

# Microclima outdoor

## Valutazioni EX-ANTE

### Aree di progetto



Kristian Fabbri - 29 Settembre 2017

Simulazioni Dott.sa Marianna Nardino



Ferrara

# Ferrara

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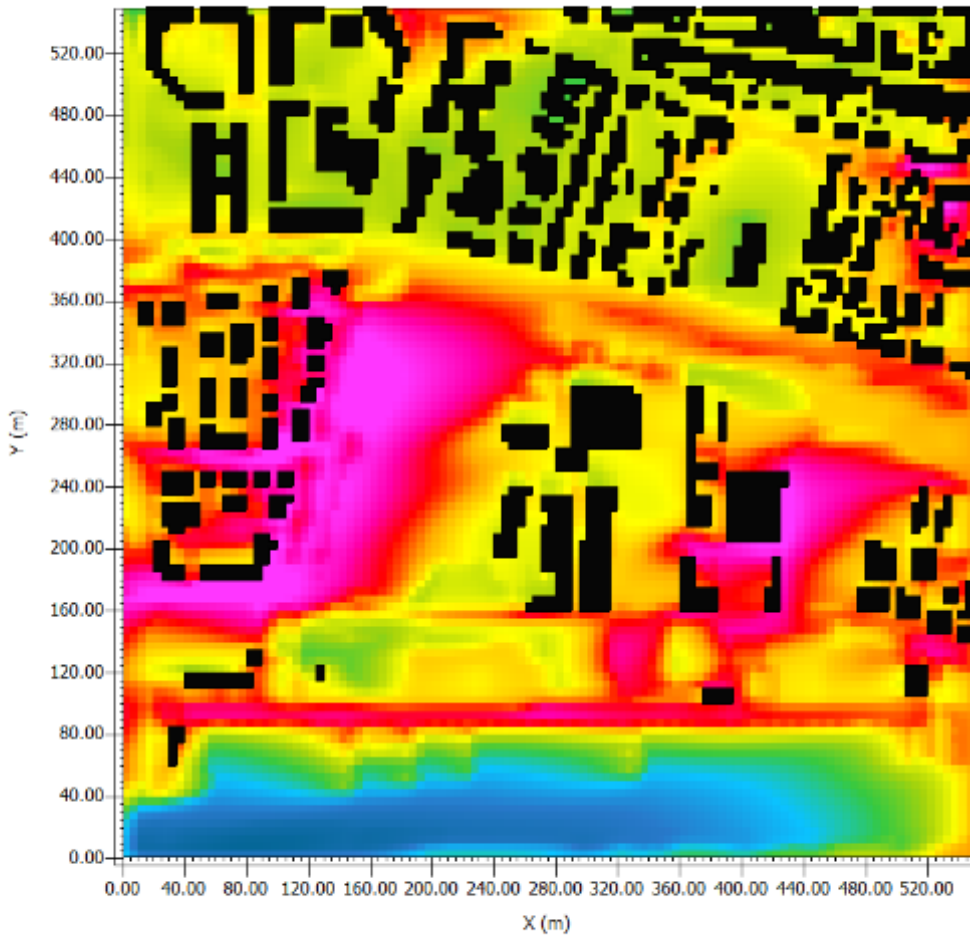
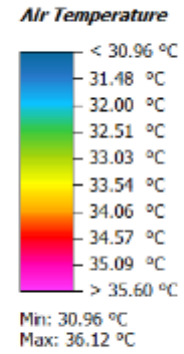


Figure 1: Sim Ferrara  
14:00:00 24.06.2017  
x/y Out at k=4 (r=1.8000 m)



**Temperatura dell'aria a 1.8 m di altezza alle ora 14:00**  
I valori maggiori sono registrati nelle aree dei parcheggi. L'effetto del canale Darsena è evidente dalle temperature mostrate.

# Ferrara

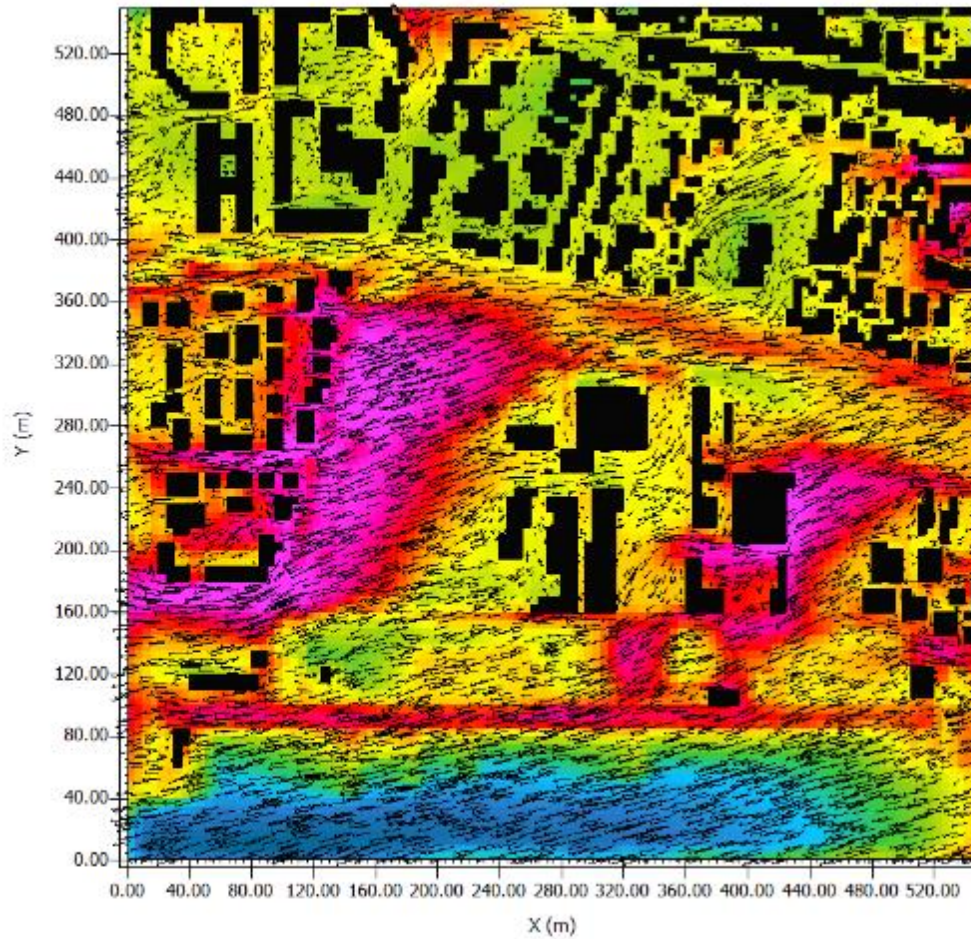
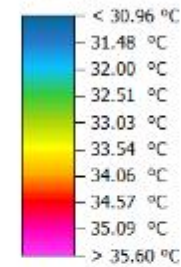


