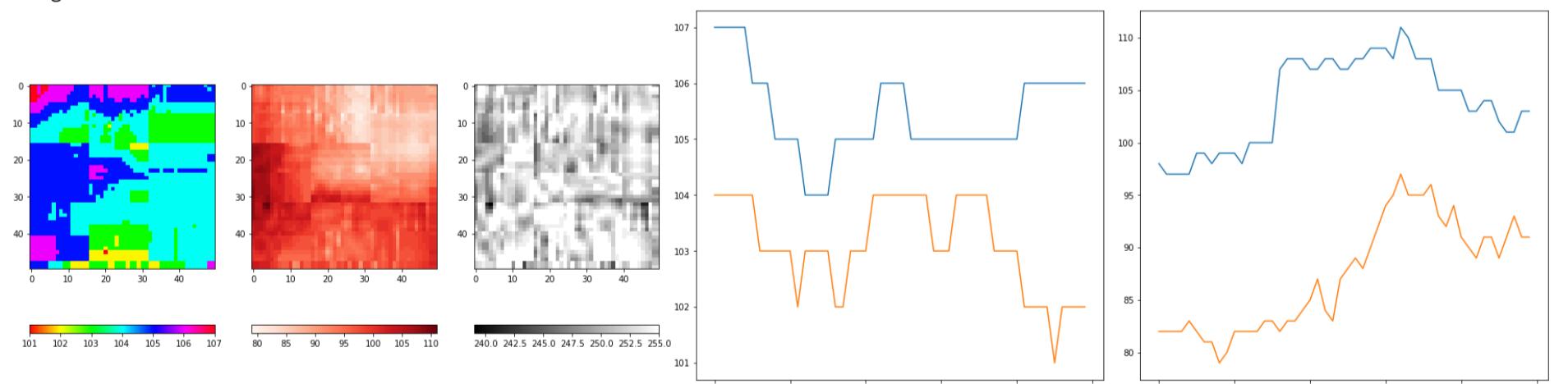


In []: `run_skin_analysis_hsv()`

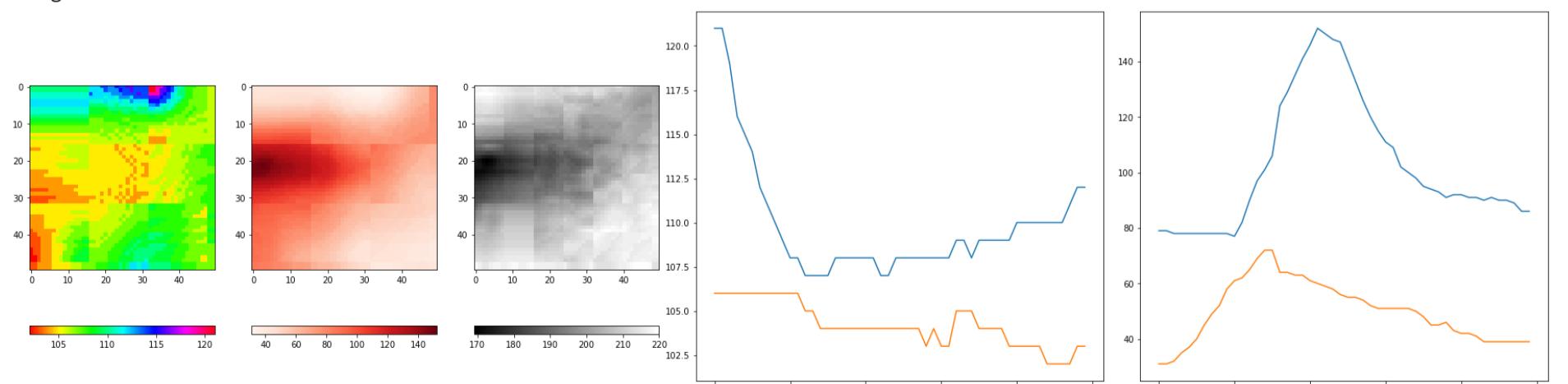
98% perc max = 156.9, 255.0
5% perc min = 53.35, 15.700000000000001
<Figure size 2304x288 with 0 Axes>



