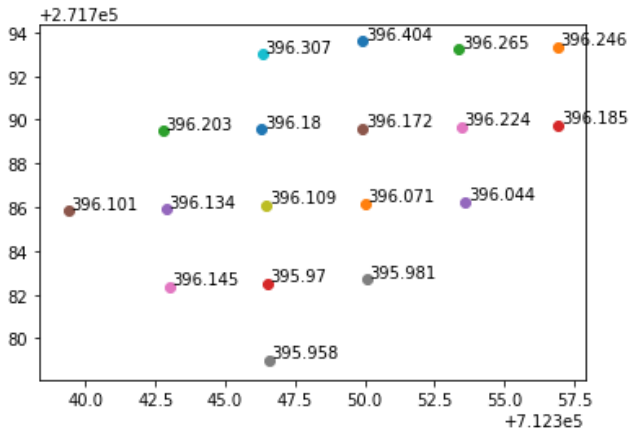
Interpolation methods

Load data

Hydraulic head measurements from Widen site, Switzerland

In [1]:
```
import numpy as np
import matplotlib.pyplot as plt
import scipy.interpolate
```

In [5]:
```
data = np.loadtxt('hydr_heads.txt')
Xw = data[:,0]#-np.min(data[:,0])
Yw = data[:,1]#-np.min(data[:,1])
Hw = data[:,2]

for i in range(0,len(Hw)):
    plt.scatter(Xw[i],Yw[i])
    plt.text(Xw[i]+0.1,Yw[i]+0.1,str(Hw[i]))
```



Target data grid

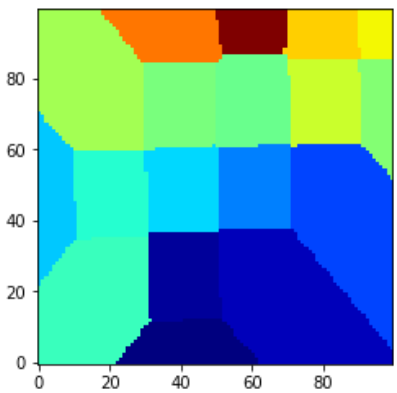
In [9]:
```
#Xi = np.meshgrid(np.min(Xw)+np.real([i for i in range(0,100)])*(np.max(Xw)-np.min(Xw)))
#Yi = np.meshgrid(np.min(Yw)+np.real([i for i in range(0,100)])*(np.max(Yw)-np.min(Yw)))
Xi, Yi = np.meshgrid(np.min(Xw)+np.real([i for i in range(0,100)])*(np.max(Xw)-np.min(Xw))*0.01,np.min(Yw)+np.real([i for i in range(0,100)])*(np.max(Yw)-np.min(Yw))*0.01)


print(Xi)
print(Xw)
```

```
[[712339.365   712339.54072 712339.71644 ... 712356.40984 712356.58556
  712356.76128]
 [712339.365   712339.54072 712339.71644 ... 712356.40984 712356.58556
  712356.76128]
 [712339.365   712339.54072 712339.71644 ... 712356.40984 712356.58556
  712356.76128]
 ...
 [712339.365   712339.54072 712339.71644 ... 712356.40984 712356.58556
  712356.76128]
 [712339.365   712339.54072 712339.71644 ... 712356.40984 712356.58556
  712356.76128]
 [712339.365   712339.54072 712339.71644 ... 712356.40984 712356.58556
  712356.76128]]
[712349.916 712356.892 712353.377 712356.937 712353.592 712349.91
 712353.463 712350.06  712346.485 712346.326 712346.3   712350.017
 712342.759 712346.508 712342.869 712339.365 712342.993 712346.577]
```

Nearest neighbor

In [10]:
```
Hi = scipy.interpolate.griddata(np.vstack([Xw,Yw]).T,Hw,(Xi,Yi),method='nearest')
```