Figure 1: Sim Ferrara  
14:00:00 24.06.2017  
x/y Cut at z=4 (z=1.8000 m)

### Air Temperature



Min: 30.96 °C  
Max: 36.12 °C

### Flow v

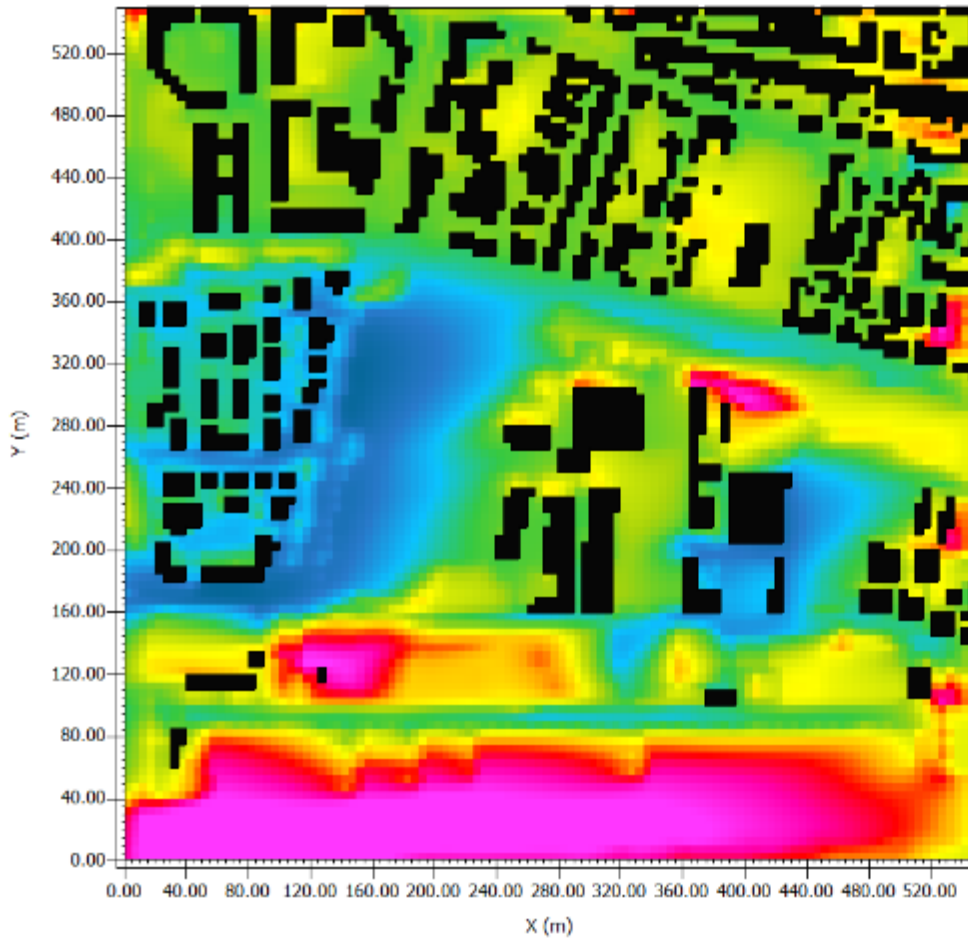
- 0.60 m/s
- 1.20 m/s
- 1.80 m/s
- 2.40 m/s
- 3.00 m/s



## Flusso del vento a 1.8 m di altezza alle ore 14:00

Il grafico mostra come si incanala il vento nella geografia del luogo. Input importante che può dare considerazioni per il progetto

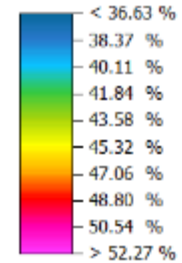
# Ferrara



Sim Ferrara 14:00:00  
24.06.2017  
x/y Cut at k=1 (z=1.8000 m)

**Umidità Relativa a 1.8  
m di altezza alle ore  
14:00**  
Il grafico

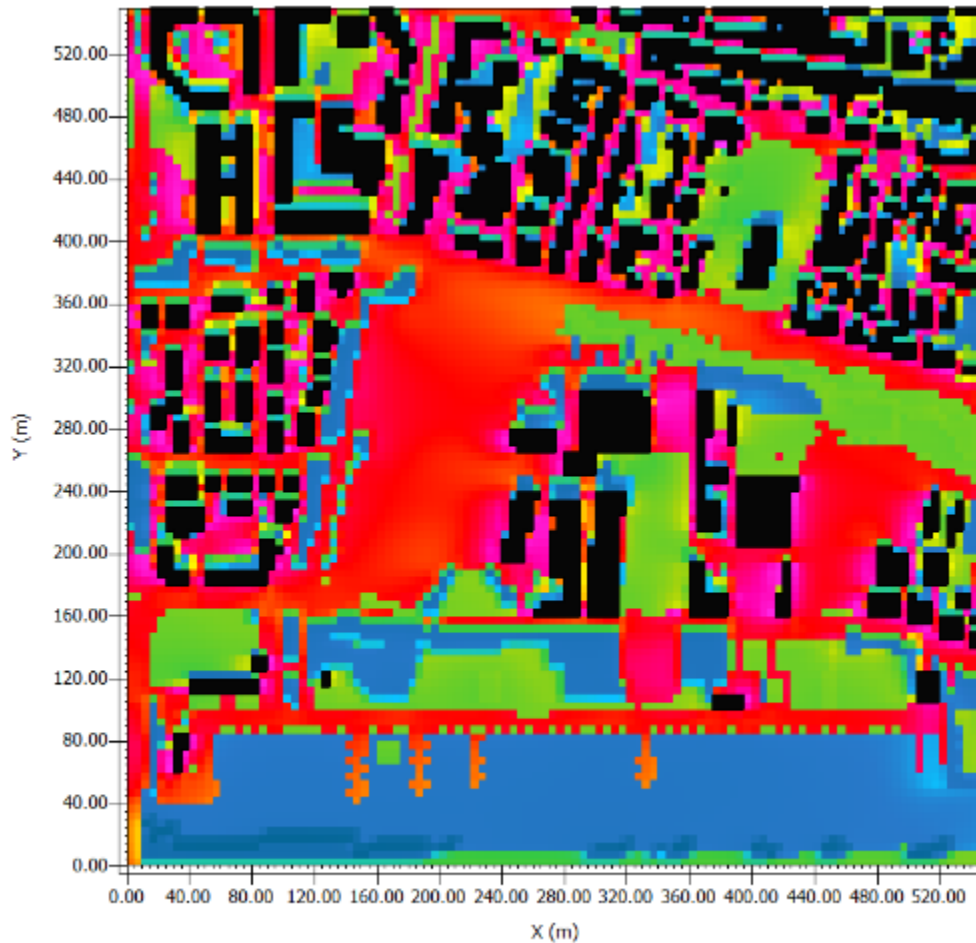
*Relative Humidity*



Min: 36.63 %  
Max: 54.01 %

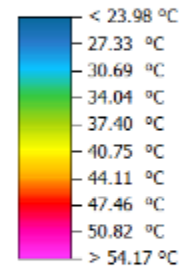


# Ferrara



Sim Ferrara 14:00:00  
24.06.2017  
x/y Cut at k=0 (z=0.0000 m)