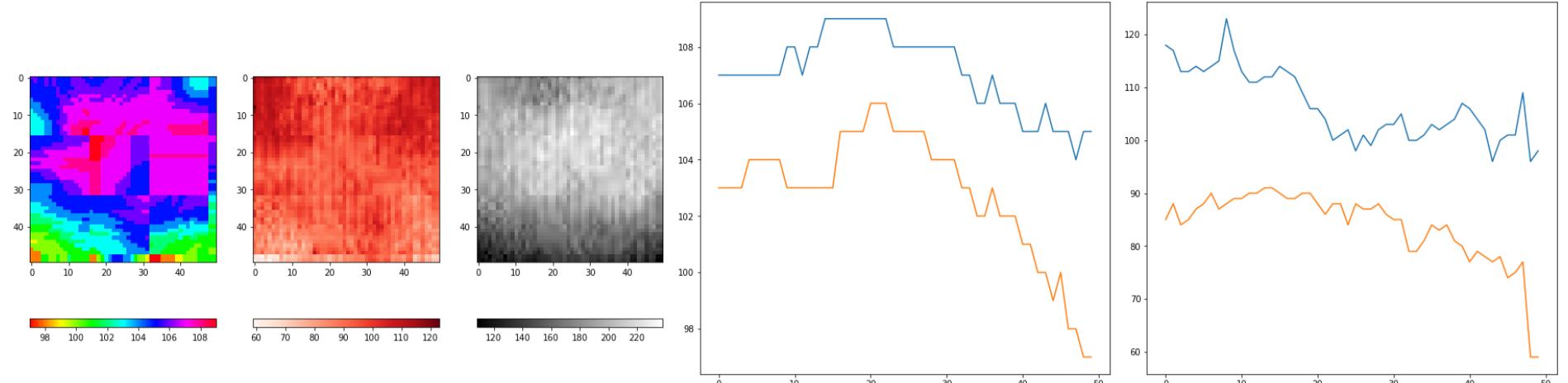
<Figure size 2304x288 with 0 Axes>



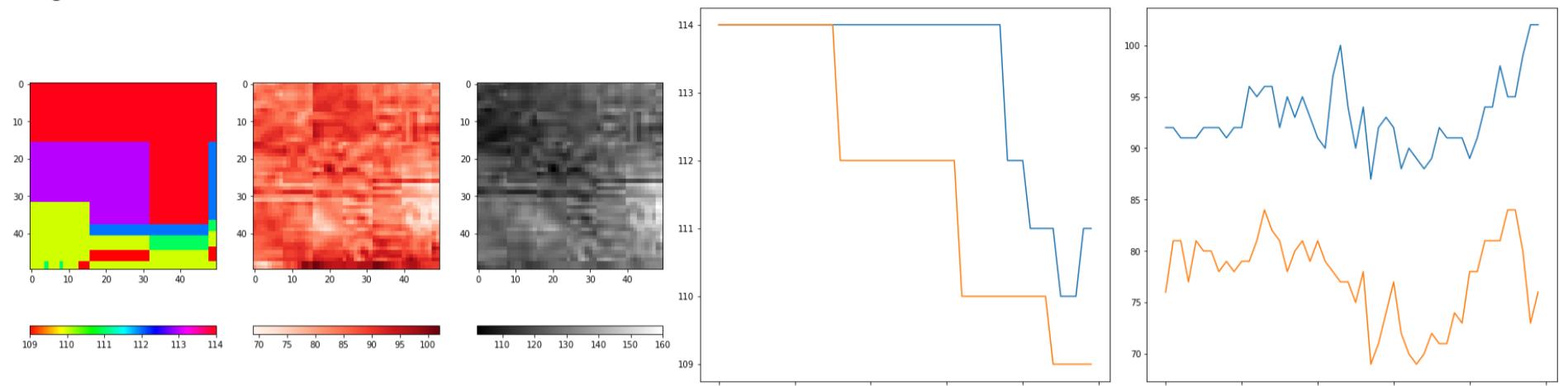
<Figure size 2304x288 with 0 Axes>



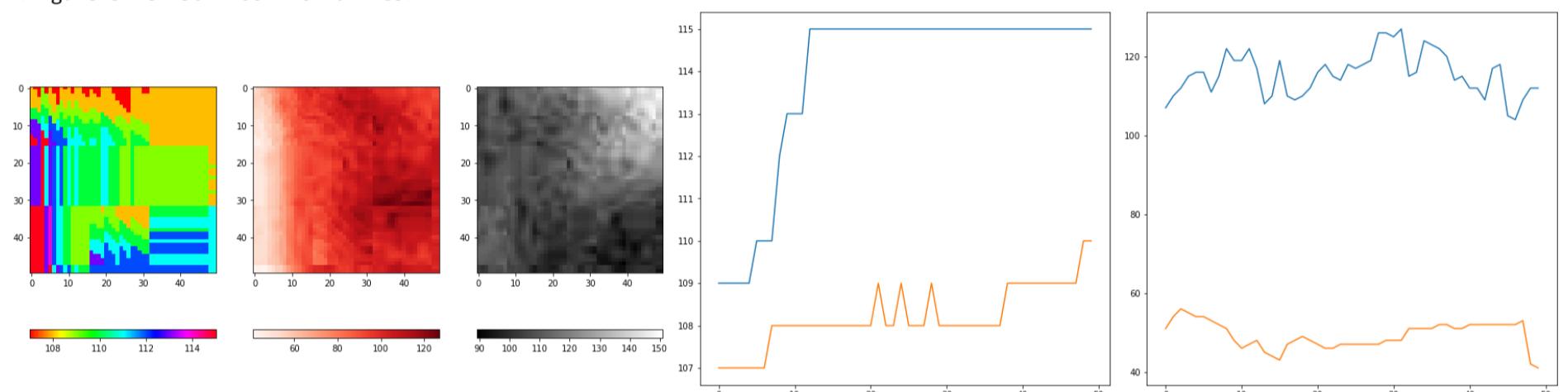
<Figure size 2304x288 with 0 Axes>



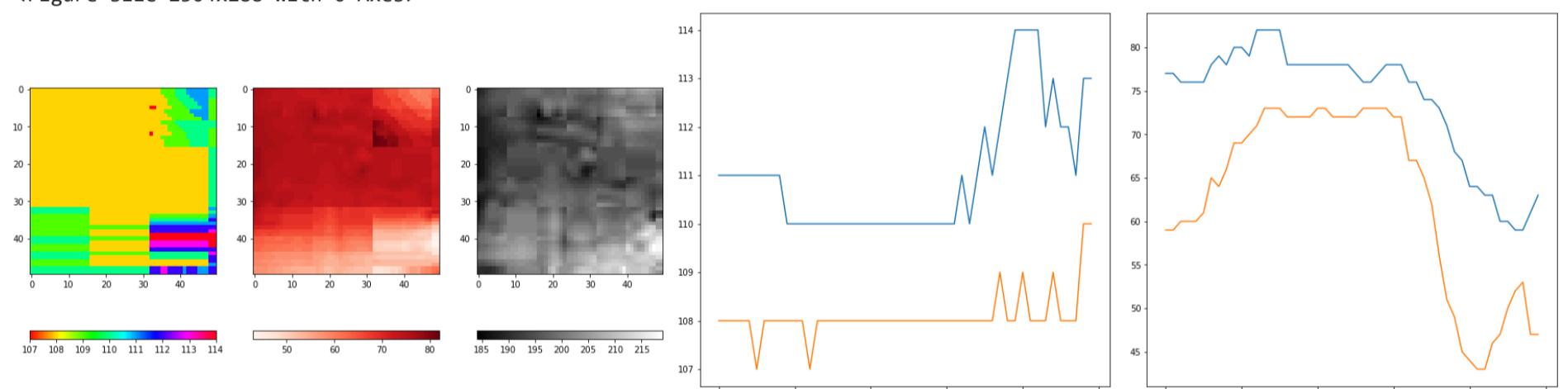
<Figure size 2304x288 with 0 Axes>



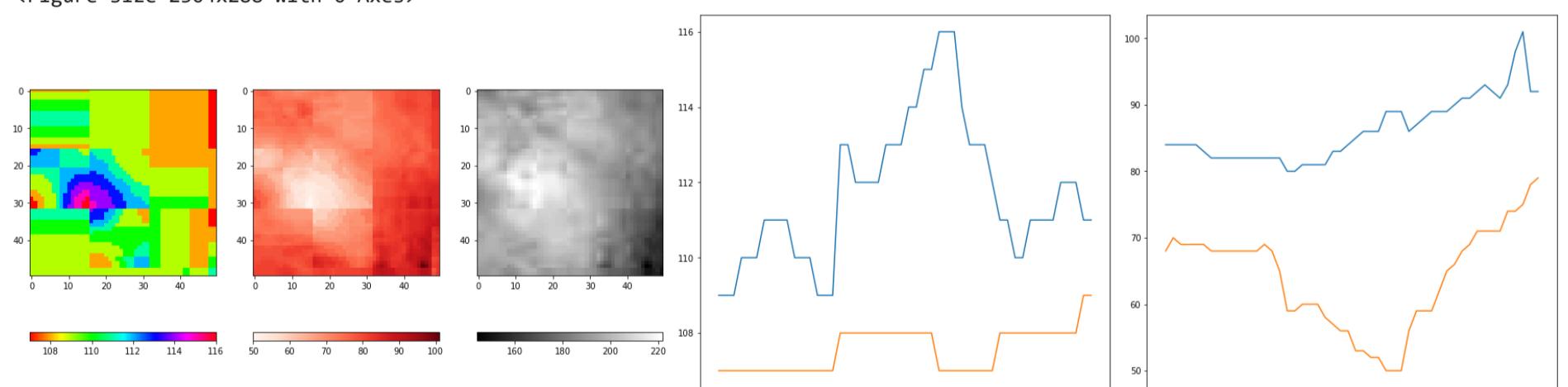
<Figure size 2304x288 with 0 Axes>



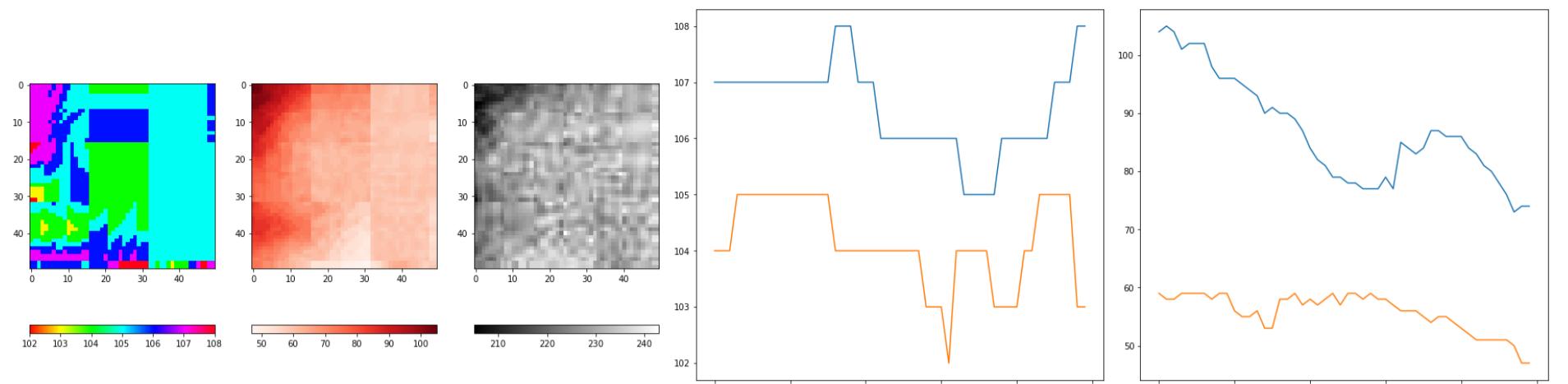
<Figure size 2304x288 with 0 Axes>



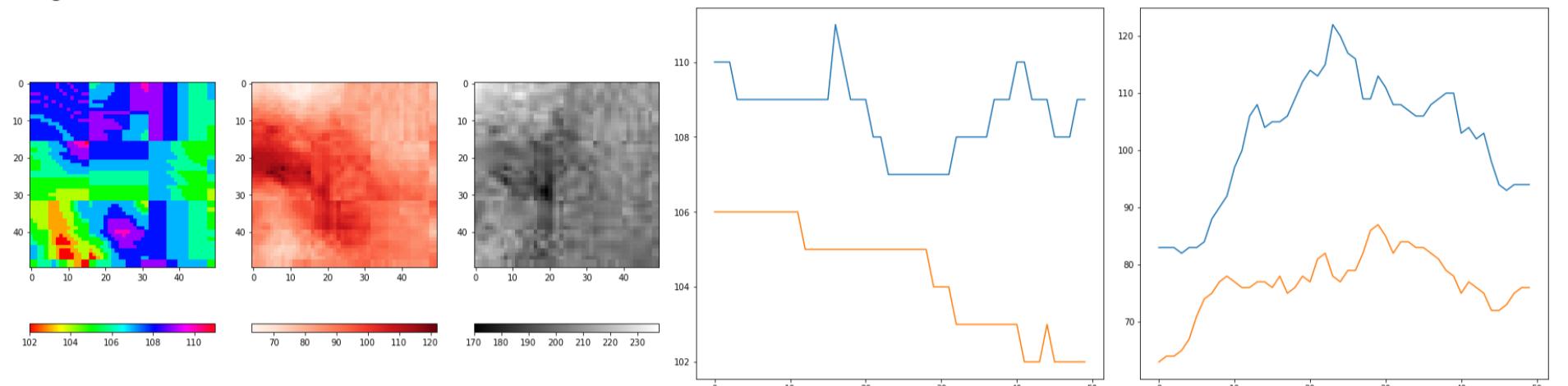
<Figure size 2304x288 with 0 Axes>



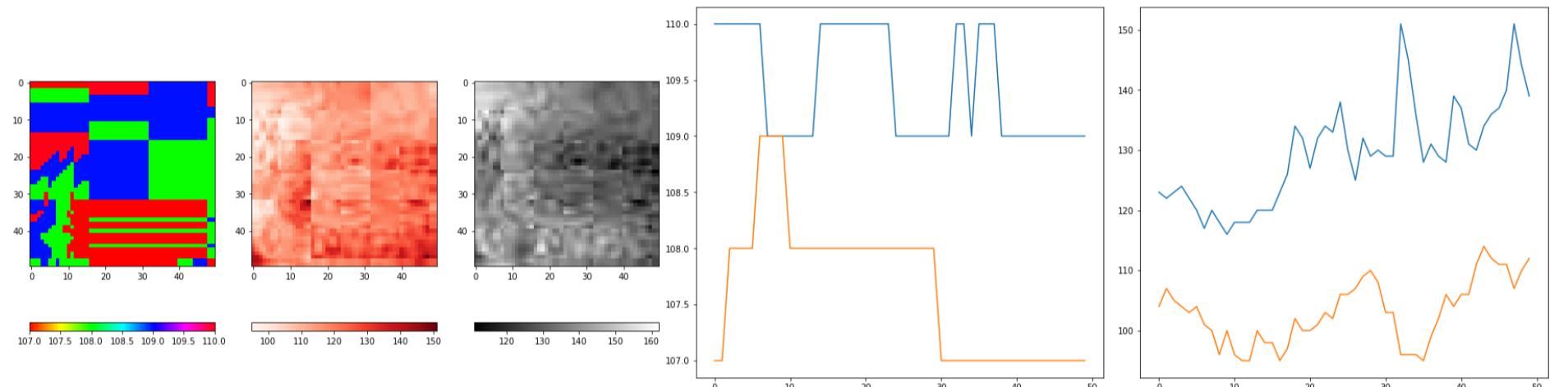
<Figure size 2304x288 with 0 Axes>



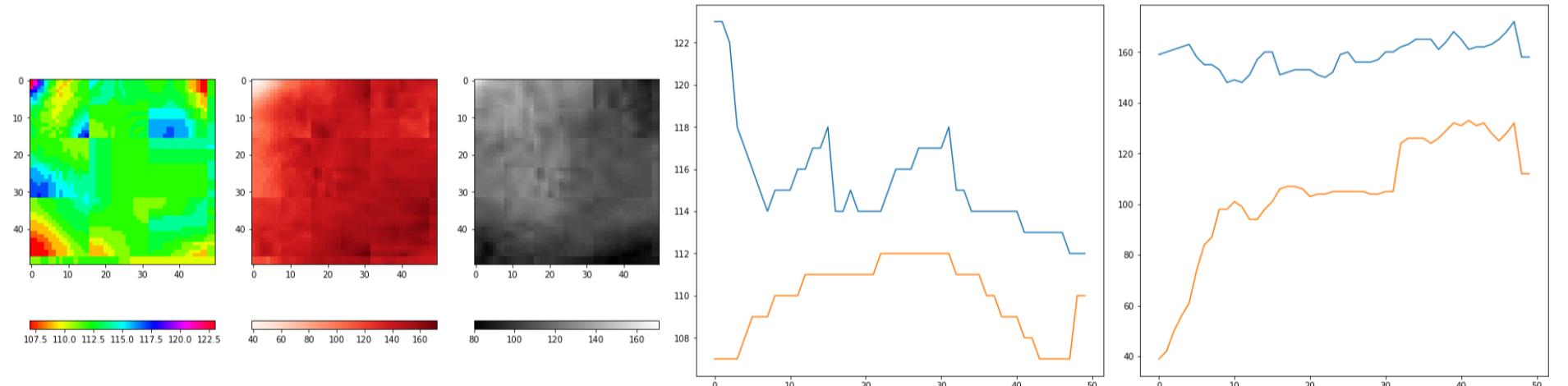
<Figure size 2304x288 with 0 Axes>