In [22]:
```
plt.imshow(Hi)
plt.jet()
plt.gca().invert_yaxis()
```

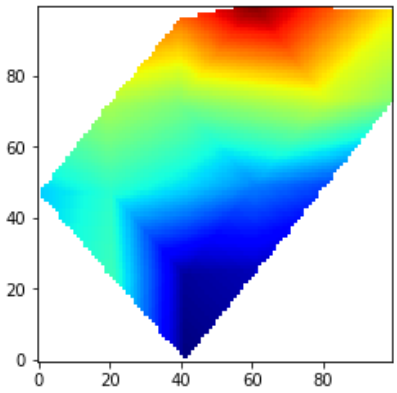


In [20]:
```
np.min(Hi)
```

Out[20]: 395.981

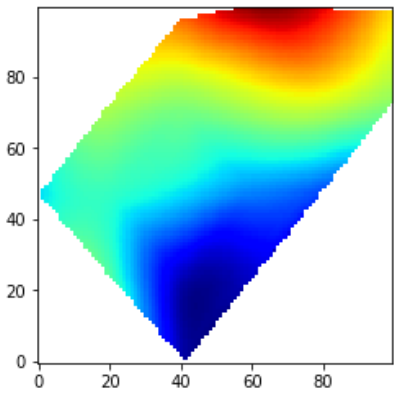
Linear interpolation

In [21]:
```
Hi_lin = scipy.interpolate.griddata(np.vstack([Xw,Yw]).T,Hw,(Xi,Yi),method='
linear')
plt.imshow(Hi_lin)
plt.jet()
plt.gca().invert_yaxis()
```



Cubic interpolation

In [20]:
```
Hi_lin = scipy.interpolate.griddata(np.vstack([Xw,Yw]).T,Hw,(Xi,Yi),method='
cubic')
plt.imshow(Hi_lin)
plt.jet()
plt.gca().invert_yaxis()
```



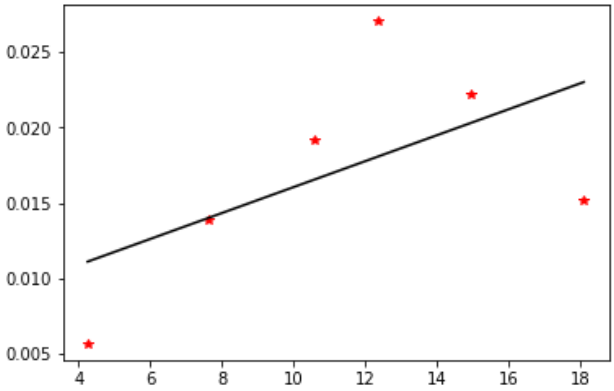
Kriging

This section uses the pykrige module

In [23]:
```
import pykrige
```

Ordinary kriging

In [40]:
```
OK = pykrige.ok.OrdinaryKriging(data[:, 0], data[:, 1], data[:, 2], variogra
m_model='linear',
                        verbose=False, enable_plotting=True)
```

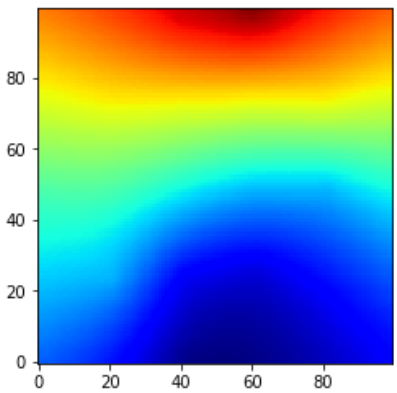


In [41]:
```
Xi2 = np.min(Xw)+np.real([i for i in range(0,100)])*(np.max(Xw)-np.min(Xw))*
0.01
Yi2 = np.min(Yw)+np.real([i for i in range(0,100)])*(np.max(Yw)-np.min(Yw))*
0.01
z, ss = OK.execute('grid', Xi2, Yi2)
```

In [42]:
```
np.shape(ss.data)
```

Out[42]:
```
(100, 100)
```

In [43]:
```
plt.imshow(z.data)
plt.gca().invert_yaxis()
```



In [ ]:
```
```