*T Surface*

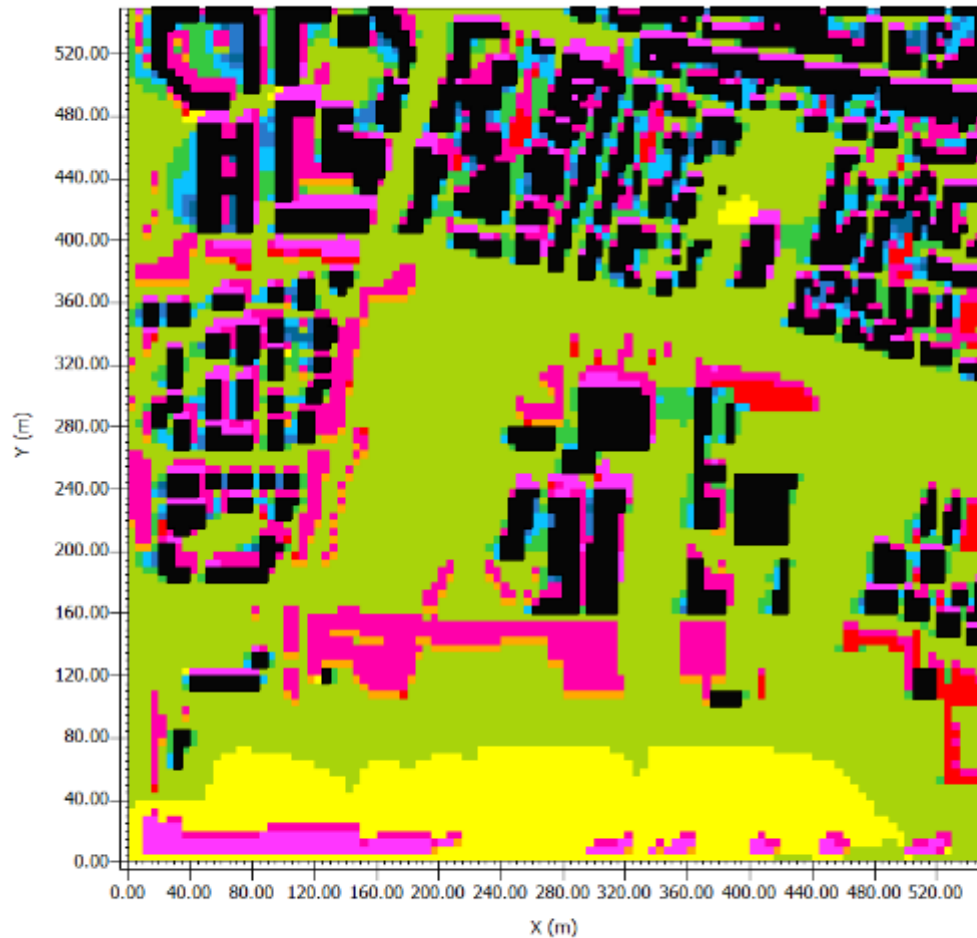


Min: 23.98 °C  
Max: 57.53 °C

**Temperatura  
superficiale alle ore  
14:00**

Il grafico mostra le temperature radianti dei materiali alla superficie quindi si distingue l'asfalto dalla vegetazione e dall'acqua.

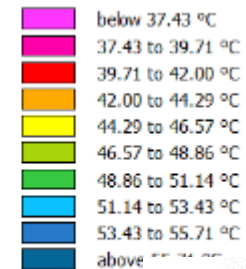
# Ferrara



Sim Ferrara 14:00:00  
24.06.2017  
x/y Cut at k=4 (z=1.8000 m)

**PET a 1.8 m di altezza  
alle ore 14:00**  
Il grafico

## PET



Mn: 35.14 °C  
Max: 58.00 °C

## PET physiological effective temperature

PMV	PET (°C)	Thermal perception	Grade of physiological stress
-3.5	4	Very cold	Extreme cold stress
-2.5	8	Cold	Strong cold stress
-1.5	13	Cool	Moderate cold stress
-0.5	18	Slightly cool	Slight cold stress
0.5	23	Comfortable	No thermal stress
1.5	29	Slightly warm	Slight heat stress
2.5	35	Warm	Moderate heat stress
3.5	41	Hot	Strong heat stress
		Very hot	Extreme heat stress