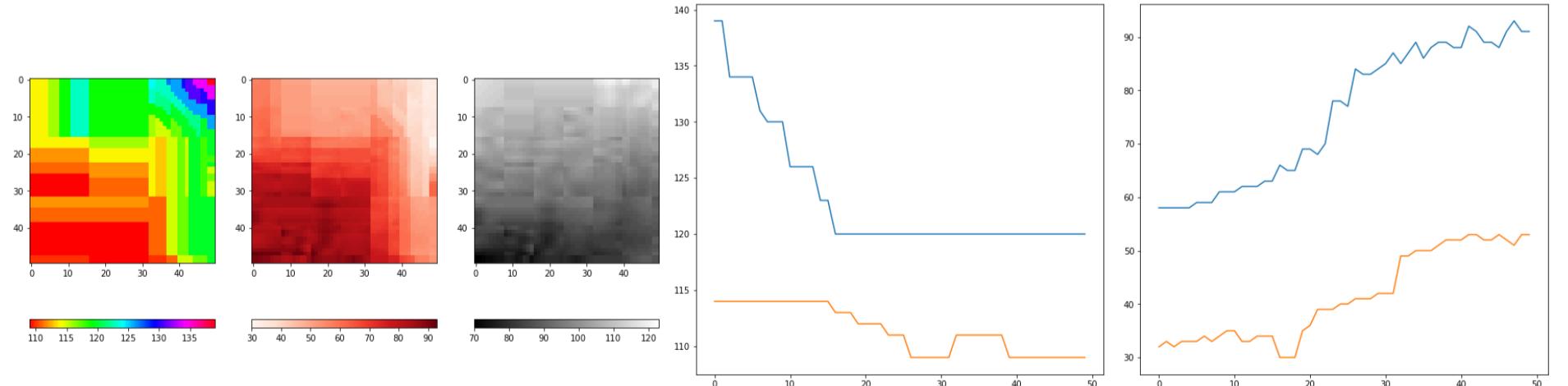
<Figure size 2304x288 with 0 Axes>



<Figure size 2304x288 with 0 Axes>



<Figure size 2304x288 with 0 Axes>



<Figure size 2304x288 with 0 Axes>

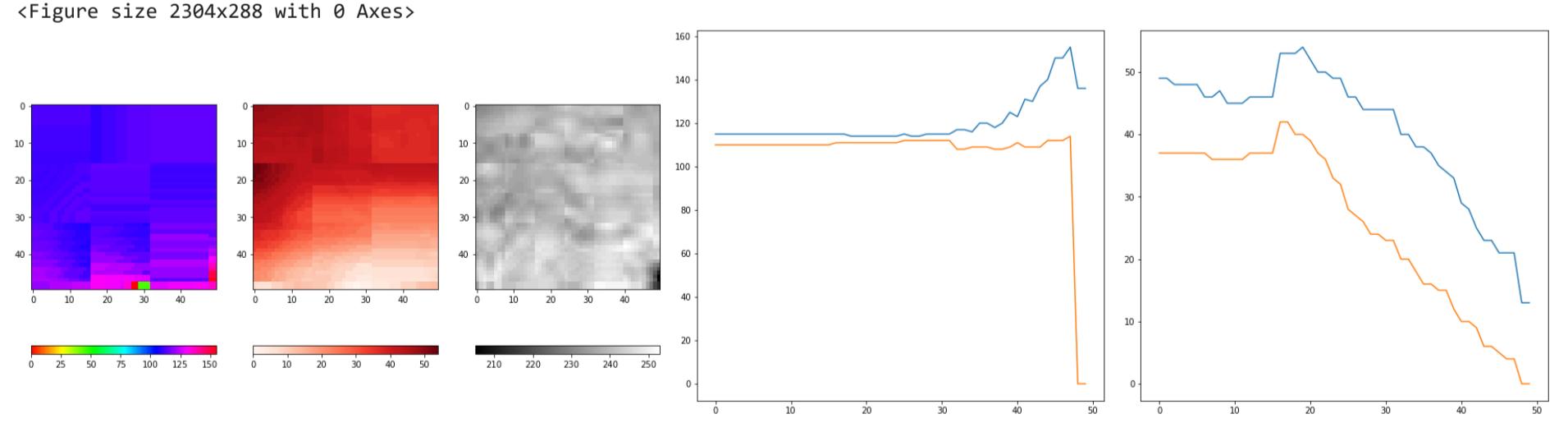
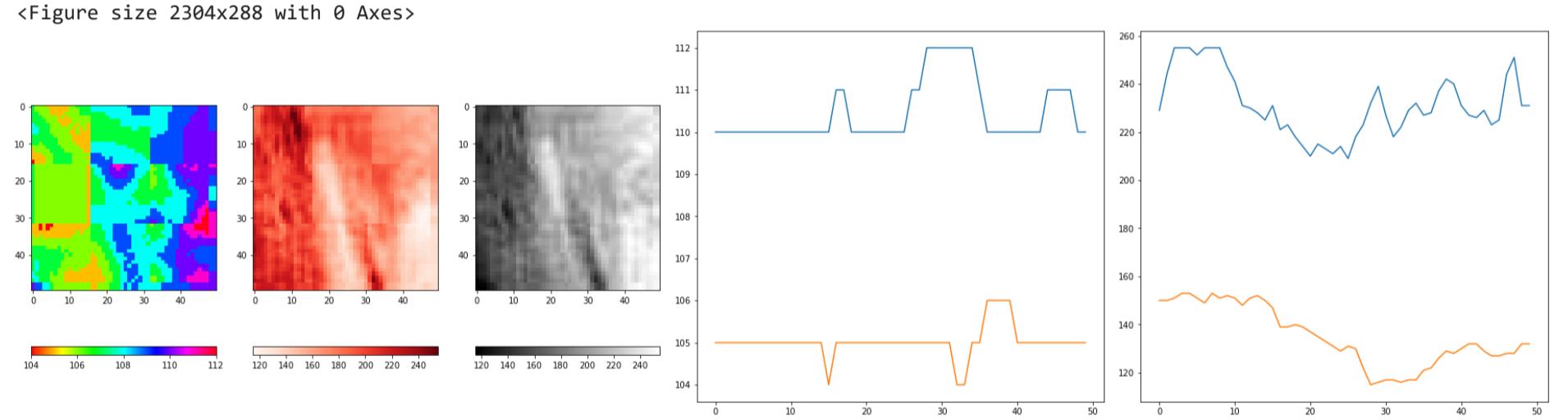
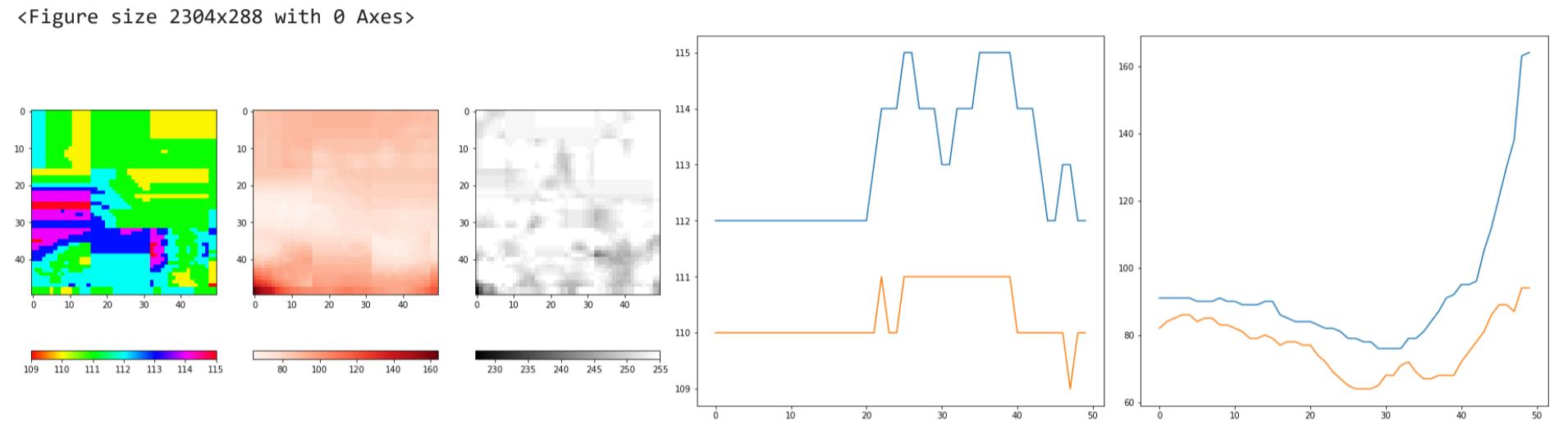
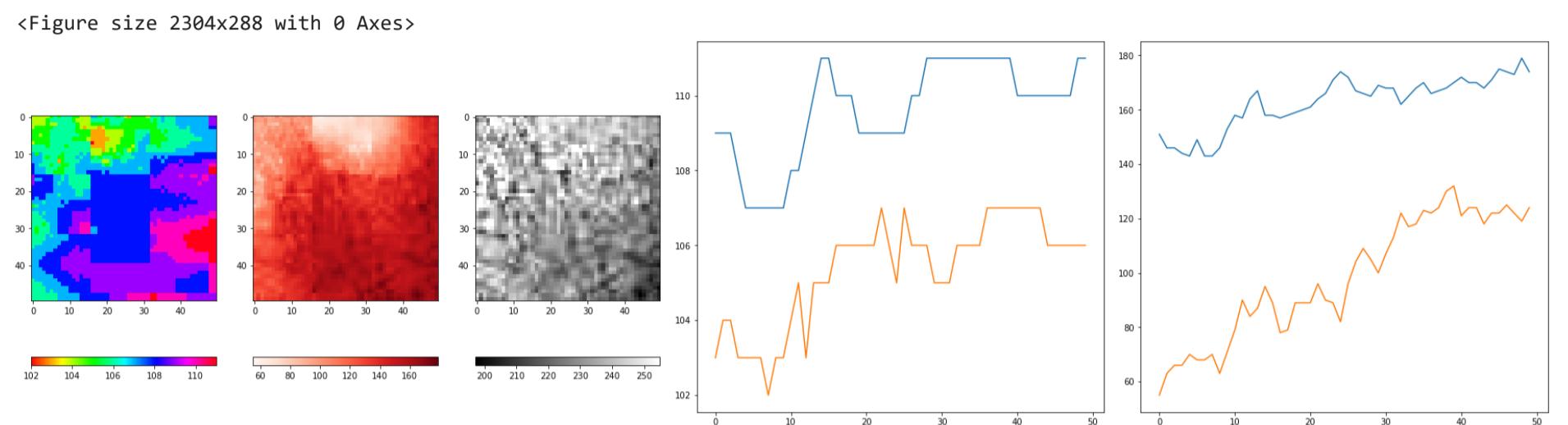
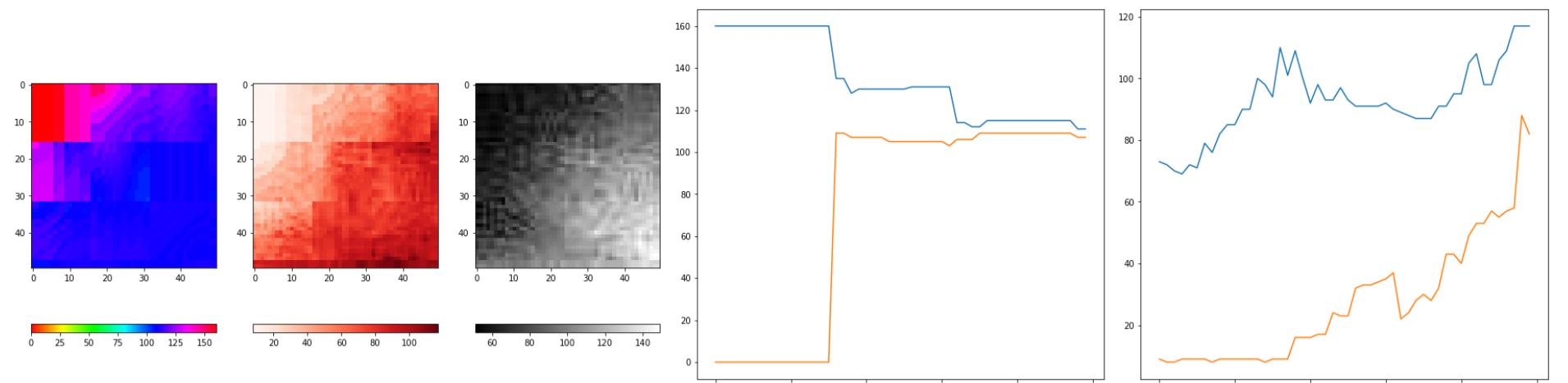
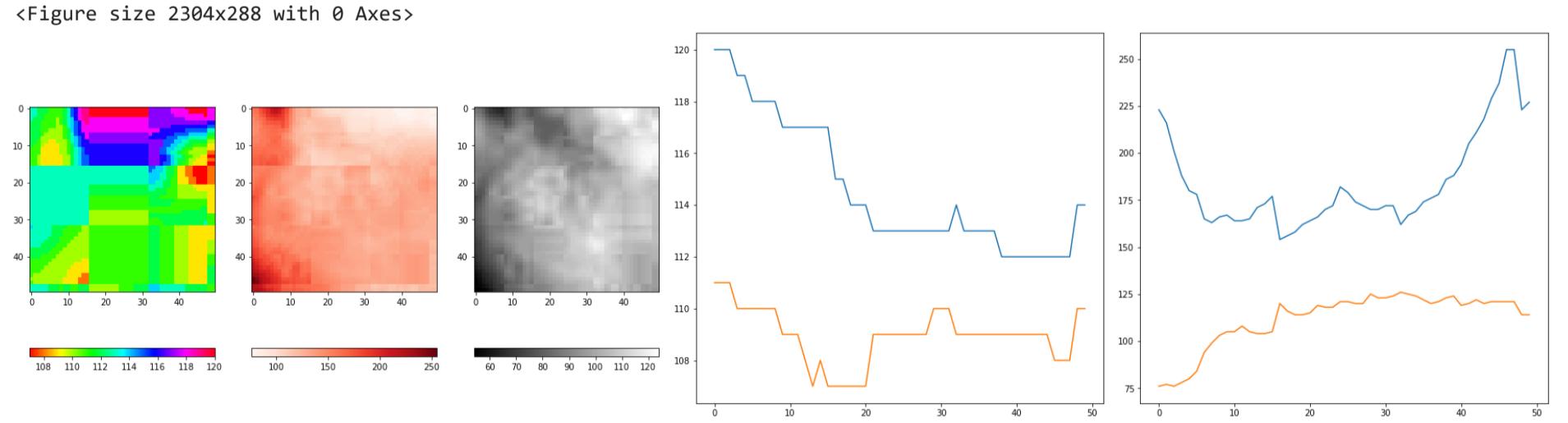
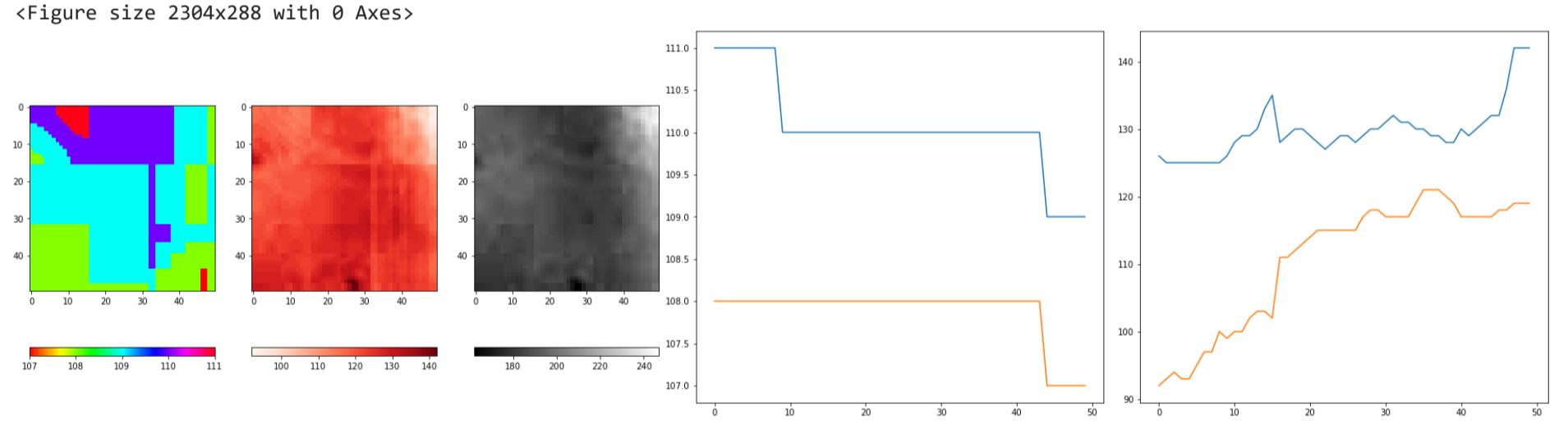
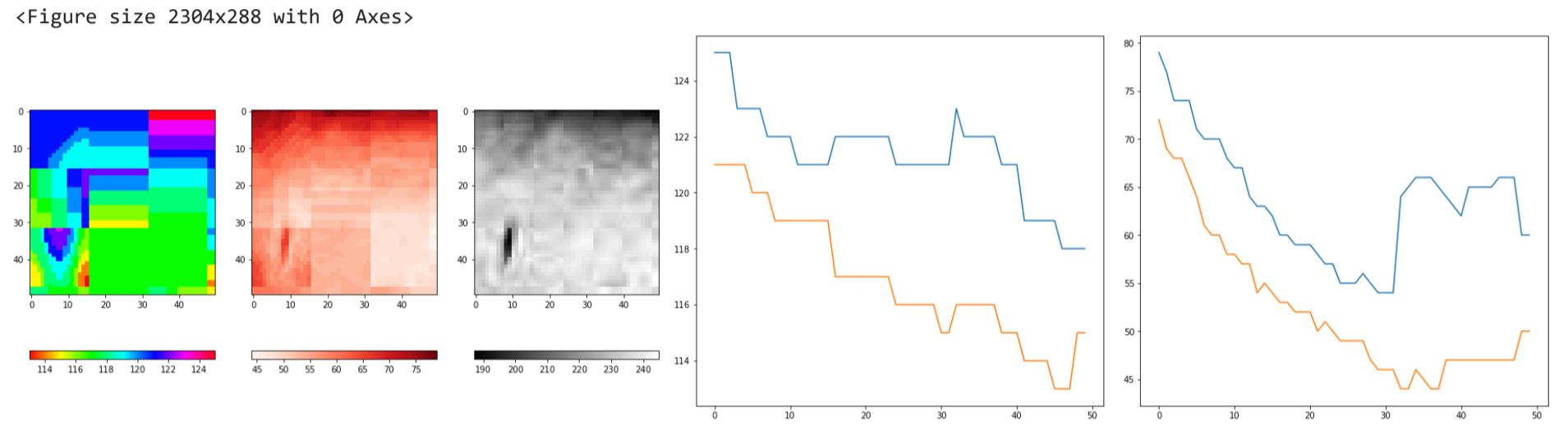
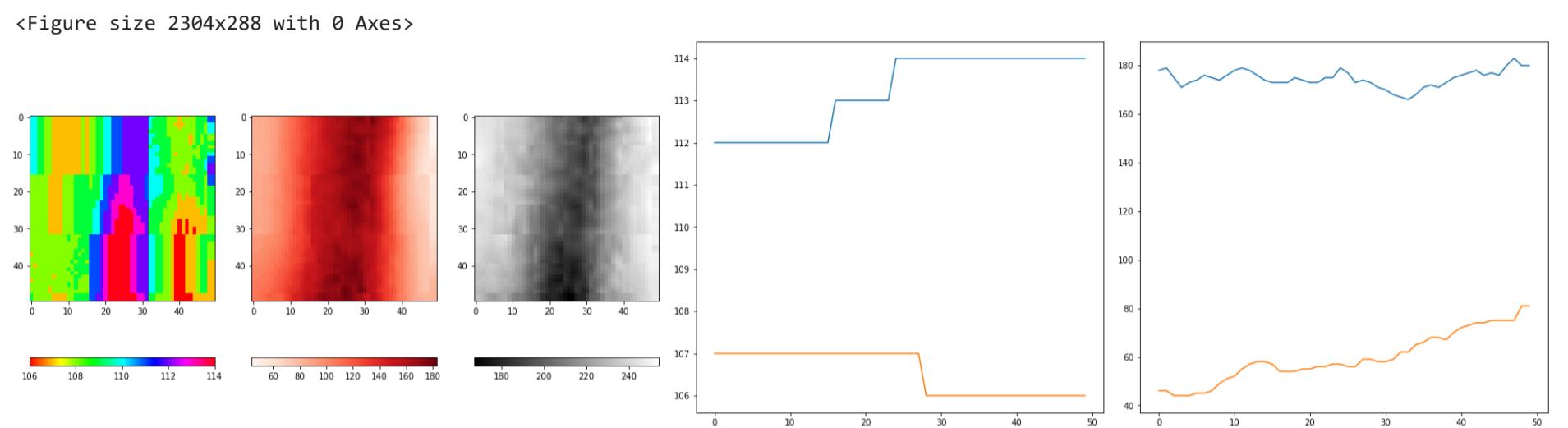
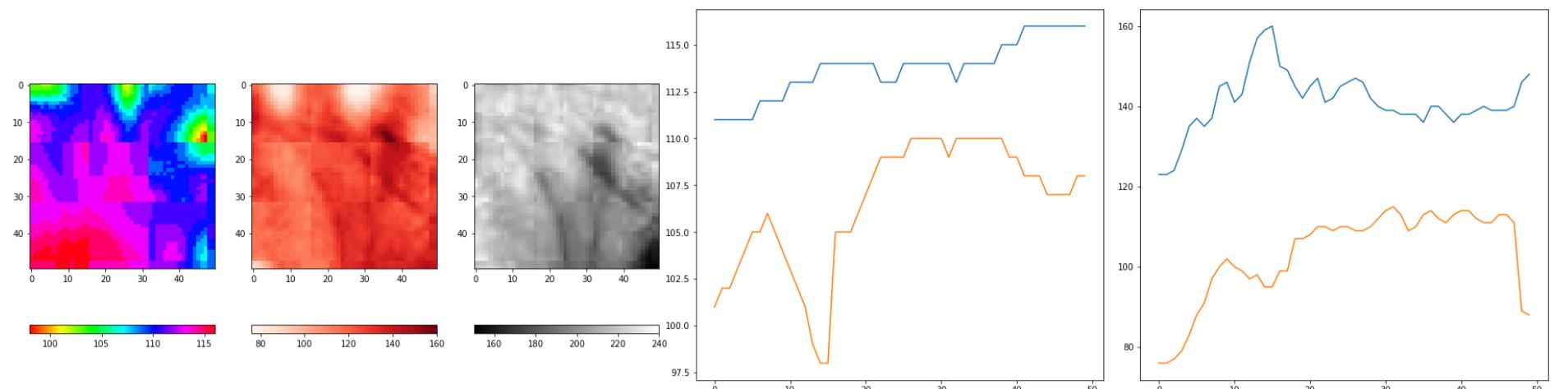
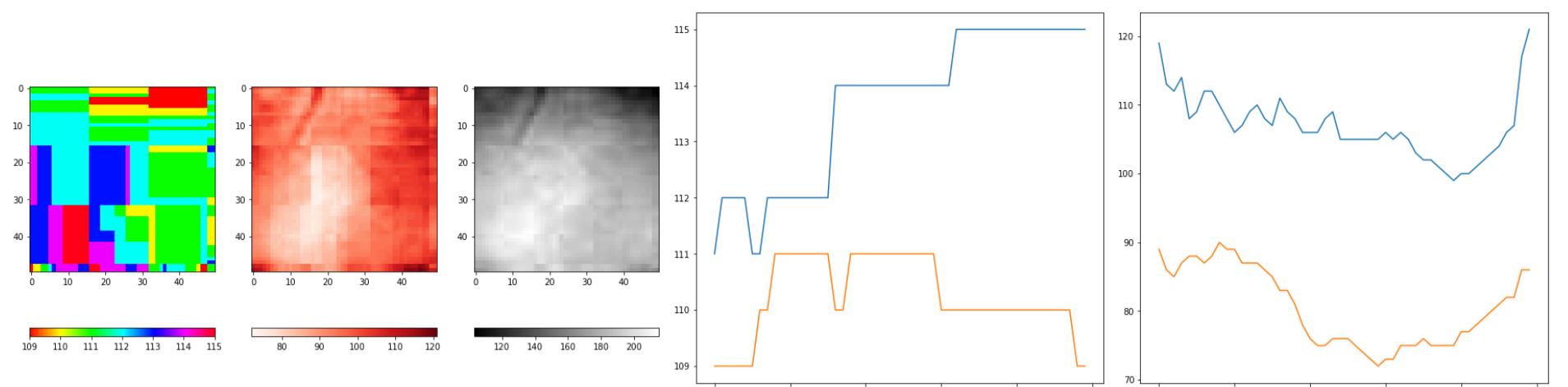
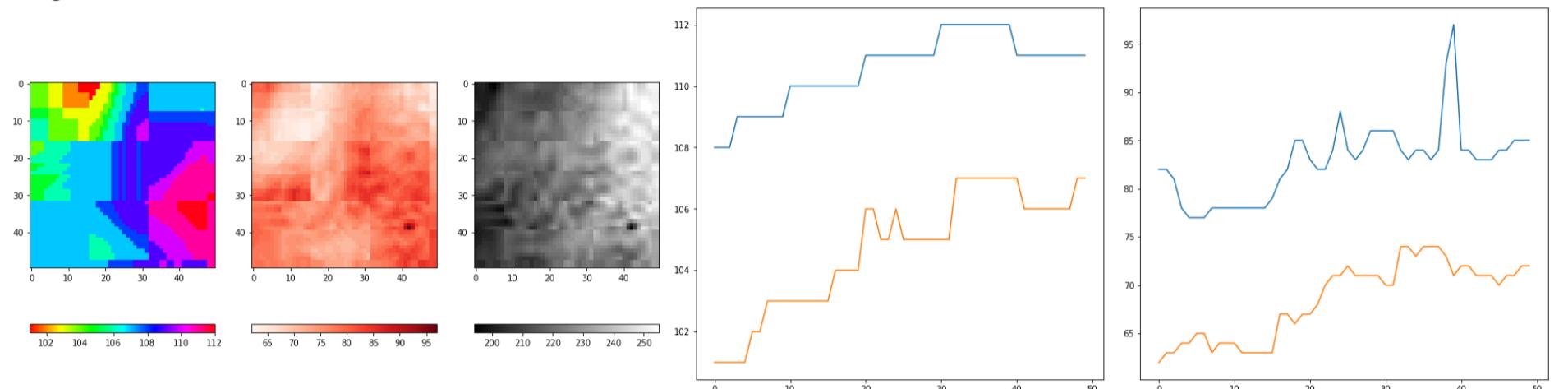


Figure size 2304x288 with 0 Axes

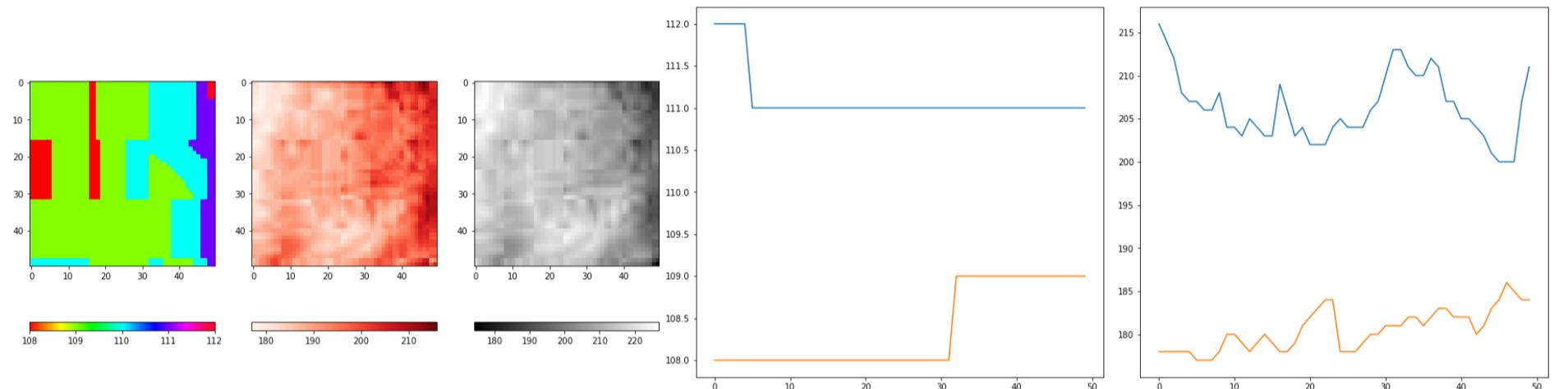




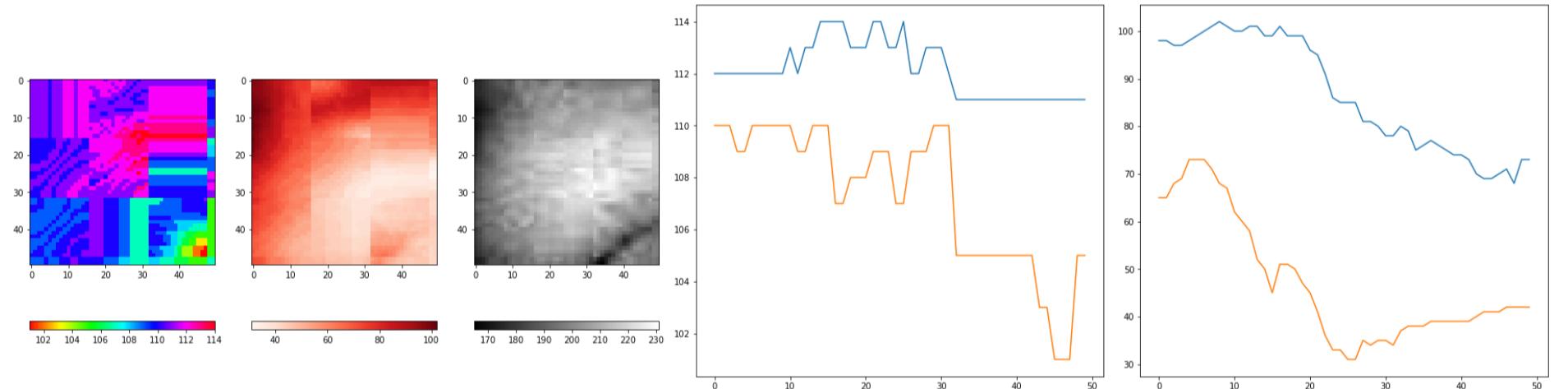
<Figure size 2304x288 with 0 Axes>



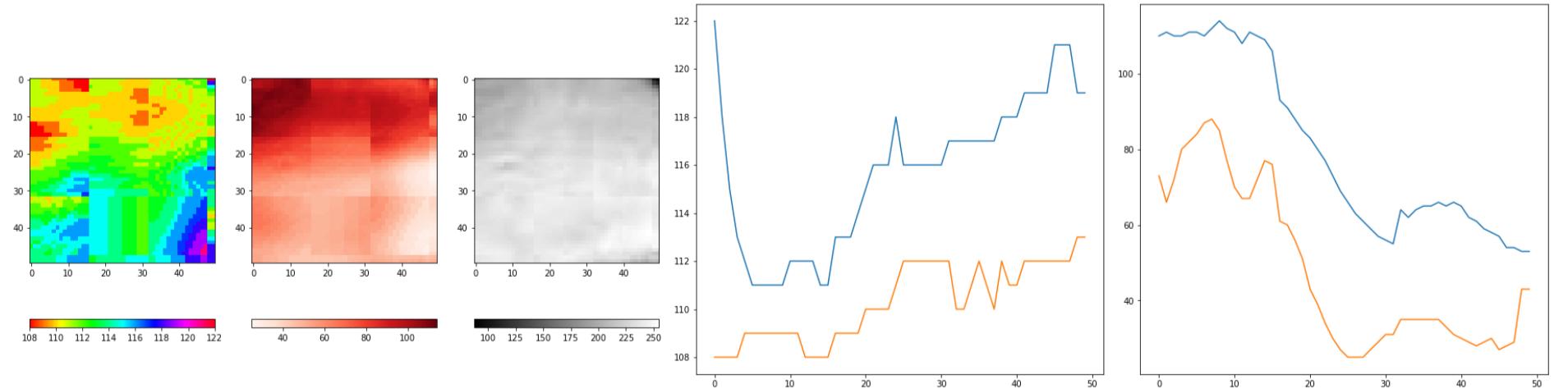
<Figure size 2304x288 with 0 Axes>



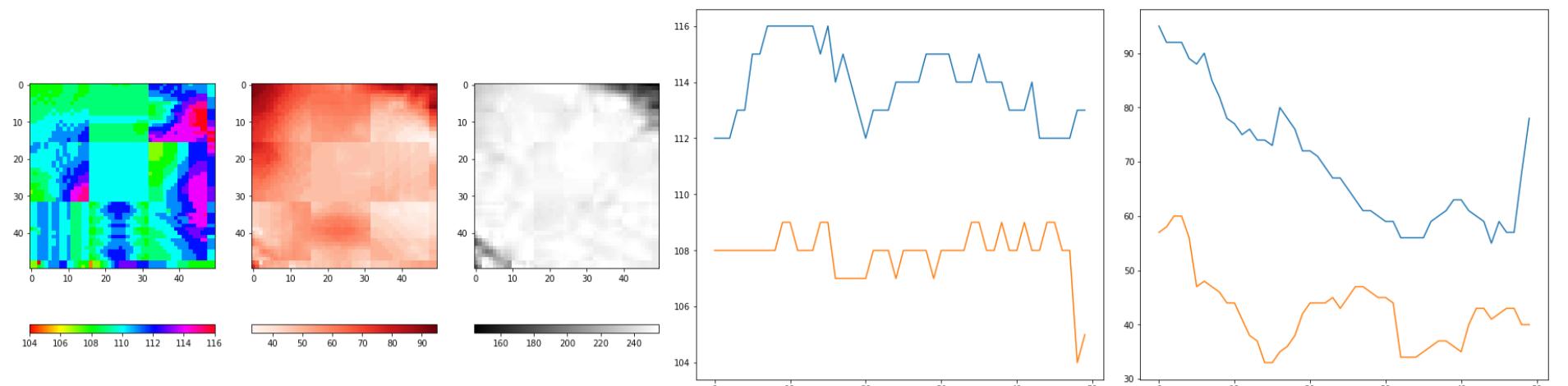
<Figure size 2304x288 with 0 Axes>



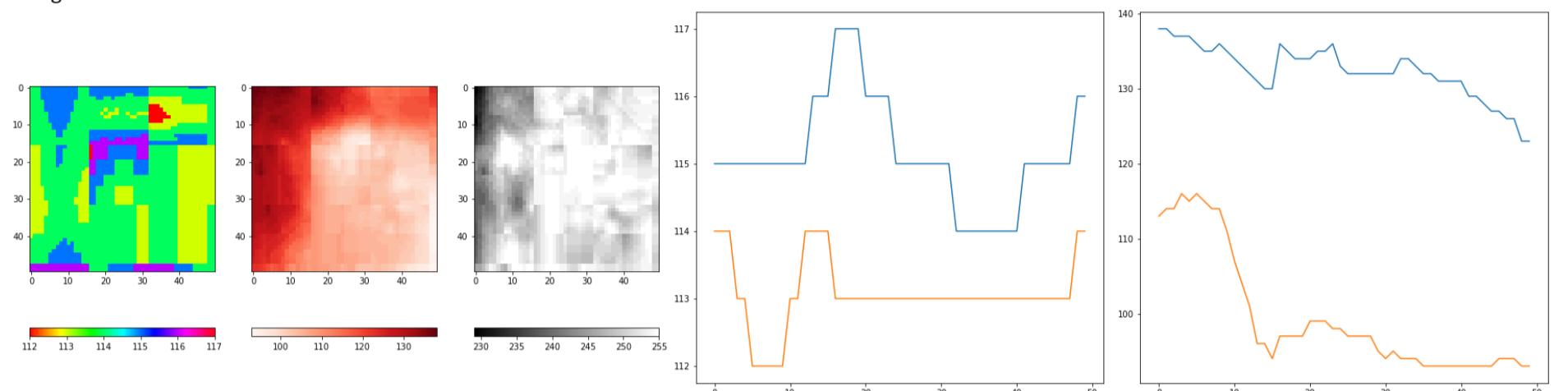
<Figure size 2304x288 with 0 Axes>



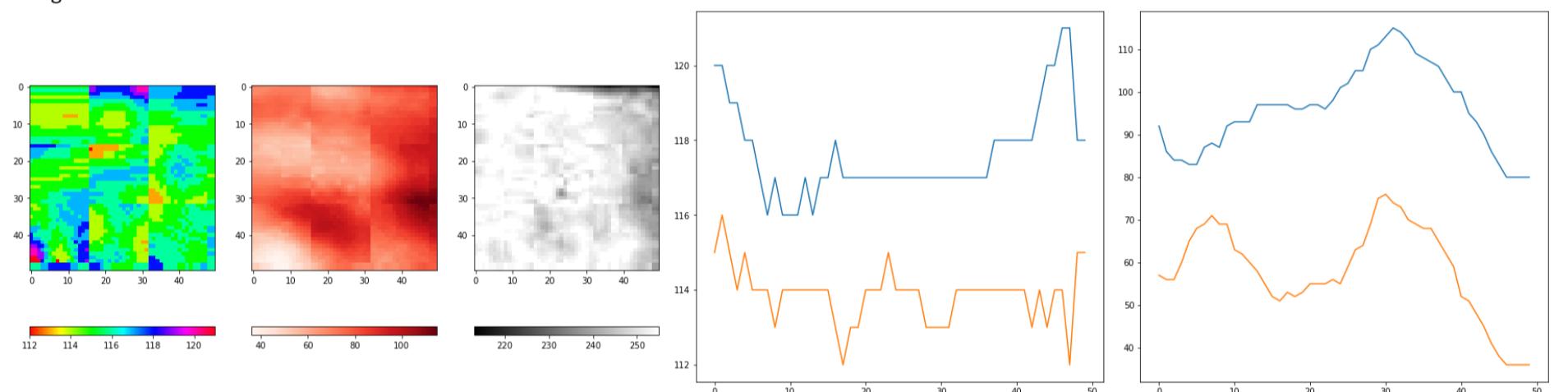
<Figure size 2304x288 with 0 Axes>



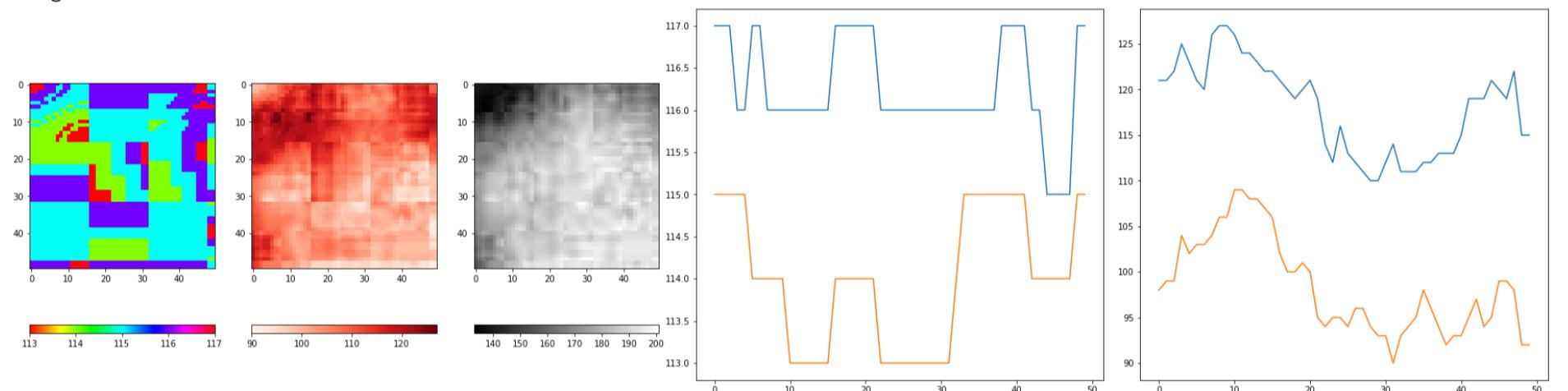
<Figure size 2304x288 with 0 Axes>



<Figure size 2304x288 with 0 Axes>



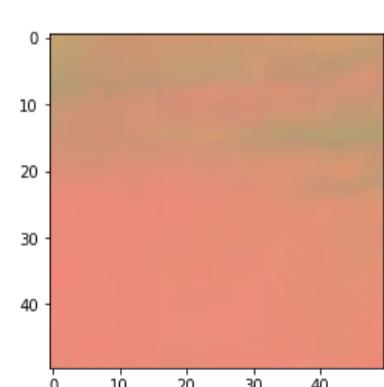
<Figure size 2304x288 with 0 Axes>



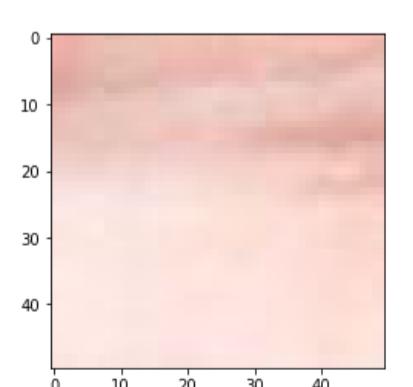
In []:

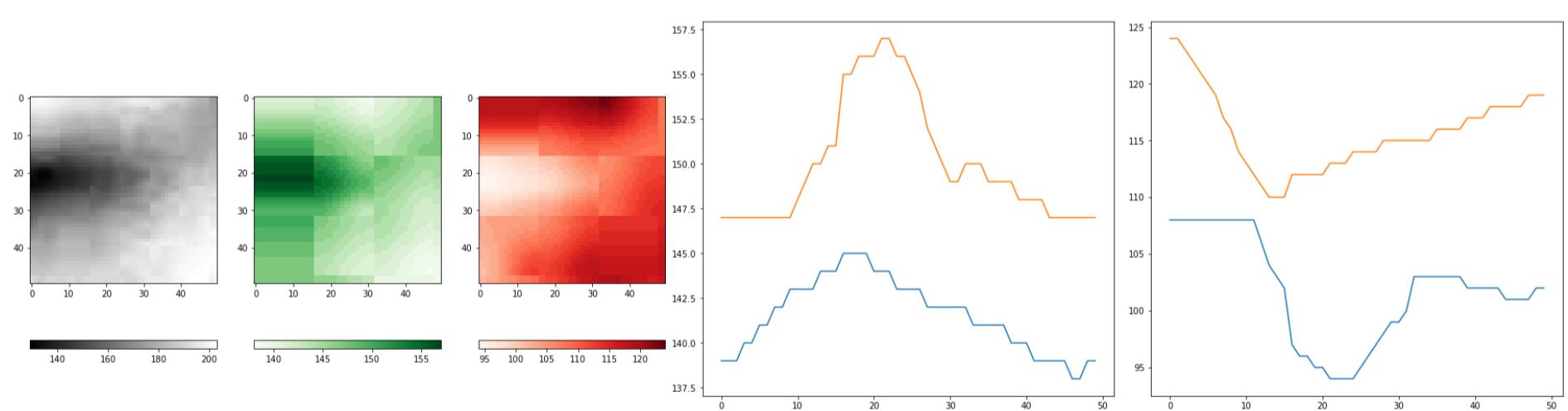
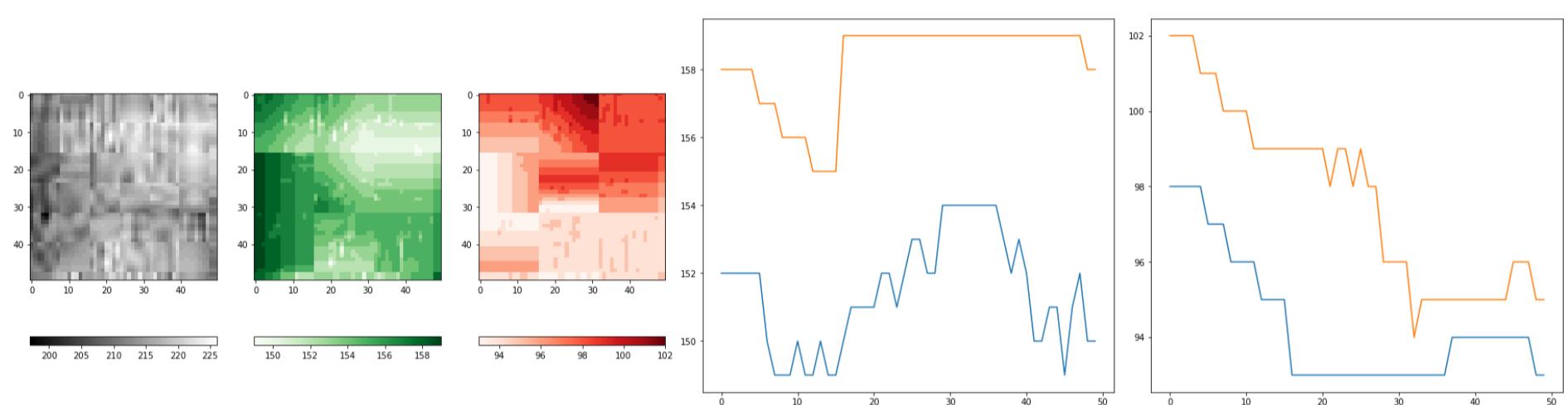
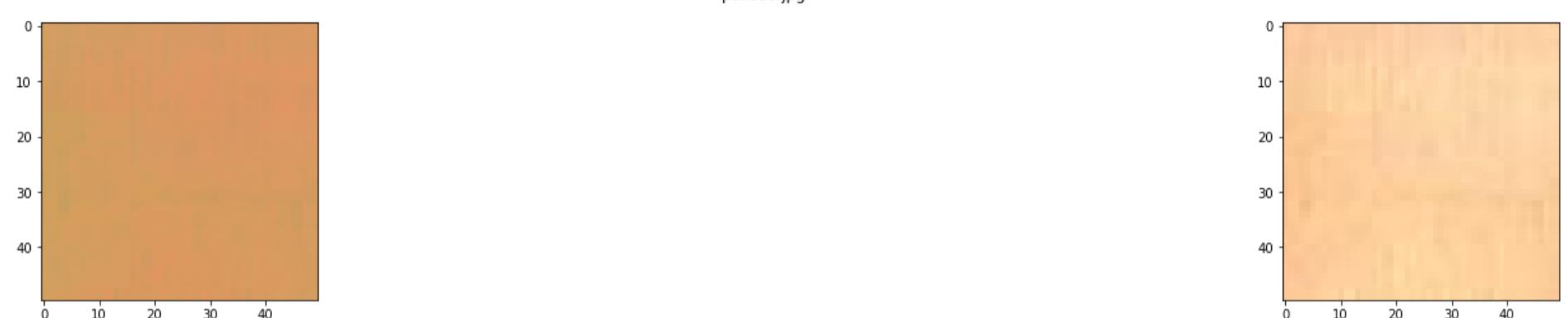
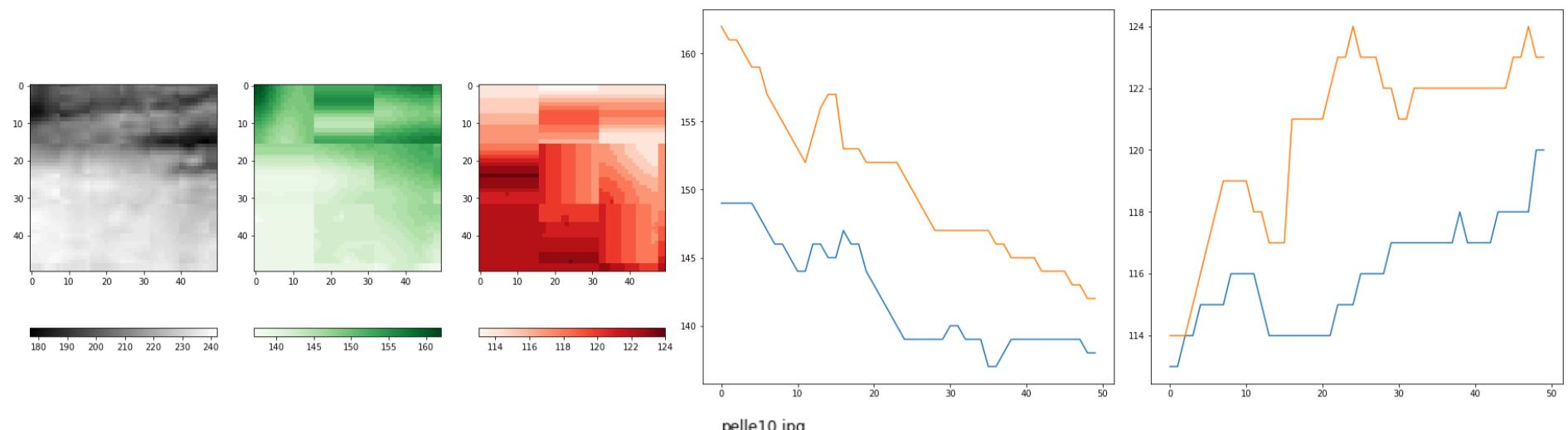
```
run_skin_analysis_ycbcr()
```

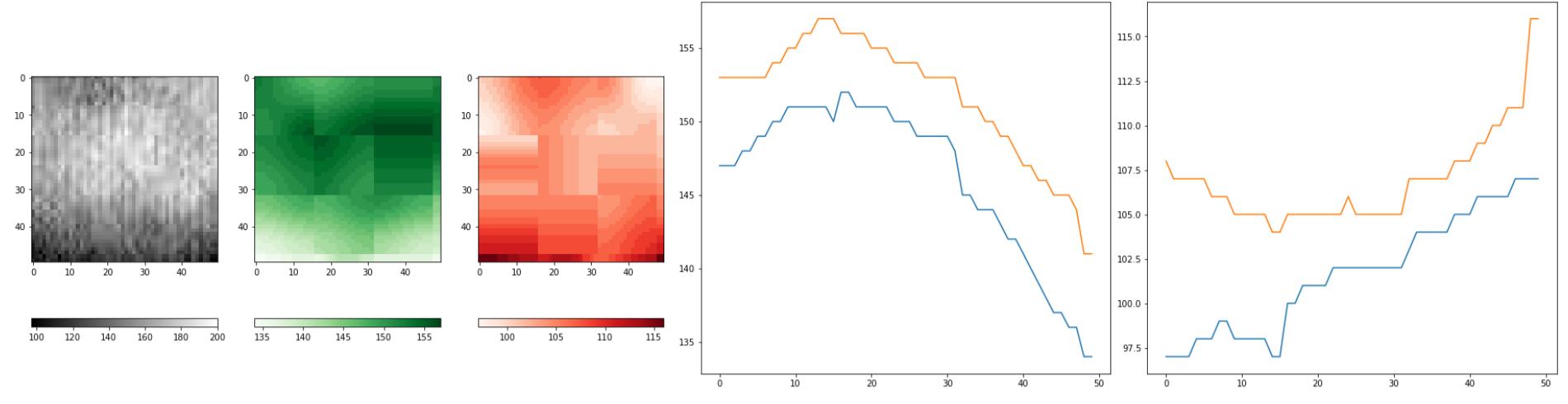
98% perc max = 185.76, 130.0
2% perc min = 127.62, 77.34