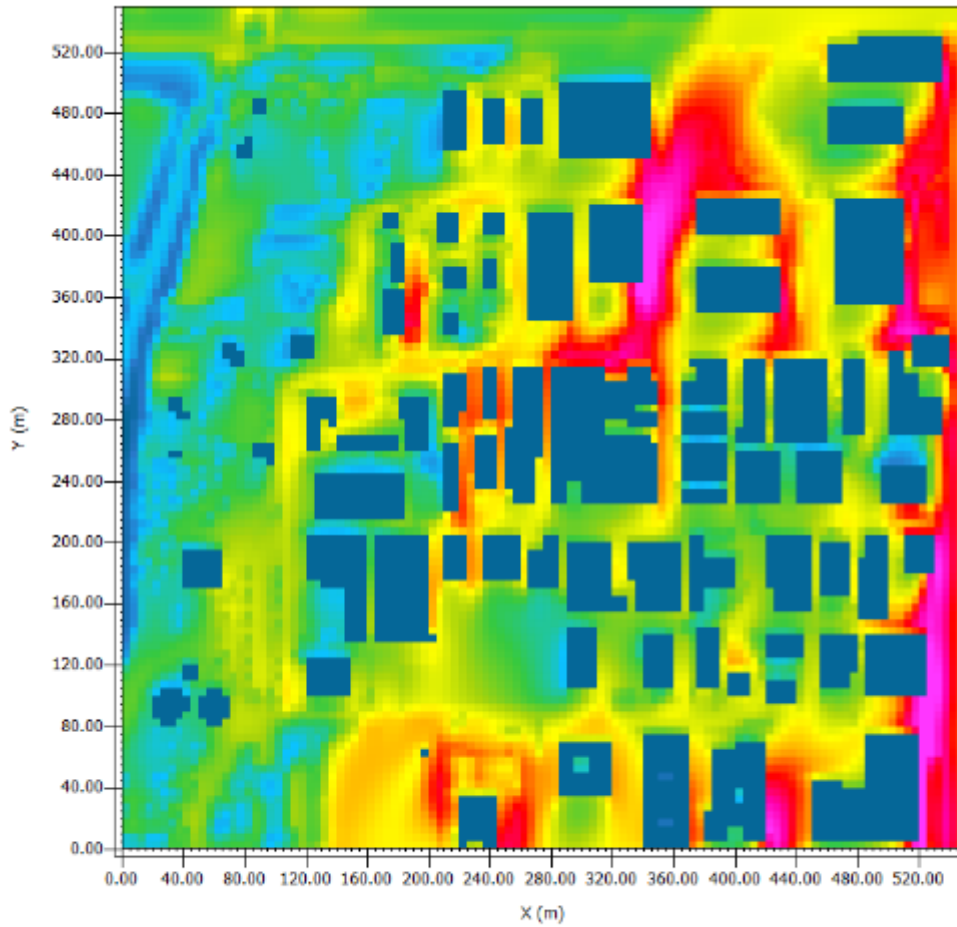


**San Lazzaro (BO)**

# **San Lazzaro**



# San Lazzaro (BO)

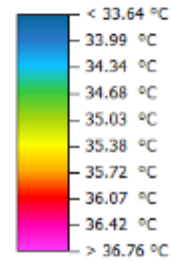


SanLazR3 14:00 24.06.2017

x/y Schnitt bei k=4 (z=1.8000 m)

**Temperatura dell'aria  
a 1.8 m di altezza alle  
ora 14:00**  
I valori.

*Air Temperature*

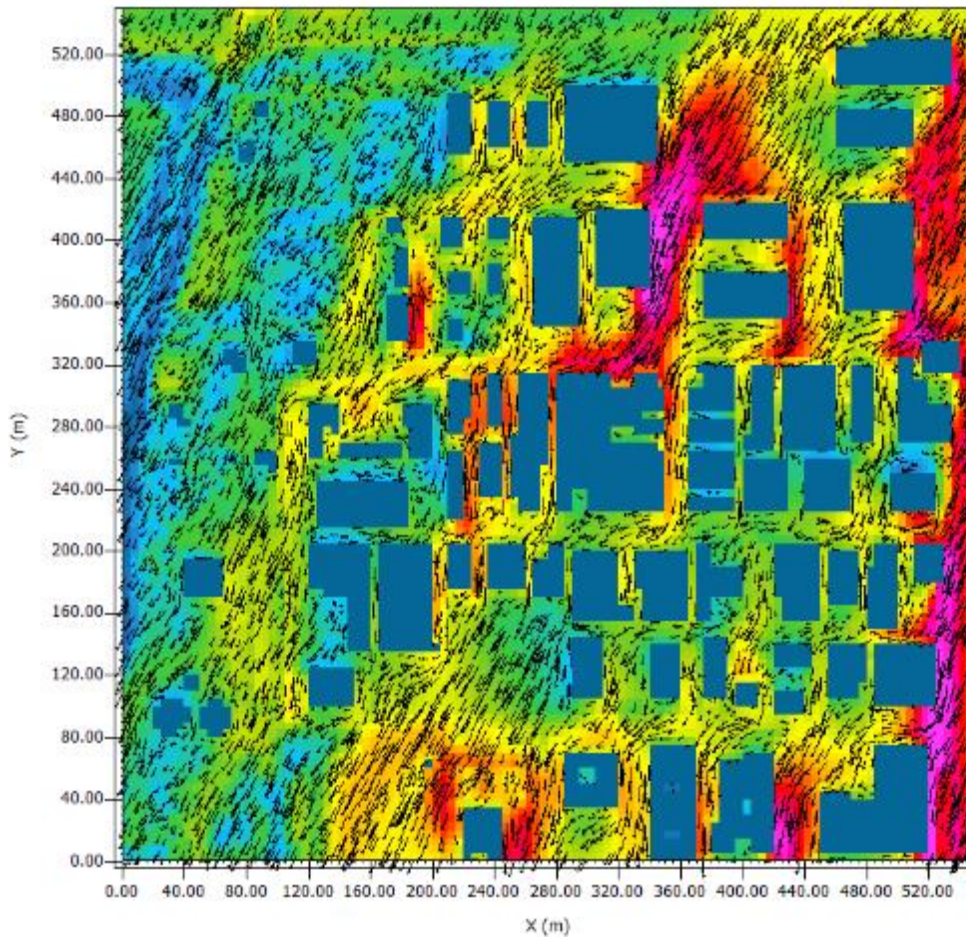


Min: 33.64 °C

Max: 37.11 °C



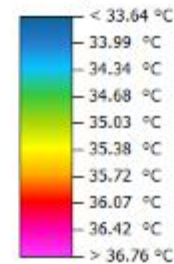
# San Lazzaro (BO)



SanLazR3 14:00 24.06.2017

x/y Schnitt bei k=4 (z=1.8000 m)

*Air Temperature*



Min: 33.64 °C

Max: 37.11 °C

*Flow v*

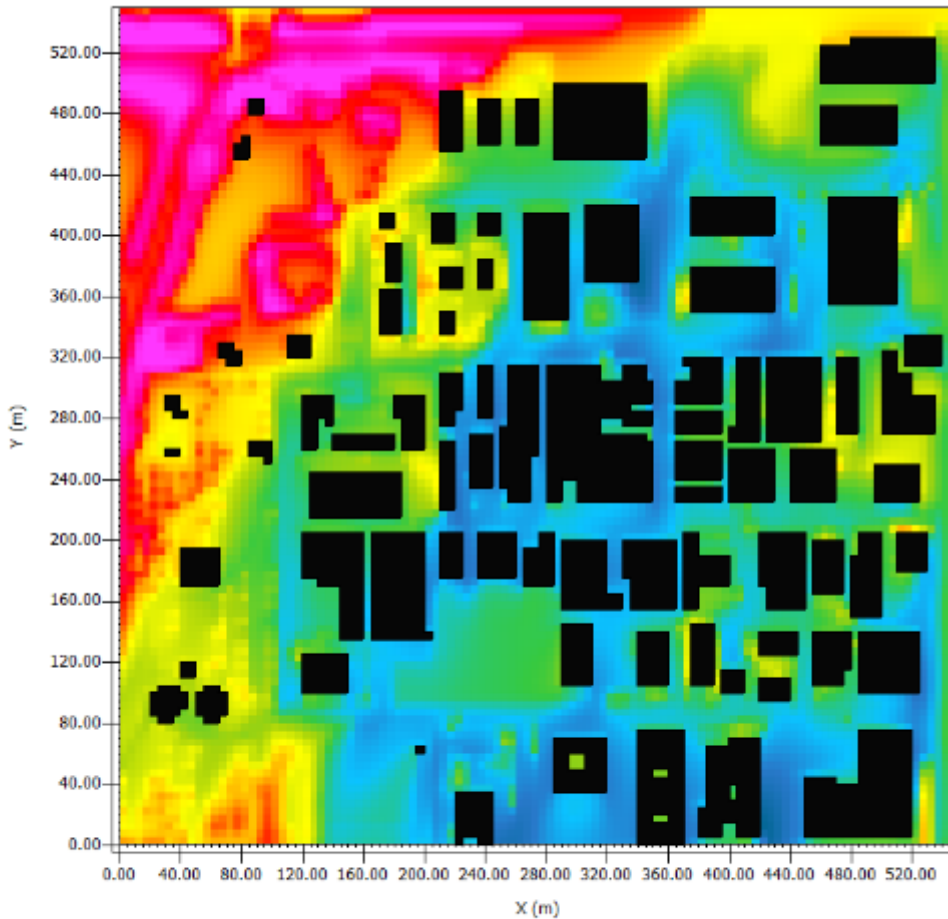
- 0.60 m/s
- 1.20 m/s
- 1.80 m/s
- 2.40 m/s
- 3.00 m/s