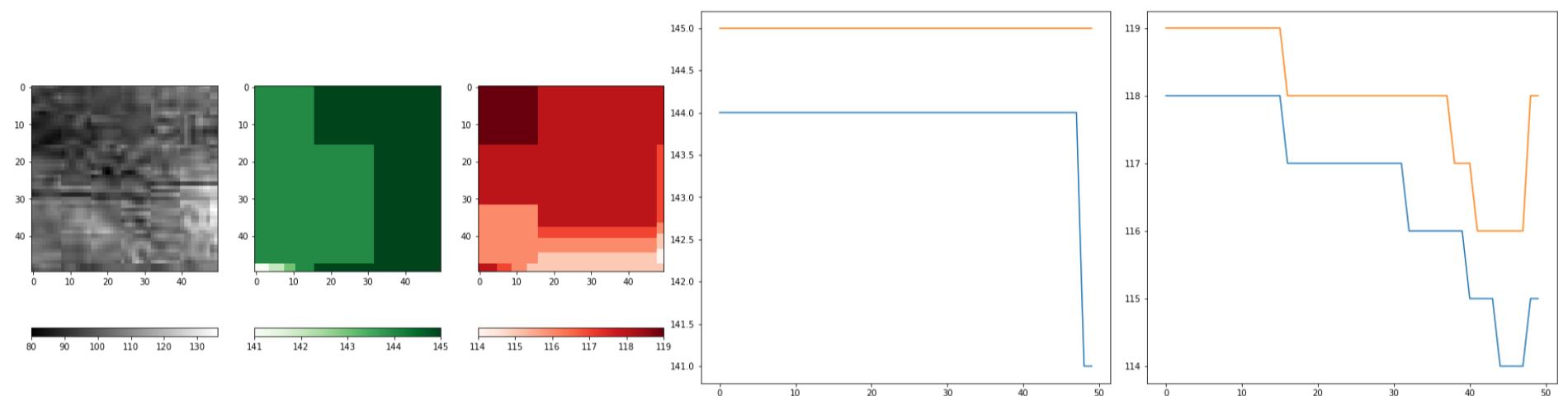
pelle1.jpg



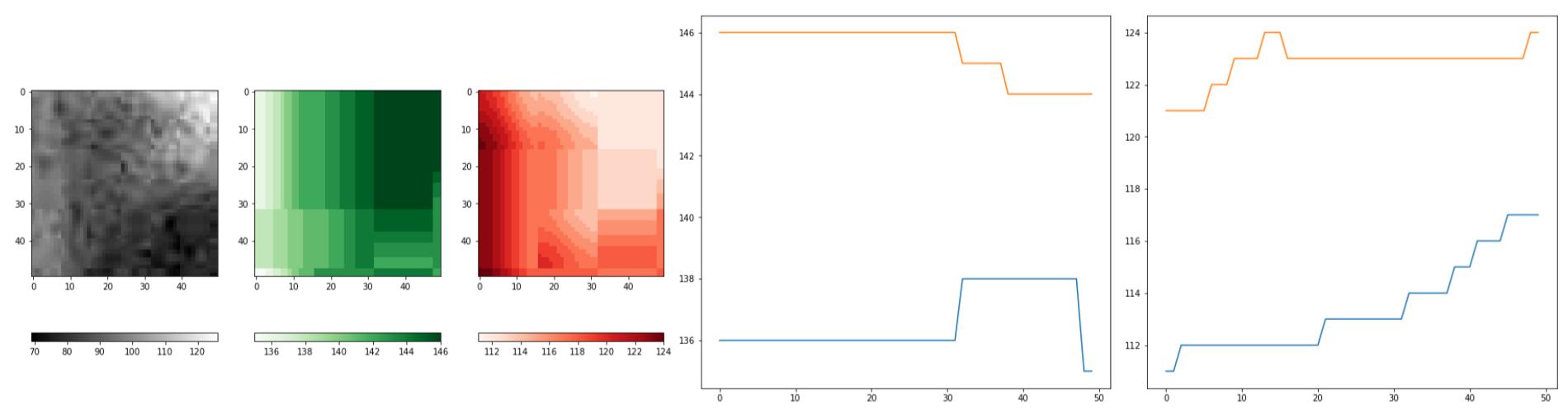




`pelle13.jpg`

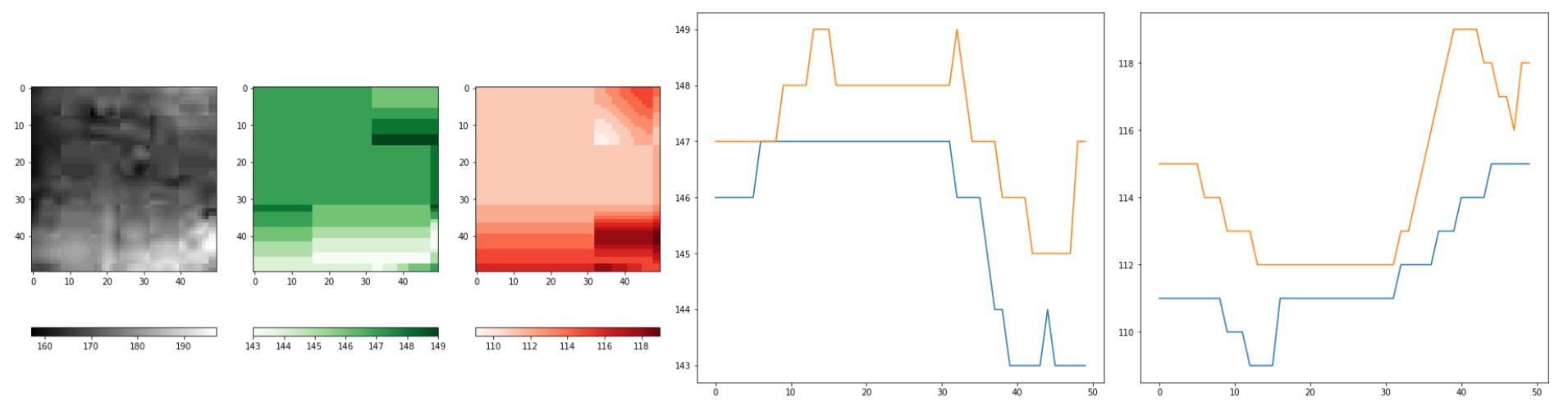


`pelle14.jpg`

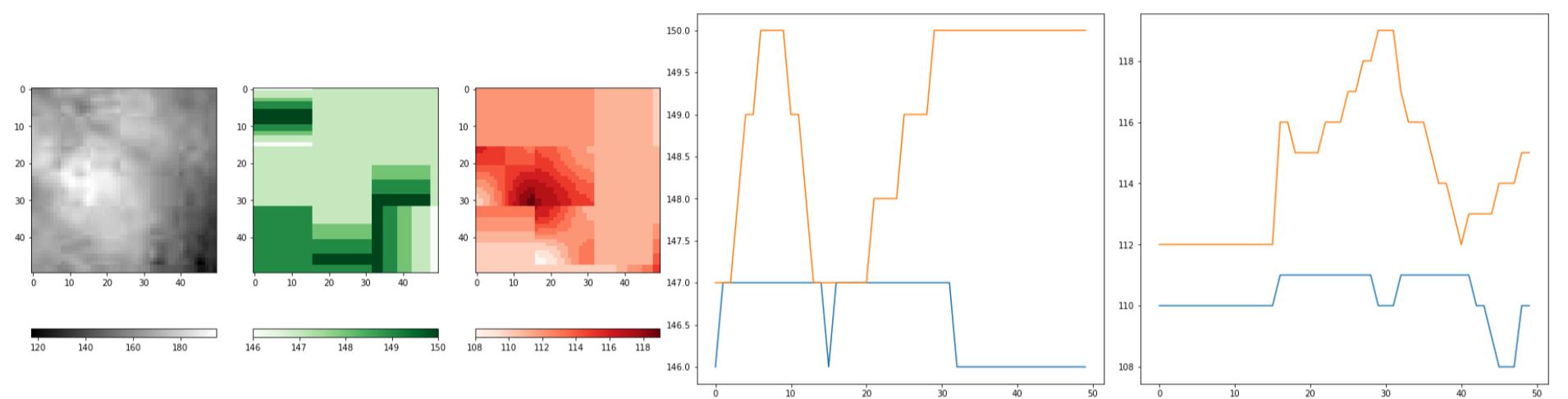


`pelle15.jpg`

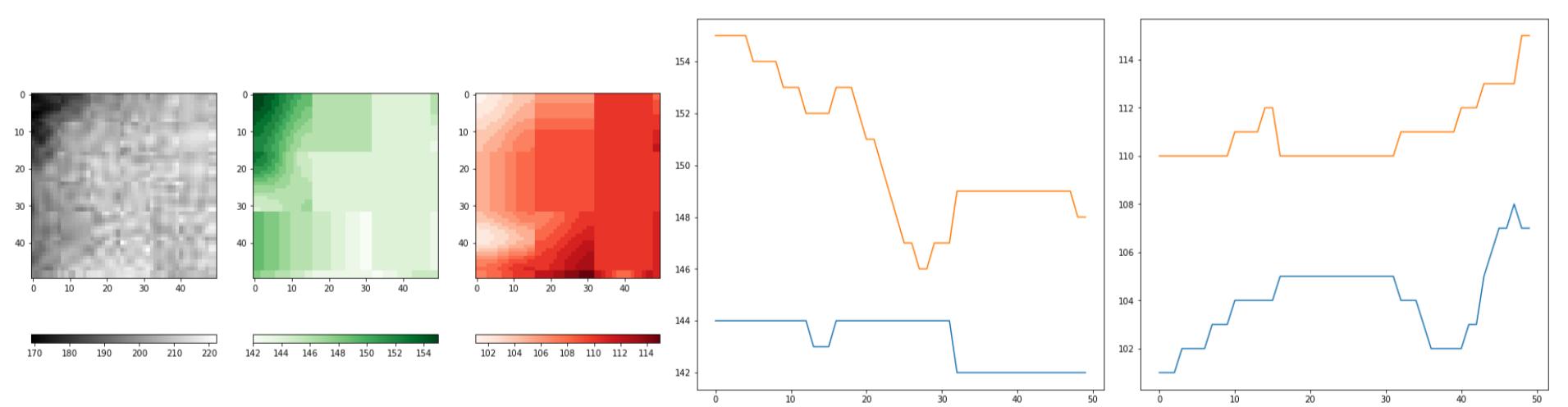




pelle16.jpg

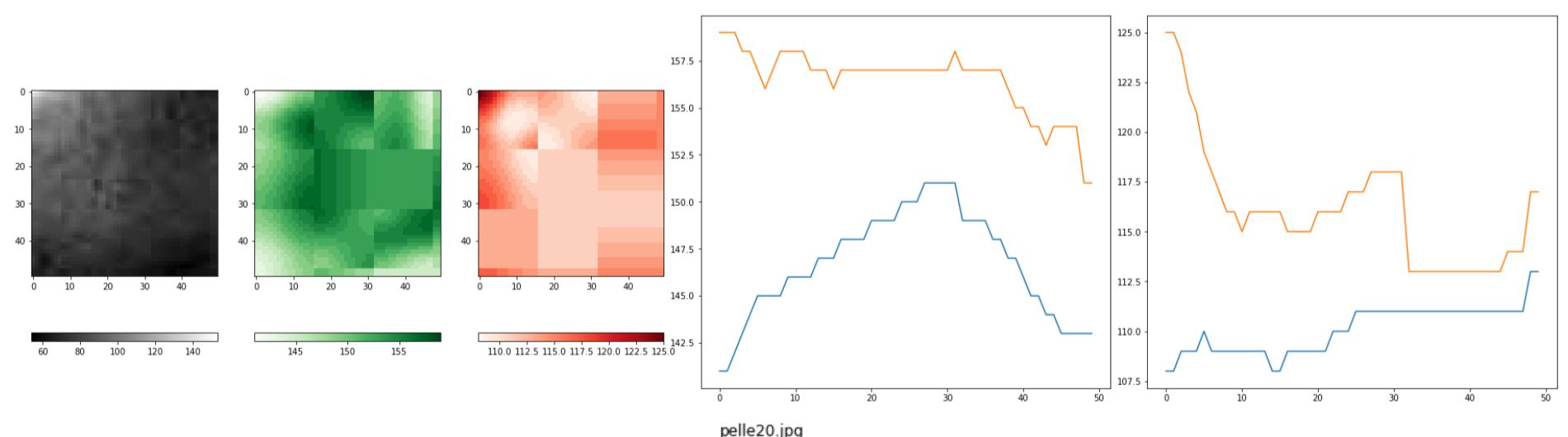
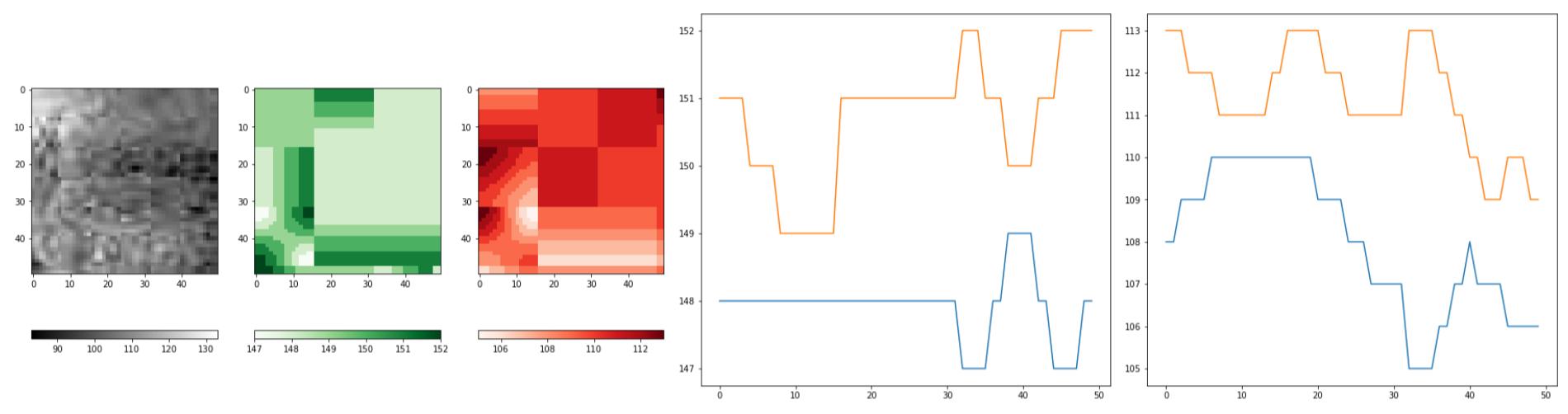
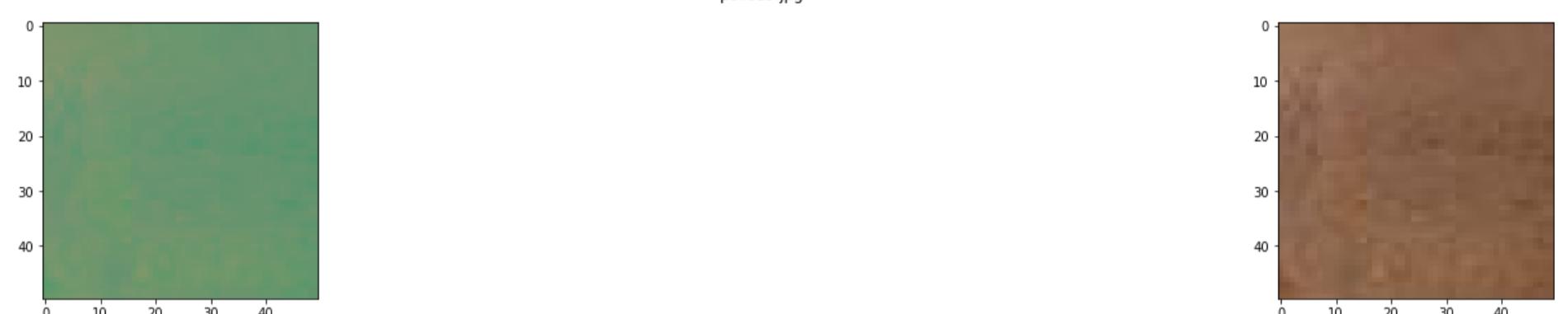
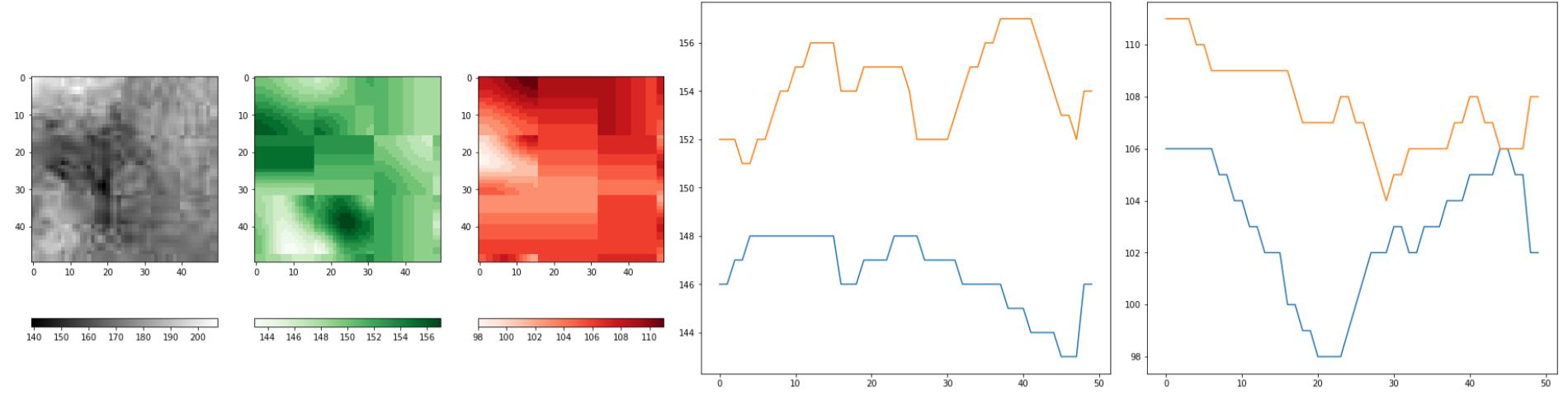


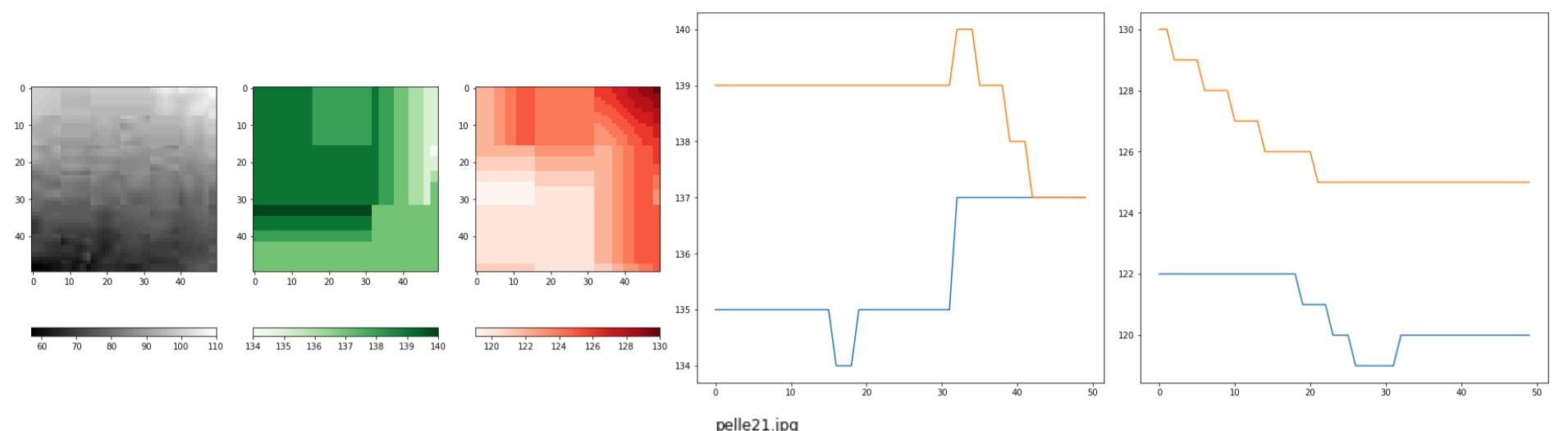
pelle17.jpg



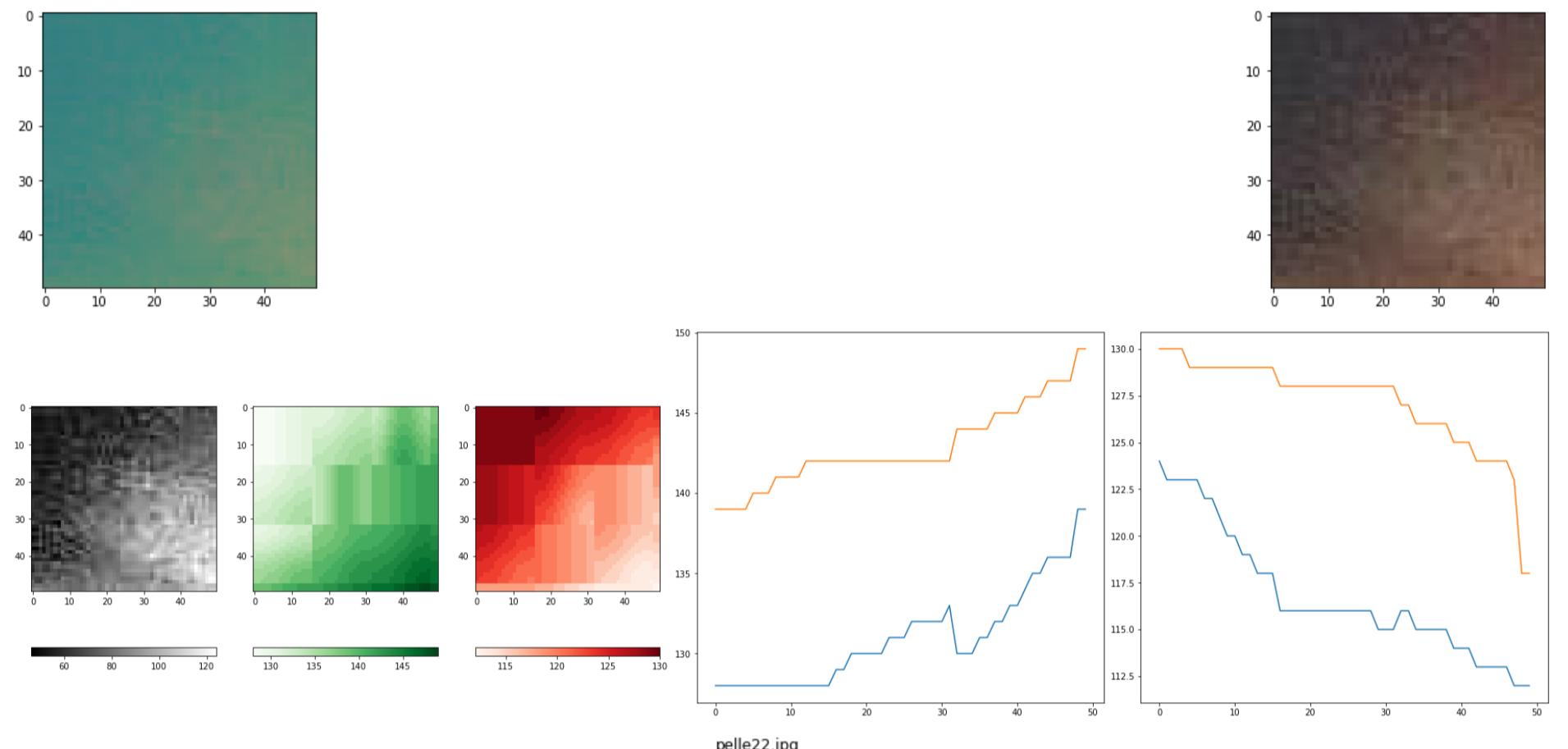
pelle18.jpg







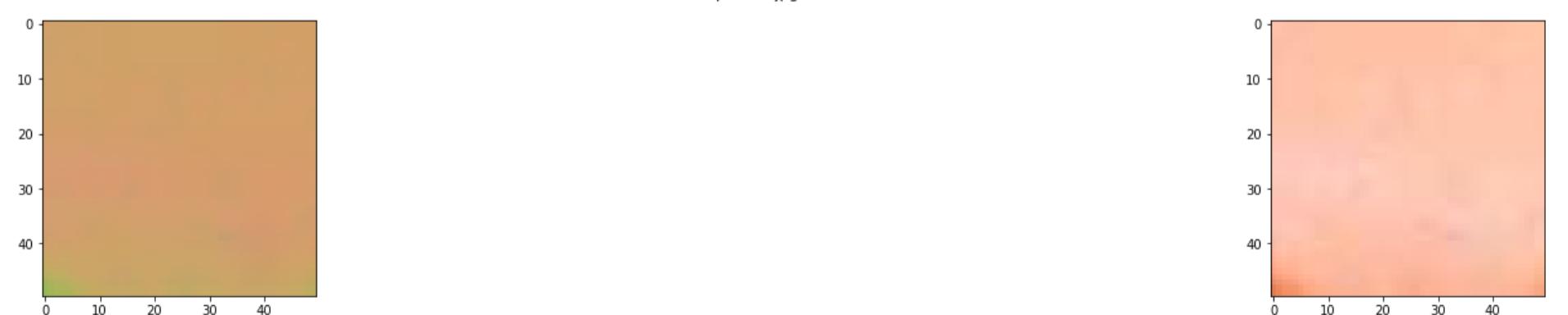
`pelle21.jpg`

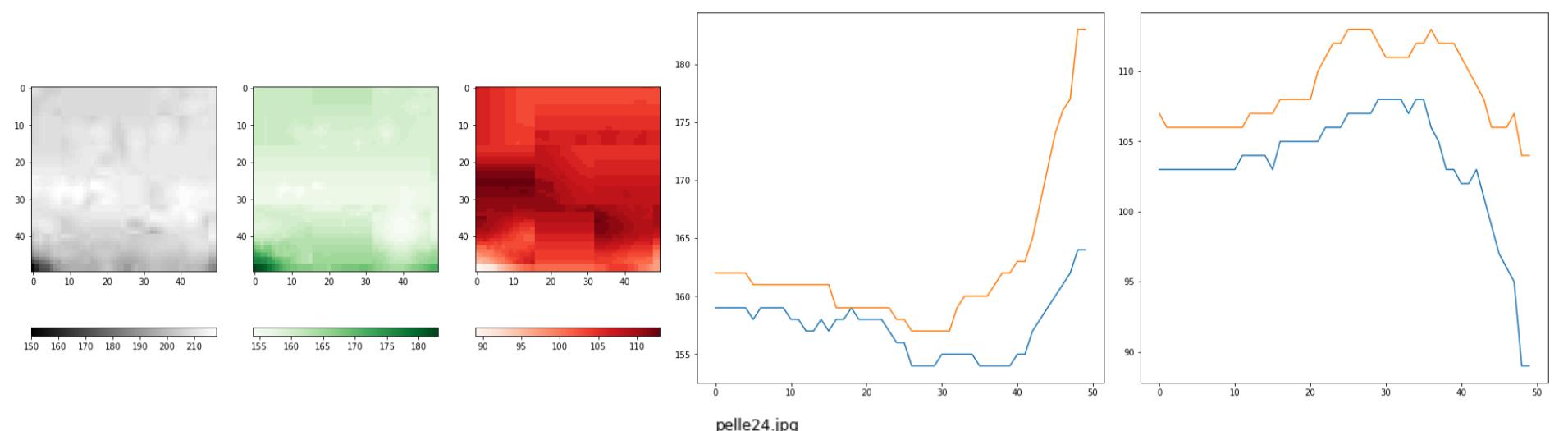


`pelle22.jpg`

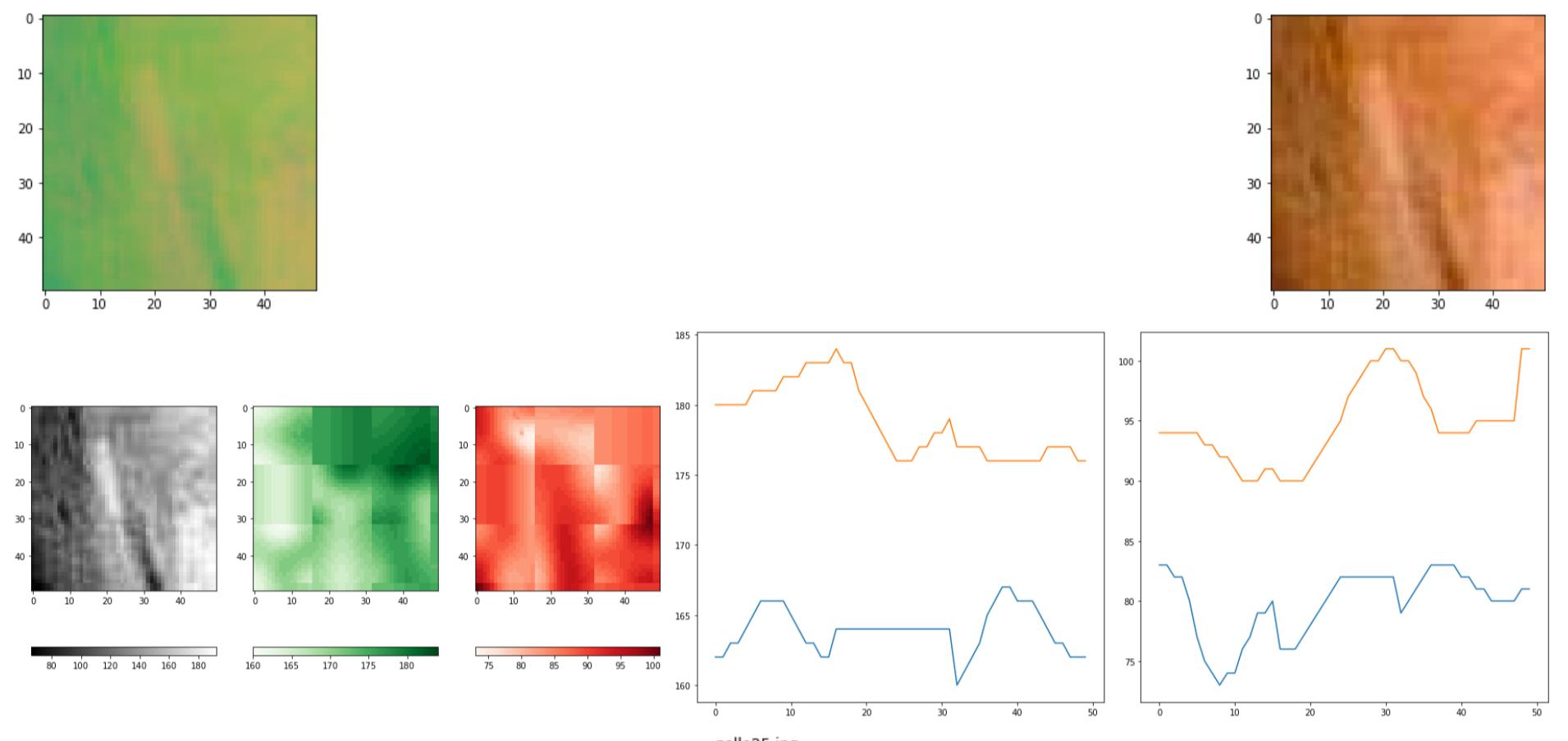


`pelle23.jpg`

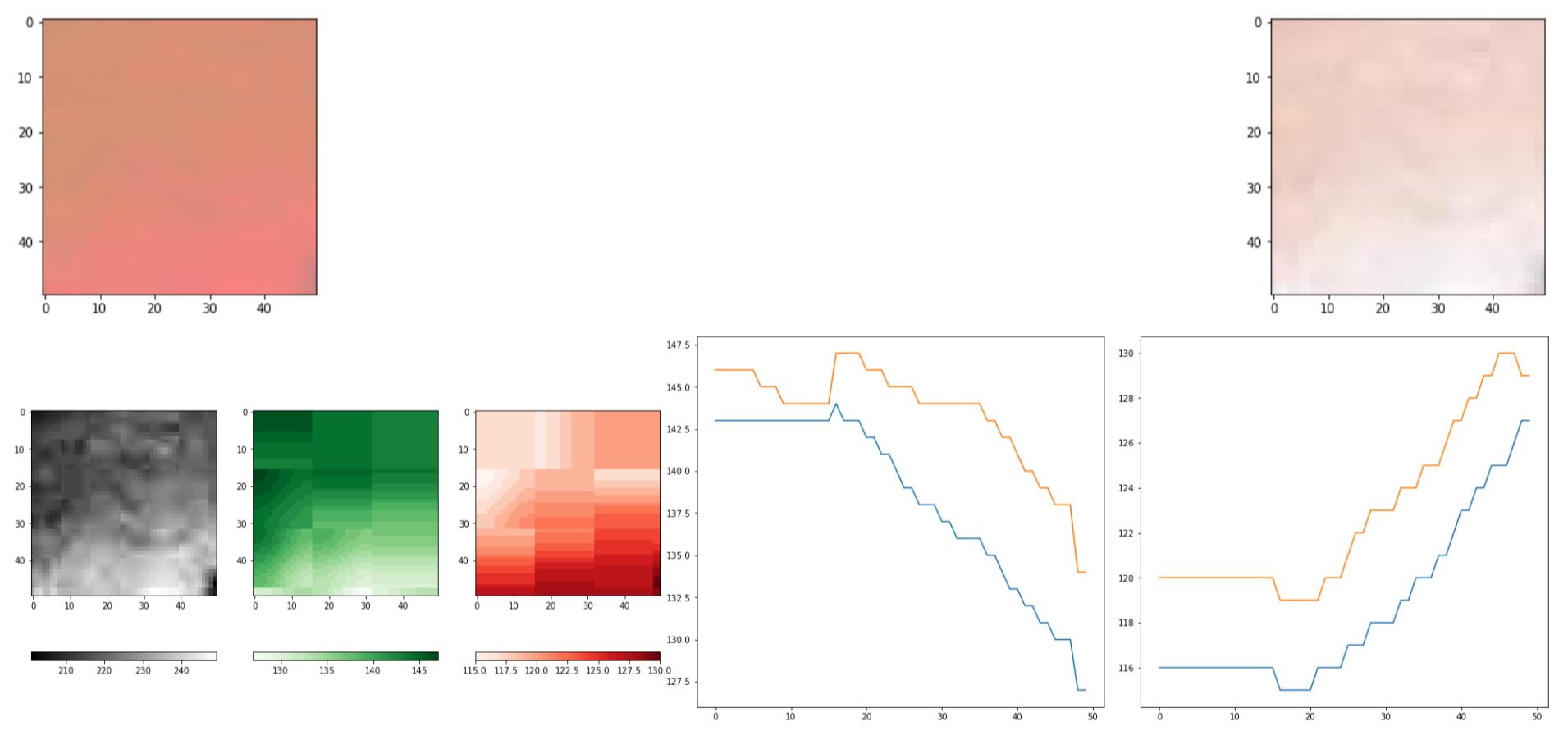




pelle24.jpg