**Flusso del vento a 1.8 m di altezza alle ore 14:00**

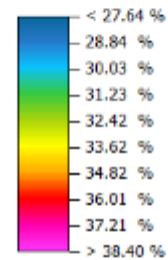
Il grafico mostra come si incanala il vento nella geografia del luogo. Input importante che può dare considerazioni per il progetto

# San Lazzaro (BO)



SanLazR3 14:00 24.06.2017  
x/y Cut at k=4 (z=1.8000 m)

*Relative Humidity*

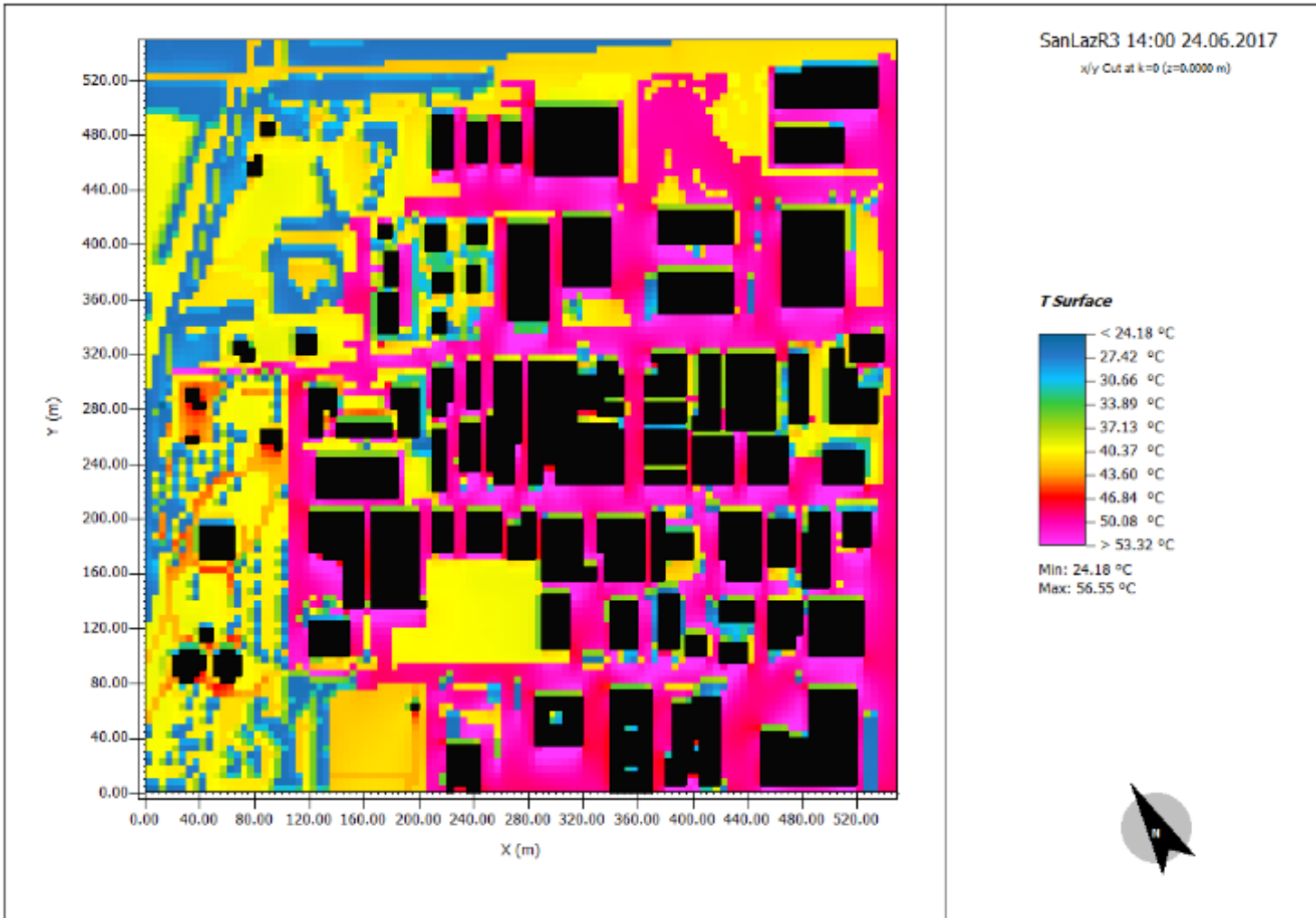


Min: 27.64 %  
Max: 39.60 %



**Umidità Relativa a 1.8  
m di altezza alle ore  
14:00**  
Il grafico

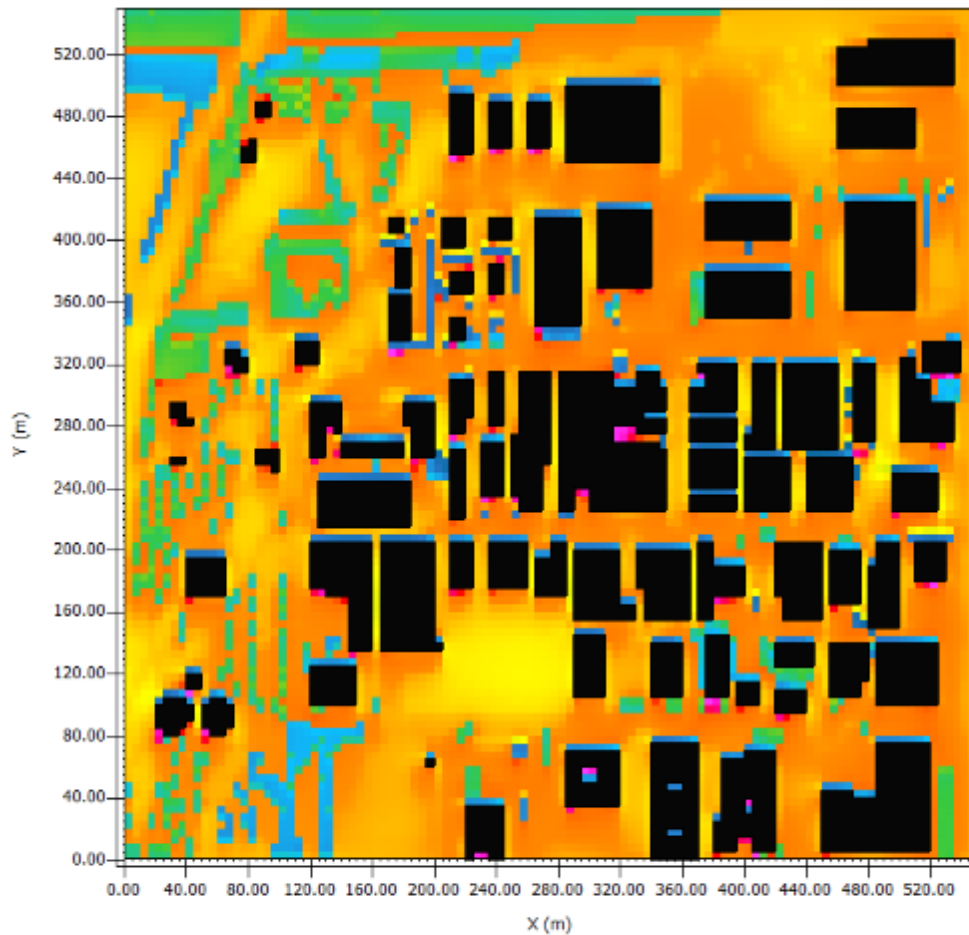
# San Lazzaro (BO)



## Temperatura superficiale alle ore 14:00

Il grafico mostra le temperature radianti dei materiali alla superficie quindi si distingue l'asfalto dalla vegetazione e dall'acqua.

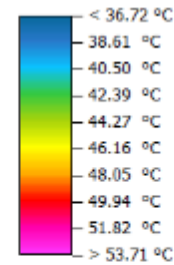
# San Lazzaro (BO)



SanLazR3 13:00:00 24.06.2017

x/y Cut at k=4 (z=1.8000 m)

PET



Min: 36.72 °C

Max: 55.60 °C

**PET a 1.8 m di altezza  
alle ore 14:00**  