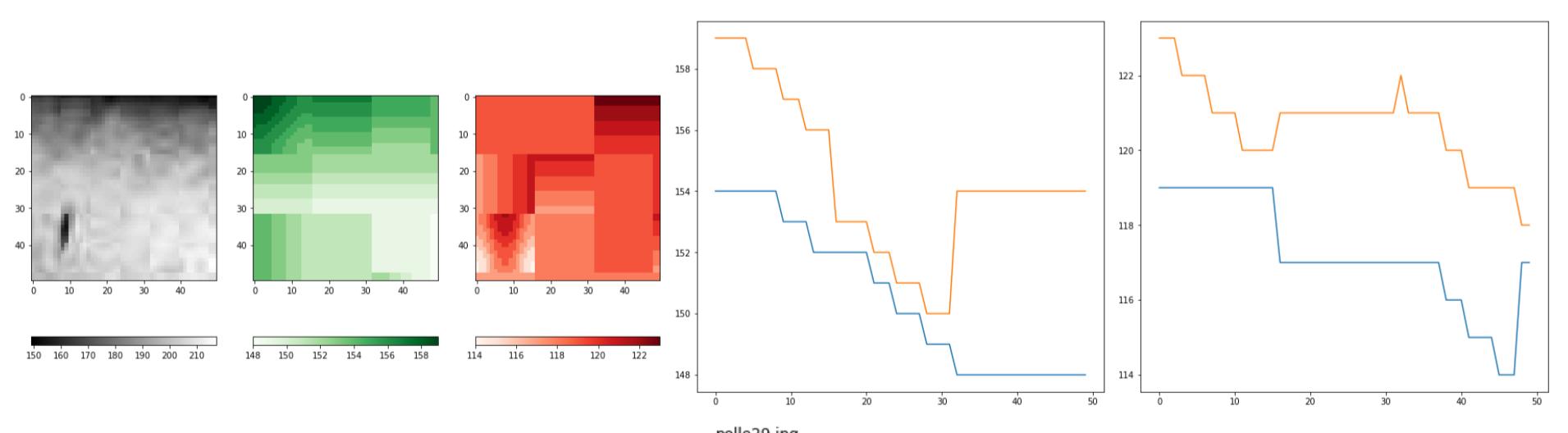
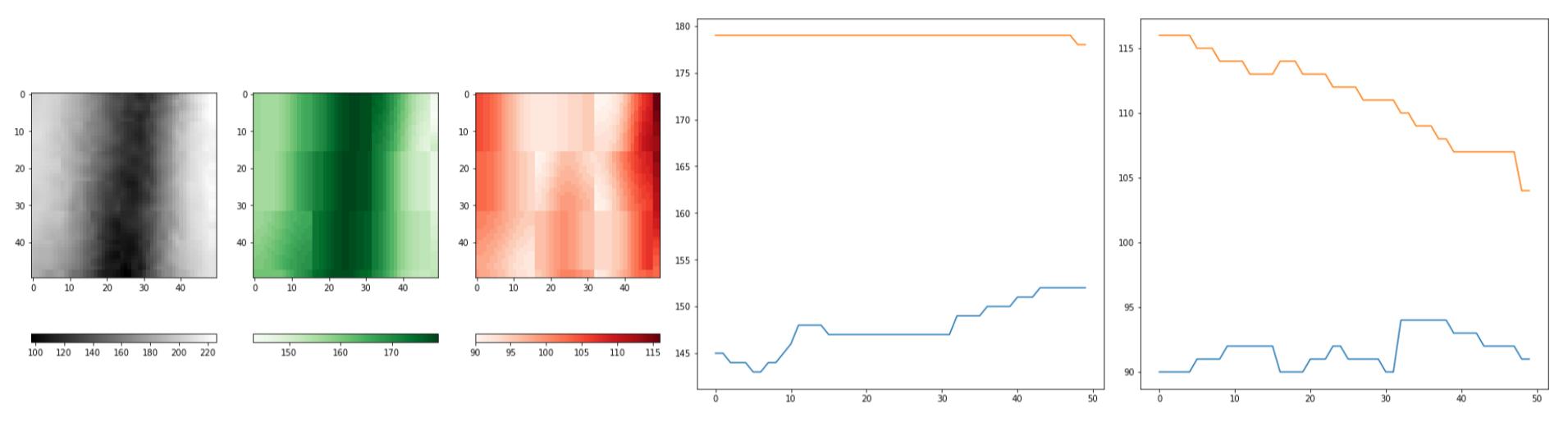
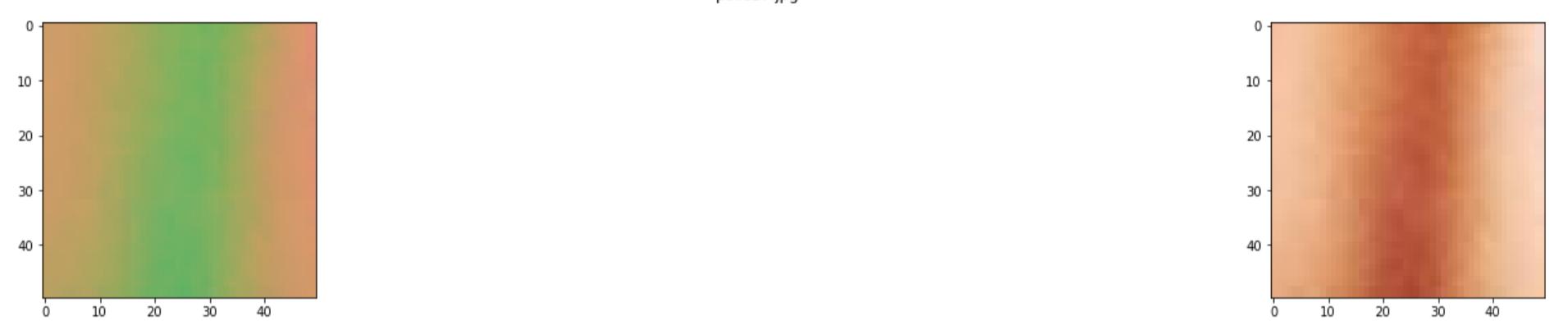
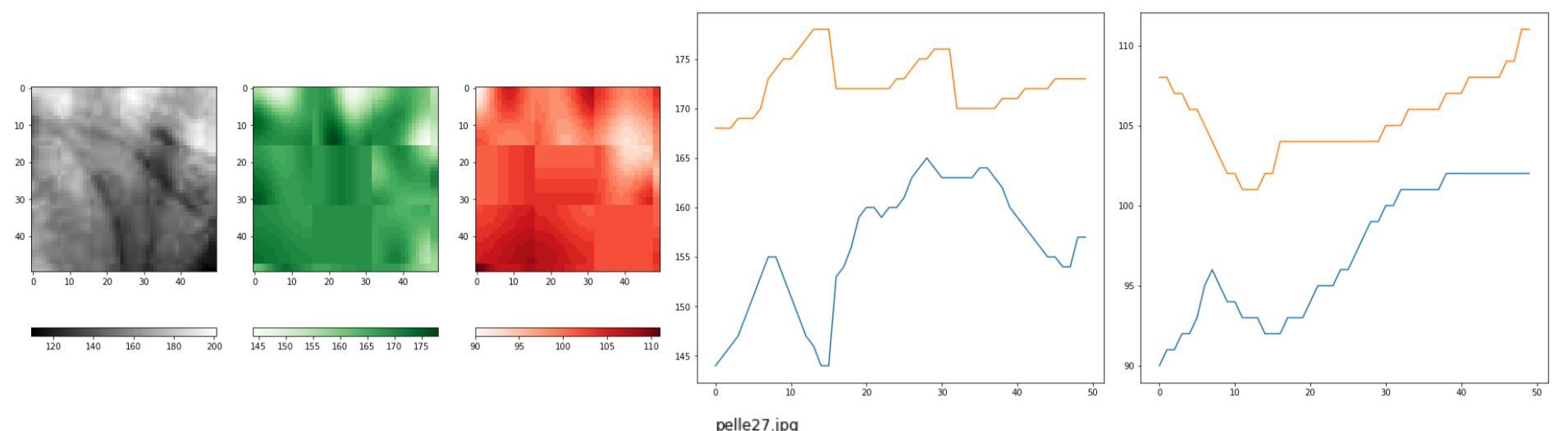


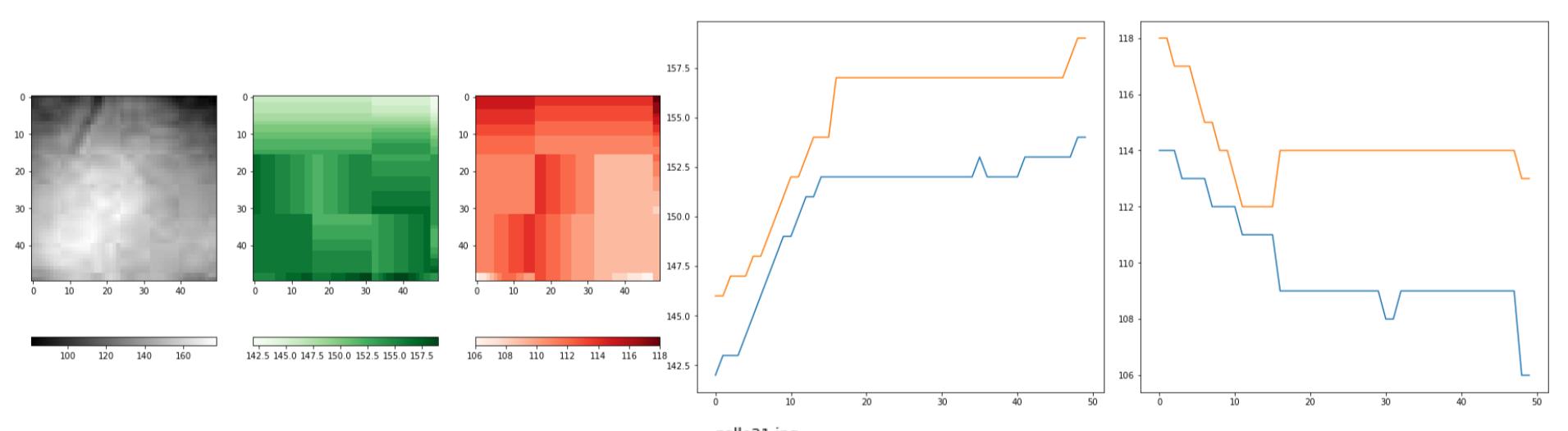
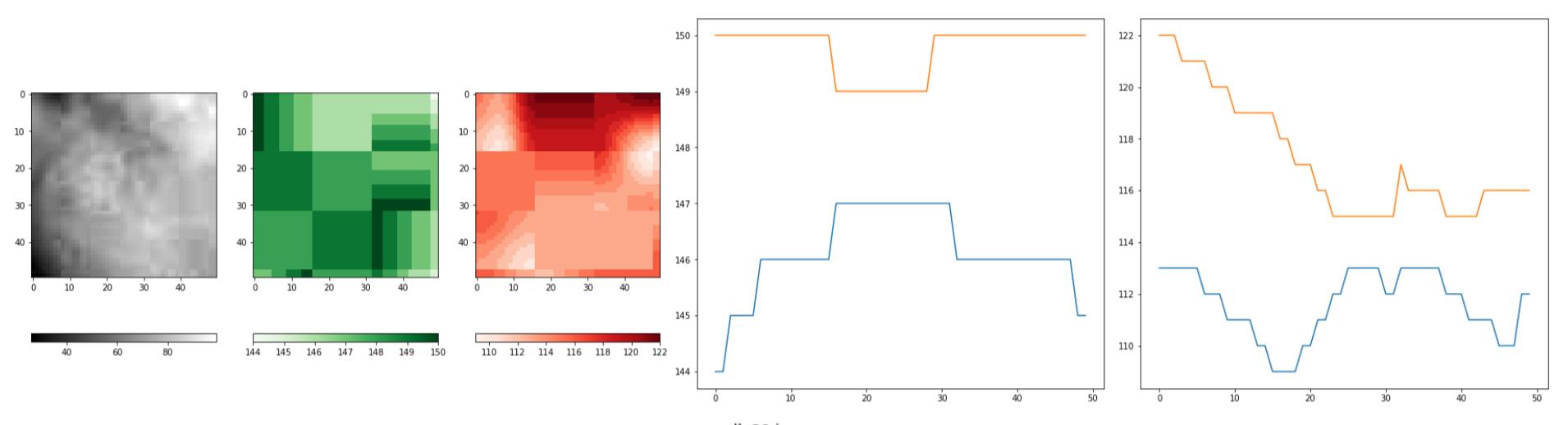
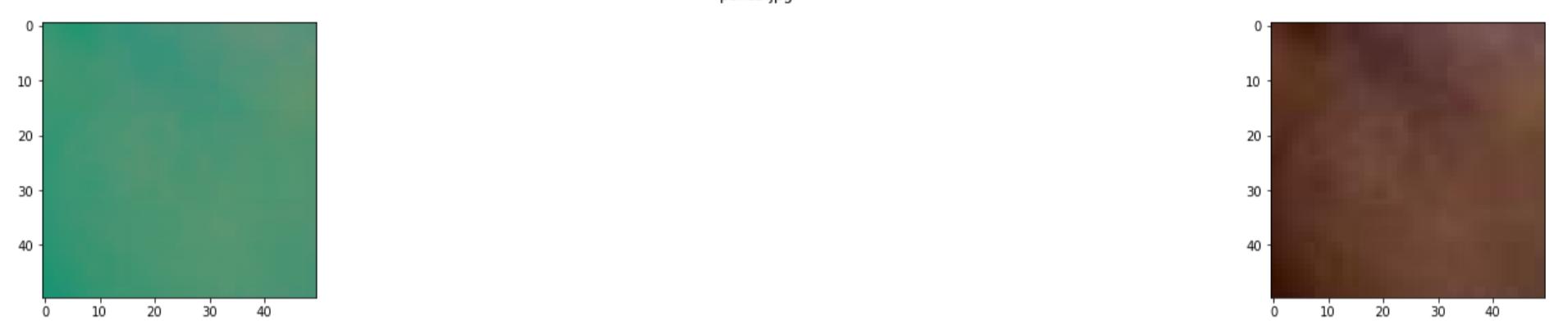
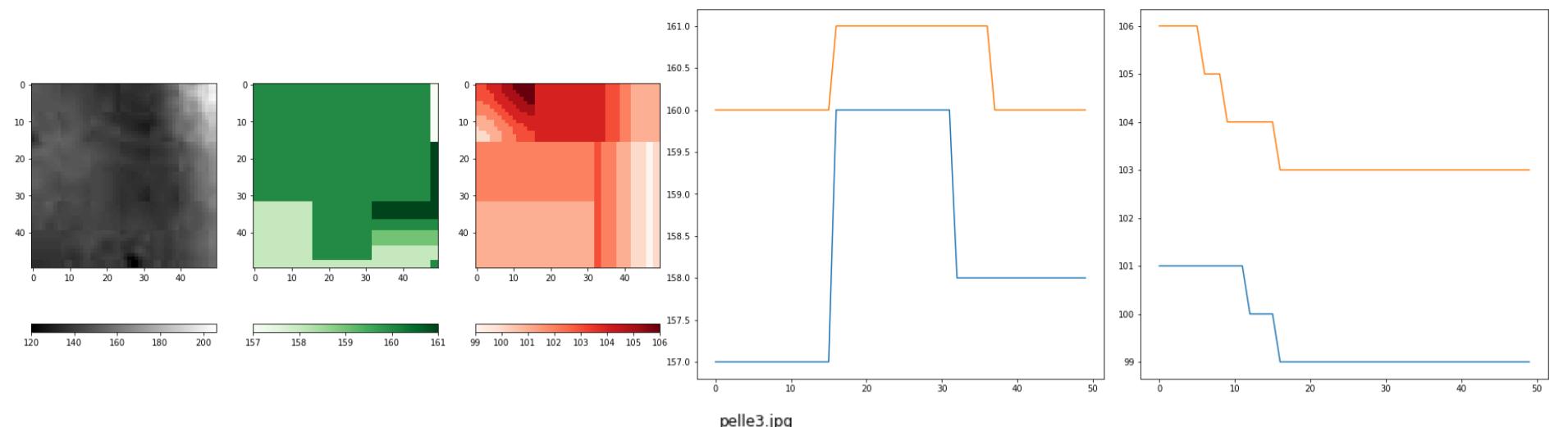
pelle25.jpg