Il grafico

**PET physiological effective temperature**

PMV	PET (°C)	Thermal perception	Grade of physiological stress
-3.5	4	Very cold	Extreme cold stress
-2.5	8	Cold	Strong cold stress
-1.5	13	Cool	Moderate cold stress
-0.5	18	Slightly cool	Slight cold stress
0.5	23	Comfortable	No thermal stress
1.5	29	Slightly warm	Slight heat stress
2.5	35	Warm	Moderate heat stress
3.5	41	Hot	Strong heat stress
		Very hot	Extreme heat stress





Ravenna

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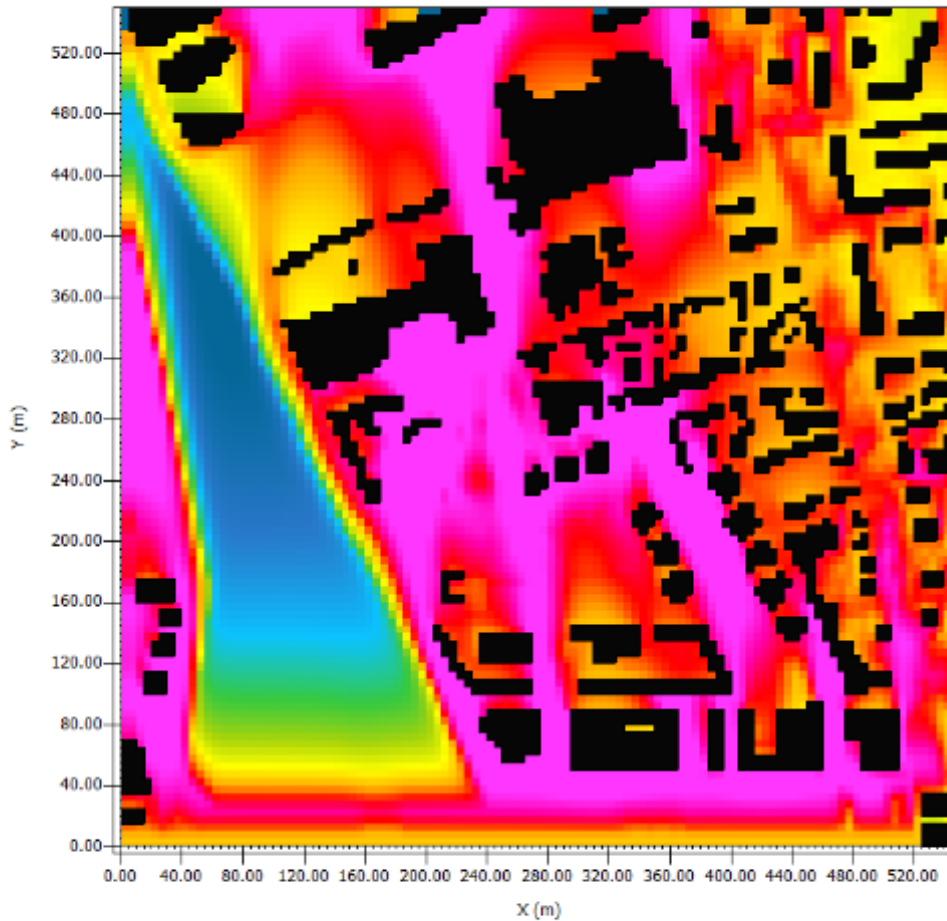
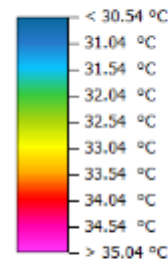


Figure 1: Ravenna Rebus3  
14:00 24.06.2017  
x/y Cut at k=4 (z=1.8000 m)

### Air Temperature



Min: 23.54 °C  
Max: 37.21 °C



**Temperatura dell'aria a 1.8 m di altezza alle ora 14:00**

I valori maggiori sono registrati nelle aree dei parcheggi.

L'effetto del canale Darsena è evidente dalle temperature mostrate.

# Ravenna

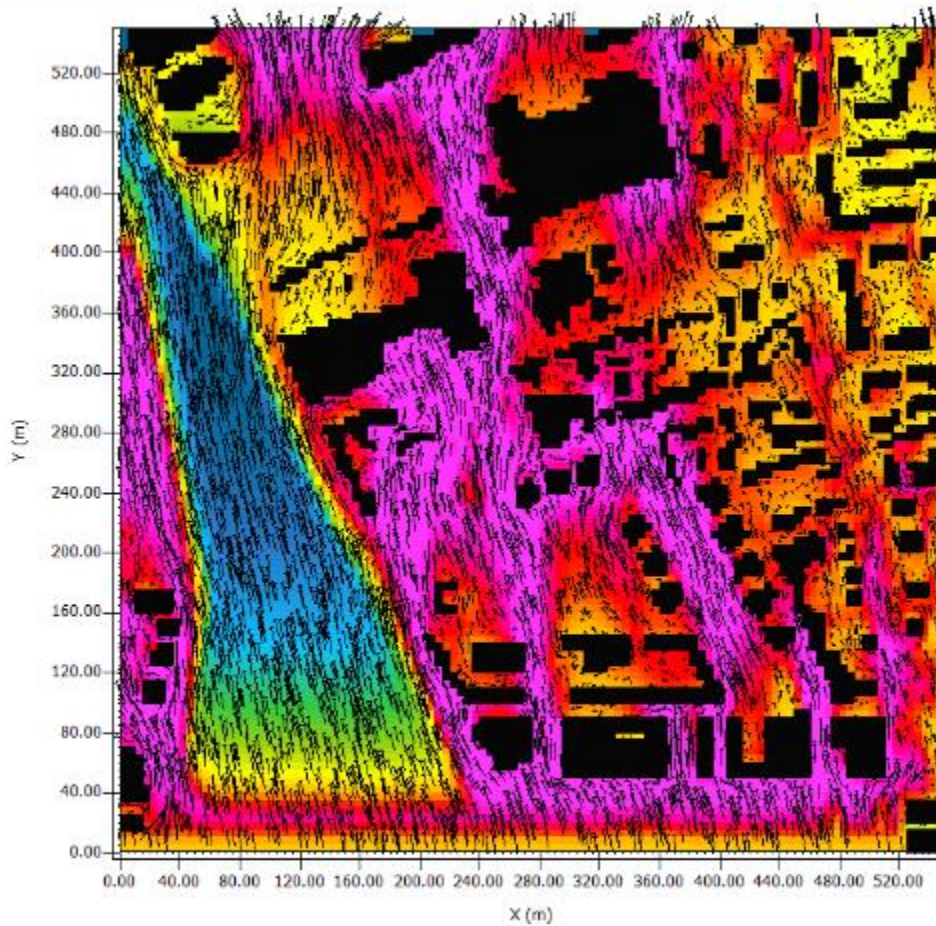
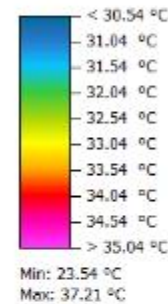


Figure 1: Ravenna Rebus3  
14:00 24.06.2017  
z/y Cut at k=4 (z=1.8000 m)

### Air Temperature



### Flow v

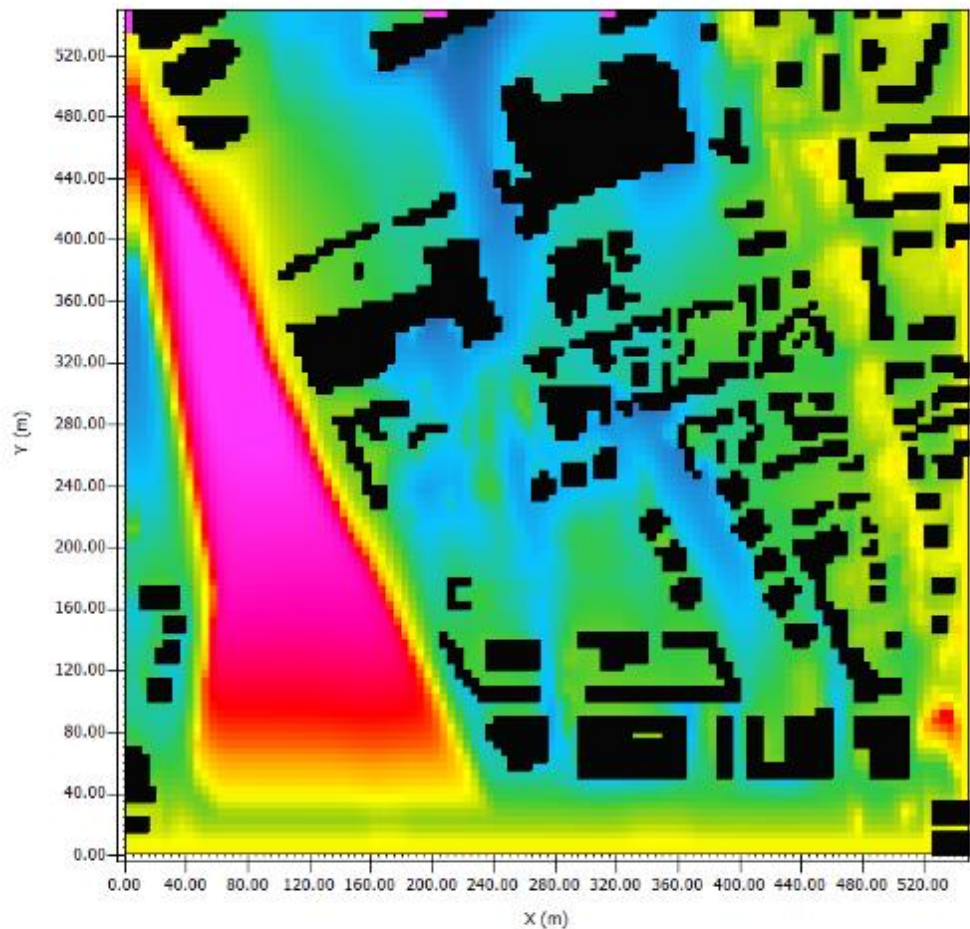


## Flusso del vento a 1.8 m di altezza alle ore 14:00

Il grafico mostra come si incanala il vento nella geografia del luogo. Input importante che può dare considerazioni per il progetto

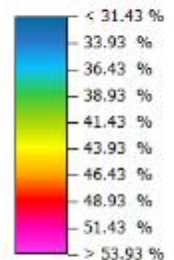


# Ravenna



Ravenna Rebus3 15:00  
24.06.2017  
x/y Cut at k=4 (z=1.8000 m)