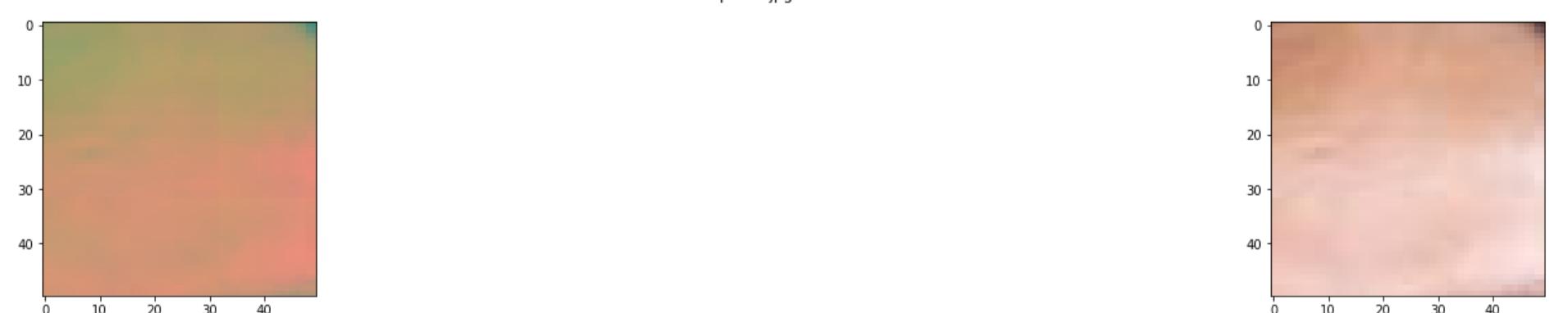
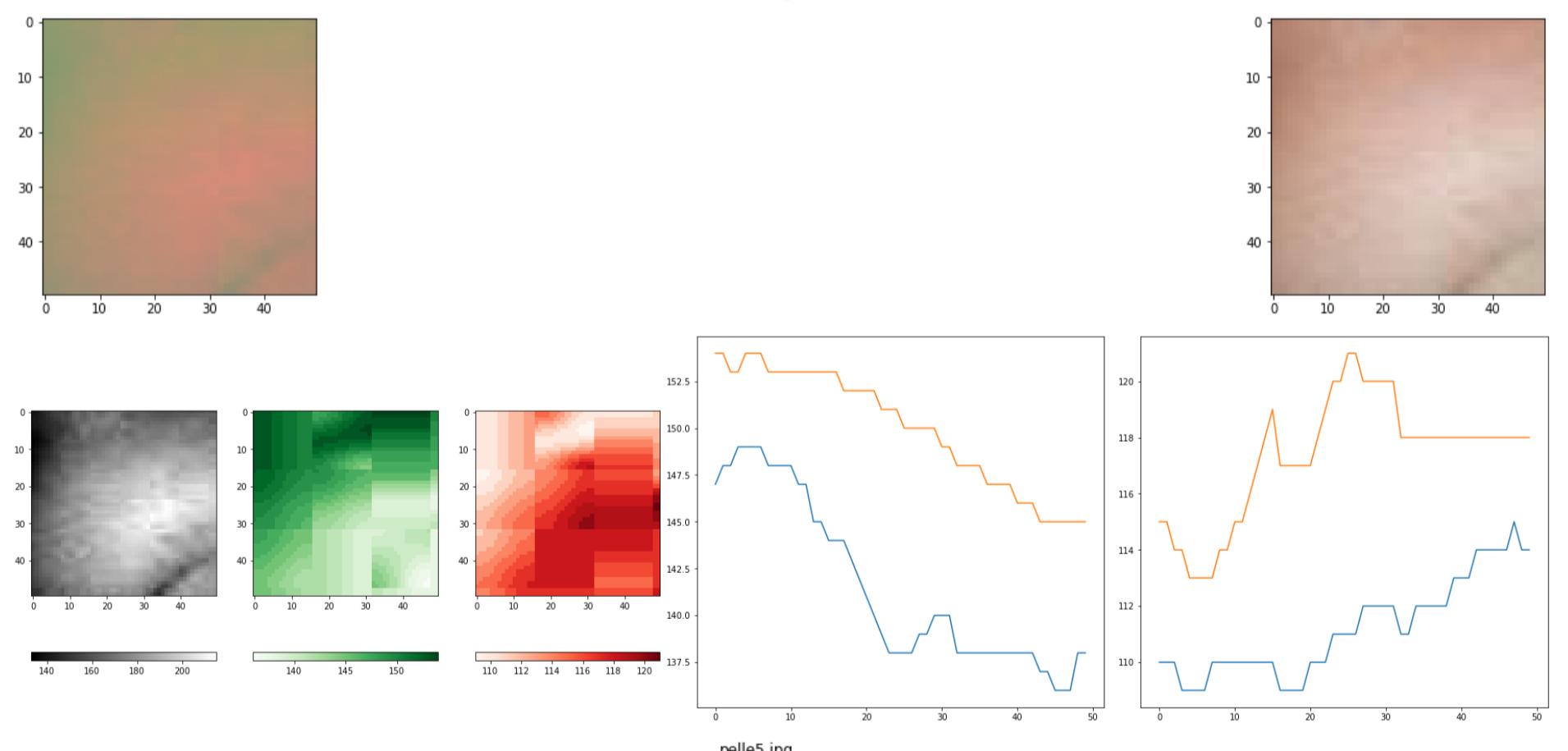
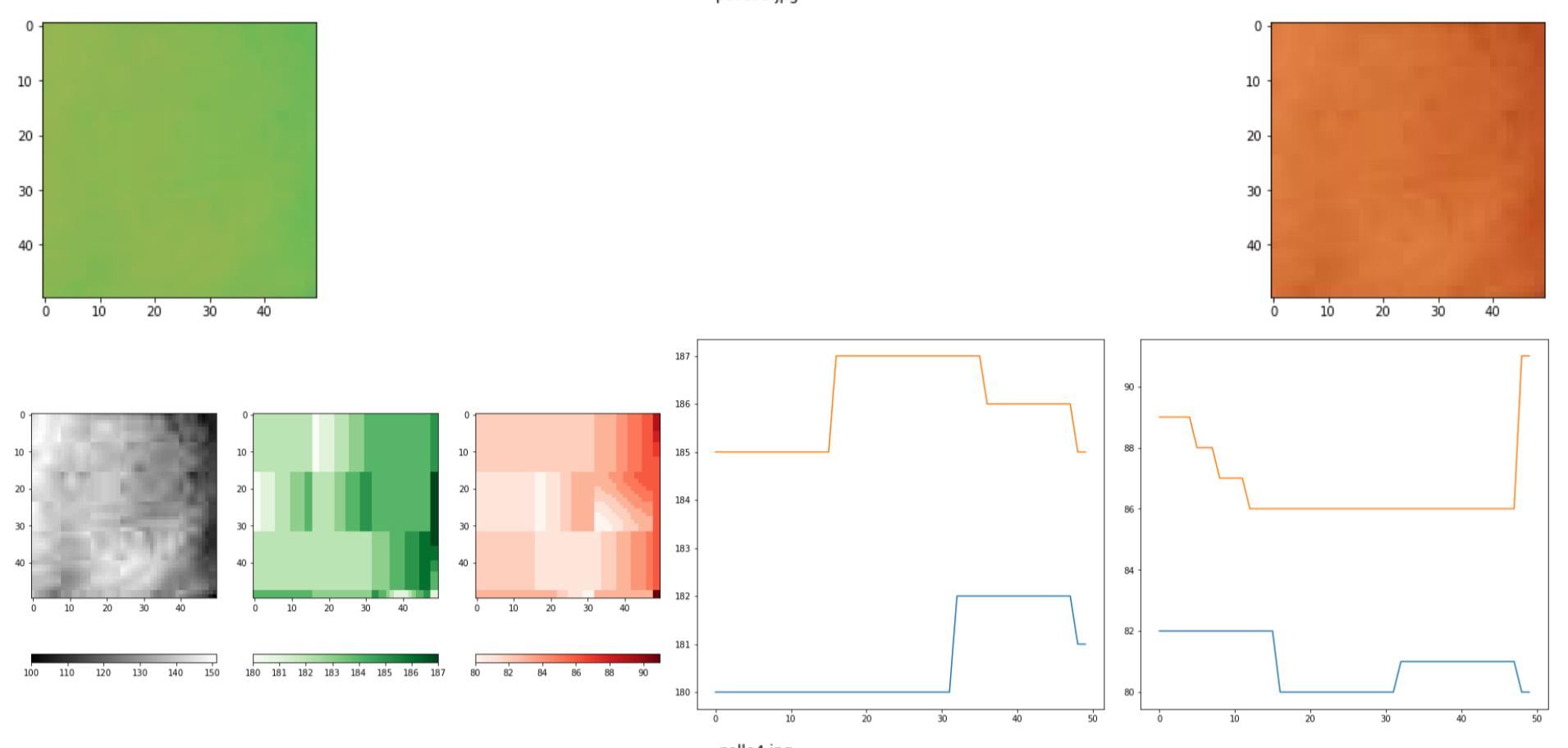
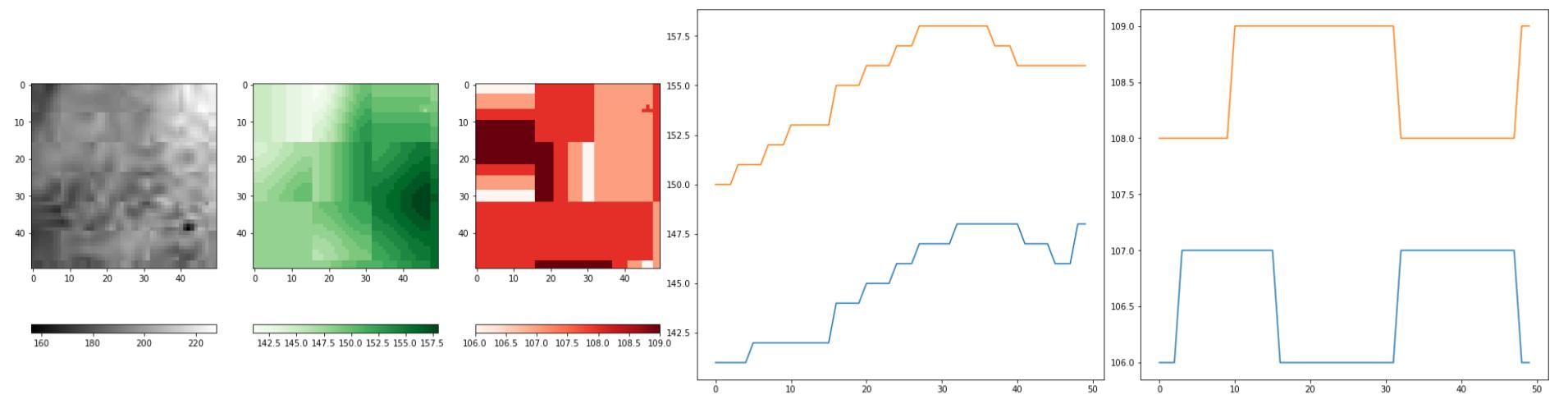


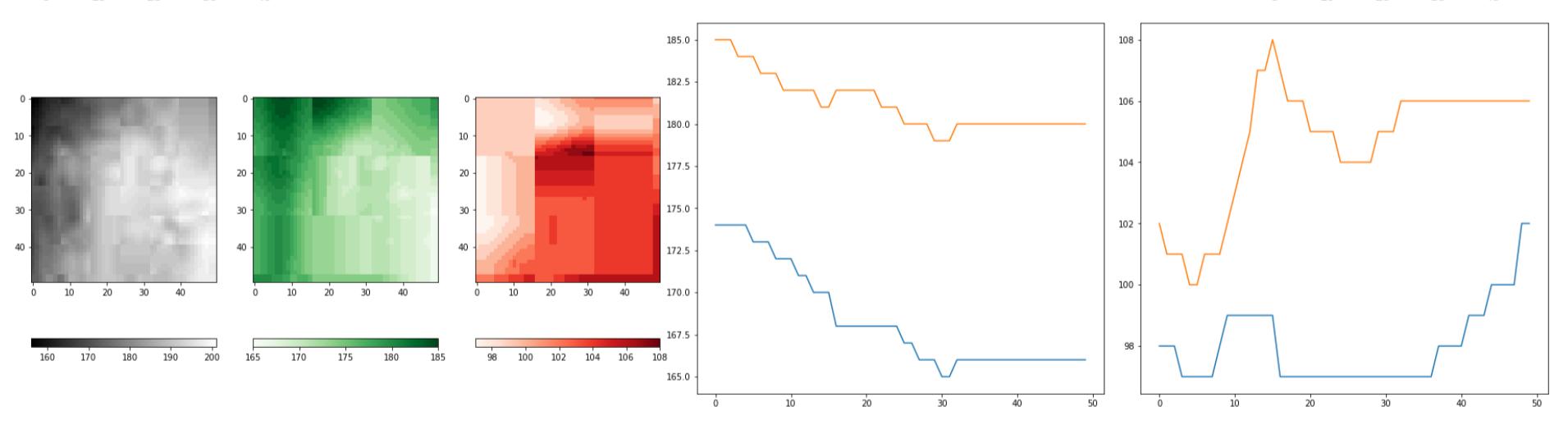
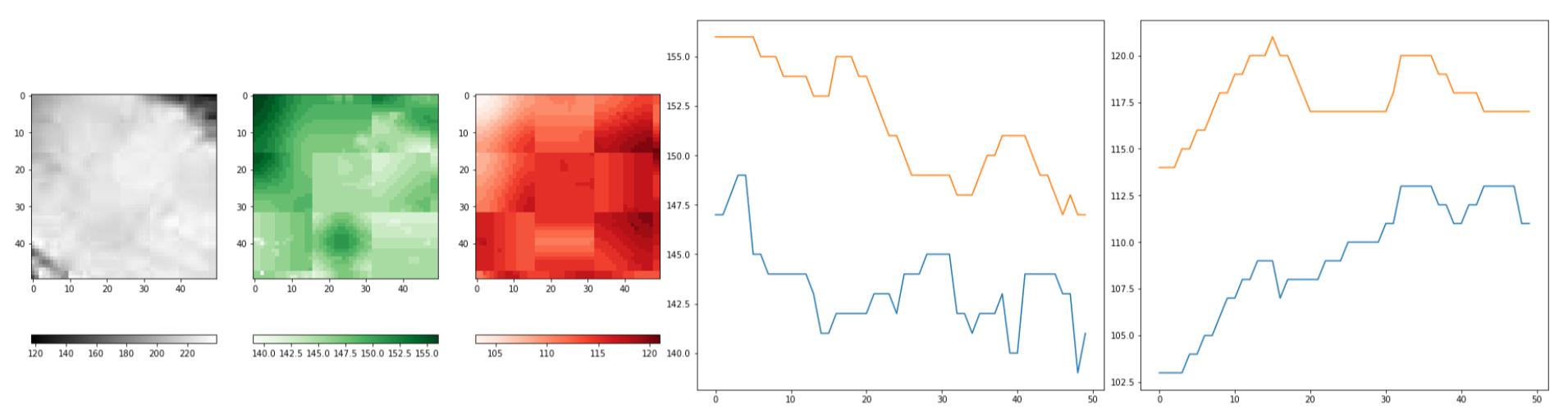
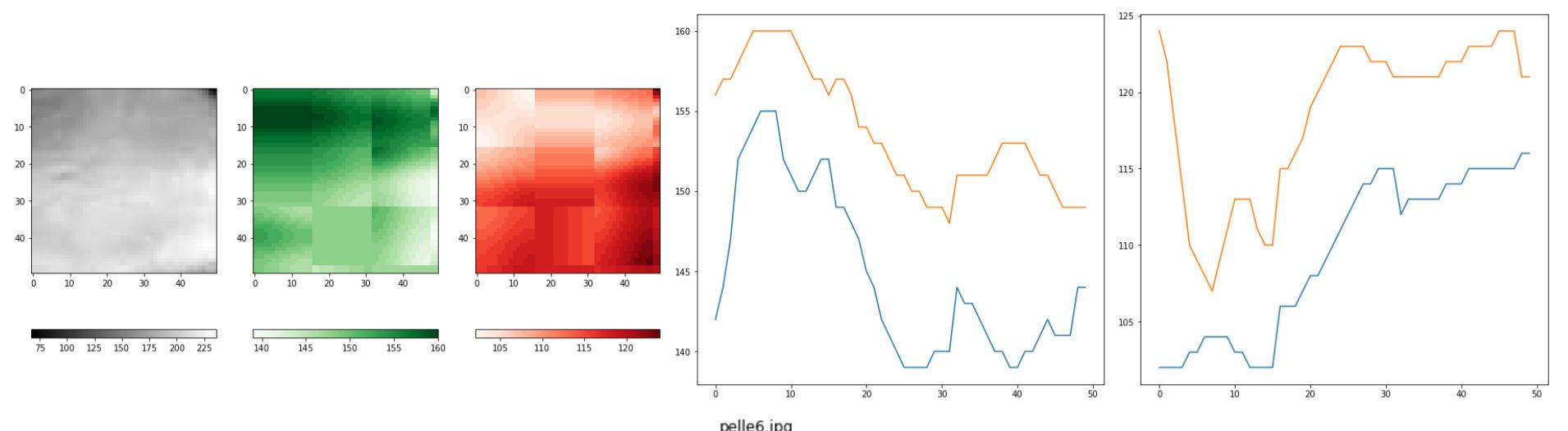
pelle26.jpg

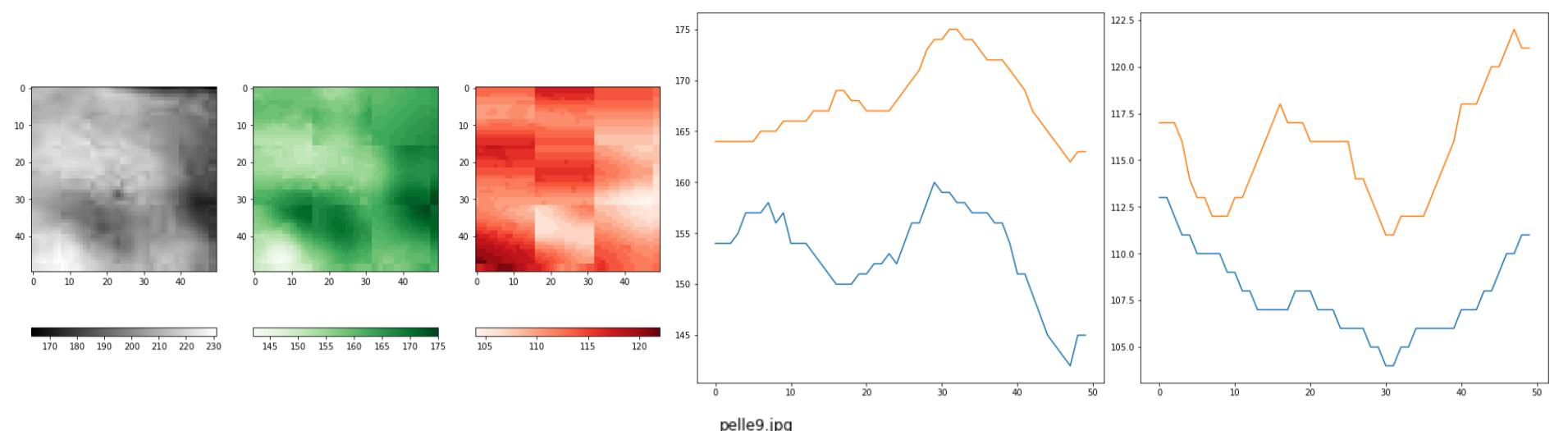












pelle9.jpg