### Relative Humidity

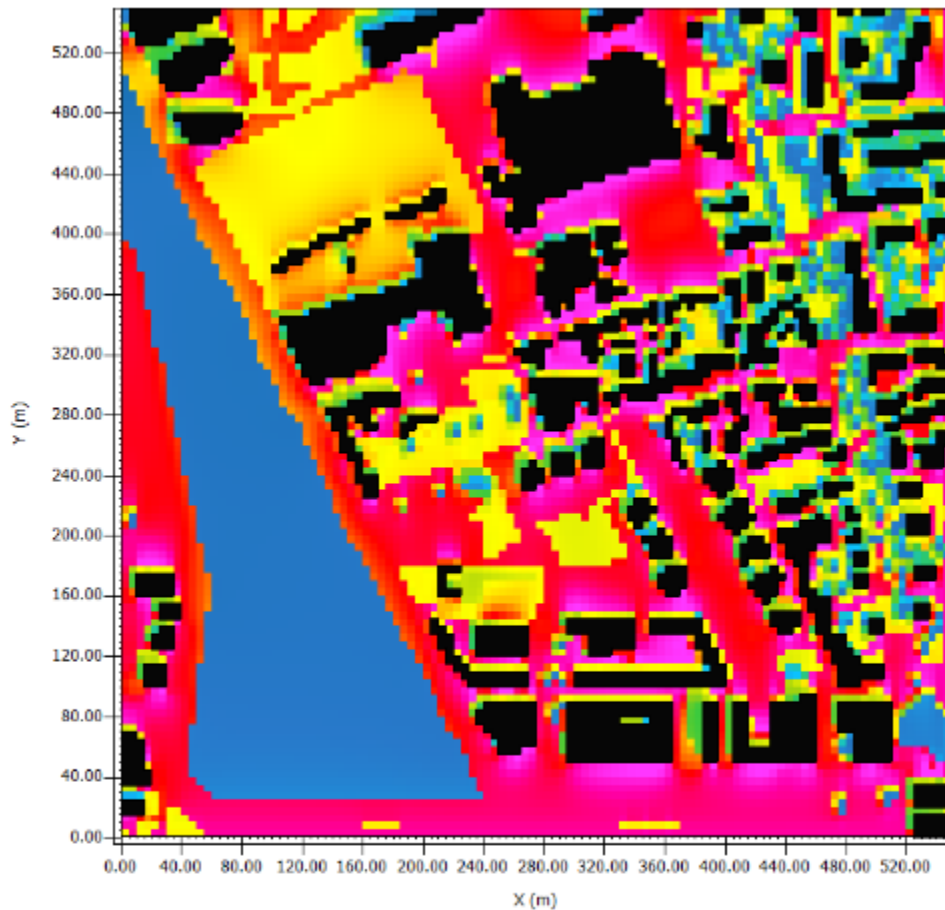


Min: 31.43 %  
Max: 67.47 %



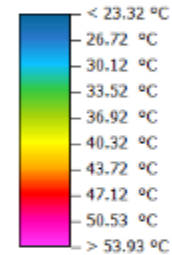
**Umidità Relativa a  
1.8 m di altezza alle  
ore 14:00**  
Il grafico

# Ravenna



Ravenna Rebus3 14:00  
24.06.2017  
x/y Cut at k=0 (z=0.0000 m)

*T Surface*



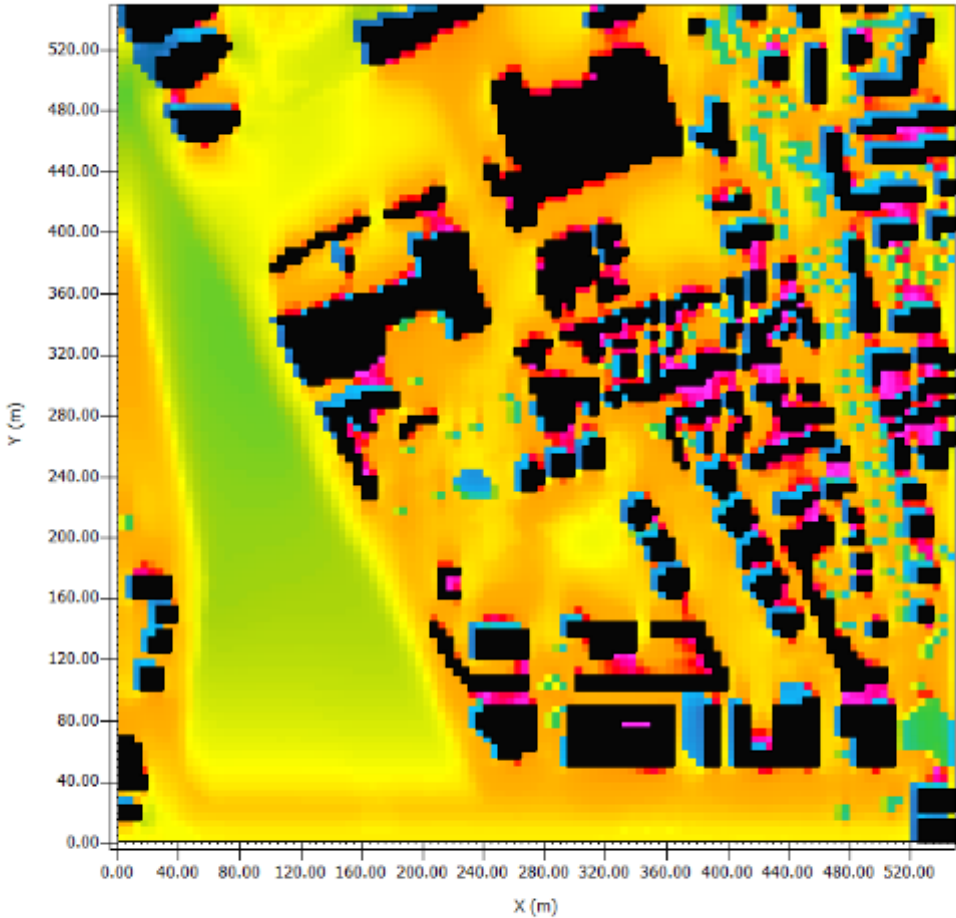
Min: 23.32 °C  
Max: 57.33 °C



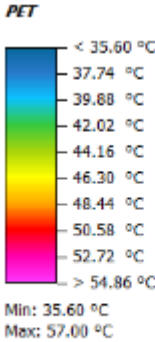
## Temperatura superficiale alle ore 14:00

Il grafico mostra le temperature radianti dei materiali alla superficie quindi si distingue l'asfalto dalla vegetazione e dall'acqua.

# Ravenna



Ravenna Rebus3 13:00:00  
 24.06.2017  
 -y Out at k=4 (z=1.8000 m)



**PET a 1.8 m di altezza  
 alle ore 14:00**  
 Il grafico

**PET physiological effective temperature**

PMV	PET (°C)	Thermal perception	Grade of physiological stress
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**Grazie**